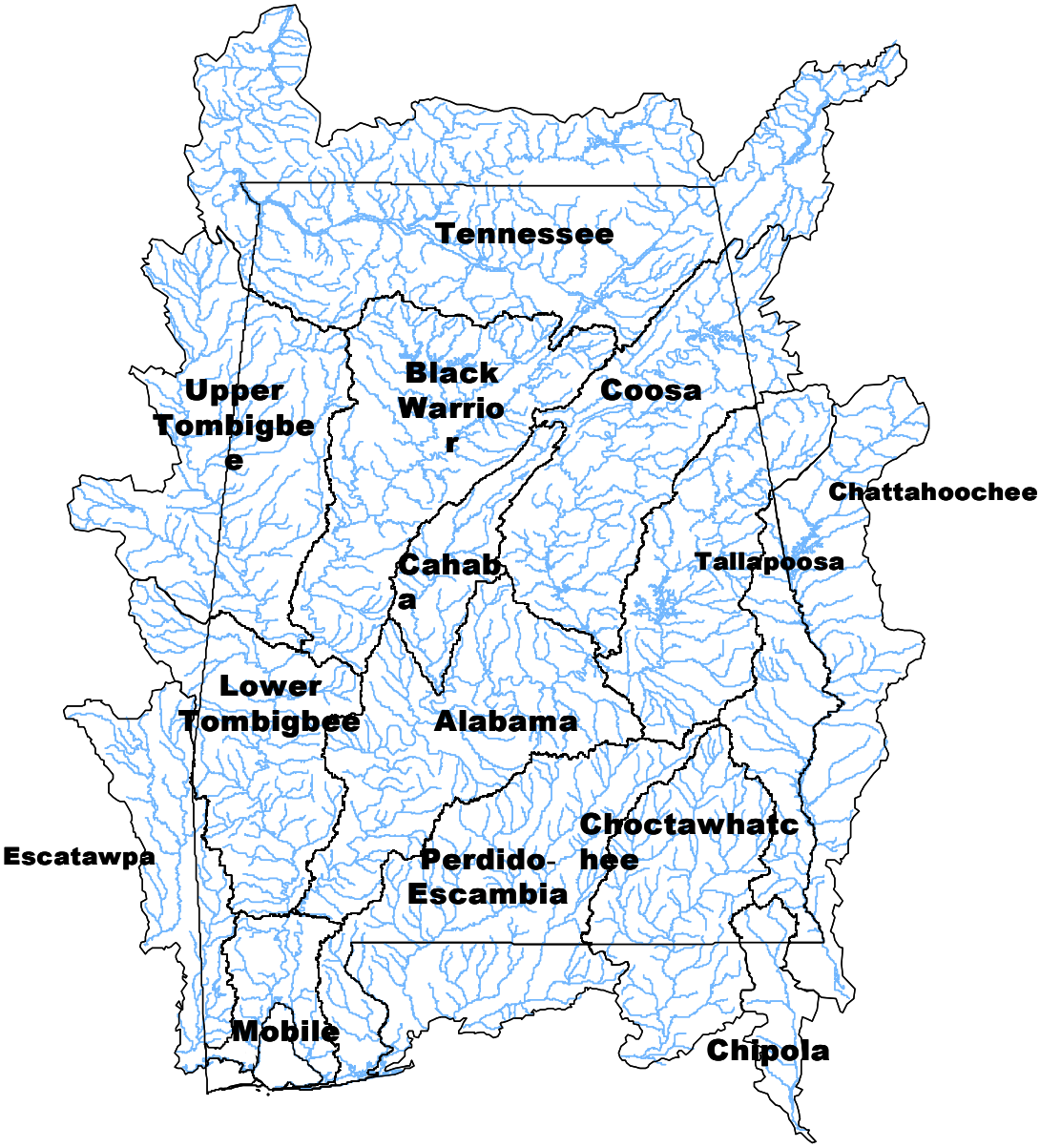
Alabama's 2002 Water Quality Report to Congress

(Clean Water Act §305(b) Report)



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The Great Seal of Alabama
The Rivers State

A special thanks to all the contributors!

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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
CPYRWMA	Choctawhatchee-Pea and Yellow Rivers Watershed Management Authority
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

List of Acronyms (cont.)

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

Executive Summary

Alabama has a population in excess of 4,447,100 (2000 Census), a 10.1% increase in population from the 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 (National Wetland Inventory estimates). 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 Draft 2000 §303(d) List. The total mileage for rivers and streams not supporting designated uses is 1,979.1 miles. This total is 2.6% of the 77,272 total rivers and streams miles. This is a good indication that Alabama has a high percentage of full use support for rivers and streams. Alabama has monitored 7,103 miles (9.2%) and evaluated 12,145 miles (15.7%) of the 77, 242 perennial and intermittent rivers and streams (§305(b) full support and §303(d) non waters) for this reporting period. Alabama has completed the fifth year of random sampling of wadeable riverine waters. EPA-Gulf Breeze staff will report statistically defensible statewide results in the near future. Appendix C contains preliminary graphs for Upland Alamap dissolved oxygen, temperature, pH and fecal coilform measurements. Publicly accessible lake and reservoir acres, according to Table 4-1, have a 78.6% 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 has developed nutrient criteria for 4 reservoirs (Weiss Lake, Lake Harris, West Point Lake, and Wheeler Lake. Alabama's estuaries enjoy overall good health considering the following two facts. The majority of estuaries are affected by a single pollutant category which is pathogens. The random coastal sampling performed over the last 9 years (1993-2001) 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). Alabama has initiated a Wetlands Identification Program in coastal Alabama (Baldwin County) and has completed an extensive study of the possible wetland restoration locations for 5 areas of the State (Alabama River Watershed, Lower Black Warrior River Watershed, Sipsey River Watershed, and Baldwin and Mobile Counties). Statewide wetland estimates derived from EPA landuse data are also included in the wetlands section. ADEM and the US Army Corps of Engineers continue to partner in the management and mitigation of impacts to wetlands in the water quality certification processes of Section 401 and 404 of the Clean Water Act. Alabama has one of the best preserved major river deltas in the U.S., that being the Mobile-Tensaw River Delta. To preserve such a valuable national resource the Alabama Department of Natural Resources and Conservation-State Lands Division has

purchased a very large percentage of the Delta through the the US Department of Interior's North American Wetlands Conservation Act (NAWCA) funding. The coastal section contains a map of wetland tracts purchased through NAWCA. Wetlands have also been purchased at Weeks Bay, a National Estuarine Reserve.

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. Alabama's Drinking Water Program (583 water supply systems) was recently ranked 2nd in the nation by a USEPA Report in overall public water supply system compliance. Rhode Island (83 water supply systems) was ranked 1st in the nation.

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.

Table ES-1

Atlas

Topics	Value
State population	4,447,100
State surface area	51,609
Number of river basins	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 (includes bays and inlets)	337
Acres of freshwater wetlands*	3,600,000
Acres of tidal wetlands*	27,600

*historic National Wetland Inventory estimates

Table ES-2
Surface Water Classifications and Designations

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

Part I Water Quality Standards Program

The Water Quality Standards Program at Alabama Department of Environmental Management (ADEM) has been extremely active since the last 305(b) Report was submitted in April of 2000. ADEM's Water Quality Standards (WQS) Program, consisting of the Water Quality Criteria (Rule 335-6-10) and Water Use Classifications for Interstate and Intrastate Waters (Rule 335-6-11) has been the subject of numerous changes over the last two last years. The subject regulations, which govern our water quality program have been amended twice within a 15-month period and are once again undergoing public review as a result of additional proposed changes. Use classification upgrades for several stream segments and nutrient criteria development for lakes has been the primary focus of water quality standards development within ADEM's WQS Program. The sections that follow provide a brief summary of the subject rule changes according to the dates in which the rules take effect, namely September 7, 2000 and January 12, 2001. The Department believes the recent changes to the WQS Program is a direct reflection of our ongoing commitment to restore, maintain, and protect the physical, chemical, and biological integrity of Alabama's waters.

1 Water Quality Rule Changes Effective September 7, 2000

On August 1, 2000, the State of Alabama adopted regulations that became effective September 7, 2000. Highlights of the rule changes are listed below. A more detailed discussion for a number of the following changes is provided thereafter.

- Creation of the Limited Warmwater Fishery (LWF) use classification. (*See Section 1.1*)
- Elimination of the Navigation (N) and Industrial Operations (IO) use classifications. (*See Section 1.2*)
- More restrictive bacteria criteria added to the Public Water Supply (PWS) classification.
- Addition of bacteria criteria for the Agricultural and Industrial Water Supply (A&I) use classification.
- Classification of Hatchet Creek, East Fork Hatchet Creek and West Fork Hatchet Creek as Outstanding Alabama Water. (*See Section 1.3*)
- Classification of R.L. Harris Lake as Swimming and Other Whole Body Water-Contact Sports (S).
- Classification of Coldwater Spring, a segment of the Tallapoosa River, and Sinking Creek as Public Water Supply.
- Opossum Creek and a segment of Valley Creek were upgraded from Industrial Operations (IO) to Agricultural and Industrial Water Supply (A&I). (*See Section 1.2*)

1.1 Creation of the Limited Warmwater Fishery (LWF) Use Classification

On August 1, 2000, the Environmental Management Commission (EMC) adopted regulations which created a new use classification, Limited Warmwater Fishery (LWF), within ADEM's Use Classification System (Administrative Code 335-6-11). The key element of the LWF classification is that it establishes seasonal uses and water quality criteria for certain waters of the State that otherwise cannot maintain the Fish & Wildlife criteria on a year-round basis. In general, the water quality criteria associated with the Limited Warmwater Fishery classification are the same as the Fish and Wildlife criteria except for the following:

- Minimum dissolved oxygen requirements are reduced from 5 mg/l to 3 mg/l during the period May through November.
- The seven-day, two-year ($7Q_2$) low flow instead of the seven-day, ten-year ($7Q_{10}$) low flow is used to establish the chronic aquatic life criteria for point source discharges.
- Bacteriological criteria for incidental water contact and recreation during the months of June through September are not required.

The development of the LWF classification is a product of the Department's long-standing commitment to continuously strive to upgrade all waters of the state that currently do not meet the "fishable/swimmable" goal as defined under Section 101(a) of the Clean Water Act. Prior to the LWF classification, use attainability analyses (UAAs) developed by the Department for waters classified less than "fishable/swimmable", such as Industrial Operations (IO) segments or Agricultural and Industrial Water Supply (A&I) segments, indicated that F&W was not attainable year-round for all parameters. However, the UAAs did suggest that, for many A&I waters, a quality commensurate with F&W is attainable year-round for some parameters and on a seasonal basis for other parameters. The LWF classification has provided ADEM with the ability to better protect those certain waters of the state that can attain "fishable/swimmable" criteria for certain times of the year. Please refer to Section 1.3 for a more detailed look at Use Attainability Analysis and their role in ADEM's use classification program.

1.2 Elimination of the Navigation and Industrial Operations Use Classifications

As of September 7, 2000 the Department eliminated two use classifications from ADEM's Use Classification System, namely Industrial Operations (IO) and Navigation (N). This was a significant milestone for the Department in that both of these designated uses and the water quality criteria necessary to protect these uses were considered less than the "fishable/swimmable" goal as defined by the Clean Water Act. Of ADEM's designated uses, Industrial Operations and Navigation afforded the least amount of protection for Alabama's waters. In general, both Navigation and Industrial Operations classifications offered little protection for aquatic life, with year-round dissolved oxygen criteria of 2.0 mg/l and 3.0 mg/l respectively. In addition, neither classification afforded bacteriological protections or safeguards against acute and chronic effects to aquatic life from toxic substances. However, no waters of the State have been classified as Navigation since 1985. In addition, September 7, 2000 marks the date in which the last remaining IO segments within Alabama, namely Opossum Creek (8.5 stream miles) and Valley Creek (13.1 stream miles), were upgraded to Agricultural and Industrial Water Supply. Since no waters of Alabama were classified as Industrial Operations or Navigation, these designated uses were no longer needed within ADEM's Water Quality Program. Most importantly, the elimination of these designated uses brings added protections, such as aquatic life criteria, more stringent dissolved oxygen requirements, and bacteriological criteria for all waters of Alabama. The following tables illustrate the changes that were made to ADEM's Use Classification System as of September 7, 2000.

Table 1-1

Previous Surface Water Use Classification System

Outstanding Alabama Water	*(OAW)*
Public Water Supply	*(PWS)*
Swimming and Other Whole Body Water-Contact Sports	*(S)*
Shellfish Harvesting	*(SH)*
Fish and Wildlife	*(F&W)*

Meets CWA Fishable/Swimmable Goals ▲ ▼ Less Than CWA Fishable/Swimmable Goals

Agricultural and Industrial Water Supply	*(A&I)*
Industrial Operations	*(IO)*
Navigation	*(N)*

Table 1-2

Current Surface Water Use Classification System (effective September 7, 2000)

Outstanding Alabama Water	(OAW)
Public Water Supply	(PWS)
Swimming and Other Whole Body Water-Contact Sports	(S)
Shellfish Harvesting	(SH)
Fish and Wildlife	(F&W)

Meets CWA Fishable/Swimmable Goals ▲ ▼ Less Than CWA Fishable/Swimmable Goals

	Limited Warmwater Fishery (LWF)
Agricultural and Industrial Water Supply	(A&I)

1.3 Classification of Hatchet Creek to Outstanding Alabama Water (OAW)

On November 24, 1992 the Environmental Management Commission adopted the Outstanding Alabama Water (OAW) use classification. The OAW classification is exclusive in that it offers increased protection to surface waters that have unique characteristics such as high water quality, waters of state parks and wildlife refuges, and waters of exceptional recreational or ecological significance. The OAW classification provides increased water quality protections in the following manner:

- new or expanded point source discharges are not allowed unless a thorough evaluation of treatment and disposal alternatives demonstrates no feasible alternative to the discharge to OAW classified waters,
- more stringent minimum treatment requirements (for domestic wastewater discharges: 15 *mg/l* biochemical oxygen demand (5-day), 3 *mg/l* ammonia nitrogen, 6 *mg/l* dissolved oxygen, and disinfection of the effluent; for non-domestic discharges, a comparably stringent level of treatment),
- more stringent toxicity limits for discharges, and
- a higher minimum in-stream dissolved oxygen level of 5.5 *mg/l* (versus 5.0 *mg/l*).

As of September 2000, Hatchet Creek was upgraded to Outstanding Alabama Water (OAW) making it one of only six waterbodies within Alabama to receive such a designation. Other waters include the Cahaba River, Little Cahaba River, Tensaw River, Briar Lake, and Tensaw Lake. The segments of Hatchet Creek that were upgraded to OAW include the embayment of Lake Mitchell to the source of both East Fork Hatchet Creek and West Fork Hatchet Creek. The drainage basin that defines the segments of Hatchet Creek being upgraded includes the subwatersheds of Upper Hatchet Creek, Socapatoy Creek, and Middle Hatchet Creek. The total drainage area for the three subwatersheds is approximately 359 square miles totaling 229,557 acres.

Hatchet Creek is truly one of the most pristine and undeveloped natural resources within Alabama and is known for its unique ecological habitat as evidenced by the diversity of its aquatic fauna and flora. There are 14 families and 61 species of fish within the Hatchet Creek watershed. Some of the more sensitive fish species include the speckled chub, tricolor shiner, shadow bass and the brightly colored bronze and greenbreast darters. The faunal richness of Hatchet Creek is largely due to the exceptional water quality that allows its diverse snail and fish species to thrive in the watershed. The creek also provides refuge for the Tulotoma snail (*Tulotoma magnifica*), a federally endangered species. Other sensitive aquatic snails found in

the watershed include the bubble elimia, prune elimia, and the pebblesnail. It also provides habitat for very large populations of the rare and beautiful Cahaba lily (*Hymenocallis cornaria*).[1]

1.3 Water Quality Rule Changes Effective January 12, 2001

On December 5, 2000, the State of Alabama adopted regulations that became effective January 12, 2001. Highlights of the rule changes are listed below. A detailed summary for some of the following changes is provided thereafter.

- Upgraded a segment of Lost Creek (Carbon Hill) from A&I to F&W.
- Upgraded a segment of Town Creek/Cane Creek (Jasper) from A&I to LWF.
- Upgraded a segment of Cane Creek (Oakman) from A&I to LWF.
- Upgraded a segment of Buck Creek (Alabaster) from A&I to LWF.
- Upgraded a segment of the Mobile River (Mobile) from A&I to LWF.
- Upgraded a segment of Chickasaw Creek (Mobile) from A&I to LWF.
- Upgraded a segment of Flint Creek (Hartselle) from A&I to LWF.
- Revised language within the 335-6-10-.07 in order to clarify which waters the acute and chronic aquatic life criteria apply.
- Established additional site-specific toxicity criteria (7Q10 vs 7Q2 flow) for Flint Creek, Buck Creek, & Mobile River.
- Established additional site-specific dissolved oxygen criteria of 4.0 mg/L and the F&W fecal coliform criteria were applied year-round to Buck Creek.
- Established Nutrient Water Quality Criteria Expressed as Chlorophyll a for 4 reservoirs (See Section 1.31 below).

1.4 Numeric Water Quality Criteria Development for Nutrients

The development of nutrient criteria has taken top priority within Alabama this year. As of January 12, 2001, ADEM adopted water quality regulations that established numeric- specific criteria on four reservoirs within Alabama. Specifically, chlorophyll a criteria were adopted for Walter F. George Lake and West Point Lake on the Chattahoochee River Basin, R.L. Harris Lake on the Tallapoosa River Basin and Weiss Lake on the Coosa River Basin. The chlorophyll a criteria were established at particular locations within each reservoir, such as the dam forebay and at mid-reservoir. In addition, the lake specific, chlorophyll a criteria would be attained if the mean of monthly samples taken April through October (i.e. growing season) within the photic-zone of the main river channel were not exceeded.

The Department is already well underway in developing plans for future nutrient criteria development for Alabama's lakes and reservoirs. Because criteria development is solely dependent upon the available data, sampling plans have been prepared and efforts are underway to gathering the necessary data to establish numeric nutrient criteria for the remaining lakes and reservoirs throughout Alabama. The Department's current strategy entails setting chlorophyll a criteria on a lake specific basis versus using EPA's 304(a) ambient water quality criteria recommendations developed by using a very broad ecoregional approach. Table 1-3 below provides the implementation schedule for numeric nutrient criteria for the 41 public lakes and reservoirs located throughout Alabama. Figure 1-1 on the following page provides a pictorial representation of the 41 lakes and the dates in which nutrient criteria are scheduled for adoption.

[1] Outstanding Alabama Water Evaluation Report, ADEM-June 2000.

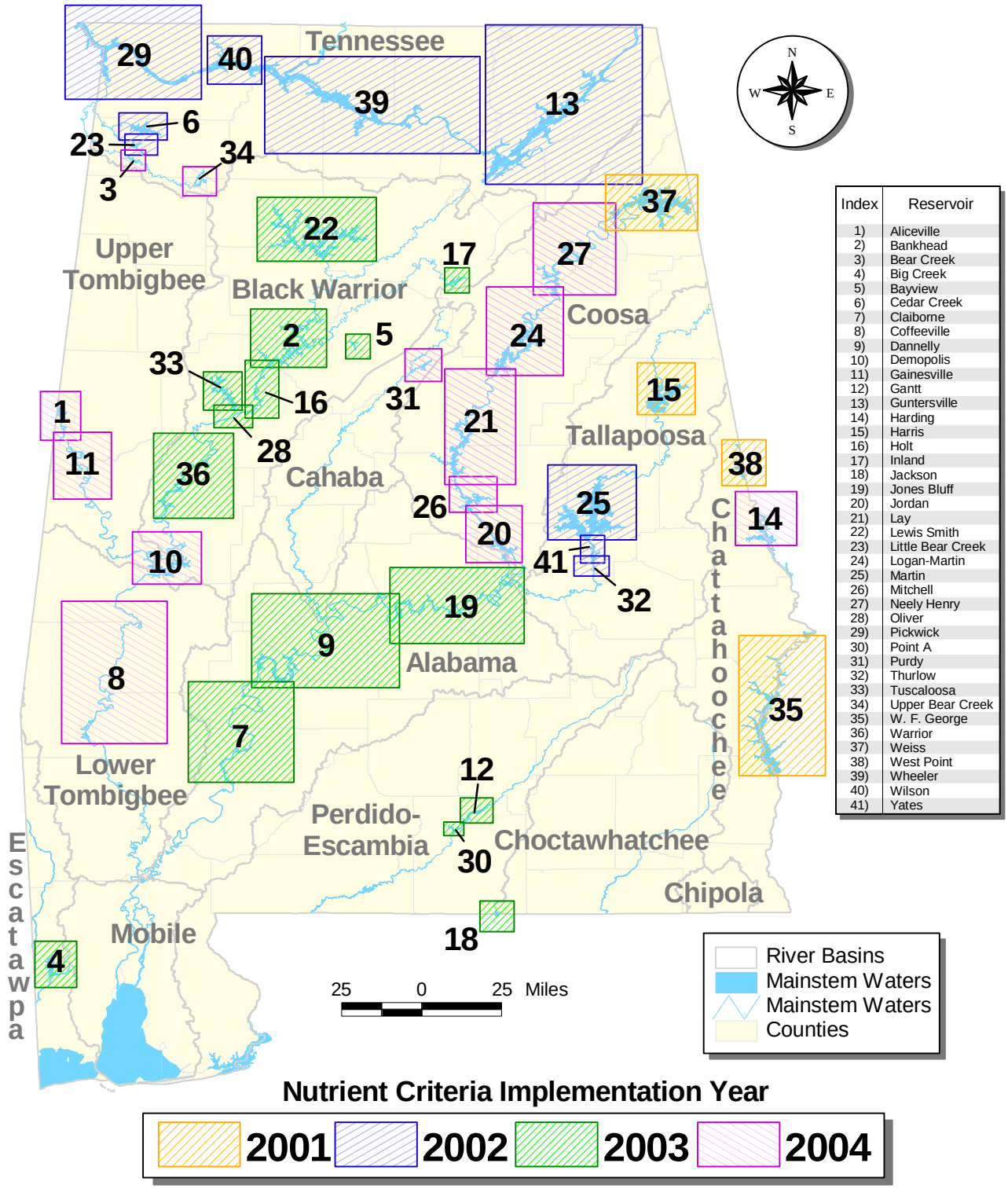
Table 1-3
Implementation Schedule for Nutrient Criteria: Lakes and Reservoirs.

Year	Number of Reservoirs	Major Basin(s)	Name of Reservoirs
2001	4	Chattahoochee, Coosa, Tallapoosa	West Point, W.F. George, Weiss, R.L. Harris
2002	9	Tallapoosa, Tennessee	Martin, Yates, Thurlow, Guntersville, Wheeler, Wilson, Pickwick, Little Bear, Cedar
2003	14	Alabama, Perdido-Escambia, Escatawpa, Black Warrior	Claiborne, Dannelly, Woodruff, Gantt, Point A, Jackson, Big Creek, Lewis Smith, Bankhead, Holt, Oliver, Tuscaloosa, Warrior, Bayview
2004	14	Black Warrior, Cahaba, Chattahoochee, Coosa, Tombigbee, Tennessee	Inland, Purdy, Harding, Neely Henry, Logan Martin, Lay, Mitchell, Jordan, Aliceville, Gainesville, Demopolis, Coffeeville, Bear, Upper Bear
Total	**41**		

For the remaining types of waterbodies, such as rivers and streams, estuarine and coastal waters, and wetlands the Department is in the process of developing strategies, goals, technical advisory teams, sampling plans and implementation plans that address nutrient issues for each of these types of waters. Nutrient criteria development for Alabama's rivers and streams has already begun via the formation of a nutrient workgroup comprising technical experts throughout the region. The kickoff meeting for this Rivers & Streams Workgroup has been set for February 2002. As for Wetlands and Coastal/Marine Waters the Department is in the process of reviewing EPA Headquarters technical guidance manuals and 304(a) ambient water quality criteria for these waterbody types. The Department has and will continue to actively participate as a member of the EPA Region 4-Regional Technical Advisory Group (RTAG) in order to ensure Alabama's nutrient program is technically sound via peer reveiw from experts throughout the Southeast.

Figure 1-1

Implementation Schedule for Alabama's Lakes and Reservoirs



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

1.5 Use Attainability Analysis and Use Classification Upgrade Reports and their Role in Use Classification Changes

In support of the aforementioned use classification upgrades several Use Attainability Analyses (UAAs) and Use Classification Upgrade Reports (UCURs) were prepared by the Department. According to Section 131.10(j) of the Water Quality Standards Regulations, a UAA is required when States assign designated uses to surface waters considered less than the "fishable/swimmable" goal as defined in Section 101(a)(2) of the Clean Water Act. The use classification changes for all of the segments were upgrades because the water quality criteria associated with the changed classification were more stringent than before. For certain stream upgrades, such as Valley Creek, a UAA was prepared to document why the stream could not meet the Clean Water Act's definition of "fishable/swimmable". For stream upgrades that met EPA's "fishable/swimmable" goal, but did not attain ADEM's Fish and Wildlife goals, the Department prepared a Use Classification Upgrade Report to support the subject upgrade as well as justify why the particular stream could not attain ADEM's Fish and Wildlife use. For streams that were upgraded to ADEM's Fish and Wildlife status no report was prepared. (See Table 1-4 for details).

In accordance with the Federal Water Quality Standards Regulation (40 CFR 131.3), a use attainability analysis is a structured scientific assessment of the factors affecting the attainment of a use which may include physical, chemical, biological, and economic factors as described in Section 131.10(g).

Applicable Factors as defined by 40 CFR Part 131.10(g):

1) Naturally occurring pollutant concentrations prevent the attainment of the use; or
2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude the attainment of aquatic life protection uses; or
6) Controls more stringent than those required by Sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

Use Attainability Analysis (UAAs) and Use Classification Upgrade Reports (UCURs) involve extensive evaluation of the many elements associated with a use classification change. Such efforts include but are not limited to data collection and assessment, intensive field surveys, whole effluent toxicity test and evaluations, water quality modeling, point and non-point source assessment, and calculation of predicted effluent limits for municipal and industrial point sources.

The Table 1-4 provides a summary of the UAAs and UCURs that were conducted as a result of the use classification changes that occurred during calendar years 2000 and 2001.

Table 1-4

UAAs & UCURs Conducted in Support of Use Classification Changes for CY2000-2001

Stream Name	Segment Length (miles)	Classification Change	Type of Report & Date Finalized	Applicable 40 CFR 131.10 Factor(s)
Valley Creek	9.7	IO to A&I	UAA, Oct 2000	5
Opossum Creek	8.5	IO to A&I	UAA, Oct 2000	5
Lost Creek	8.2	A&I to F&W	no report prepared	n/a
Cane Creek (Oakman)	2.7	A&I to LWF	UAA, Jan 2001	2, 3, 6
Buck Creek	5.9	A&I to LWF	UCUR, Jan 2001	n/a
Mobile River	7.6	A&I to LWF	UAA, Jan 2001	1, 3, 5
Chickasaw Creek	4.5	A&I to LWF	UAA, Jan 2001	1, 3, 5
Flint Creek	9.9	A&I to LWF	UCUR, Jan 2001	n/a
Cane Creek (Jasper)	9.5	A&I to LWF	UAA, Jan 2001	1, 5, 6
Town Creek	1.1	A&I to LWF	UAA, Jan 2001	1, 5, 6

For more specific information pertaining to Alabama's Water Quality Standards Program contact Mr. Chris Johnson-ADEM Water Quality Branch (phone (334) 270-5635 or clj@adem.state.al.us

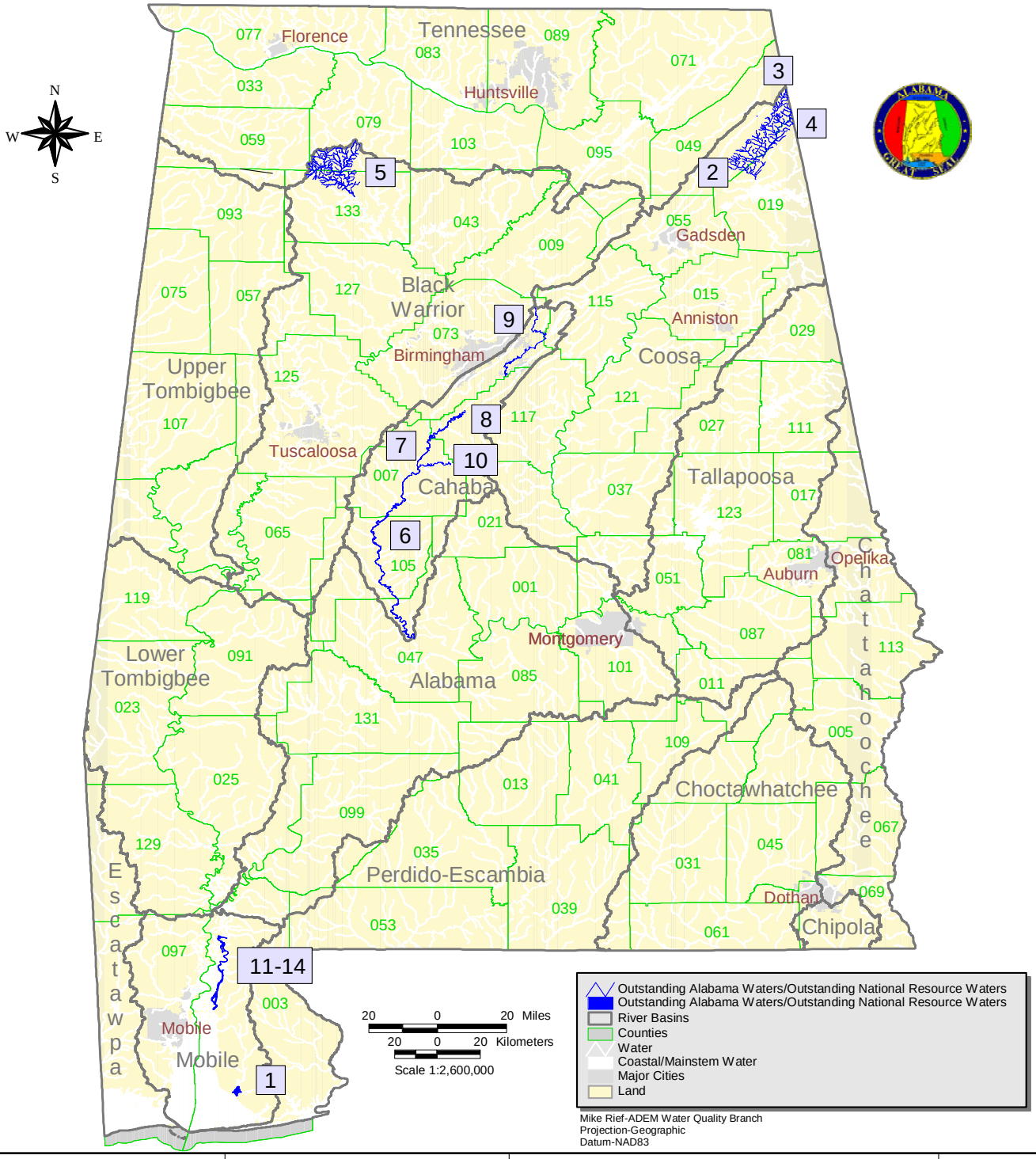
1.4 1.6 Surface Water Use Classification Maps

Surface Water Use Classification Maps (Statewide and by River Basin) are available at http://www.adem.state.al.us/EnviroProtect/Water/Surface/SurfaceOth/maps/alamaps.htm. There is also a link for these maps at http://www.geographynetwork.com/free.cfm under the *Static Map Images* heading. These maps depict the classified surface waters as listed in *ADEM Water Division-Water Quality Program-Chapter 335-6-11-Water Use Classifications for Interstate and Intrastate Waters (effective 01/12/2001)*. The MS Powerpoint files that are downloadable for each of Alabama's river basins contain a placeable wmf image for plotting and a tiff image for easier viewing. The Statewide Classification Map[2] contains 34" x 44" inch images for the map sheet, 34" x 56" images for the table sheet, and a MS Powerpoint file that contains 15" x 20" images for the river basin specific classification tables (1 to 2 tables per slide). Please contact ADEM's Water Quality Branch Chief (Mr. Lynn Sisk (phone: (334) 271-7826) (email: ls@adem.state.al.us)) if any errors specific to the classifications are found on these maps. [2]

[2] First Place in Environmental System Research Institute's™ 2001 Southeastern Regional Users Group Conference Poster Contest.

Figure 1-2

Alabama's Outstanding Alabama Waters and Outstanding National Resource Waters



Index	Waterbody	From	To	Classification
1	Weeks Bay	Bon Secour Bay	Fish River	S/F&W3
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&W3
3	East Fork of Little R and tributaries	Little River	Alabama-Georgia state line	PWS/S/F&W3
4	West Fork of Little R and tributaries	Little River	Alabama-Georgia state line	PWS/S/F&W3
5	Sipsey Fork and tributaries	Sandy Creek	Its source	F&W3
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 Designated as a Outstanding National Resource Water

Part II Coastal Area Assessment

1 Summary and Background

1.1 Water Pollution Control Program-Alabama Coastal Nonpoint Pollution Control Program (ACNPCP)

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 to control land and water uses associated with Agriculture, Forestry, Urban Areas, Hydro-modification, Streambank and Shoreline Erosion, Wetland and Riparian Areas, 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 the ACNPCP 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.

*[Note: ADECA-Coastal Programs was transferred to the Alabama Department of Conservation and Natural Resources (ADCNR)-Coastal Section in October, 2000.]

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 Pollution Control Program. Since achieving conditional approval, ADEM has sought to more fully develop the program, seeking full approval of the program, and to see that program components are implemented to the maximum extent practicable. This is being accomplished through the development of additional work elements and by developing partnerships and strategies.

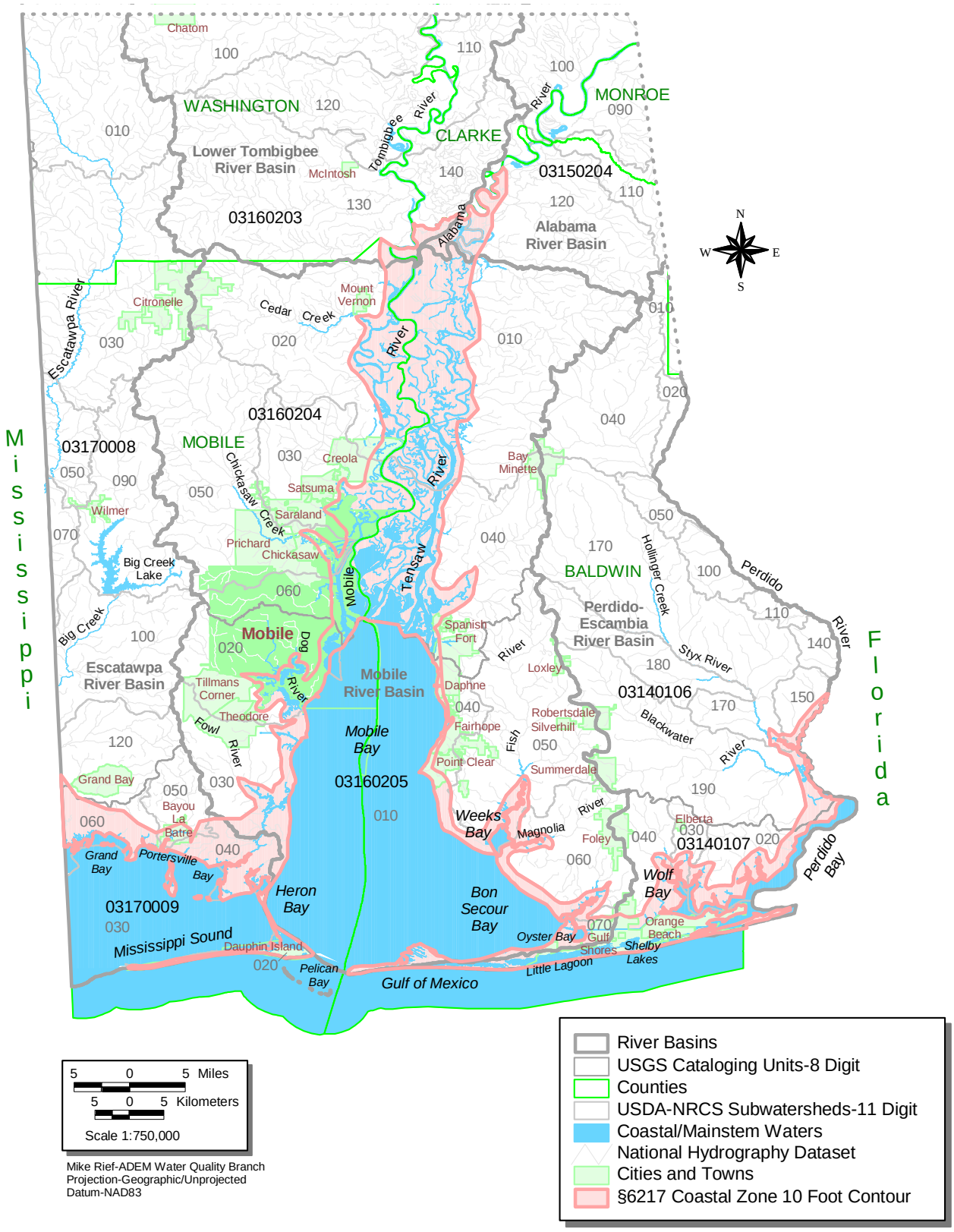
The ACNPCP supports the building of partnerships with Federal, State and Local agencies, businesses, organizations and decision makers to influence the implementation of items necessary to achieve program approval and operation. The ACNPCP has access to a broad-based Technical Advisory Committee (TAC), which is utilized to enhance Coordination and Cooperation issues.

The ADEM's ACNPCP has continued to facilitate and conduct quarterly meetings of the Coastal Alabama Nonpoint Source Resources Matrix (Matrix). The Matrix is a forum that enhances Administrative Cooperation and Coordination and includes onsite meetings to introduce the concepts of the ACNPCP and other coastal NPS efforts. These onsite meetings include several other local partners (federal, state, county and local municipal entities). The ADEM ACNPCP Coordinator has compiled and submitted Matrix and other related information to the federal agencies for the purpose of seeking approval for these program elements.

Numerous preliminary meetings and several teleconferences have been held with NOAA, EPA, ADCNR, Mobile-NEP, and Alabama-Clean Water Partnership facilitators to further Administrative Coordination and Interagency Cooperation. The ADEM continues to work with ADCNR- Coastal Section and federal agencies to further develop the ACNPCP.

Figure 2-1

Alabama's
§6217 Coastal Zone Management Area



Mike Rief-ADEM Water Quality Branch
Projection-Geographic/Unprojected
Datum-NAD83

ADEM is currently developing and engaged in many ongoing projects pertinent to the ACNPCP that monitor and promote the effectiveness of nonpoint source pollution controls, 6217-management measures and program approval criteria:

The Alabama Coastal Nonpoint Pollution Control Program submitted a "Coastal Section" for inclusion in ADEM's “Alabama NPS Management Plan”, recently prepared by ADEM’s Office of Education and Outreach(OEO)-Nonpoint Source Unit.

- ADEM hosted a workshop entitled "The Status and Trends of Wetlands and Submersed Aquatic Vegetation in Mobile and Baldwin Counties, Alabama".
- The Alabama Nonpoint Education for Municipal Officials (NEMO) Program is an excellent tool to approach many program elements in the Urban category and is being developed through the ADEM-OEO, ADEM-ACNPCP, and a group of statewide partners. The AL-NEMO Program promotes various outreach methods to protect water quality utilizing proactive approach to land-use planning. A key component of the AL-NEMO Program emphasizes educating local officials on how land use decisions impact water quality. The ADEM will continue to submit AL-NEMO package items to the federal agencies, as they are developed, to seek approval for this program element. The AL-NEMO Program provides an effective education and outreach tool to enhance local awareness of nonpoint source issues. The ACNPCP has coordinated AL-NEMO Workshops, initiated the Coastal NEMO Team, which has been the basis for the statewide model, and facilitated customized local NEMO Presentations for the Management Area.
- ADEM's Inspectors continue extensive field efforts to conduct inspections of construction and mining operations and targeted watershed studies of ACNPCP Management Area.
- 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, which has resulted in the recent issuance of a Legal Opinion from the State Attorney General, and a documented demonstration of interagency field and enforcement efforts to illustrate Program accomplishments.
- ADEM focuses on a watershed approach, addressing sub-watersheds that impact the coastal waters of Alabama. Several Watershed Surveys have been completed. The ADEM Watershed Survey protocol was updated and published in FY01. Based upon the implementation of this study, it is anticipated that subsequent watershed surveys will be conducted bi-annually. The current sub-watershed survey being conducted for the Bayou Sara Watershed (HUC 03160204-050) is in Mobile County, Alabama. During this reporting period (2000-2001) a survey was completed for the Little Lagoon Watershed (HUC 03140107-040). These watershed surveys are a key component of the ACNPCP Five-Year Implementation Plan and Overall Strategy Plans.
- The ACNPCP played an active role in the development of, and is an active participant in, the Coastal Alabama Clean Water Partnership (CACWP). It's geographic area is the Escatawpa, Mobile-Tensaw, and Perdido Sub-Basins, that roughly overlay the ACNPCP Management Area.

Alabama's 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 NOAA-OCRM and USEPA, that all sub-watersheds inclusive within Mobile and Baldwin Counties comprise the ACNPCP Management Area. Various other issue areas have been targeted for priority program development to achieve full program approval and further enhance the management of land and water uses to develop an effective approach to improving overall water quality for Coastal Alabama.

2 Surface Water Assessment

2.1 Surface Water Monitoring Program Summary

Six 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 seven 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 was incorporated into the Alabama's "ASSESS (ADEM's Strategy for Sampling Environmental indicators of Surface water quality Status) Program" as Coastal ALAMAP (ALAMAP-C) in October 1997. Sampling has recurred annually since 1993. Table 1-1 and Figure 1-2 respectively summarizes overall use support per sampling year and depicts station locations of the Coastal ALAMAP Program. A report similar to ALAMAP's March 1998 publication, *A Report on the Condition of the Estuaries of Alabama in 1993-1995: A Program in Progress*, summarizing additional data collections, will be published in the future.

Second, 19 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.

Third, Alabama is a partner with the U.S. EPA in its National Coastal Assessment (NCA). NCA is a multi-year partnership among EPA's Office of Research and Development (ORD), EPA's Office of water (OW), EPA's Regional Offices, all coastal states, and selected territories. As part of this effort, ORD has developed a coastal monitoring program with EPA Region 4 and the Alabama Department of Environmental management (ADEM). This joint effort will determine the condition of estuarine waters in the coastal resources of Alabama, and allow comparison to other U.S. coastal areas. The ORD National Health and Environmental effects Research Laboratory's Gulf Ecology Division in Gulf Breeze, Florida is coordinating this effort. NCA is a strategic partnership between EPA and the coastal states and other Federal Agencies. Each state uses a compatible probabilistic design and a common set of environmental indicators to survey its coastal resources and assess their condition. These estimates can then be aggregated to assess conditions at the EPA Regional, biogeographical, and national levels. All data will be made available for public access on the Internet. Fifty sampling locations in Alabama's coastal area have been determined by NCA. Each of these locations was sampled during the summers' 2000 and 2001 index periods and will continue to be sampled each year through 2004. NCA and ALAMAP-C programs were designed to work together so that the condition of geographical sub-areas within Alabama's coastal area can be assessed with known confidence. Additional intensive ALAMAP-C locations are sampled during the same index period. One hundred forty (140) NCA / ALAMAP-C sites were sampled during 2000 and one hundred sixty-six (166) NCA / ALAMAP-C sites were sampled in 2001.

The Coastal Alabama Recreational Water Quality Monitoring Program (Beach Monitoring) is the forth monitoring program in place during the reporting period. The Alabama coastal beaches are a major tourist attraction as well as a lifestyle staple for Alabama residents. Alabama has approximately 50 miles of Gulf beach and an estimated 65-70 miles of estuarine beaches where the adjacent waters are classified for swimming under the State's Water Use Classification System. In an effort to increase public awareness and provide valuable water quality information, ADEM and the Alabama Department of Public Health (ADPH), under a grant from the EPA's Gulf of Mexico Program, have implemented a bacteriological water quality

monitoring and notification program. This program involves the routine collection of water samples from a number of high-use public recreational areas. Samples are collected twice per week during the summer months and once per month during the cooler months. These samples are analyzed for bacteriological indicators (Fecal Coliform and Enterococci bacteria). These bacteria by themselves are not considered harmful to humans but often occur in the presence of potential human pathogens. The indicator bacteria used (Enterococci) and the threshold concentration, which triggers an advisory, are based on recommendations provided by the EPA in the documents Ambient Water Quality Criteria for Bacteria (1986) and Water Quality Standards Handbook, second addition (1983). All data from this program and current information concerning swimming advisories is available to the public on ADEM's website at www.adem.state.al.us. This information is also made available to the public through press releases to the general media or upon request to the ADEM or the ADPH. Monitoring for this program has resulted in the issuance of seven swimming advisories by the ADPH and publicity generated through this program has indirectly lead to the upgrade and improved monitoring of sewer collection lines in Mobile and Baldwin Counties as well as a high flow contingency plan for the city of Daphne where excess sewage flow can be diverted to an alternative temporary storage site. A map and graphs for each beach monitoring station's Fecal Coliform and Enterococcus geomean results are contained in **Part VI Public Health Information.**

Fifth, during May 2001, the ADEM published the *Contingency Plan for Monitoring and Response of Marine Biotoxins, Pfiesteria and Other Harmful Algal Blooms*. This effort, funded by a grant from the USEPA Region IV (cooperative agreement #CP984885-00-0), established protocol for routinely sampling Alabama's coastal area for phytoplankton and responding to HABs. Monitoring under this program allows for more timely detection of changes in phytoplanktonic populations in Alabama's Gulf waters which may lead to possible prediction of the presence, movement, and growth of HABs. One hundred sixty-two (162) samples were analyzed during the period October 2000 through December 2001. This ongoing effort is accomplished through cooperation between the ADEM, the ADPH, and the ADCNR-MRD.

Finally, one coastal watershed survey was started and one watershed survey was completed during this reporting cycle. The Mobile Branch of ADEM began a two-year survey of the Bayou Sara watershed in Mobile County and completed the survey of Little Lagoon watershed in Baldwin County (A Survey of the Little Lagoon Watershed , April 2000). Also, the Mobile Branch completed a report entitled "Methodology for Coastal Watershed Assessments" in April 2001. This document presents a more comprehensive approach to the Coastal Watershed Assessment Program by providing a basic framework to ensure consistency among the different studies conducted while still remaining flexible enough to apply to all watersheds and their priority issues.

Figure 2-2

Active Coastal Trend Stations

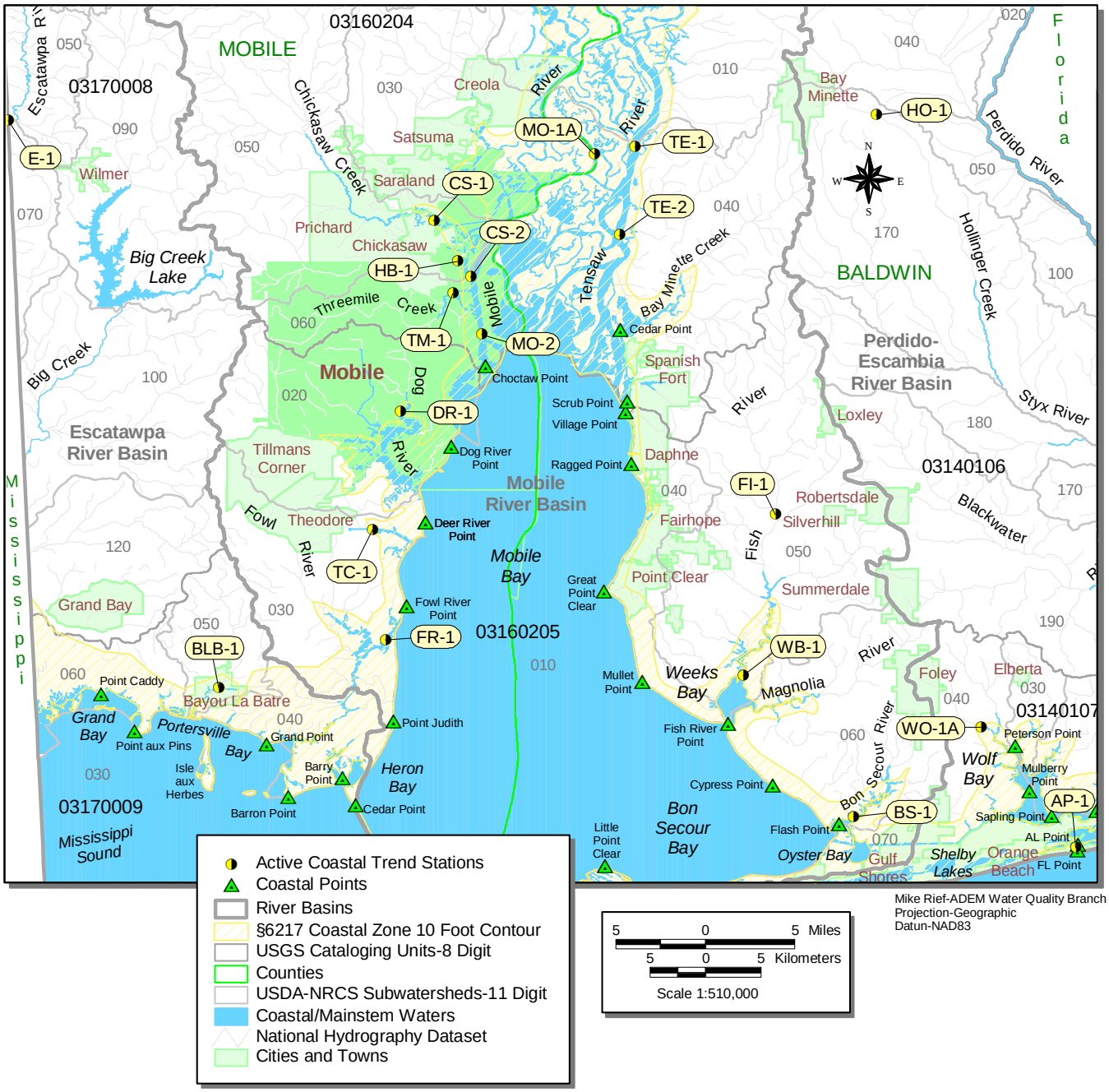


Table 2-1
Active Coastal Trend Stations

Station	Station Location	Latitude	Longitude
BLB-1	BAYOU LA BATRE RIVER @ AL HWY 188	30.405556	-88.248056
BS-1	BON SECOUR RIVER NEAR BON SECOUR	30.301389	-87.735417
CS-1	CHICKASAW CREEK @ NORTH SIDE U.S. HWY 43 BRIDGE CROSSING	30.7825	-88.074583
CS-2	CHICKASAW CREEK @ NORTH SIDE CSX RxR CROSSING @ CONFLUENCE WITH MOBILE RIVER	30.7375	-88.044583
DR-1	DOG RIVER @ LUSCHER PARK BOAT LAUNCH NEAR I-10	30.628611	-88.101389
E-1	ESCATAPAW RIVER @ U.S. HWY 98(MOFFAT ROAD) NEAR MISSISSIPPI	30.86375	-88.418056
FI-1	FISH RIVER @ U.S. HWY 104	30.545417	-87.798611
FR-1	FOWL RIVER @ HWY 193	30.444028	-88.113333
HB-1	HOG BAYOU @ BURIED PIPELINE CROSSING	30.75	-88.055
HO-1	HOLLINGER CREEK @ STILL ROAD (OFF COUNTY ROAD 112)	30.868264	-87.716875
MO-1A	MOBILE RIVER @ CSX RxR CROSSING	30.836667	-87.944722
MO-2	MOBILE RIVER @ GOVERNMENT STREET (BANKHEAD TUNNEL)	30.690833	-88.035556
TC-1	THEODORE INDUSTRIAL CANAL @ HWY 193 (RANGELINE ROAD)	30.533333	-88.123889
TE-1	TENSAW RIVER @ CSX RxR CROSSING	30.8425	-87.912083
TE-2	TENSAW RIVER @ SOUTHERN TIP OF GRAVINE ISLAND	30.770833	-87.924444
TM-1	THREE MILE CREEK BETWEEN U.S. HWY 43 & RxR CROSSING	30.724028	-88.059028
WB-1	WEEKS BAY @ U.S. HWY 98 (MARINA)	30.415556	-87.824444
WO-1A	WOLF CREEK @ COUNTY ROAD 12	30.373611	-87.6325
AP-1	ALABAMA POINT	30.2766	-87.55567

2.2 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 and 140,415 in 2000. Between 1990 and 2000, the Baldwin County population increased by 42.9%. The population of Mobile County increased from 393,826 in 1994 to 399,429 in 1998 to 399,843 in 2000. Between 1990 and 2000, the Mobile County population increased by 5.6%. 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, particularly in terms of 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. 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 is incorporated into the project proposal.

There has 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.

Coastal wetland data is provided in Part IX Alabama's Wetlands Program. ADEM's Coastal Section is working with other governmental entities to support wetland and submersed aquatic vegetation status and trend identification. At this time, both Mobile and Baldwin Counties have been flown and databases having georeferenced color infrared images will be compiled for wetland mapping purposes. Coast-wide photography to be used for mapping submersed aquatic vegetation is scheduled to be taken the summer or fall of 2002.

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 oversees the replanting of oyster reefs and believes that there has been an increase in reef size over time. ADCNR also reported that oyster drills have had an impact on a part of the reef during 2000. It is believed that the increase in oyster drill activity was due to lower fresh water entering the system because of lower rainfall amounts for the year. Even though the oyster drill activity is reportedly increased, the Alabama Department of Public Health's (ADPH) Seafood Branch reports that oyster harvests from Alabama's coastal waters jumped from 376,539 pounds in 1999 to 791,908 pounds in 2000, the latest data available. During 2001 the Seafood Branch issued 45 shellfish, 21 blue crab, and 47 shrimp and fish processing permits. In addition to routine permits issued by the Seafood Branch, 19 permits were issued to plants that produce specialty products for worldwide distribution. These products range from cooked ready-to-eat gumbo available in local grocery stores to roe mullet egg sacks exported to Asian countries for further processing.

Shrimp populations are cyclic and are doing well (3.1 million pounds of shrimp are harvested each year from the area). Brown shrimp landings were down in 2001, most likely due to the effects of tropical storm Allison. Crab populations are stable as well with 2.9 million pounds landed in Alabama per year. 2000 blue crab landings were the highest on record and probably due to the warm dry winter.

D. Toxic Contamination

The ADEM has conducted studies to determine metals enrichment in estuarine sediments and has sampled sediments in proximity to shipyards, petroleum storage terminals, and industrial point source discharges. Beginning in 1993 the ADEM implemented ALAMAP-C to provide a statistically defensible characterization of Alabama's coastal waters. Its parametrical coverage includes metals and selected organic compounds in estuarine sediments. During 2000, ADEM began sampling Alabama's estuarine sediments for toxicity, and fishes for whole-body contaminants as part of the NCA program, described above. 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 6-3 Shellfish Harvesting Area Closures/Reopenings, Figure 6-2 Oyster/Shellfish Harvesting Areas that are Opened or Closed by the ADPH, and a brief narrative of Oyster/Shellfish Harvesting Area Notices issued by the ADPH-MRD are included in **Part VI Public Health Information**.

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 VI Public Health**.

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 / Clean Water Partnerships

The ADEM continues to actively participate in Near Coastal Water projects and in the Coastal Alabama Clean Water Partnership.

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 ADEM 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 2-2
Summary the 1993-2001 Coastal Alamap Sampling Program Percent Violations of Alabama's Coastal Criteria for Dissolved Oxygen, pH, and Temperature

2001 NCA and ALAMAP-C: DO, pH & Temperature Summary	
Dissolved Oxygen Violations were 9.0% (15 of 166 Stations) with 5.0 mg/L as criteria	Full Support
Dissolved Oxygen Violations were 4.8% (8 of 166 Stations) [1]	Full Support
pH violations were 0% (0 of 166 Stations above 8.5)	Full Support
Temperature violations were 0% (0 of 166 Stations)	Full Support
2000 NCA and ALAMAP-C: DO, pH & Temperature Summary	
Dissolved Oxygen Violations were 11% (15 of 140 Stations) with 5.0 mg/L as criteria	Partial Support
Dissolved Oxygen Violations were 2.1% (3 of 140 Stations) [1]	Full Support
pH violations were 5.7% (8 of 140 Stations above 8.5)	Full Support
Temperature violations were 1% (2 of 140 Stations)	Full Support
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) [1]	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) [1]	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% (7 of 109 stations) [1]	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% (5 of 128 stations) [1]	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 2-3

Alabama's
Coastal Alamap Program
1993-2001 Stations

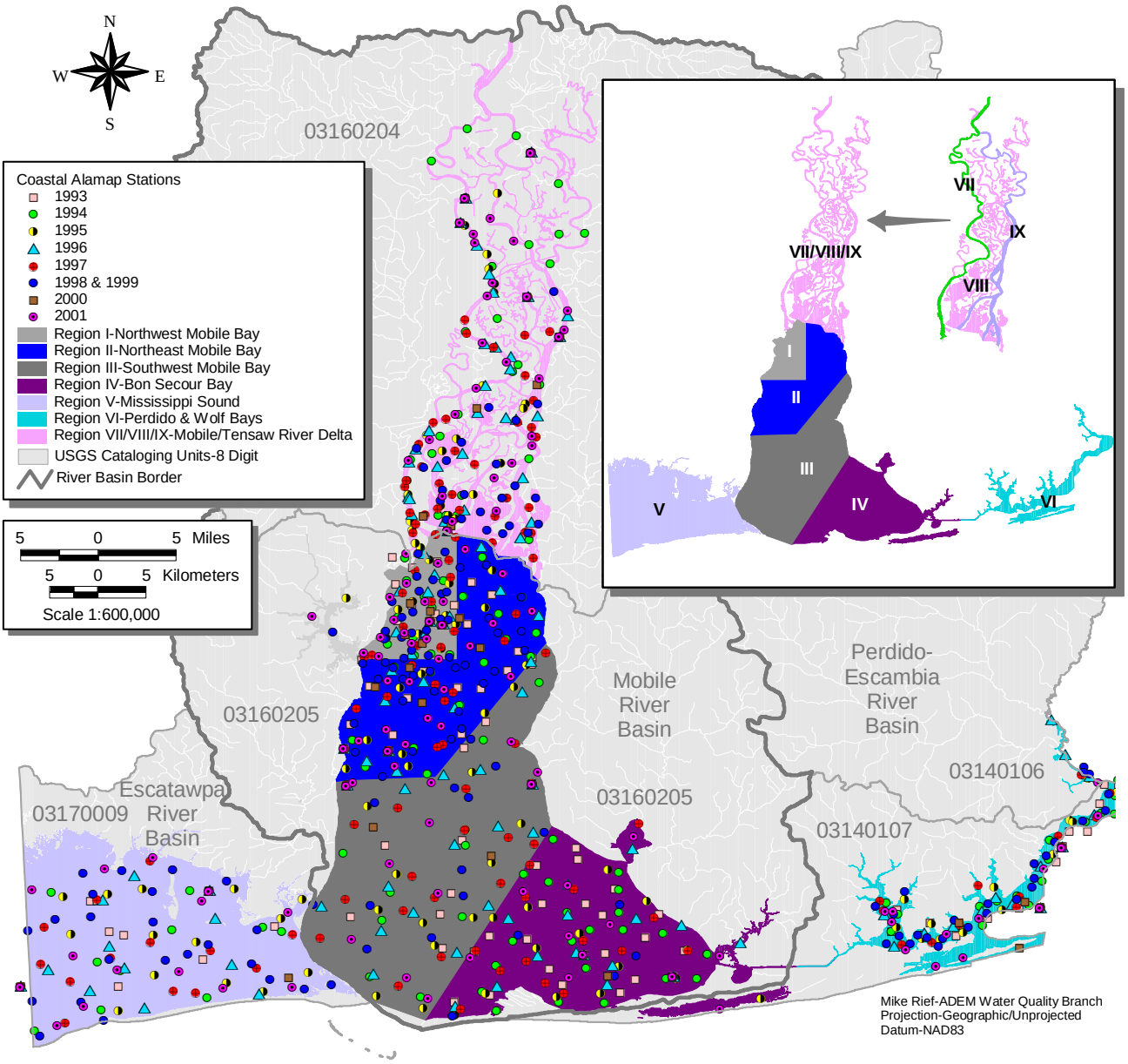


Table 2-3
Overall Use Support of 1998 §303(d) Estuaries
(square miles)

Support Status	Monitored
Partially Supporting	517.3
Not Supporting	23.2
Total	540.5

Table 2-4
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 2-5
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

Since no estuaries have been added to the *Draft 2000 §303(d) List* these estuary tables remain unchanged from the previous reporting period. The listed impact to Alabama's Gulf of Mexico waters is for consumption of king mackerel. See the **Part VI Public Health Information** for more information on coastal fish consumption advisories.

For more information pertaining to Alabama's Coastal Monitoring Programs contact the ADEM Field Operations Mobile Office (Mr. John Carlton-Chief (phone (251) 450-3430 or jcc@adem.state.al.us) or the ADEM Coastal Program Office (Mr. Brad Gane-Chief (phone (251) 432-6533 or bwg@adem.state.al.us).

Part III Ground Water Assessment

1 Overview of State Ground Water Protection Programs

Many of elements of Alabama's ground water programs listed in Table 4-1 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 quantity 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.

2 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.

3 Significant State Ground Water Program Developments

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

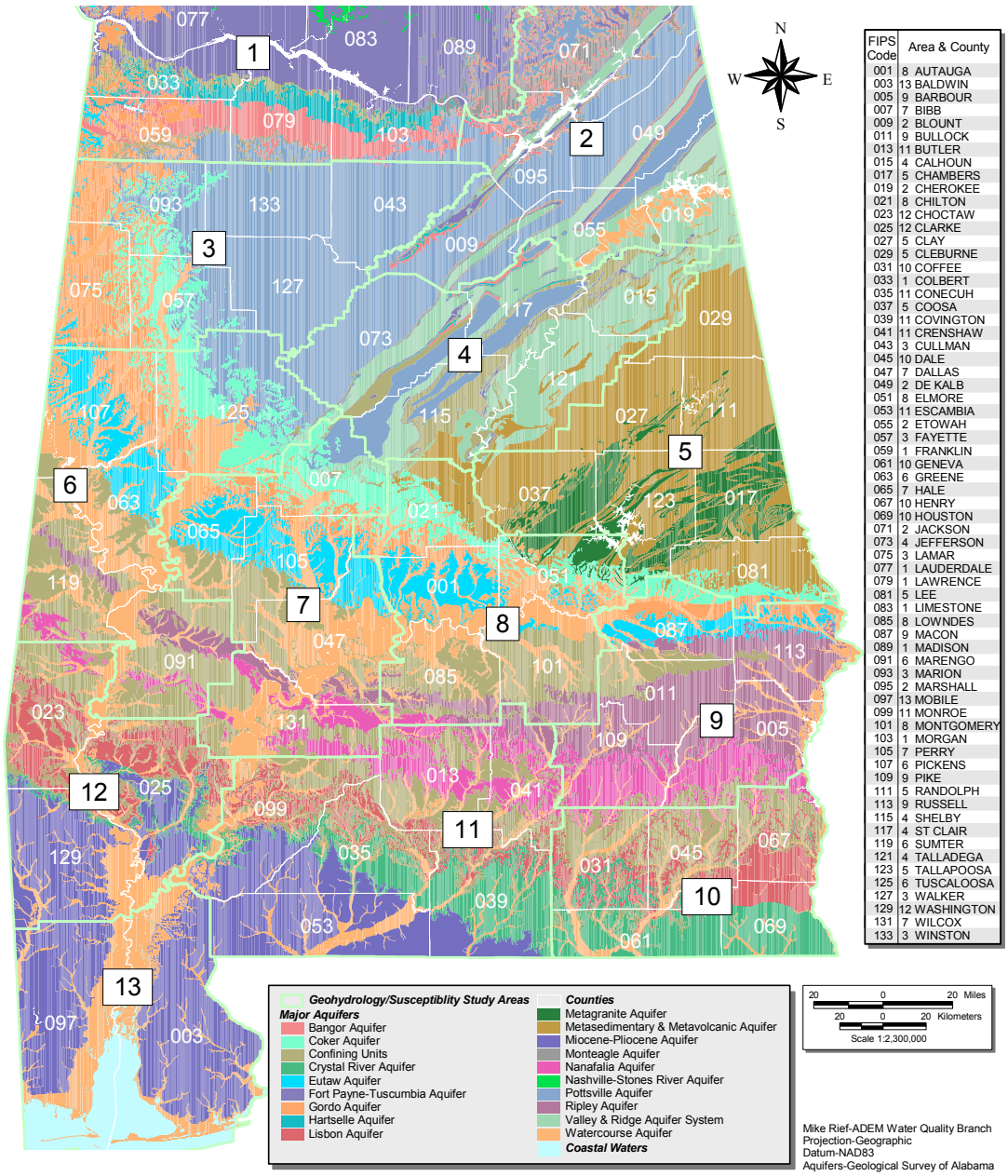
- Implementation of the Source Water Assessment Program within the ADEM Water Supply Branch regulations.
- Implementation of guidance for Risk Based Corrective Action (RBCA) for petroleum fuels.
- A RBCA approach for releases other than petroleum related fuels that are regulated under the State Ground Water Program was developed and is currently under review.
- 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 September 1997, to revise a series of 13 Aquifer Vulnerability Reports. These reports are being revised 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), Area 10 (Washington, Choctaw and Clarke Counties), and Area 5 (Coosa, Cleburne, Clay, Randolph, Tallapoosa, Chambers and Lee Counties) have been completed and published as a compact disc. Area 4 (Jefferson, Shelby, Talladega, St Clair and Calhoun Counties) has been drafted and is currently under review.

- The Non-Point Source Program has provided funding for pesticide sampling of residential wells in vulnerable areas in the southernmost half of the Coastal Plain Ground Water Province. Sampling and analysis, and the development of the final report have been completed. The State Groundwater Program has provided funding for pesticide sampling of residential wells in vulnerable areas in the northernmost half of the Coastal Plain Ground Water Province. Sampling and analysis, and the development of the final report have been completed.
- Separate ground water festivals were held in Colbert County and Limestone County in March of 2000 and in March of 2001. Approximately 1000 and 700 students per year participated in the ground water activities at the Colbert County and Limestone County festivals, respectively. Separate ground water festivals were held in Madison and Lauderdale Counties in May of 2000 and in May of 2001. Approximately 2400 and 1200 students per year participated in the ground water activities at the Madison County and Lauderdale County festivals, respectively. A groundwater festival was held in Blount County in October 2000 and October 2001 with approximately 700 students per year participating in ground water activities. In May of 2001, a groundwater festival was held for the first time in Montgomery County with approximately 1000 students participated in the ground water activities. A ground water festival was also held for the first time in Houston County in October 2001. Approximately 1100 students participated in the ground water activities. Exhibits were provided along with demonstrations during these two-day events.
- Regulations have been developed by ADEM and implemented to deal with Concentrated Animal Feeding Operations (CAFOS). Hydrogeologic site evaluations and ground water monitoring requirements have been included in 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 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.
- ADEM is near completion of a state wide ambient ground water quality monitoring effort using the probabilistic monitoring grid approach.
- ADEM has implemented an ambient ground water monitoring program in the Piedmont District for radionuclides.
- ADEM has implemented an ambient ground water monitoring program for nutrients in watersheds with heavy poultry industry.

Figure 3-1

Study Areas for the Geohydrology and Susceptibility of Major Aquifers



FIPS Code		Area & County
001	8	AUTAUGA
003	13	BALDWIN
005	9	BARBOUR
007	7	BIBB
009	2	BLOUNT
011	9	BULLOCK
013	11	BUTLER
015	4	CALHOUN
017	5	CHAMBERS
019	2	CHEROKEE
021	8	CHILTON
023	12	CHOCTAW
025	12	CLARKE
027	5	CLAY
029	5	CLEBURNE
031	10	COFFEE
033	1	COLBERT
035	11	CONECUH
037	5	COOSA
039	11	COVINGTON
041	11	CRENSHAW
043	3	CULLMAN
045	10	DALE
047	7	DALLAS
049	2	DE KALB
051	8	ELMORE
053	11	ESCAMBIA
055	2	ETOWAH
057	3	FAYETTE
059	1	FRANKLIN
061	10	GENEVA
063	6	GREENE
065	7	HALE
067	10	HENRY
069	10	HOUSTON
071	2	JACKSON
073	4	JEFFERSON
075	3	LAMAR
077	1	LAUDERDALE
079	1	LAWRENCE
081	5	LEE
083	1	LIMESTONE
085	8	LOWNDES
087	9	MACON
089	1	MADISON
091	6	MARENGO
093	3	MARION
095	2	MARSHALL
097	13	MOBILE
099	11	MONROE
101	8	MONTGOMERY
103	1	MORGAN
105	7	PERRY
107	6	PICKENS
109	9	PIKE
111	5	RANDOLPH
113	9	RUSSELL
115	4	SHELBY
117	4	ST CLAIR
119	6	SUMTER
121	4	TALLADEGA
123	5	TALLAPOOSA
125	6	TUSCALOOSA
127	3	WALKER
129	12	WASHINGTON
131	7	WILCOX
133	3	WINSTON

Table 3-1 Summary of State Ground Water Protection Programs

Programs or Activities	Check	Implementation Status	Responsible State Agency (1)
Active Sara Title III Program	X	Fully established	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 stringen 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

4 Summary of Ground Water Contamination Sources

4.1 Reporting Area

The Alabama Department of Environmental Management has selected the physiographic districts between the Southern Pine Hills district and the Black Prairie districts in Alabama for evaluation during this reporting period. The districts included in this report are the Dougherty Plain district, the Hatchetigbee Dome subdistrict, the Lime Hills district, the Buhrstone Hills subdistrict, the Flatwoods subdistrict, the Southern Red Hills district, the Chunnenuggee Hills district, and the Alluvial-Deltaic Plain of the East Gulf Coastal Plain Province. These districts are underlain by the Nanafalia-Clayton Aquifer, Lisbon Aquifer, Providence-Ripley Aquifer, and Upper Floridan Aquifer. These aquifers are significant sources of drinking water supplies for private residential use as well as for municipalities. Counties included in the reporting area in whole or part are Barbour, Bullock, Butler, Choctaw, Clarke, Coffee, Conecuh, Covington, Crenshaw, Dale, Dallas, Geneva, Henry, Houston, Lowndes, Macon, Marengo, Monroe, Montgomery, Pike, Russell, Sumter, and Wilcox. Data contained in Table 4-2 and 4-3 were queried and retrieved by county. Some overlap of data from physiographic districts not included in the reporting area is shown where the above mentioned counties do not lie wholly within the report's selected physiographic districts.

4.2 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 4-2, 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.

4.3 Superfund CERCLIS and DOD Sites

ADEM's Land Division works with EPA and the Department of Defense to manage these types of sites. Two (2) facilities identified in Table 4-2 are listed on the National Priority List (NPL). These sites include: American Brass Inc., and T H and AG Nutrition site. Confirmed releases of pesticides and volatiles have been detected in groundwater at these facilities. Both sites have had investigations performed and one site is under active remediation under the authority of the Superfund Program.

The CERCLIS listings include 16 non-NPL sites located in the report area. These are sites where State and Federal Funds have been used to conduct preliminary and secondary assessments by ADEM and EPA. Five (5) of the sixteen sites have had confirmed releases of contaminants into groundwater, one has active remediation and one has completed cleanup.

Two Department of Defense Sites (DOD) are listed in Table 4-2. The ongoing site assessments are being funded by the Defense Environmental Restoration Fund.

4.4 Underground Storage Tank Program

The largest category of sites listed in Table 4-2 is underground storage tanks (UST). 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, 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 was conducted in 2000.

4.5 Hazardous Waste Management Program (RCRA)

Five (5) hazardous waste sites (RCRA) were identified in the study area. The ADEM Land Division manages these sites. 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.

4.6 Underground Injection Control Program

The Underground Injection Control (UIC) program is managed by the ADEM Ground Water Branch. In this reporting area permits are issued to Class V sites for the subsurface injection of treated wastewater, and for the disposal of treated ground water resulting from the remediation of recovered contaminated groundwater. UIC Class V permits are issued for the subsurface injection or placement of materials such as oxygen release compounds, chlorine, experimental bacteria stimulation solution, and other substances to aid in the remediation of contaminated groundwater. Most of the UIC sites are greenfield (new) sites and involve laundromats, car washes, truck washes, meat processors, and treated industrial or commercial waste water. Some UIC sites involve the issuance of a permit for the injection of heat pump return water or condensate from boiler blowdown that contain no contaminants. Class I and Class IV UIC wells are prohibited in the State of Alabama, and Class II injection wells are managed by the State of Alabama Oil and Gas Board.

4.7 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.

4.8 Nonpoint Source Program

The non-point source sites are new sites where hydrogeologic site evaluations have been conducted by the Department for the land application of treated effluent from municipal facilities. No non-point source sites were identified in the study area for years 2000-2001.

Figure 3-2

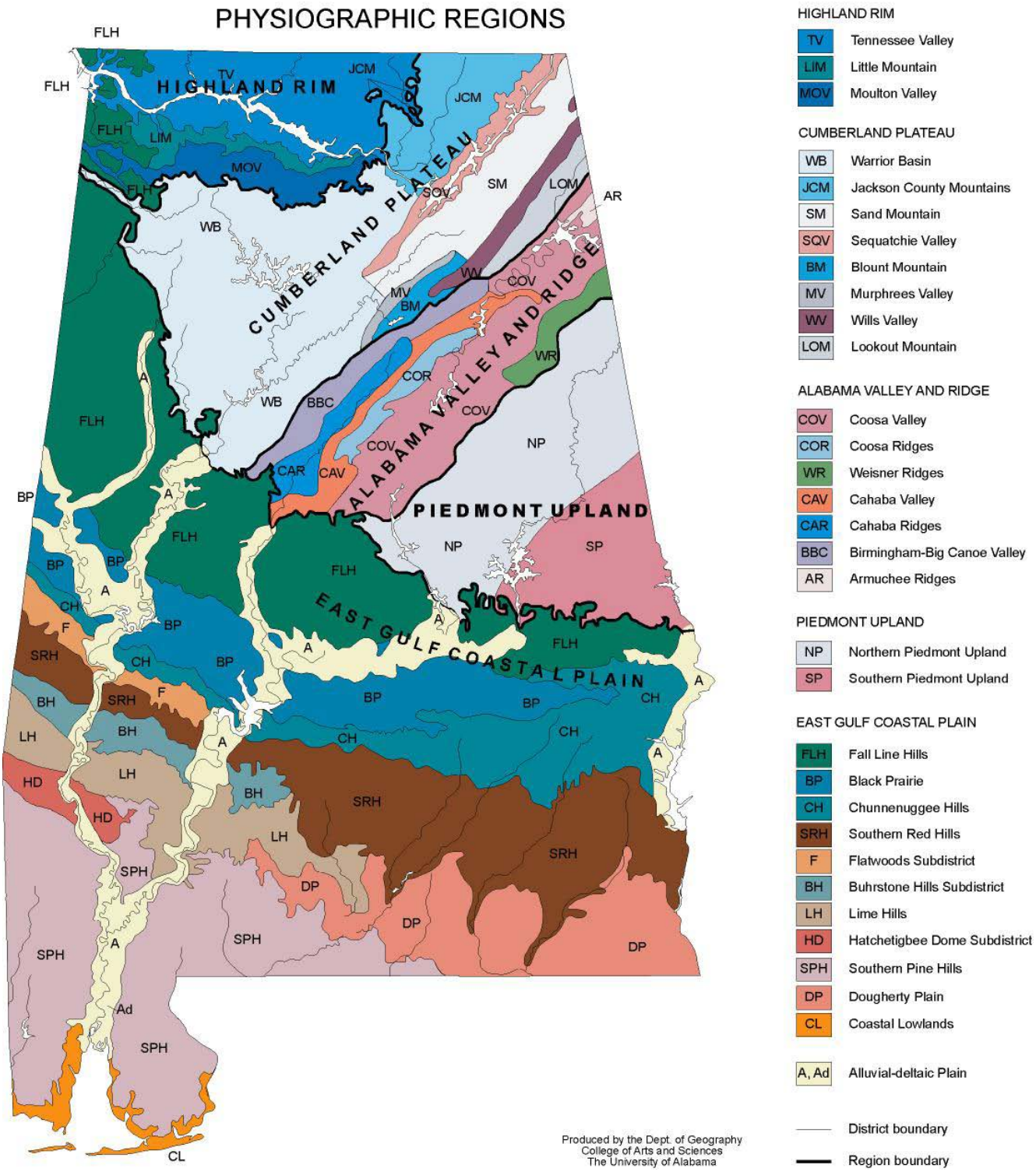
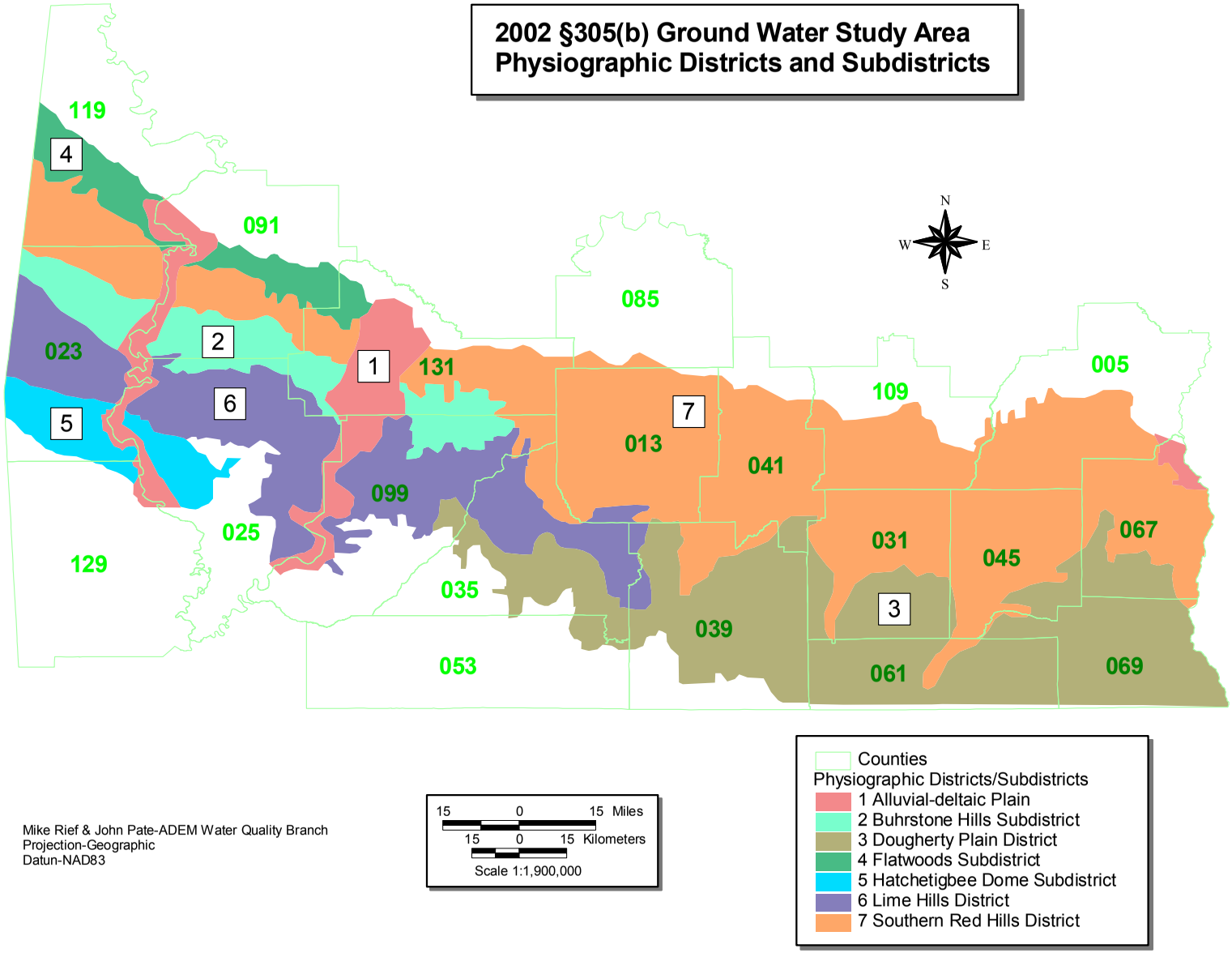

PHYSIOGRAPHIC REGIONS
HIGHLAND RIM
CUMBERLAND PLATEAU
ALABAMA VALLEY AND RIDGE
PIEDMONT UPLAND
EAST GULF COASTAL PLAIN
FLH
TV
JCM
LIM
MOV
SQV
SM
LOM
AR
WB
WV
COV
MV
BM
WR
COR
BBC
CAR
CAV
NP
SP
BP
A
CH
F
SRH
BH
LH
HD
SPH
DP
Ad
CL
HIGHLAND RIM
TV Tennessee Valley
LIM Little Mountain
MOV Moulton Valley
CUMBERLAND PLATEAU
WB Warrior Basin
JCM Jackson County Mountains
SM Sand Mountain
SQV Sequatchie Valley
BM Blount Mountain
MV Murphrees Valley
WV Wills Valley
LOM Lookout Mountain
ALABAMA VALLEY AND RIDGE
COV Coosa Valley
COR Coosa Ridges
WR Weisner Ridges
CAV Cahaba Valley
CAR Cahaba Ridges
BBC Birmingham-Big Canoe Valley
AR Armuchee Ridges
PIEDMONT UPLAND
NP Northern Piedmont Upland
SP Southern Piedmont Upland
EAST GULF COASTAL PLAIN
FLH Fall Line Hills
BP Black Prairie
CH Chunnenuggee Hills
SRH Southern Red Hills
F Flatwoods Subdistrict
BH Buhrstone Hills Subdistrict
LH Lime Hills
HD Hatchetigbee Dome Subdistrict
SPH Southern Pine Hills
DP Dougherty Plain
CL Coastal Lowlands
A, Ad Alluvial-deltaic Plain
District boundary
Region boundary
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

Figure 3-3



County	FIPS Code
Barbour	005
Butler	013
Choctaw	023
Clarke	025
Coffee	031
Conecuh	035
Covington	039
Crenshaw	041
Dale	045
Escambia	053
Geneva	061
Henry	067
Houston	069
Lowndes	085
Marengo	091
Monroe	099
Pike	109
Sumter	119
Washington	129
Wilcox	131

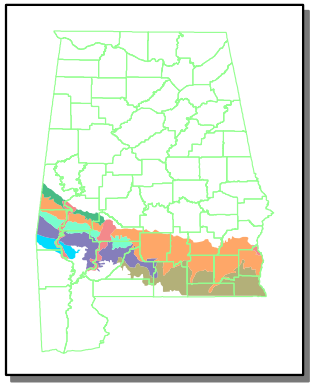
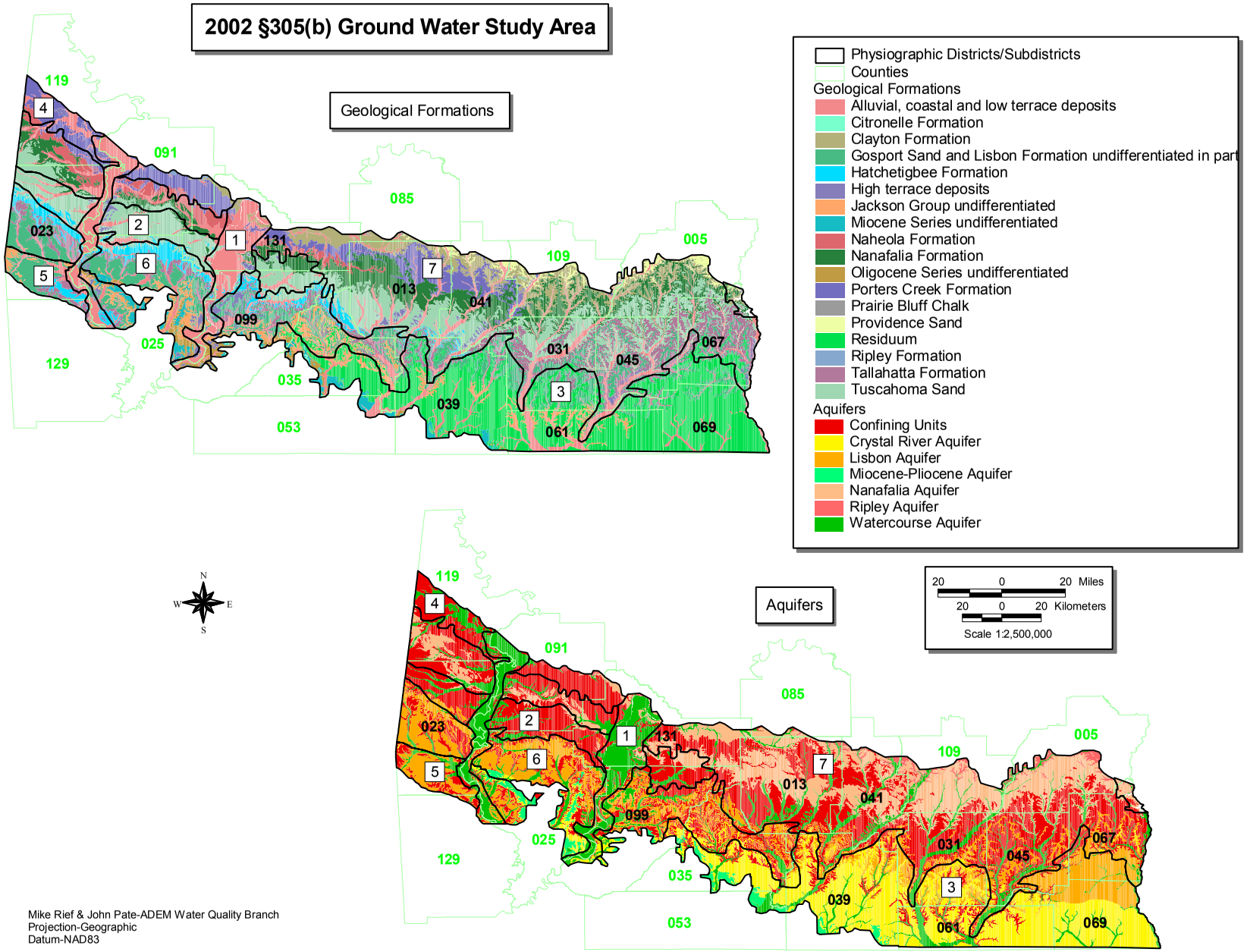


Figure 3-4



Mike Rief & John Pate-ADEM Water Quality Branch
Projection-Geographic
Datum-NAD83

Table 3-2. Ground Water Contamination Summary

Hydrogeologic Setting: Dougherty Plain district, Hatchetigbee Dome subdistrict, Lime Hills district, Buhrstone Hills subdistrict, Flatwoods subdistrict, Southern Red Hills district, Chunnenuggee Hills district, and the Alluvial-Deltaic Plain district of the East Gulf Coastal Plain Physiographic Section

Spatial Description: See Figure 4-1

Map Available: See Figure 4-1

Data Reporting Period: 2000-2001.

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	2	2	2	Pesticides, Metals	2	0	1	1	0
CERCLIS (non-NPL)	16	6	5	VOCs, Metals	5	1	1	0	1
DOD/ DOE	2	2	2	VOCs	2	0	1	0	0
UST	4332 registere d	814	733	BETX, MTBE, Lead	754	814	42	42	401
RCRA Corrective Action	5	5	5	VOCs, SVOCs, Metals, Pesticides, Herbicides, Sulfate, Chloride	2	0	3	3	0
Underground Injection	41	10	10	Hydrocarbons, Metals					
State Sites	18	18	15	VOCs, SVOCs, Metals		6	9	9	2
Non-point Sources	0								
Totals									

5 Ambient Monitoring Network

Aquifer monitoring data listed in Table 4-2 was evaluated for counties in the study area. The monitoring data were obtained from the Geological Survey of Alabama (GSA) and from ADEM's computer databases. The 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. In some years, water levels were also measured in the spring. Ground water quality was monitored annually by the GSA at one hundred and fifty (150) sites. GSA monitored these sites for a wide variety of inorganic compounds, some organic compounds, and physico-chemical parameters such as turbidity. Since 1996, budgetary constraints have necessitated the postponement of the annual water quality monitoring program of the GSA. In 1996, the last year in which data were collected, thirty-one (31) wells and two (2) springs were monitored by the GSA in the region covered by this report. Twenty-two (22) of the 31 wells had no nitrate detections, and at all thirty-three (33) sites nitrate concentrations were less than 5.0 mg/L. One (1) well had manganese concentrations exceeding the MCL of 0.05 mg/L. The MCL for total dissolved solids of 500 mg/L was exceeded in six (6) wells; the MCL for chloride of 250 mg/L was exceeded in three (3) wells; the MCL for iron of 0.3 mg/L was exceeded in one (1) well; and the MCL for antimony of 0.006 mg/L was exceeded in one (1) well. The following is a list of wells and springs identified within the study area of this report.

Table 3-3
Well ID Data
Wells sampled by GSA for Water Quality Parameters in the Study Area
David C. Kopaska-Merkel
Taken from GSA Circular 122N (Water in Alabama, 1996)

Code No.	Well/spring No.	County	Aquifer	Springs
9	S-2	Conecuh	Tallahatta Fm	
10	M-01	Choctaw	Nanafalia Fm	
11	M-8	Covington	Nanafalia Fm	
12	R-11	Geneva	Nanafalia Fm	
13	U-4	Monroe	Nanafalia Fm	
14	HH-6	Clarke	Crystal River Fm	spring
15	K-4	Coffee	Clayton Fm	
16	F-16	Dale	Ripley Fm	
19	L-5	Crenshaw	Ripley Fm	
20	O-38	Wilcox	Ripley Fm	
21	S-1	Barbour	Ripley Fm	
22	I-19	Houston	Ripley Fm	
24	K-95	Montgomery	Eutaw Fm	
25	L-26	Marengo	Eutaw Fm	
27	J-31	Montgomery	Tuscaloosa Group	
29	L-12	Lowndes	Tuscaloosa Group	
30	L-3	Bullock	Tuscaloosa Group	
32	Q-6	Houston	Tuscaloosa Group	
36	V-1	Barbour	Tuscaloosa Group	
38	J-11	Pike	Tuscaloosa Group	
53	BB-1	Choctaw	Gosport Sand-Lisbon Fm	
55	FF-01	Choctaw	Hatchetigbee Fm	
56	FF-8	Barbour	Clayton Fm	spring
58	W-01	Houston	Crystal River Fm	
60	L-09	Marengo	Eutaw Fm	
64	QQ-01	Monroe	Miocene Series	
66	G-27	Wilcox	Ripley Fm	
67	H-8	Geneva	Lisbon Fm	
70	AA-1	Houston	Lisbon Fm	
113	X-1	Henry	Clayton Fm	
114	K-7	Crenshaw	Clayton Fm	
115	H-2	Clarke	Tuscahoma Sand	
116	O-12	Clarke	Lisbon Fm	

Table 3-4a Aquifer Monitoring Data

Hydrogeologic Setting: Dougherty Plain district, Hatchetigbee Dome subdistrict, Lime Hills district, Buhrstone Hills subdistrict, Flatwoods subdistrict, Southern Red Hills district, Chunnenuggee Hills district, and the Alluvial-Deltaic Plain district of the East Gulf Coastal Plain Physiographic Section (See Figure 1) Reporting Period: years 2000 and 2001

Number of Wells

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	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
			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	31 wells 2 springs	Mn						1			
		NO_3	22		11						
		Antimony						1			
		Chlorides						3			
		Iron						1			
		TDS						6			
Raw Water Quality Data from Public Water Supply Wells	NOT AVAILABLE										
Finished Water Quality Data from Public Water Supply Wells	393										
		50	30		303		1	1			

Table 3-4b Aquifer Monitoring Data

Major uses of the aquifer or hydrologic units Lisbon	X Public water supply	___ Irrigation	___ Commercial	___ Mining
	Baseflow			
	X Private water supply	___ Thermoelectric	___ Livestock	___ Industrial
	Maintenance			
Major uses of the aquifer or hydrologic units Nanfalia-Clayton	X Public water supply	X Irrigation	___ Commercial	___ Mining
	Baseflow			
	___ Private water supply	___ Thermoelectric	___ Livestock	___ Industrial
	Maintenance			
Major uses of the aquifer or hydrologic units Providence-Ripley	X Public water supply	___ Irrigation	___ Commercial	___ Mining
	Baseflow			
	___ Private water supply	___ Thermoelectric	___ Livestock	___ Industrial
	Maintenance			
Major uses of the aquifer or hydrologic units Upper Floridan	X Public water supply	X Irrigation	___ Commercial	___ Mining
	Baseflow			
	X Private water supply	___ Thermoelectric	___ Livestock	___ Industrial
	Maintenance			

Table 3-5
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			
Barbour	140,000,000	28,000,000	7,000,000	175,000,000	80	16	4
Bullock	8,000,000			8,000,000	100		
Butler							
Choctaw	30,000,000			30,000,000	100		
Clarke	58,000,000			58,000,000	100		
Coffee	183,000,000	8,000,000		191,000,000	96	4	
Conecuh	38,000,000			38,000,000	100		
Covington	80,000,000	25,000,000	2,000,000	107,000,000	75	23	2
Crenshaw	54,000,000			54,000,000	100		
Dale	254,000,000		17,000,000	271,000,000	93		6
Dallas	62,000,000	31,000,000	8,000,000	101,000,000	61	30	8
Geneva	5,000,000	4,000,000	2,000,000	11,000,000	45	36	18
Henry	6,000,000		91,000,000	97,000,000	7		94
Houston	558,000,000	13,000,000	93,000,000	664,000,000	84	2	14
Lowndes	23,000,000			23,000,000	100		
Macon	12,000,000	812,125	1,000,000	14,000,000	86	6	7
Marengo	75,000,000	31,000,000	59,000,000	145,000,000	51	21	27
Monroe	118,000,000	9,000,000	5,000,000	132,000,000	89	7	4
Montgomery	641,000,000		21,000,000	662,000,000	97		3
Pike	172,000,000		61,000,000	233,000,000	74		26
Russell	21,000,000	28,000,000		49,000,000	43	57	
Sumter	56,000,000			56,000,000	100		
Wilcox	21,000,000			21,000,000	100		
Totals	2,615,000,000	177,812,125	367,000,000	3,140,000,000	83	6	1

Source: Durham-ADECA Office of Water Resources, 2001

6 Summary of Groundwater Quality

6.1 Hydrogeology

The physiographic districts for this 2002 305(b) Report study area, lie between the Southern Pine Hills district and the Black Prairie district of the East Gulf Coastal Plain. Generally speaking they trend from northwest to southeast and/or west to east. Depending on the area of the State evaluated, the various districts are comprised of as few as a single geologic formation to as many as nine separately identifiable geologic formations. The southern most district in this report is the Dougherty Plain district. They are described below as they appear from south to north across the area of this report's interest.

6.1.1 Dougherty Plain District

The Dougherty Plain Physiographic district consists of portions of Monroe County, Escambia County, Conecuh County, Covington County, Geneva County, Coffee County, Dale County and Henry County, and all of Houston County. This district has been characterized as undifferentiated limestone residuum, bedded sand and clay, and surficial terrace material (Sapp and Emplaincourt, 1975). Active limestone solution has transferred most minor drainageways to the subsurface, especially in extreme southeastern Alabama. Topography is that of a low cuesta that is more dissected in south central Alabama than in southeast. The area is extensively cultivated. The land surface in the area ranges from 100 to 400 feet above sea level (Castleberry, Moreland, Scott 1989) (Scott and Cobb 1988).

In the eastern portion of the Dougherty Plain district underlying sediments belong to the Ocala Limestone, Ocala Limestone and Moodys Branch Formations undifferentiated, Lisbon and Tallahatta Formations. The western portion of the district contains sediments belonging to the Citronelle Formation, Miocene Series undifferentiated, Oligocene Series undifferentiated, Jackson Group undifferentiated, the Gosport Sand and Lisbon Formation, and the Lisbon and Tallahatta Formations.

6.1.2 Lime Hills District

The Lime Hills Physiographic district consists of portions of Monroe County, Conecuh County, Choctaw County, Clarke County and Wilcox County. This area has been characterized as rugged topography developed on more resistant limestone (Sapp and Emplaincourt, 1975). The Hatachetigbee Dome subdistrict is a northwest-southeast oriented flexure within this district.

The sediments that occur in the western portion of the Lime Hills district typically belong to the Citronelle Formation, Miocene Series, Oligocene Series, Jackson Group, Gosport Sand and Lisbon and Tallahatta Formations, and Hatchetigbee and Tuscahoma Formations. The eastern portion of the Lime Hills district includes sediments belonging to the Oligocene Series undifferentiated, Jackson Group undifferentiated, Gosport Sand and Lisbon Formation, Tallahatta Formation, and Hatchetigbee Formation.

6.1.3 Southern Red Hills District

The Southern Red Hills district contains two subdistricts. They are the Flatwoods and Burhstone Hill subdistricts. The Southern Red Hills district and its subdistricts extend across Choctaw and Clarke, Monroe, Butler, Crenshaw, Covington, Coffee, Dale and Henry Counties. The Southern Red Hills district in Wilcox County is considered to be the most rugged topographic region in the Alabama Coastal Plain with a ten-mile wide hilly belt some 200-300 feet above nearby streams. This area has been described as a southward-sloping upland of moderate relief. The Flatwoods lowland subdistrict along northern edge in the west and the rugged Burhstone Hills subdistrict along southern edge of the Southern Red Hills district are developed on indurated resistant siliceous claystone and sandstone.

The geologic formations within the Southern Red Hills district and its subdistricts are many. Various formations found in this district include the Naheola, Porters Creek and Clayton, Tuscahoma, Nanafalia, Hatchetigbee, Gosport Sand, Lisbon, Tallahatta undifferentiated, and Midway group undifferentiated.

6.1.4 Chunnenuggee Hills District)

The Chunnenuggee Hills district is present across many counties within the reporting area. This district is encountered in the counties of Sumter, Marengo, northern Wilcox, southern Dallas, southern Lowndes, southern Montgomery, northern Pike, southern Macon, south Russell, north Barbour, south Bullock, northeastern Butler, and northern Crenshaw. The Chunnenuggee Hills is described as a pine-forested series of sand hills and cuestas developed on chalk in west Alabama, and more resistant clay, siltstone, and sandstone in the east.

Geologic formations found in the Chunnenuggee Hills district include the Porters Creek and Clayton, Prairie Bluff Chalk, Ripley, Providence Sand, Demopolis Chalk, Blufftown, Mooreville Chalk, and Eutaw.

6.1.5 Alluvial-Deltaic Plain District)

The Alluvial-Deltaic Plain district is found in and adjacent to valleys associated with all major and minor rivers and creeks throughout the study area. These areas are characterized by flat flood plains and terraces.

6.2 Aquifers

6.2.1 Upper Floridan aquifer

The Upper Floridan aquifer mainly consists of the Ocala Limestone. The Upper Floridan aquifer is the main water supply source for the southernmost part of the study area in portions of Houston, Geneva, Coffee, Covington, Conecuh, Escambia, and Monroe Counties. The recharge area for the Upper Floridan aquifer generally coincides with its area of groundwater withdrawal, and consists of a relatively flat sandy landscape containing numerous depressions formed by the solution of the underlying limestone. The residuum remaining from the dissolution of the limestone is moderately to highly permeable, and is hydraulically connected to the aquifer. Wells screened in the Upper Floridan aquifer can produce up to 1,000 gallons of groundwater per minute (Scott and Cobb, 1988).

6.2.2 Lisbon aquifer

The Lisbon aquifer is a water supply source for all or portions of Houston, Henry, Geneva, Coffee, Butler, Covington, Conecuh, Monroe, Washington, Clarke and Choctaw Counties. The Lisbon aquifer generally changes becoming thicker and includes more geologic formations from southeast Alabama to southwest Alabama. Groundwater in the Lisbon aquifer is generally under artesian pressure. In southeast Alabama the Lisbon aquifer consists of the sand beds of the Lisbon Formation, Tallahatta Formation and Hatchetigbee Formation. In south-central and southwest Alabama the aquifer also includes the Gosport Sand, Bashi Formation, Moody's Branch Formation, and the upper part of the Tuscahoma Formation. Well yields for wells screened in the Lisbon aquifer generally ranges from 500 gallons per minute in southeast Alabama to 0.5 million gallons per day in southwest Alabama.

6.2.3 Nanafalia-Clayton aquifer

The Nanafalia-Clayton aquifer is a water supply source for portions of Coffee, Henry, Barbour, Pike, Crenshaw, Butler, Monroe, Wilcox, Marengo, southern Sumter and Choctaw Counties. Groundwater in the Nanafalia-Clayton aquifer is generally under artesian pressure, and occurs in the Clayton Formation, Porters Creek Formation, Naheola Formation, Nanafalia Formation, and the basal sand unit of the Tuscahoma Formation (from oldest to youngest). Well yields for wells screened in the Nanafalia-Clayton aquifer generally ranges from 300 gallons per minute to 0.5 million gallons per day.

6.2.4 Providence-Ripley aquifer

The Providence-Ripley aquifer is a water supply source for portions of Butler, Crenshaw, Wilcox, Dallas, Barbour, Russell, Bullock and Pike Counties. In southern Bullock, and northern Pike and Barbour

Counties the sand beds of the Ripley are part of the Providence-Ripley aquifer (Kidd, 1087). Wells screened in these sand beds may yield 0.5 to 1.0 million gallons of water per day.
The Ripley is also a major aquifer and water supply source for Crenshaw, Butler, and northeasternmost Monroe Counties. (Castleberry, Moreland, and Scott, 1089). Wells screened in the Ripley in Crenshaw, Butler and Monroe Counties may yield 200 to 600 gallons of water per minute.
The Ripley in Dallas and Wilcox Counties only exist along and just north of the Dallas-Wilcox county line in an area of about 116 square miles (Mooty, 1987). A few private wells in southern Dallas County are screened in the Ripley. The wells for the towns of Camden and Pine Apple in Wilcox County are also screened in the Ripley as their public water supply. Reported yields ranged from less than 10 to 120 gallons per minute.
The Providence Sand unit in Pike and Bullock Counties is also a major water supply source. Wells screened in the Providence Sand may yield up to 0.5 million gallons of water per day. The Providence Sand does not exist in Dallas and Wilcox Counties, and is not a major aquifer in Crenshaw and Butler Counties.

6.5 General Statement of Ground Water Quality and Vulnerability

The source of recharge to the major aquifers in the study area is rainfall. Alluvial and terrace deposits along major streams overlie parts of the recharge areas for the major aquifers of this report. The various aquifers principally receive recharge from their outcrop areas within the various counties in the study area. All recharge areas for the major aquifers are susceptible to contamination from the surface.

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Part IV Lake Water Quality Assessment

1 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 mainstem and tributary embayment 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;

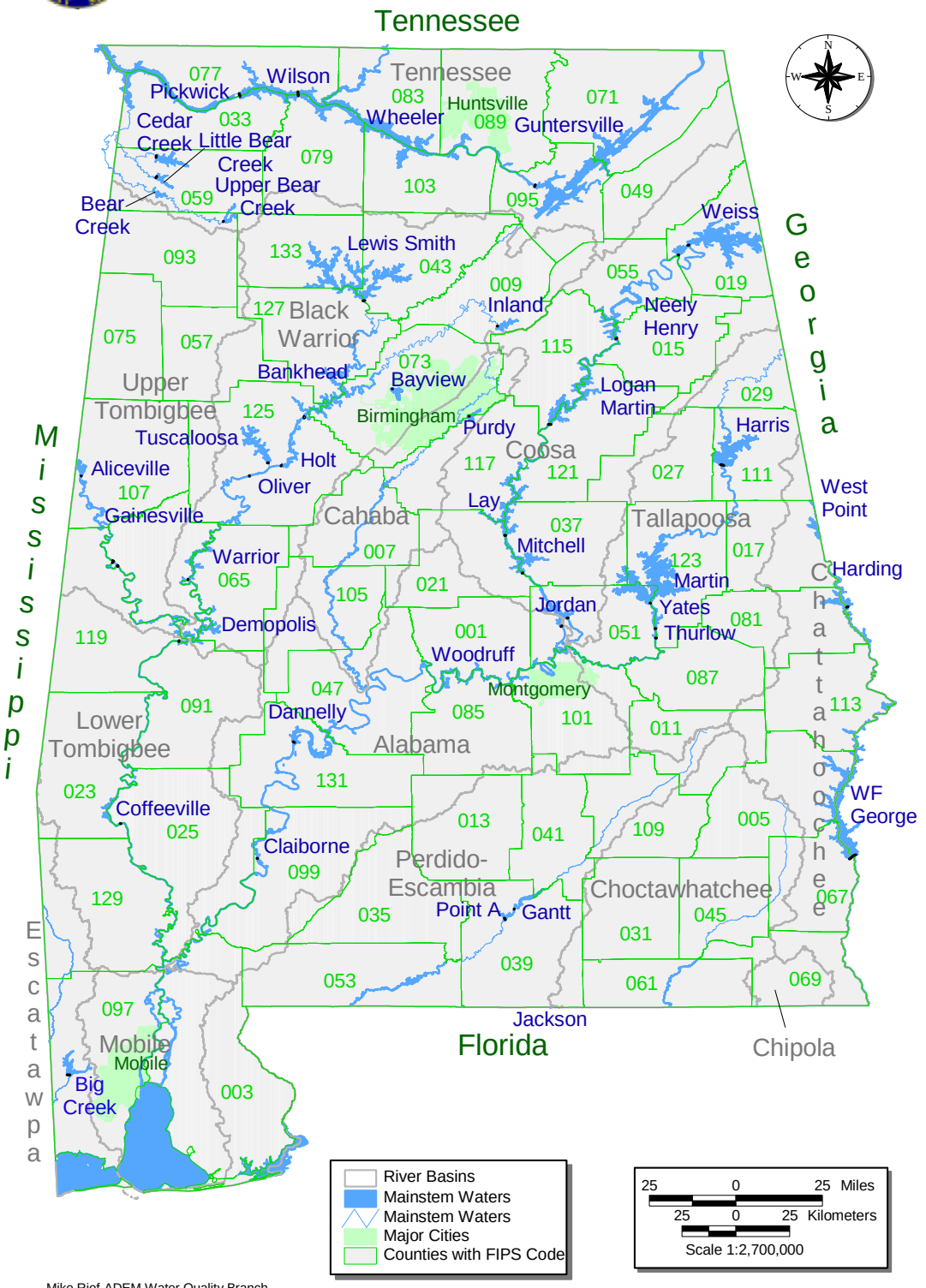
c) Chattahoochee and Conecuh River Basin reservoirs, 1999;

d) Coosa, Tallapoosa, and Alabama River Basin reservoirs, 2000; and,

e) Tombigbee and Escatawpa reservoirs, 2001.

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 4-1
Publicly Accessible Reservoirs of Alabama



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

River Basins
Mainstem Waters
Mainstem Waters
Major Cities
Counties with FIPS Code

25 0 25 Miles
25 0 25 Kilometers
Scale 1:2,700,000

Mike Rief-ADEM Water Quality Branch
Software: ESRI® Arcview 3.2™
Projection: Geographic/Unprojected
Datum: NAD83

Table 4-1
Overall Use Support Summary for Lakes and Reservoirs (acres)

Degree of Use Support	Assessment Category		
	Monitored	Evaluated	Total Assessed
Size Fully Supporting	364,541	1,061*	365,602
Size Not Supporting	99,486	0	99,486
TOTAL ASSESSED	464,027	1,061*	465,088

* county fishing lakes

2 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 of lakes for each trophic classification appear in Tables 4-2, 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 4-3. 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 4-2
Trophic Status of Significant Publicly Owned Lakes

	Number of Lakes	Acreage of Lakes
Total	41	463,587
Assessed	41	347,223
Oligotrophic	3	41,565
Mesotrophic	12	74,799
Eutrophic	26	347,223
Hypereutrophic	0	0
Dystrophic	0	0
Unknown	0	0

3 Control Methods

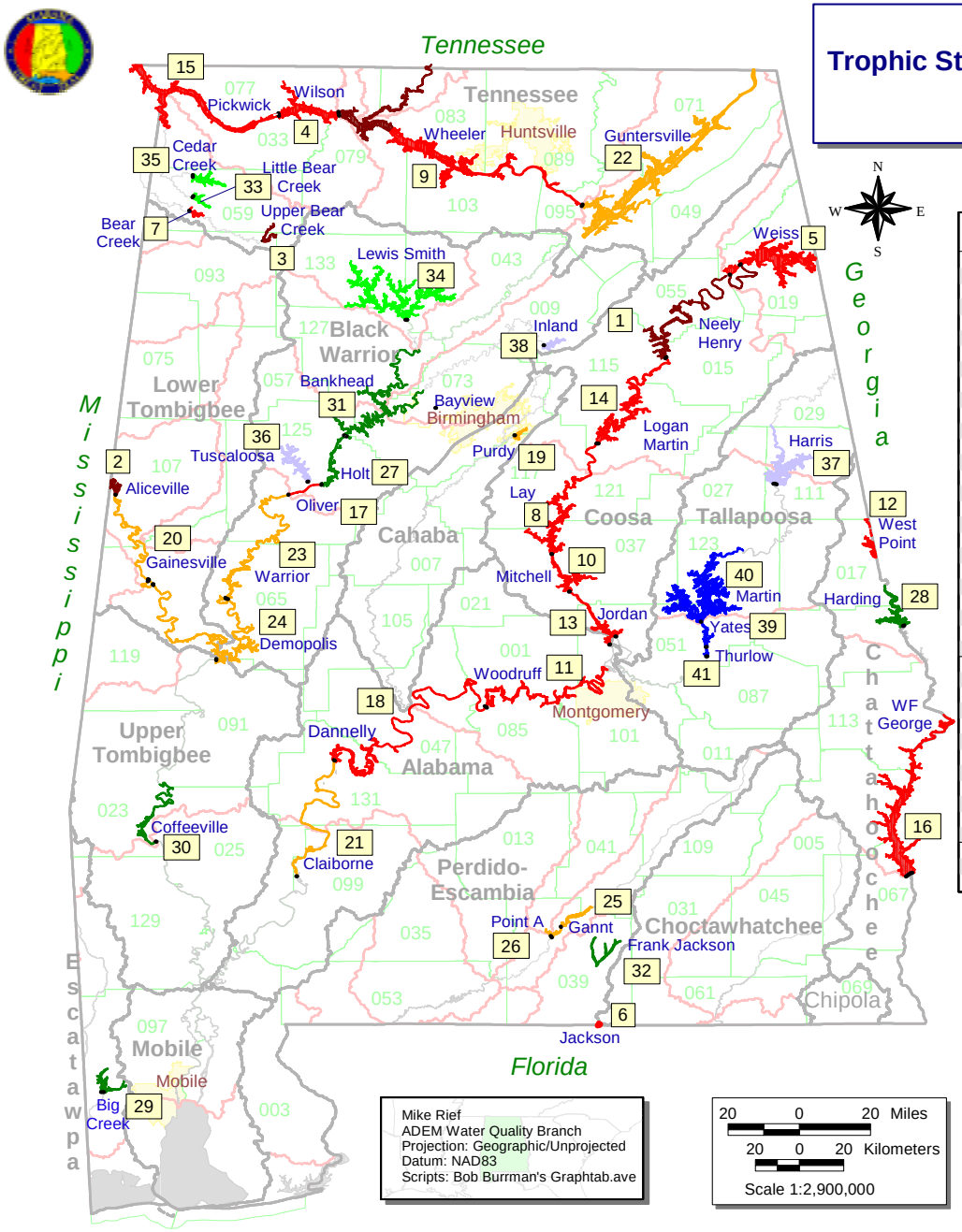
The ADEM has not defined control methods specifically for lakes. Instead, the pollution controls of ADEM's Point Source Program (NPDES permitting) and the Nonpoint Source Program are applicable for all of the State's surface waters.

4 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. All Clean Lakes Program Phase I Diagnostic/Feasibility Studies were conducted through cooperative agreements between ADEM and Auburn University. A list of the Clean Lakes Program Projects of Alabama appears in Table 4-4.

Figure 4-2

Lake and Reservoir Trophic State Index Values (August Forebay) and Trophic State



Mike Rief
ADEM Water Quality Branch
Projection: Geographic/Unprojected
Datum: NAD83
Scripts: Bob Burrman's Graphtab.ave

20 0 20 Miles
20 0 20 Kilometers
Scale 1:2,900,000

1-41

Index	Trophic State	Reservoir	River Basin	August TSI	Year
1	Eutrophic	Neely Henry	Coosa	69	2000
2		Aliceville	Tombigbee	63	2001
3		Upper Bear	Tennessee	63	2001
4		Wilson	Tennessee	63	2001
5		Weiss	Coosa	62	2001
6		Jackson	Yellow	60	2001
7		Bear	Tennessee	60	2001
8		Lay	Coosa	60	2000
9		Wheeler	Tennessee	60	2001
10		Mitchell	Coosa	59	2000
11		Woodruff	Alabama	58	2000
12		West Point	Chattahoochee	58	2001
13		Jordan	Coosa	58	2000
14		Logan Martin	Coosa	58	2000
15		Pickwick	Tennessee	58	2001
16		W. F. George	Chattahoochee	57	2001
17		Oliver	Warrior	57	2000
18		Dannelly	Alabama	57	2000
19		Purdy	Cahaba	56	2001
20		Gainesville	Tombigbee	55	2001
21		Claiborne	Alabama	54	2000
22		Guntersville	Tennessee	54	2001
23		Warrior	Warrior	52	2000
24		Demopolis	Tombigbee	52	2001
25		Gantt	Conecuh	50	2001
26		Point A	Conecuh	50	2001
27	Mesotrophic	Holt	Warrior	49	2000
28		Harding	Chattahoochee	48	2001
29		Big Creek	Escatawpa	47	2001
30		Coffeeville	Tombigbee	47	2001
31		Bankhead	Warrior	47	2000
32		Frank Jackson	Conecuh	47	2001
33		Little Bear	Tennessee	46	2001
34		Smith	Warrior	46	2000
35		Cedar	Tennessee	44	2001
36		Tuscaloosa	Warrior	43	2000
37		Harris	Tallapoosa	42	2001
38		Inland	Warrior	40	2001
39	Oligotrophic	Yates	Tallapoosa	39	2000
40		Martin	Tallapoosa	37	2000
41		Thurlow	Tallapoosa	37	2000

Most Recent August TSI Value
- Eutrophic 63-70
- Eutrophic 57-62
- Eutrophic 50-56
- Mesotrophic 47-49
- Mesotrophic 44-46
- Mesotrophic 40-43
- Oligotrophic 30-39
- River Basins
- USGS Cataloging Units
- Coastal/Mainstem Waters
- Mainstem Waters
- County
- Major Cities

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

Table 4-3 Reservoir and Lake Trophic Status

Trophic State	Index	Name	River Basin	August TSI Value	August TSI Year	Average TSI Value	Managing Authority
Eutrophic	1	Neely Henry	Coosa	69	2000	63	APCO
	2	Aliceville	Tombigbee	63	2001	57	USACE
	3	Upper Bear	Tennessee	63	2001		TVA
	4	Wilson	Tennessee	63	2001		TVA
	5	Weiss	Coosa	62	2001		APCO
	6	Jackson	Yellow	60	2001	43	AL/FL Natural Lake
	7	Bear	Tennessee	60	2001		TVA
	8	Lay	Coosa	60	2000	59	APCO
	9	Wheeler	Tennessee	60	2001		TVA
	10	Mitchell	Coosa	59	2000	58	APCO
	11	Woodruff	Alabama	58	2000	57	USACE
	12	West Point	Chattahoochee	58	2001	53	USACE
	13	Jordan	Coosa	58	2000	55	APCO
	14	Logan Martin	Coosa	58	2000	59	APCO
	15	Pickwick	Tennessee	58	2001		USACE
	16	W. F. George	Chattahoochee	57	2001	55	USACE
	17	Oliver	Warrior	57	2000	53	USACE
	18	Dannelly	Alabama	57	2000	56	USACE
	19	Purdy	Cahaba	56	2001	56	BWWB
	20	Gainesville	Tombigbee	55	2001	54	USACE
	21	Claiborne	Alabama	54	2000	53	USACE
	22	Guntersville	Tennessee	54	2001		TVA
	23	Warrior	Warrior	52	2000	52	USACE
	24	Demopolis	Tombigbee	52	2001	52	USACE
	25	Gantt	Conecuh	50	2001	45	AEC
	26	Point A	Conecuh	50	2001	49	AEC
Mesotrophic	27	Holt	Warrior	49	2000	50	APCO/USACE
	28	Harding	Chattahoochee	48	2001	52	USACE
	29	Big Creek	Escatawpa	47	2001	50	City of Mobile
	30	Coffeeville	Tombigbee	47	2001	51	APCO/USACE
	31	Bankhead	Warrior	47	2000	50	USACE
	32	Frank Jackson	Conecuh	47	2001	50	ADCNR
	33	Little Bear	Tennessee	46	2001		TVA
	34	Smith	Warrior	46	2000	43	APCO
	35	Cedar	Tennessee	44	2001		TVA
	36	Tuscaloosa	Warrior	43	2000	40	City of Tuscaloosa
	37	Harris	Tallapoosa	42	2001	46	APCO
	38	Inland	Warrior	40	2001	35	BWWB
Oligotrophic	39	Yates	Tallapoosa	39	2000	43	APCO
	40	Martin	Tallapoosa	37	2000	40	APCO
	41	Thurlow	Tallapoosa	37	2000	34	APCO

* Mean values (1985-present) from dam forebay stations during August/September. Mean values may not reflect a lake current trophic state.

Hypereutrophic > 70	Eutrophic 50-69	Mesotrophic 40-49	Oligotrophic < 40

ADCNR-Alabama Department of Conservation and Natural Resources
AEC-Alabama Electric Cooperative
APCO-Alabama Power Company
BWWB-Birmingham Water Works Board
TVA-Tennessee Valley Authority
USACE-United States Army Corps of Engineers

Table 4-4
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

5 Impaired and Threatened Lakes

Summary information on overall use support for Alabama lakes appears in Table 4-1. Cause categories for lake waters not fully supporting appear in Tables 4-5. Summary information on support of individual uses of lakes appears in Table 4-12. Source categories for lake waters not fully supporting uses appear in Table 4-6. 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.

6 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 4-11. 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.

7 Acid Effects on Lakes

The number and acreage of lakes affected by acidity appear in Table 4-7. The number and acreage of lakes affected by sources of high acidity appear in Table 4-8. 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.

8 Trends

Trend information is included in Table 4-9. Trends were determined by reviewing three (3) or more years of water quality data from each reservoir during the period 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.

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

Table 4-5
Total Sizes of Waters Not Fully Supporting Uses by Various Cause Categories
Lakes and Reservoirs (acres)

Causes	Acres
Ammonia	440
Nutrients	77,470
Dissolved oxygen	61,617
Pathogens	4,640
Pesticides	440
pH	50,296
Priority Organics	57,463
Siltation	5,809
Temperature/thermal modification	7,380

Source: Final 2000 303(d) List submitted to EPA Region 4 November 2001

Table 4-6
Total Sizes of Waters Not Fully Supporting Uses Affected by Various Source Categories for Lakes and Reservoirs (acres)

Sources	Acres
Agriculture	729
Contaminated sediments	27,263
Dam construction	17,206
Flow regulation/modification	94,962
Industrial	19,937
Intensive animal feeding operations	973
Municipal	12,904
Nonirrigated crop production	7,003
Pasture grazing	7,003
Sources outside state	30,200
Unknown source	7,380
Upstream sources	12,000
Urban runoff/Storm sewers	22,526

Source: Final 2000 303(d) List submitted to EPA Region 4 November 2001

Table 4-7
Lakes Affected By Acidity

	Number of Lakes	Acreage of Lakes
Assessed for Acidity	40	485,046
Impacted by High Acidity	0	0
Vulnerable to Acidity	6	32,930

Table 4-8
Sources of High Acidity in Lakes and Reservoirs

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

Table 4-9
Status of Trends for Lakes and Reservoirs

	Number of Lakes	Acreage of Lakes
Assessed for Trends	32	277,236
Improving	1	2300
Stable	26	255,271
Degrading	0	0
Trend Unknown	5	19,665

An individual use support summary table is in the process of being completed. Lakes and Reservoirs are being digitized from the 7.5 minute USGS Quadrangles. The draft use classification shapefiles and this new reservoir coverage will allow for a precise determination of acres per use classification, and thus use classification support for each reservoir. This report will be amended with the new table upon completion of this work. This work will also clear up the minor discrepancy in Total Assessed Lake Acres between Tables 4-1 and 4-2.

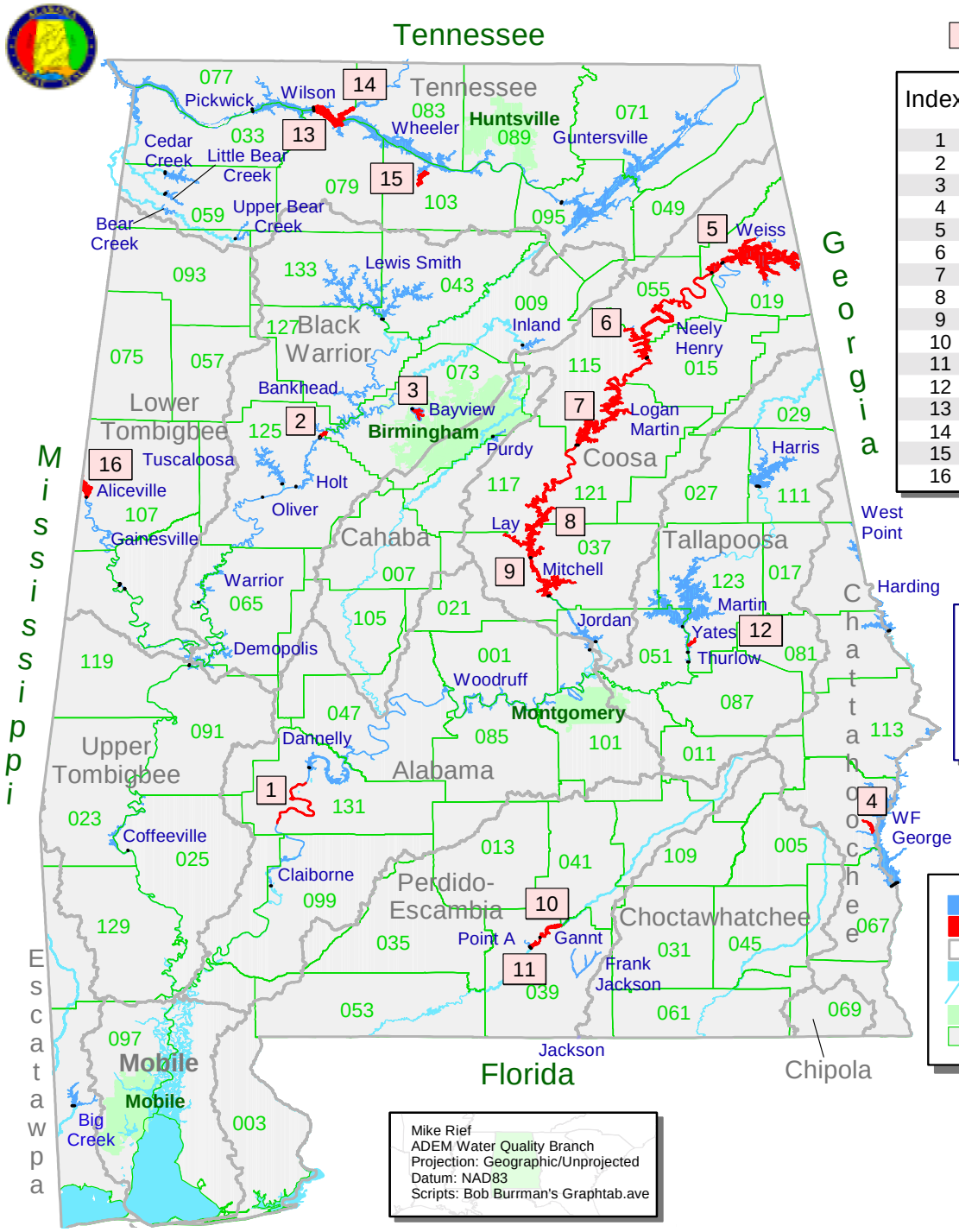
Table 4-10
State Owned and Operated Public Fishing Lakes

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

Table 4-11
Total Reservoir Size Affected by Toxicants

Waterbody	Size Monitored for Toxicants	Size with Elevated Levels of Toxicants
Lakes (acres)	277,236	60,213

For Lake-specific information contact Mr. Fred Leslie at (334) 260-2752 or at fal@adem.state.al.us



1-16

Lakes and Reservoirs
2000 §303(d) List Non Support

Index	Waterbody
1	Claiborne Reservoir-Alabama River
2	Bankhead Reservoir-Alabama River
3	Bayview Lake-Village Creek
4	W.F. George Reservoir-Barbour Creek Embayment
5	Lake Weiss-Coosa River
6	Neely Henry Reservoir-Coosa River
7	Logan Martin Reservoir-Coosa River
8	Lay Lake-Coosa River
9	Lake Mitchell-Coosa River
10	Gantt Lake-Conecuh River
11	Point A Lake-Conecuh River
12	Yates Reservoir-Sougahatchee Creek Embayment
13	Wheeler Reservoir-Tennessee River
14	Wheeler Reservoir-Elk River
15	Wheeler Reservoir-Flint Creek Embayment
16	Aliceville Reservoir-Tombigbee River

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

Figure 4-3

Lake and Reservoir Use Support
2002 §305(b) Full Support
and
2000 §303(d) List Non Support

- 2002 §305(b) Report Lakes/Reservoirs-Full Support
- 2000 §303(d) List Lakes/Reservoirs-Non Support
- River Basins
- Mainstem/Coastal Waters
- Mainstem Rivers
- Major Cities
- Counties with FIPS Code

20 0 20 Miles
20 0 20 Kilometers
Scale 1:2,900,000

Mike Rief
ADEM Water Quality Branch
Projection: Geographic/Unprojected
Datum: NAD83
Scripts: Bob Burrman's Graphtab.ave

Table 4-12 Reservoir and Lake Use Support

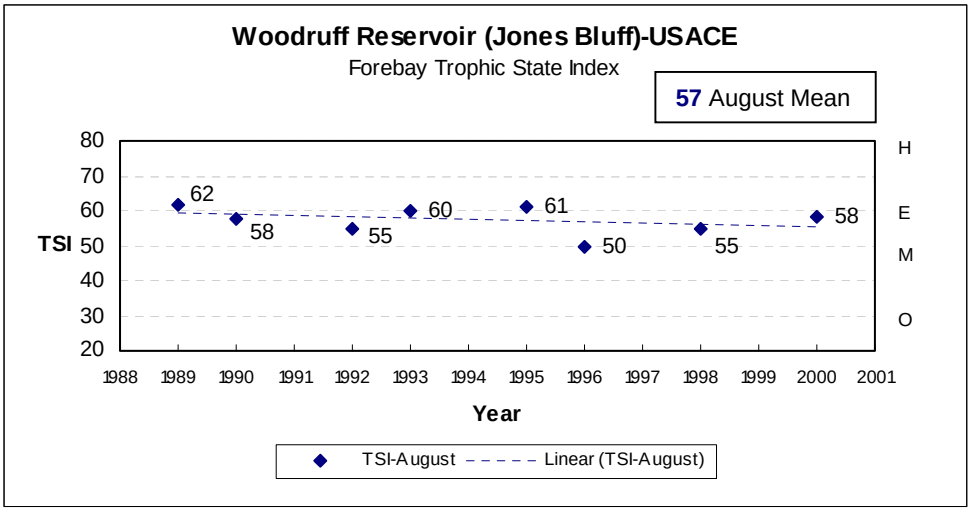
Lake/Reservoir	Support Status	Support Size (acres)	Total Size (acres)
Alabama River Basin			
Woodruff (Jones Bluff) Reservoir	Full	12,510	12,510
Dannelly (Millers Ferry) Reservoir	Full	17,200	17,200
Claiborne Reservoir			3,936
• Claiborne Reservoir	*Full*	*2,243*	
• Claiborne from Rockwest Creek to Bear Creek	*Non*	*1,693*	
Total Sizes** (acres) **for Full/Non Support, & the ALRB	**Full**	**31,953**	**33,646**
	Non	**1,693**	
Black Warrior River Basin			
Inland Lake	Full	1,095	1,095
Lake Tuscaloosa	Full	5,885	5,885
Bayview Lake	Non	440	440
Lewis Smith Lake	Full	21,200	21,200
Bankhead Reservoir			9,345
• Bankhead Reservoir	*Full*	*8,886*	
• Bankhead Reservoir from Bankhead Dam to Big Yellow Creek	*Non*	*459*	
Holt Reservoir	Full	3,300	3,300
Oliver Reservoir	Full	800	800
Warrior Reservoir	Full	7,800	7,800
Total Sizes (acres) for Full/Non Support, & the BWRB	**Full**	**49,406**	**49,865**
	Non	**459**	
Cahaba River Basin			
Lake Purdy	**Full**	**1,050**	**1,050**
Chattahoochee River Basin			
West Point Reservoir	Full	2,304	2,304
Lake Harding	Full	2,176	2,176
Walter F. George Reservoir (Lake Eufaula)			12,527
• Walter F. George Reservoir (Lake Eufaula)	*Full*	*11,798*	
• Barbour Creek Embayment	*Non*	*729*	
Total Sizes** (acres) **for Full Support & the CHARB	**Full**	**16,278**	**17,007**
	Non	**729**	
Coosa River Basin			
Weiss Lake	Non	30,200	30,200
Lake Neely Henry	Non	11,235	11,235
Logan Martin Reservoir	Non	15,263	15,263
Lay Lake	Non	12,000	12,000
Lake Mitchell	Non	5,850	5,850
Lake Jordan	Full	6,800	6,800
Total Sizes** (acres) **for Full/Non Support, & the CORB	**Full**	**6,800**	**81,348**
	Non	**74,548**	
Escatawpa River Basin			
Big Creek Lake (J. B. Converse Lake)	**Full**	3,600	**3,600**

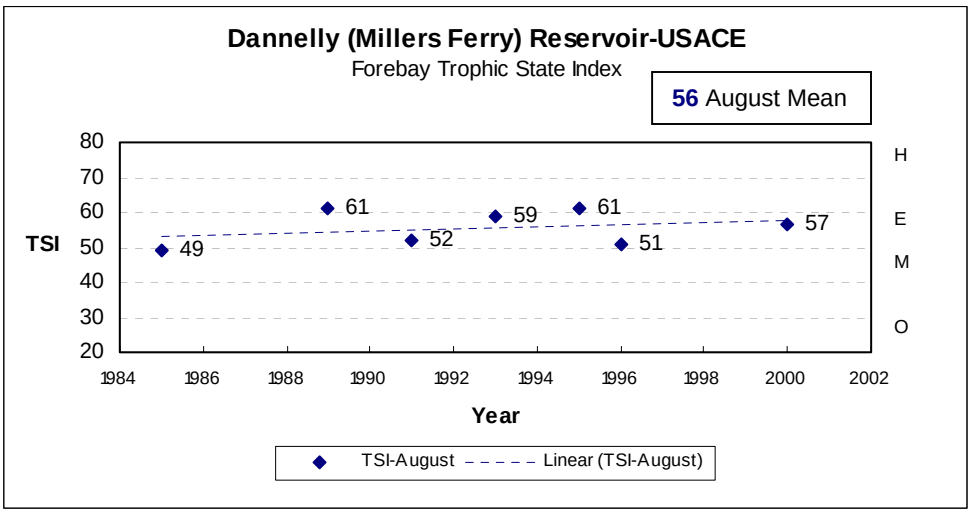
Table 4-12 (cont.)

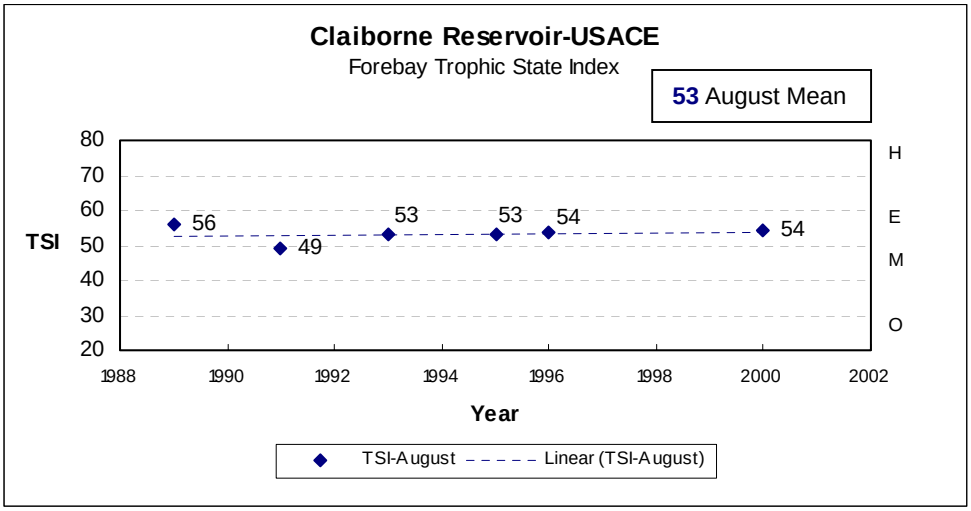
Lake/Reservoir	Support Status	Support Size (acres)	Total Size (acres)
Perdido-Escambia Reservoir			
Frank Jackson Reservoir	Full	3,278	3,278
Lake Jackson	Full	256	256
Gantt Lake	Non	2,767	2,767
Point A Lake	Non	900	900
Total Sizes** (acres) **for Full/Non Support, & the PERB	**Full**	**3,534**	**7,201**
	Non	**3,667**	
Tallapoosa River Basin			
Lake Harris (Lake Wedowee)	Full	10,660	10,660
Lake Martin	Full	39,000	39,000
Yates Reservoir (The Middle Pond)			1,980
• Yates Reservoir	*Full*	*1,724*	
• Sougahatchee Creek Embayment	*Non*	*256*	
Thurlow Reservoir (Lake Talisi)	Full	585	585
Total Sizes** (acres) **for Full/Non Support, & the TARB	**Full**	**51,969**	**52,225**
	Non	**256**	
Tennessee River Basin			
Guntersville Reservoir	Full	66,365	66,365
Wheeler Reservoir			64,350
• Wheeler Reservoir	*Full*	*54,516*	
• Wheeler Reservoir from Wheeler Dam to Elk River	*Non*	*7,380*	
• Flint Creek Embayment	*Non*	*973*	
• Elk River from Wheeler Reservoir to Anderson Creek	*Non*	*1,481*	
Wilson Reservoir	Full	15,500	15,500
Pickwick Reservoir	Full	30,660	30,660
Cedar Creek Reservoir	Full	4,200	4,200
Little Bear Creek Reservoir	Full	1,560	1,560
Bear Creek Reservoir	Full	400	400
Upper Bear Creek Reservoir	Full	1,850	1,850
Total Sizes** (acres) **for Full/Non Support, & the TNRB	**Full**	**175,051**	**184,885**
	Non	**9,834**	
Tombigbee River Basin			
Aliceville Reservoir	Non	8,300	8,300
Gainesville Reservoir	Full	6,400	6,400
Demopolis Reservoir	Full	10,000	10,000
Coffeeville reservoir	Full	8,500	8,500
Total Sizes** (acres) **for Full/Non Support, & the TORB	**Full**	**24,900**	**33,200**
	Non	**8,300**	

9 Trophic State Index Graphs

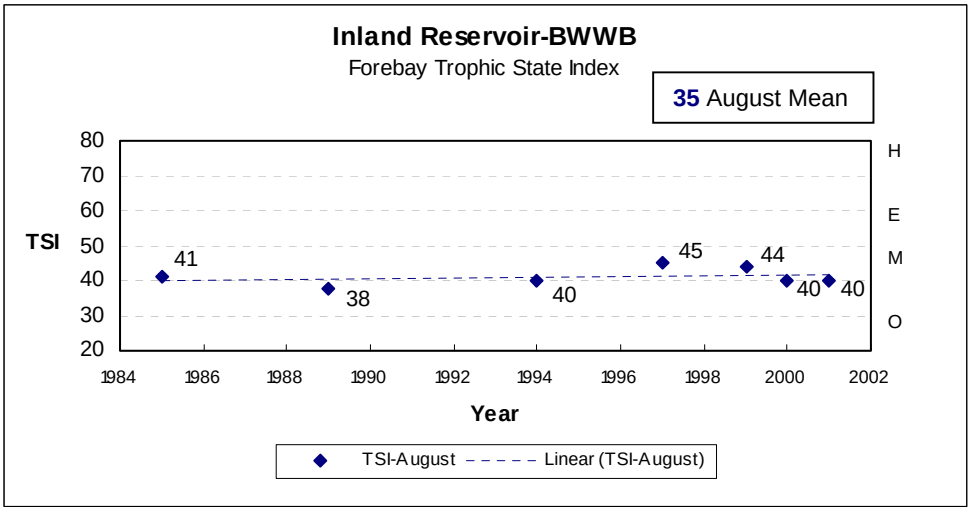
Alabama River Basin

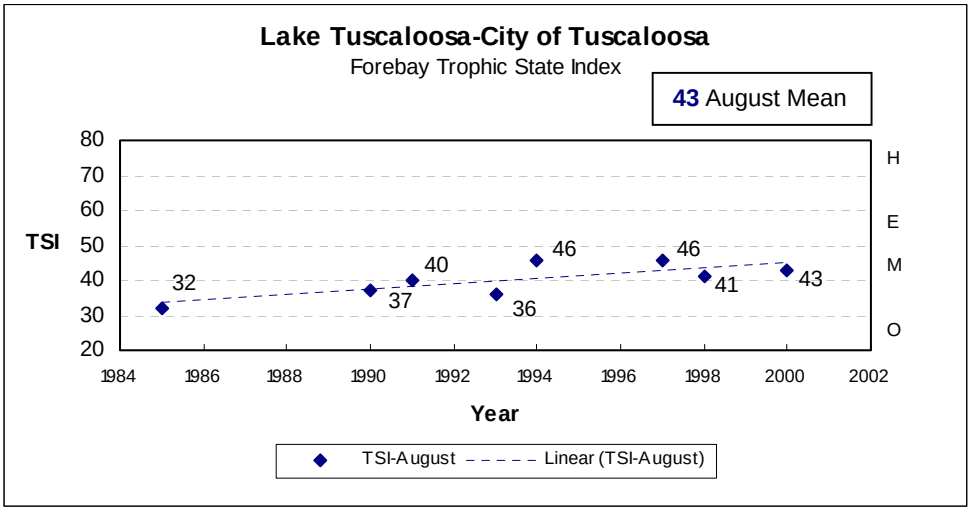


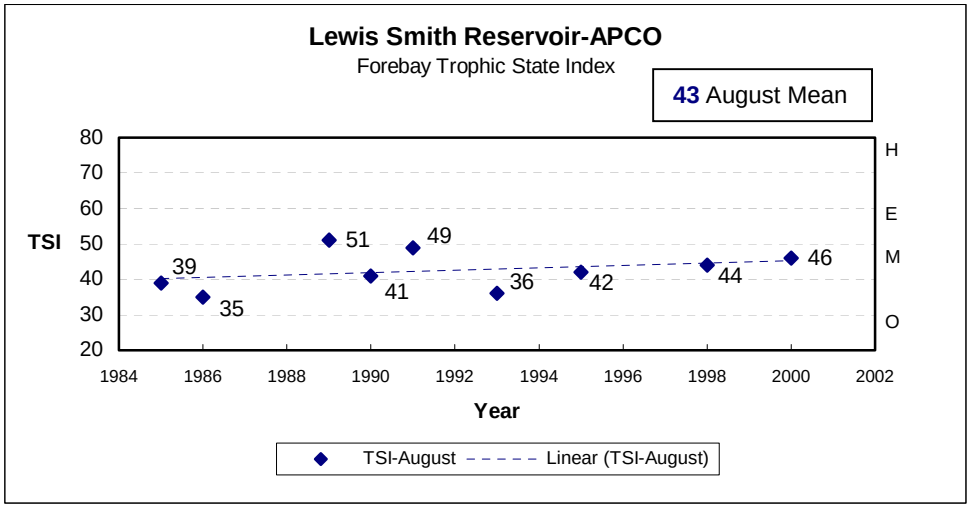


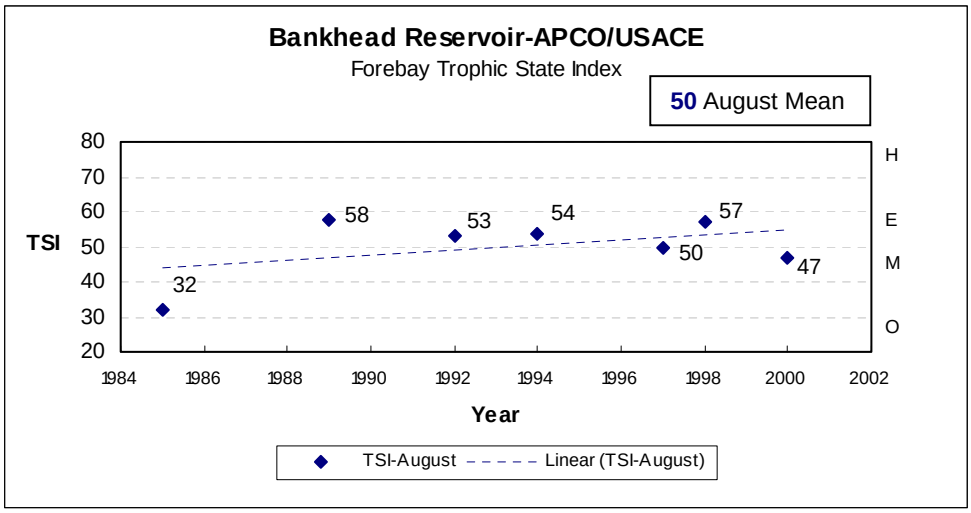


Black Warrior River Basin








Bankhead Reservoir-APCO/USACE
Forebay Trophic State Index
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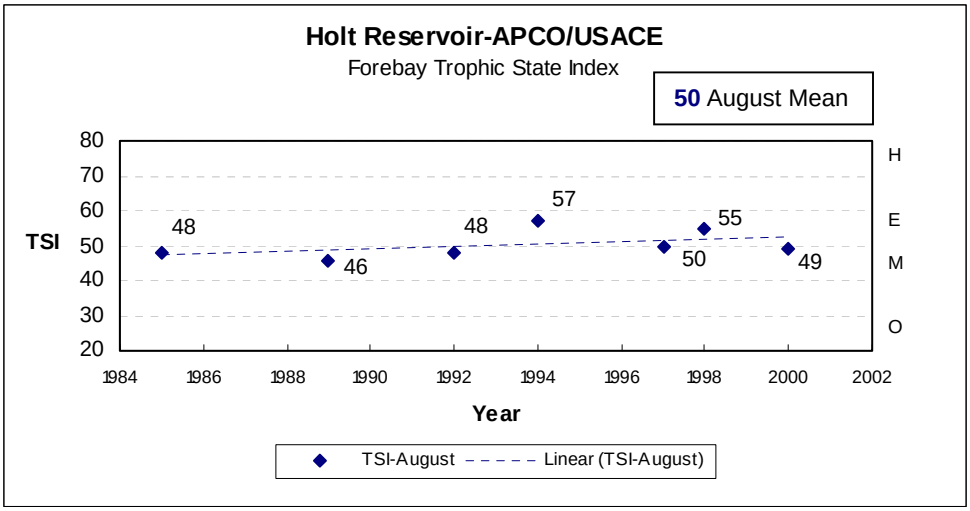
TSI-August
Linear (TSI-August)


Holt Reservoir-APCO/USACE
Forebay Trophic State Index
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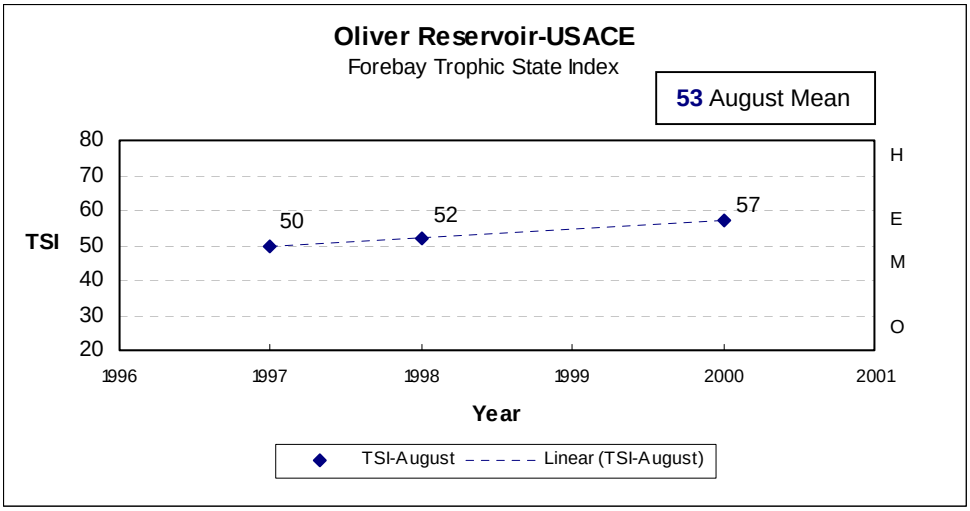
TSI-August
Linear (TSI-August)


Oliver Reservoir-USACE
Forebay Trophic State Index
53 August Mean
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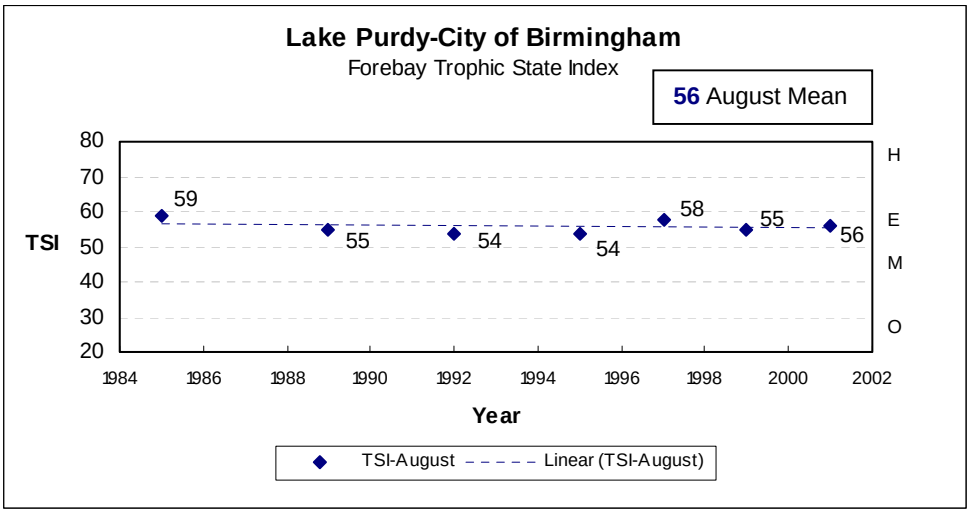
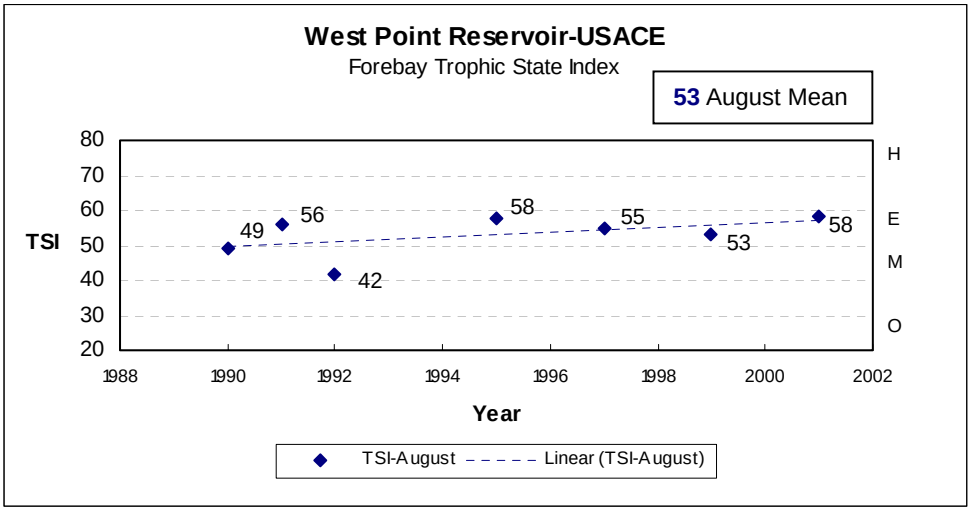
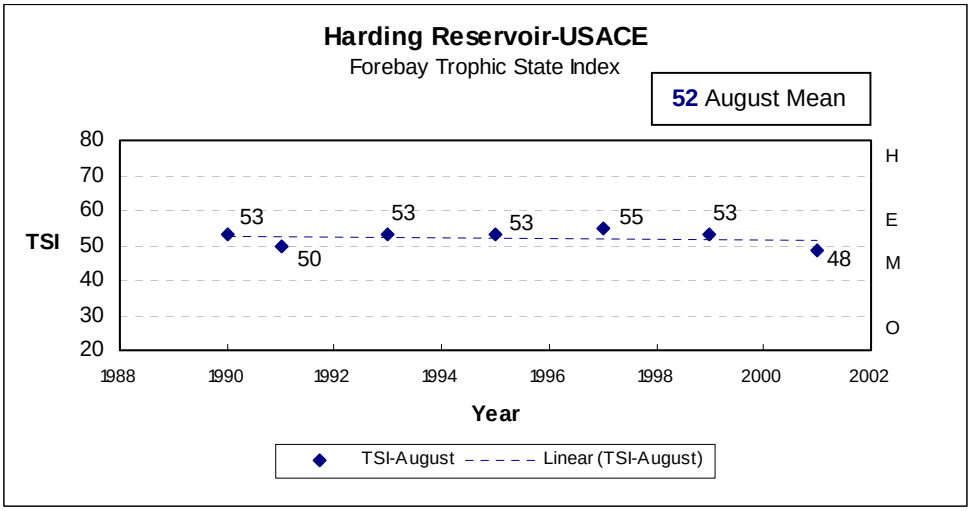
Linear (TSI-August)

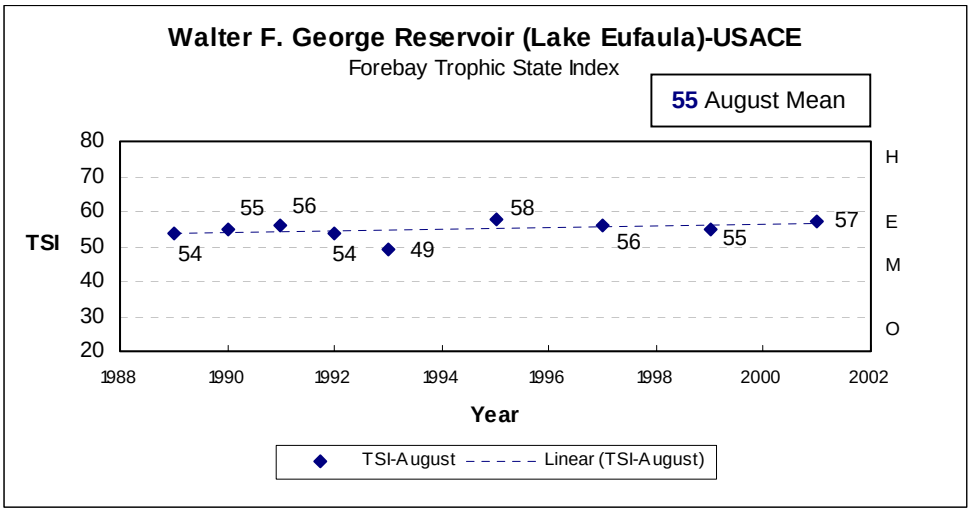
Cahaba River Basin



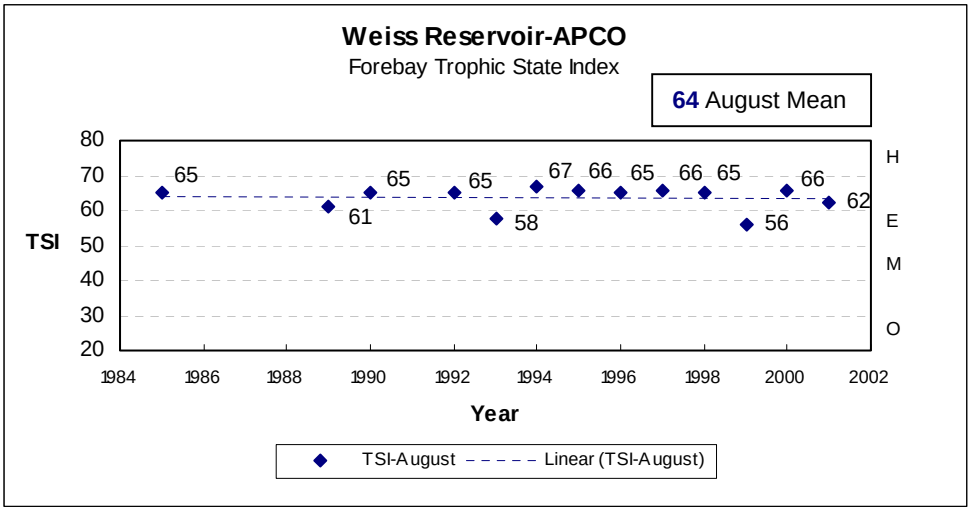
Chattahoochee River Basin

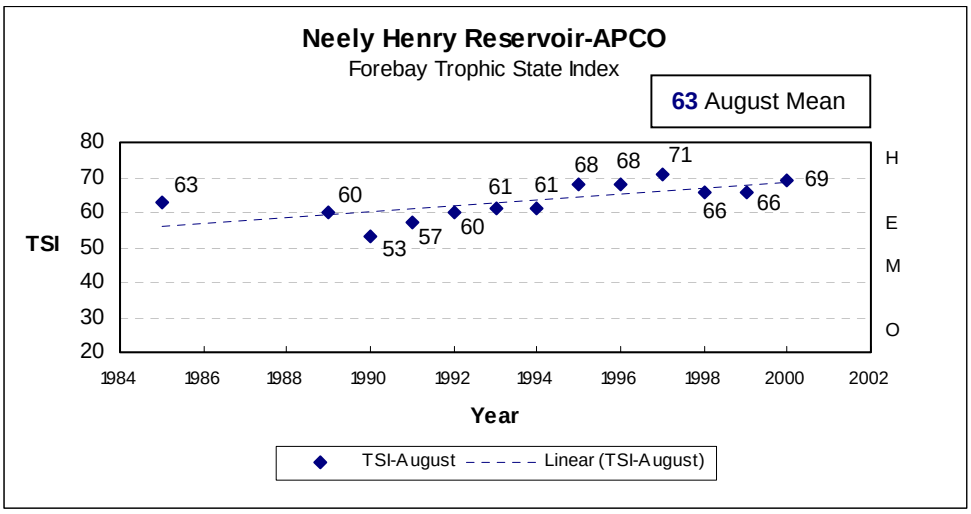


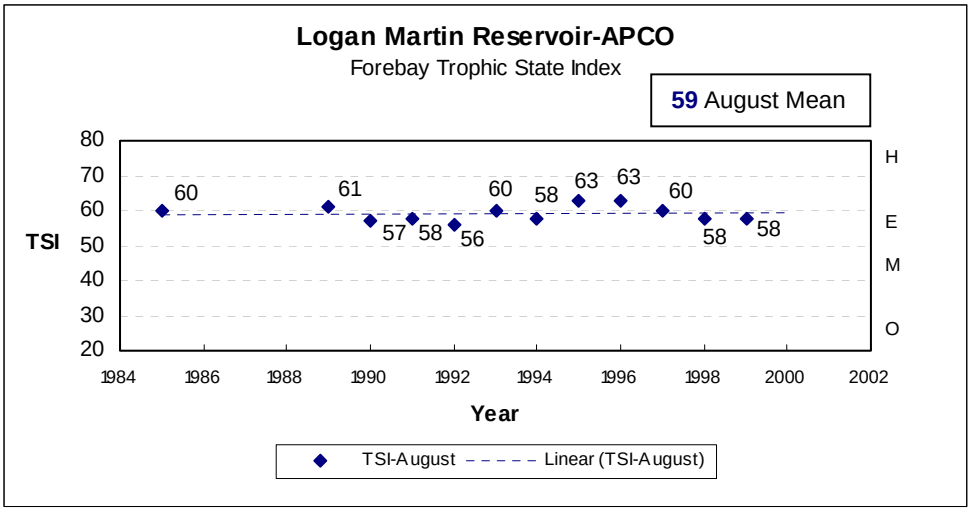




Coosa River Basin






Logan Martin Reservoir-APCO
Forebay Trophic State Index
59 August Mean
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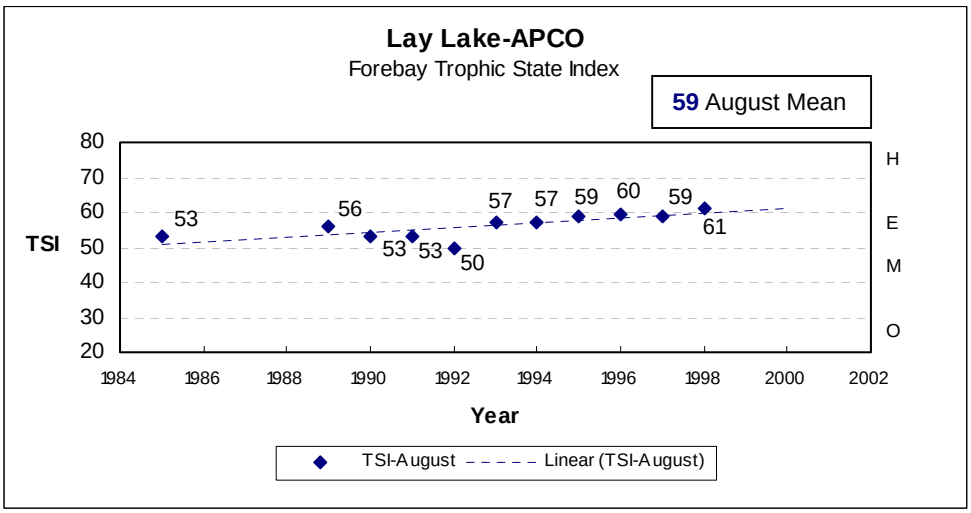
Linear (TSI-August)


Lay Lake-APCO
Forebay Trophic State Index
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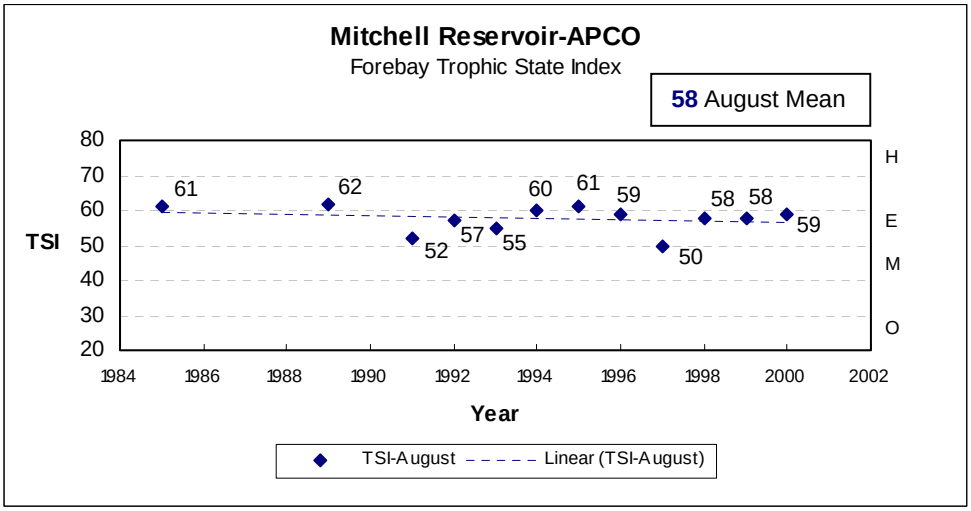
TSI-August
Linear (TSI-August)


Mitchell Reservoir-APCO
Forebay Trophic State Index
58 August Mean
TSI
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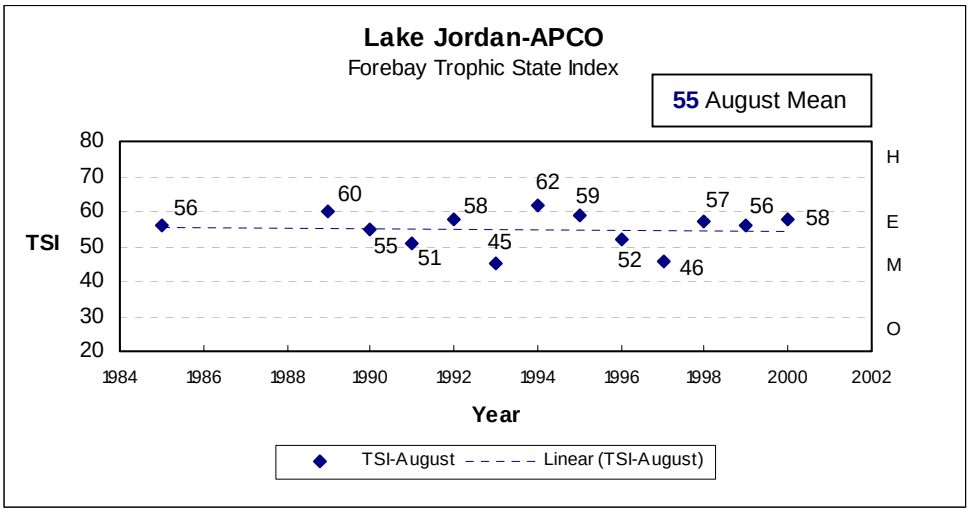
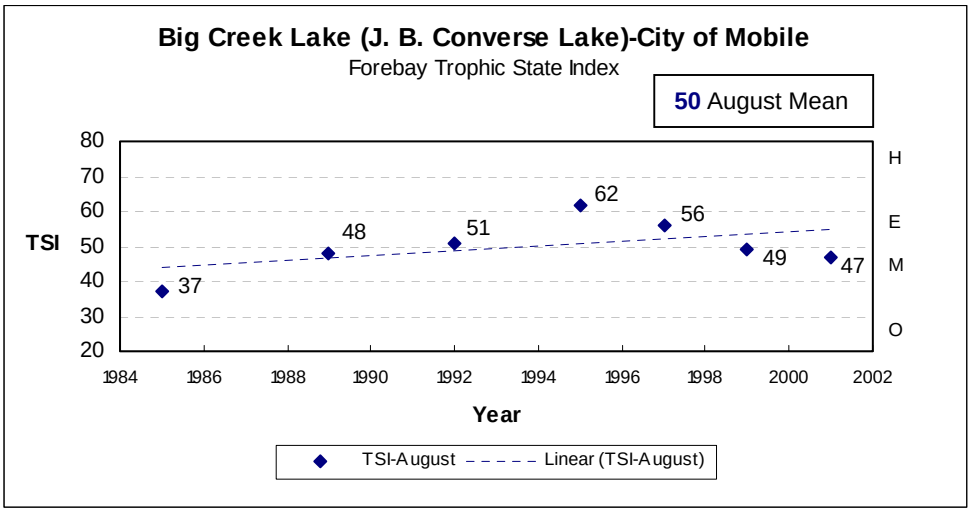
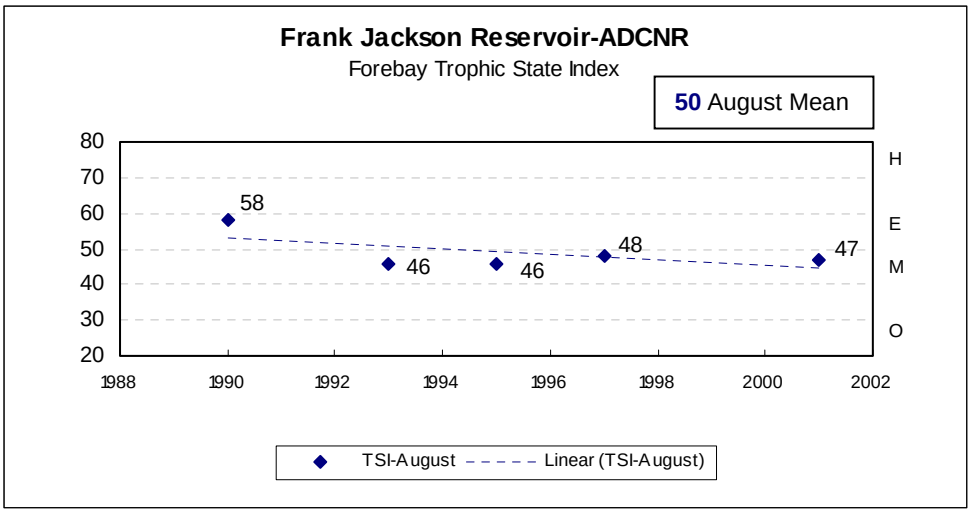
Linear (TSI-August)

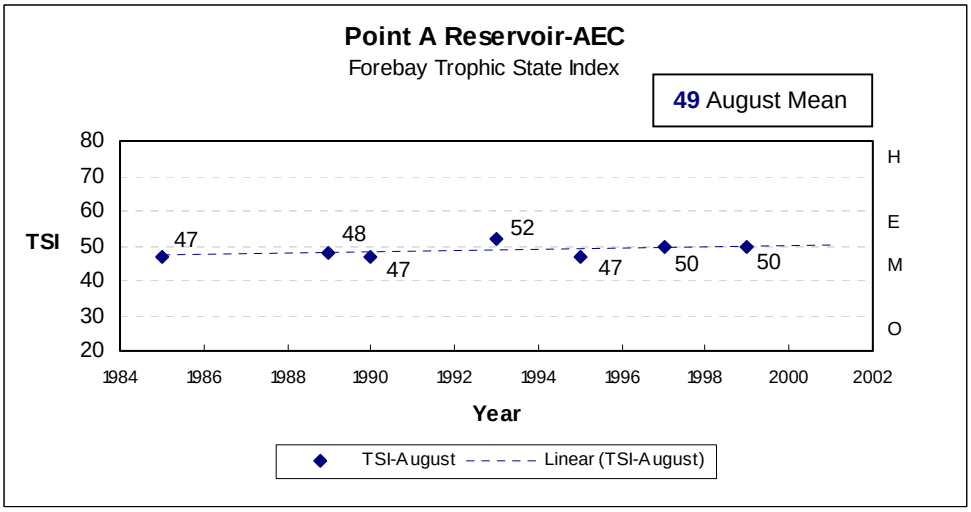


Escatawpa River Basin



Perdido-Escambia River Basin




Point A Reservoir-AEC
Forebay Trophic State Index
49 August Mean
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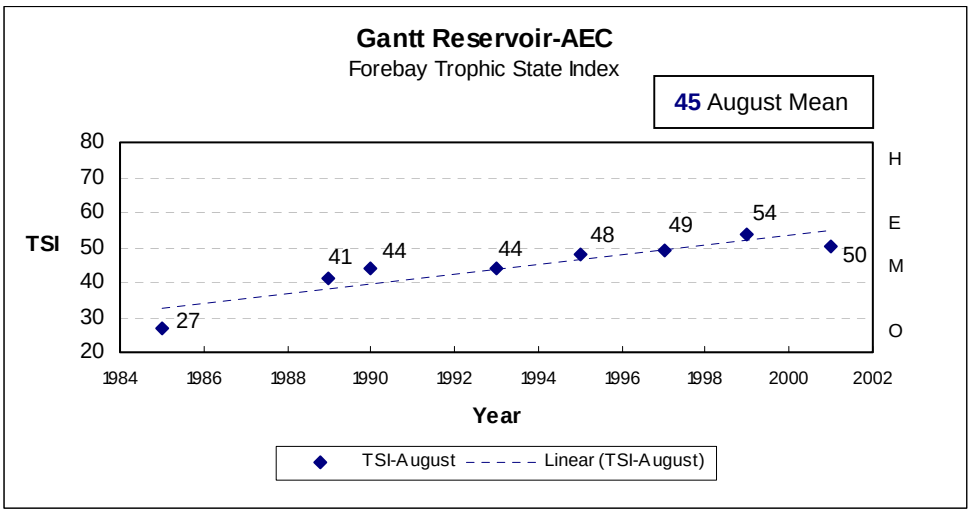
TSI-August
Linear (TSI-August)


Gantt Reservoir-AEC
Forebay Trophic State Index
45 August Mean
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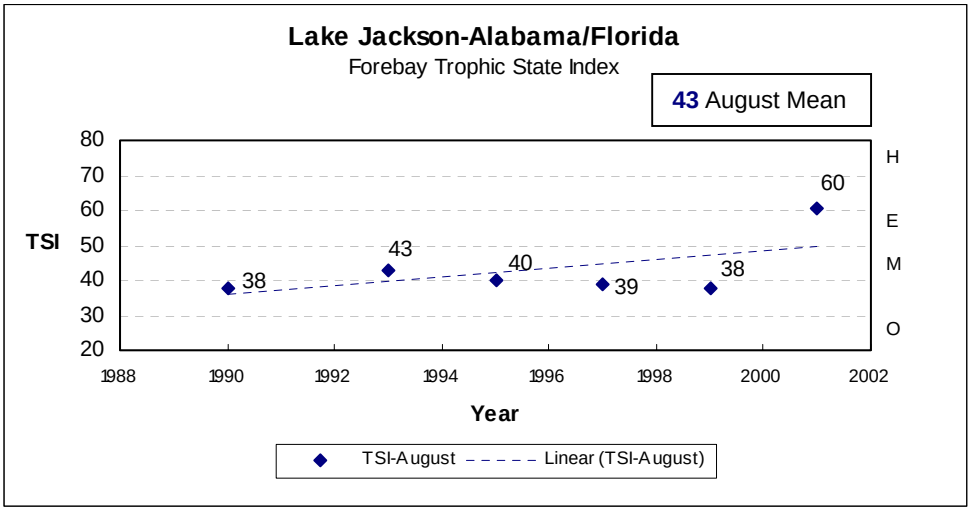
TSI-August
Linear (TSI-August)


Lake Jackson-Alabama/Florida
Forebay Trophic State Index
43 August Mean
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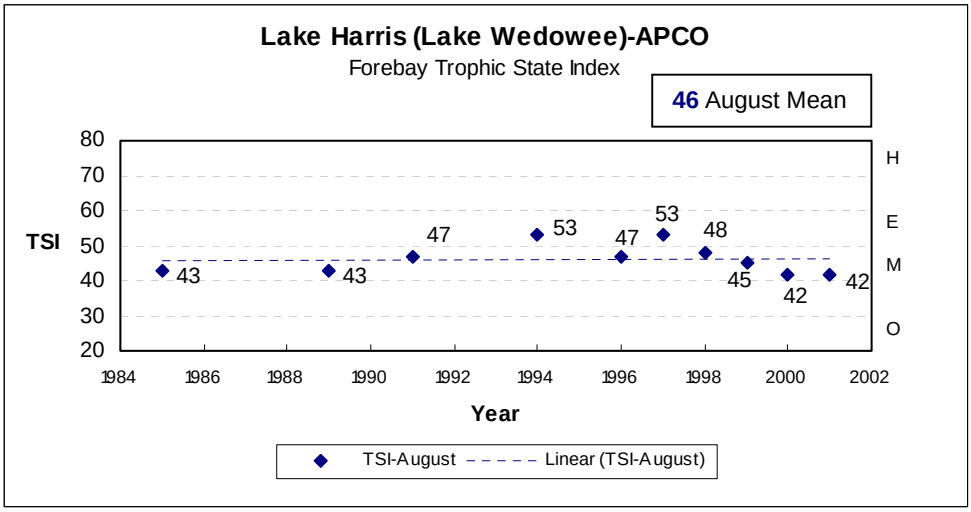
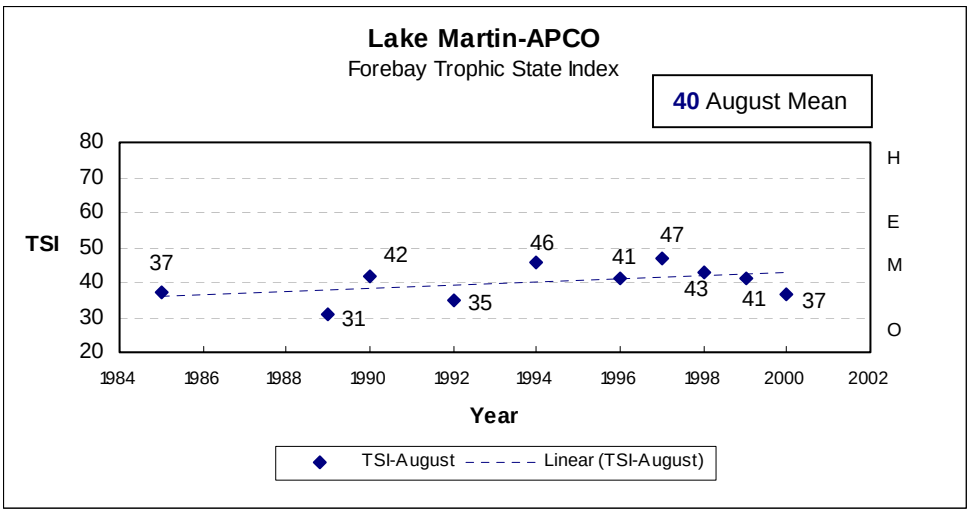
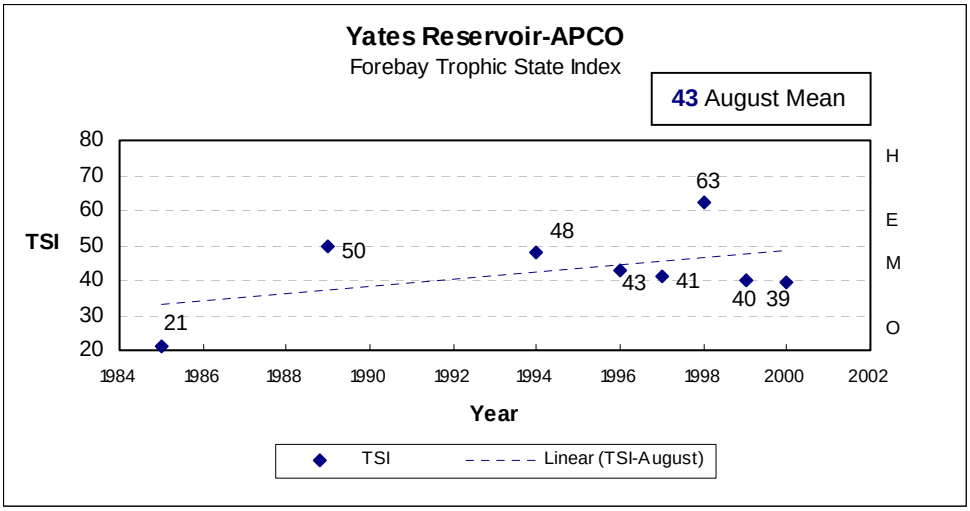
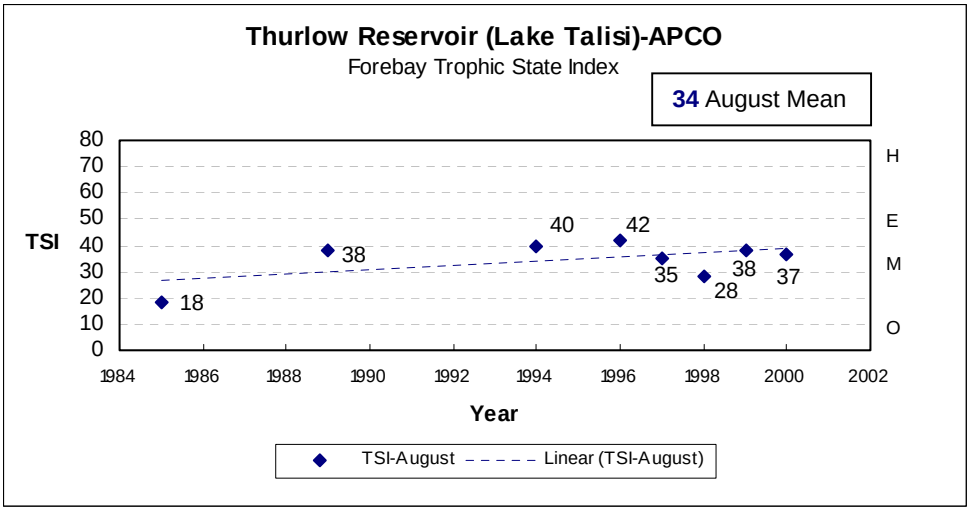
Linear (TSI-August)

Tallapoosa River Basin

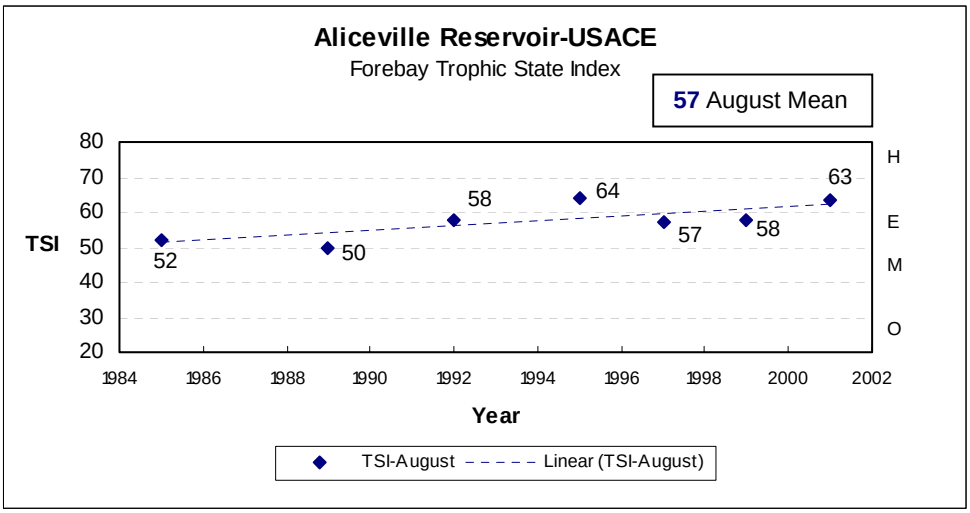


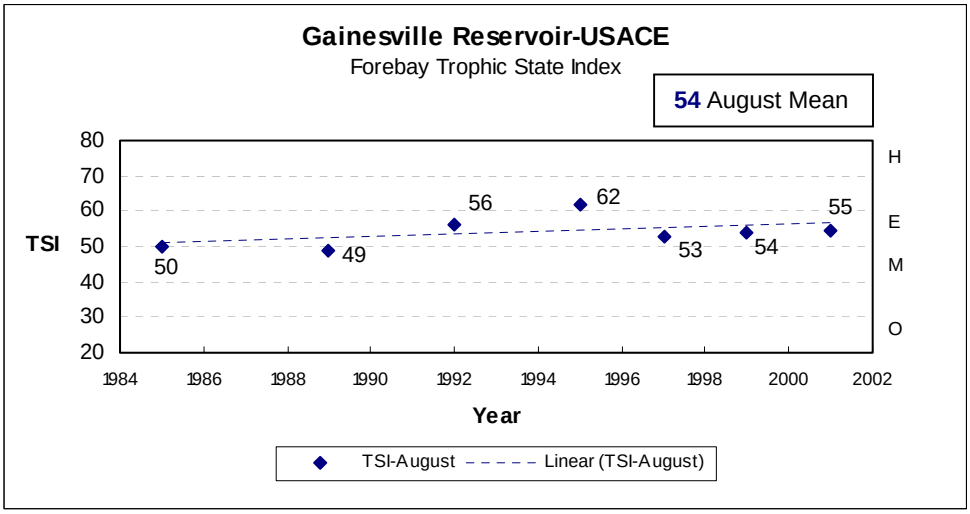


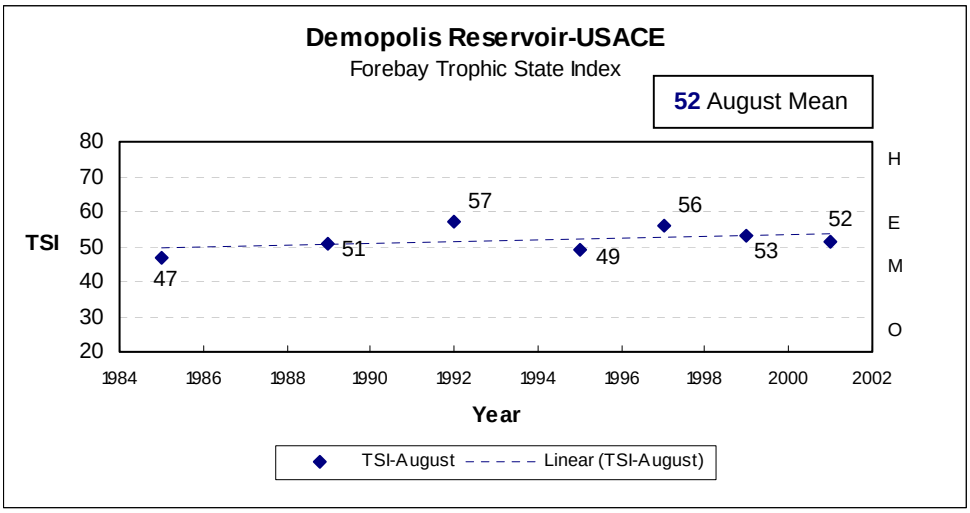




Tombigbee River Basin






Demopolis Reservoir-USACE
Forebay Trophic State Index
52 August Mean
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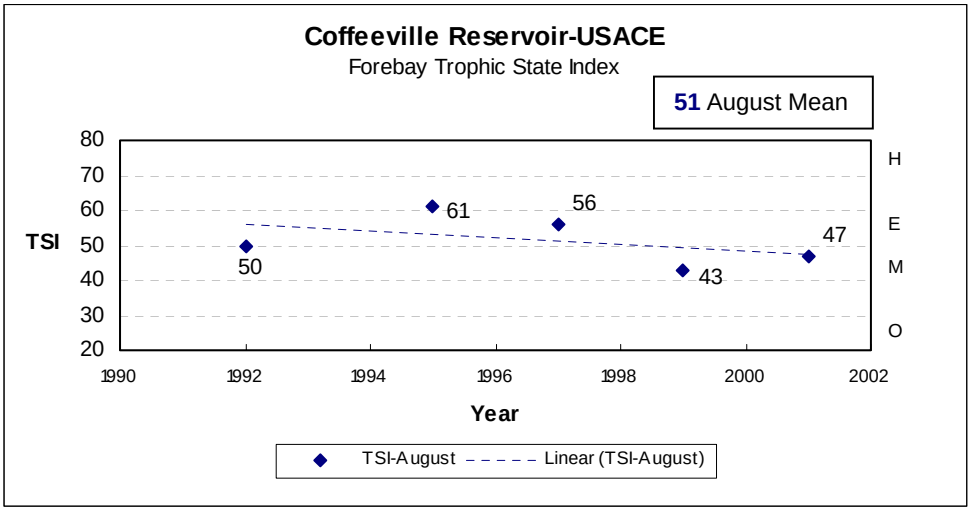
TSI-August
Linear (TSI-August)


Coffeeville Reservoir-USACE
Forebay Trophic State Index
51 August Mean
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TSI-August
Linear (TSI-August)

Part V: The Nonpoint Source Management Program

1 Overview

Since 1989, statewide nonpoint source (NPS) program management efforts in Alabama have greatly expanded in magnitude and scope in order to respond to CWA Section 319 grant guidances, additional acquisition of data and information, as new priorities emerge, and as needs are identified. Institutionalization of the Section 319 program focuses on promoting long-term state and local stakeholder capacity to voluntarily implement management measures regardless of the availability of federal resources. Public/private partnerships are being established; resources identified; and many and varied regulatory and voluntary management measures continue to be implemented. Citizen involvement and development of holistic watershed protection plans are significant contributors to successful implementation of the NPS management program.

As Alabama's population continues to expand, societal demands on its limited water resources continues to increase. The 1989 Alabama NPS Management Program was updated in 1999 and subsequently approved by EPA in September 2000 (effective October 2000). The document is dynamic and is designed to enhance opportunities for collaboration and to effectively and efficiently restore impaired waters and prevent impairments to threatened waters. It can be used a fundamental management tool to integrate statewide interests, expertise, planning, implementation, and resources, i.e., it provides a unifying framework for all stakeholders to, "work off the same page." The document promotes a flexible, targeted, iterative, and broad-based statewide and watershed protection approach.

The CWA Section 319 Alabama Nonpoint Source Management Program (Rev. 1999) document may serve as a NPS reference for this CWA Section 305(b) Report to Congress. It provides an overview of federal, state, and local programs, resources and assistance; plans, strategies, goals, and objectives; assessment and monitoring information; and management measures. Implementation timelines, stakeholder feedback loops, and evaluation indicators are used to measure results. The management program addresses a mix of water quality and technology based programs and presents a combination of regulatory, voluntary, financial and technical assistance programs needed to protect and maintain beneficial uses of surface and groundwater as expeditiously as possible. The document also incorporates coastal NPS management program efforts relate to the *Coastal Zone Act Reauthorization Amendment (CZARA),* the *Weeks Bay National Estuarine Program (NEP) Management Plan*. Of particular interest is implementation of the Alabama *Clean Water Partnership* program.

Alabama has received annual CWA Section 319(h) demonstration grant appropriations since 1990 to address a plethora of NPS runoff pollution problems (Table 4-1). Since 1990, Alabama has received approximately $19 M of Section 319(h) federal grant funds. Alabama consistently ranks 4th in the total amount of Section 319(h) grant funds among EPA Region 4 states. Since 1990, approximately 150 cooperative agreements have been executed. Grant awards are generally used as "seed" money to "kick-start" implementation of management measures and the NPS components of holistic watershed protection plans. Stakeholders provide a minimum of 40% nonfederal match.

Table 5-1
Section 319(h) Nonpoint Source Grant Allocations

Section 319	1990	1991	1992	1993	1994	1995	1996[a]	1997	1998	1999	2000	2001
Incremental Funds										1.95	1.94[c]	1.94
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]	2.58
Non-Fed ($ M)	.57	.79	.96	1.0	1.0	2.6	1.4	1.7	1.4	2.6	2.6	1.7

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

a. Management Program Update

The updated Alabama NPS Management Program and annual NPS River Basin Assessment Reports are used by resource agencies, interest groups, and citizens as statewide references for developing, coordinating, and implementing NPS plans and programs. It provides a focal point for discussing and resolving NPS runoff problems together. The Alabama NPS Management Program document is available for review or download on ADEM's Webpage at:
http://www.adem.state.al.us/EnviroProtect/WatershedMan/watman/mgtplan/mgtplan.htm
Stakeholders may direct comments to the ADEM NPS Unit at: Telephone 334-394-4354; Fax 334-271-7950; and/or E-mail Mr. Norman Blakey nb@adem.state.al.us. The document is dynamic and is expected to be updated as additional monitoring and other information is made available, as problems are identified, priorities change, or needs emerge.

b. Progress and Challenges

Much progress has been made in Alabama to protect water quality and water quality continues to be improved. However, nonpoint source pollution or "runoff pollution" is a special concern because it is often difficult to ascertain specific sources and causes; management measures are generally "voluntary," and funding and other resources are insufficient to address problems holistically.

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 is primarily a voluntary program involving 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 stressors upon limited natural resources and land.

Unlike point source pollution, which may be relatively easily collected and treated, NPS pollution in Alabama is primarily addressed through citizen education and outreach and voluntary adoption of practical and cost-effective landuse management practices. Management measures are generally designed to allow for the continuation of everyday activities while reducing or preventing NPS pollutant runoff.

Many of Alabama's NPS management measures and programs focus on "*pollution prevention*" or "*source reduction*." Regardless of the pollution "source" (e.g., agriculture, silviculture, resource extraction, construction/urban, etc.,) or cause (e.g., nutrients, pesticides, pathogens, siltation, etc.,), the Alabama program supports cost-effective and

environmentally protective management measures that efficiently reduces or abates runoff of the targeted pollutant. Much effort and resources are expended to develop and implement watershed protection plans with clearly stated, achievable, and measurable goals and objectives.

One challenge for resource agencies, policy makers, and citizens is how to cooperatively implement NPS management measures successfully, while concurrently finding ways to integrate new, unique, or emerging needs and programs. Water quality protection efforts could be better targeted in Alabama using inclusive stakeholder-developed plans and strategies to achieve common goals and objectives. However, development and "adoption" of well-designed river basin and watershed protection plans continue to be impediments to state and local efforts to protect water quality. Limited availability of staff and other resources to effect long-term, self-sustaining watershed protection efforts, develop watershed protection plans, and efficiently identify and target management measures for site-specific NPS pollutant sources and causes are program constraints.

Since NPS pollution is primarily a "people problem," the Alabama NPS program advocates building local capacity to effect changes by providing many and varied opportunities for volunteer involvement. When NPS problems do occur, it is generally because of a lack of knowledge or a perceptual problem. Although it is difficult at times to measure or quantify management program implementation "successes," especially short-term duration (1-5 years), citizen education, outreach, and involvement is - and will remain - a primary NPS pollution management tool for all Section 319 funded endeavors.

c. Management Priorities and Categories

Nonpoint source pollution continues to threaten or impair Alabama's land, water, air and other natural resources. No single agency possesses the authority, staffing, expertise, or funding to address all aspects of the NPS management program. These and other impediments exacerbate efforts to implement a holistic statewide NPS management program.

The successful Alabama Clean Water Partnership (CWP) program is striving to coordinate statewide management priorities using a river basin and local watershed protection approach. The CWP is assuming a leading role in coordinating, planning, and implementing watershed protection efforts in Alabama. In addition, the ADEM Office of Education and Outreach (OEO) is assisting stakeholders in addressing natural resource, economic, political, and social issues in the watershed. The OEO affects watershed protection by continuing to identify, motivate, and sustain partnerships; providing education and outreach; and providing plan development assistance and other resources. Implementation of total maximum daily loads (TMDL) as they are developed for the 1996 CWA Section 303(d) List of Impaired Waters is a priority consideration.

Watershed based plans, particularly those that provide for implementation of TMDLs, are significantly lacking in Alabama and will require many years to develop. Development of holistic watershed based plans to address all pollutant sources and causes of impaired and threatened waters is a NPS program priority in Alabama. While watershed protection goals, objectives, and strategies may be similar, implementation of effective, long-term management measures necessitates the development of dynamic plans and creative solutions. Few holistic watershed-based plans are in-place (e.g., Weeks Bay; NEP), while others are in various stages of development (e.g., Upper and Middle Coosa River Basin; Wolf Bay, Warrior River Basin, Cahaba River Basin,

Tennessee River Basin). Many impaired watershed stakeholders are beginning to realize the need to develop comprehensive point /nonpoint source watershed protection plans, while others are just beginning to form partnerships or initiating plan development processes. Table 4-2 list EPAs designated NPS pollutant categories/subcategories that watershed stakeholders and plans are addressing.

Table 5-2
Designated EPA Nonpoint Pollutant Categories/Subcategories

Major Nonpoint Source Pollution Categories And Subcategories	
Agriculture	Non-irrigated crop production Irrigated crop production Specialty crop production (e.g., truck farming and orchards) Pasture land Range land Feedlots - all types Aquaculture Animal holding/management areas
Silviculture	Harvesting, reforestation, residue management Forest management Road construction/maintenance
Construction	Highway/road/bridge Land development
Urban Runoff	Storm sewers (source control) Combined sewers (source control) Surface runoff
Resource Extraction/ /Exploration/ Development	Surface mining Subsurface mining Placer mining Dredge mining Petroleum activities Mill tailings Mine tailings
Land Disposal (Runoff/Leachate From Permitted Areas)	Sludge Wastewater Landfills On-site wastewater systems (septic tanks, etc.) On-site wastewater systems (septic tanks, etc.) Hazardous waste
Hydrologic/ Habitat Modifications	Channelization Dredging Dam construction Flow regulation/modification Bridge construction Removal of riparian vegetation Streambank modification/destabilization
Other	Atmospheric deposition,, Waste storage/storage tank leaks Highway maintenance and runoff Spills In-place contaminants Natural
Source unknown	

d. Management Program Implementation Strategy

The Alabama Nonpoint Source Management Program focuses on preventing or eliminating water quality impairments related to NPS runoff pollutants and protecting unimpaired and threatened waters. It promotes a cooperative partnership concept, building local capacity for stakeholders to address local problems. The program also promotes a 5-year rotational river basin approach. The rotational approach is used to assess water quality, identify specific NPS problem sources and causes, build and support partnering, devise management strategies, coordinate and fund projects, and measure management measure implementation successes. These approaches appear to be the most appropriate mechanisms that can assure that all water quality concerns are addressed holistically and in a timely and cost effective manner using a voluntary approach.

Successful implementation requires much integration and coordination of programs among agencies and watershed protection interests. The Alabama NPS Management Program has a formidable but achievable task of integrating many and varied programs including the traditional NPDES permit program, surface and groundwater protection efforts, TMDLs, monitoring and assessments, etc., using very limited NPS program resources. Continuous cooperation and collaboration with all resource providers and stakeholders are a program priority. The statewide NPS management approach parallels other coastal NPS management measures, and is not in lieu of (e.g., NEP, CZARA, and the Alabama Coastal Program). The ADEM also has a good working relationship with other resource providers including the USDA-NRCS and FSA (federal cost-share programs) and the Alabama Soil and Water Conservation Committee (state agricultural cost-share program). In addition, Section 319 funded projects are cooperatively addressing wetlands protection (ADCNR), resource extraction (OSM; ADIR), failing septage systems (ADPH), silviculture (AFC); education and outreach (ACES), and many other pollutant categories and subcategories.

e. 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 citizen advisory groups. ADEM and other agencies utilize this information to fill in gaps that are identified by other assessment efforts and to plan for and implement management measures.

The ADEM NPS Unit initiated a 5-year rotational river basin approach beginning with an FY96 Section 319 grant. Efforts involved assessing and identifying the sources and causes of NPS impacts to water quality, and then prioritizing NPS impacted watersheds for remediation. All major river basins have now been assessed except for the Tombigbee and Mobile River Basins (scheduled for FY2001 Section 319 funding). Final assessment reports are in various stages of completion due to the lag time associated with planning, collection, analyses and identification, writing, peer review, and publishing. Water quality assessment reports will be made available on the ADEM website as time and resources allow.

As the river basin assessments identify nonpoint source impairments, management measures are targeted to address specific pollutant sources and causes at priority sites. However, numbers and types of “on-the-ground” management measures may vary because of logistics, scheduling, resource availability, or a need for additional water quality information. Unanticipated demands and priorities for limited resources may also

influence the prompt targeting of management measures. State funding is inadequate and the Section 319 guidelines (FY2002 and subsequent years) imply that FY2003 funds should target Section 303(d) listed streams, and watershed plans must be in-place before Section 319 projects can be approved or funds expended. Very few watershed protection plans in Alabama have been developed and are "in-place. Thus Alabama may not be eligible to access all the FY2003 Section 319 grant funds allocated to the state

In keeping with the states 5-year rotational river basin approach, Section 319(h) proposals are generally requested the fiscal year following completion of the river basin's assessment. Table 4-3 provides a list of the major river basin assessment groupings.

Table 5-3
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)	GA Schedule
		FL (no date)	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

f. NPS River Basin Approach

Development and implementation of comprehensive watershed protection plans is a priority in Alabama. Stakeholders agree on a common set of methods, processes, and measurable criteria for dealing with NPS problems on a priority basis within prescribed timelines (*stakeholders are all agencies, organizations, and citizens that are involved with or affected by resource management decisions*). Project sites and resources are prioritized to ensure that limited NPS resources are utilized effectively and wisely. Partnership input and coordination allows 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 NPS management program is achieving this approach using the rotational river basin strategy presented in Table 4-4.

Table 5-4
Rotational River Basin Approach Strategy

1.	Assess NPS water quality in all major river basins at least once every 5 years
2.	Incorporate assessment information into Section 319 project workplans; Alabama NPS Assessment Report; CWA Section 305(b) Report to Congress; CWA Section 303(d) List of Impaired Waters; as well as other reports and lists
3.	Identify impaired water quality sites, sources, and causes
4.	Form new partnerships and/or provide resources to promote and sustain on-going local watershed protection efforts
5.	Develop and revise watershed protection plans as needed to address pollutants of concern
6.	Prioritize impaired sites and determine needed management measures (types, numbers, etc)
7.	Implement management measures based on comprehensive watershed management plans
8.	Integrate all restoration and protection activities within a well-defined priority area using a combination of resources [e.g., Section (303(d)/TMDL; Alabama Clean Water Partnership; Section 319, EQIP, etc.]
9.	Measure progress and success using feedback loops. Revise plans as necessary.

The 5-year river basin approach neither replaces nor supercedes local watershed protection or assessment initiatives. Instead, it provides a long-term water quality assessment and implementation mechanism to efficiently coordinate statewide NPS management activities.

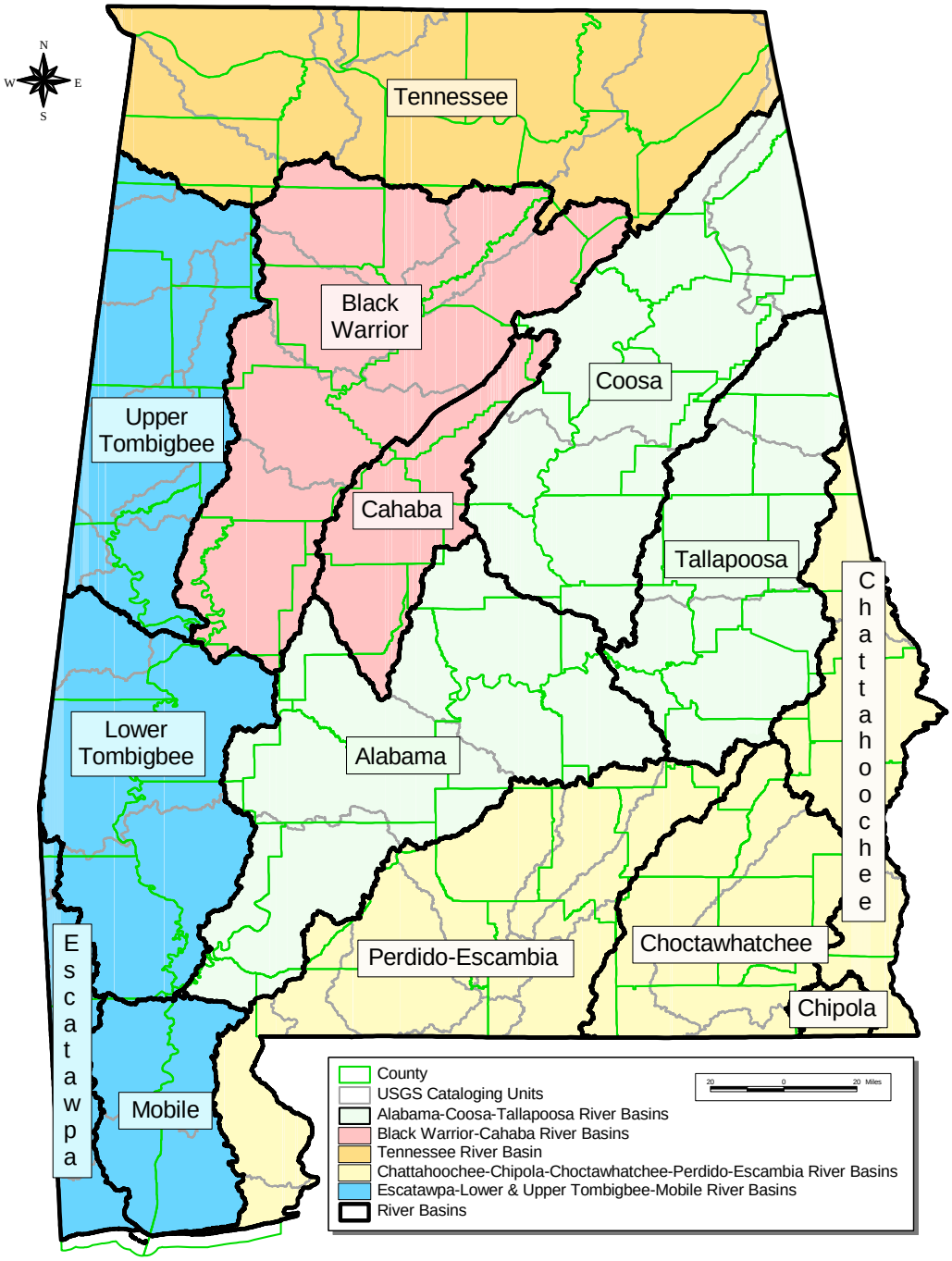
It is essential that stakeholders understand that planning and implementation of the river basin management approach will require substantial long-term commitments of time, efforts, resources, partnering and coordination, and may encompass multiple "5-year" cycles. Measurable water quality improvements and successes may be <1 year, but may be as long as 5, 10, 15, 20, or more years in the future.

The 5-year rotational NPS river basin assessment approach is summarized in Table 4-5. The assessment cycle continually rotates and repeats upon itself. Each major river basin assessed (or at least one watershed "nested" within a basin "grouping") will be "treated", as resources allow, 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 implemented beginning in Fiscal 2004.

Table 5-5
5-Year Rotational NPS River Basin Assessment Status

	Major River Basin	Assessment Schedule
1.	Cahaba; Black Warrior	(Year 1. Complete)
2.	Tennessee	(Year 2. Complete)
3.	Chattahoochee; Chipola; Choctawhatchee; Escambia; Perdido	(Year 3. Complete)
4.	Coosa; Tallapoosa; Alabama	(Year 4. In Progress)
5.	Mobile; Escatawpa; Lower Tombigbee; Upper Tombigbee	(Year 5. FY02)
6.	Cahaba; Black Warrior	(Year 6. FY03)

Figure 5-1
Alabama's
Nonpoint Source Screening Assessment Watersheds



Study Year		Nonpoint Source Screening Assessment River Basin(s)
1st	2nd	
1997	2002	Black Warrior-Cahaba
1998	2003	Tennessee
1999	2004	Chattahoochee-Chipola-Choctawhatchee-Perdido-Escambia
2000	2005	Alabama-Coosa-Tallapoosa
2001	2006	Escatawpa-Lower & Upper Tombigbee-Mobile

Mike Rief-ADEM Water Quality Branch
Projection-Geographic
Datum-NAD83

2 Alabama Water Watch Program/Association

The Alabama Water Watch (AWW) is a statewide program dedicated to developing citizen volunteer monitoring of Alabama's surface waters. It is funded in part by the US EPA Region 4 Clean Water Act §319 and ADEM and is coordinated through the Department of Fisheries and Allied Aquacultures of Auburn University.

Seventy groups submitted water quality data during 2001 with 13 of those groups new to AWW. Monitors have sampled 1,354 sites on 493 waterbodies and submitted approximately 17,000 water quality chemistry data forms since AWW's inception in 1992. Of the 3,301 chemistry data forms received from October 2000 to September 2001 58% of the records were from the Coosa (22%), the Mobile (19%) and the Tennessee (17%) River Basins. Monitors have also submitted 1,677 bacteriological samples during 2001. The AWW has done an excellent job of providing latitude and longitudes (986 stations) with the 2001 data set.

Analysis of the chemistry data for the 422 stations that were sampled at least 5 times revealed that 71% (302 stations) of the stations had no violations of the dissolved oxygen 5.0 mg/L Fish and Wildlife Use Classification standard. The 120 stations that had a violation percentage higher than 10% will be utilized by ADEM for planning future field work. Many of these stations are most likely located on smaller streams that are intermittent having natural low flow conditions during summer and fall months. Additional information on these waters by the volunteer monitors/AWW staff would be valuable. Information such as drainage area, cross-sectional information, flow/depth at consistent point in the waterbody (stage) would allow ADEM Water Quality Branch and Field Operations staff to prioritize sites with potential problems and further maximize its limited resources.

The Alabama Water Watch Program and Association is commended on the success of its public education and training activities in addition to its sampling efforts. Regular meetings are held between ADEM and AWW staff/volunteer monitors and provides the Department with valuable information about concerns of Alabama's citizens as well as positive interaction and dialogue. These meetings allow discussions of not only surface water concerns but involves all the programs administered by ADEM to manage Alabama's environment. The AWW Program is known as a national leader and is frequently called upon by other states for information regarding AWW activities. Figure 5-2 depicts the locations of AWW groups presently sampling Alabama's surface waters. Table 5-5 is indexed to the map and provides each group's name and AWW code.

Figure 5-2

2001 Alabama Water Watch Citizen Monitoring Groups

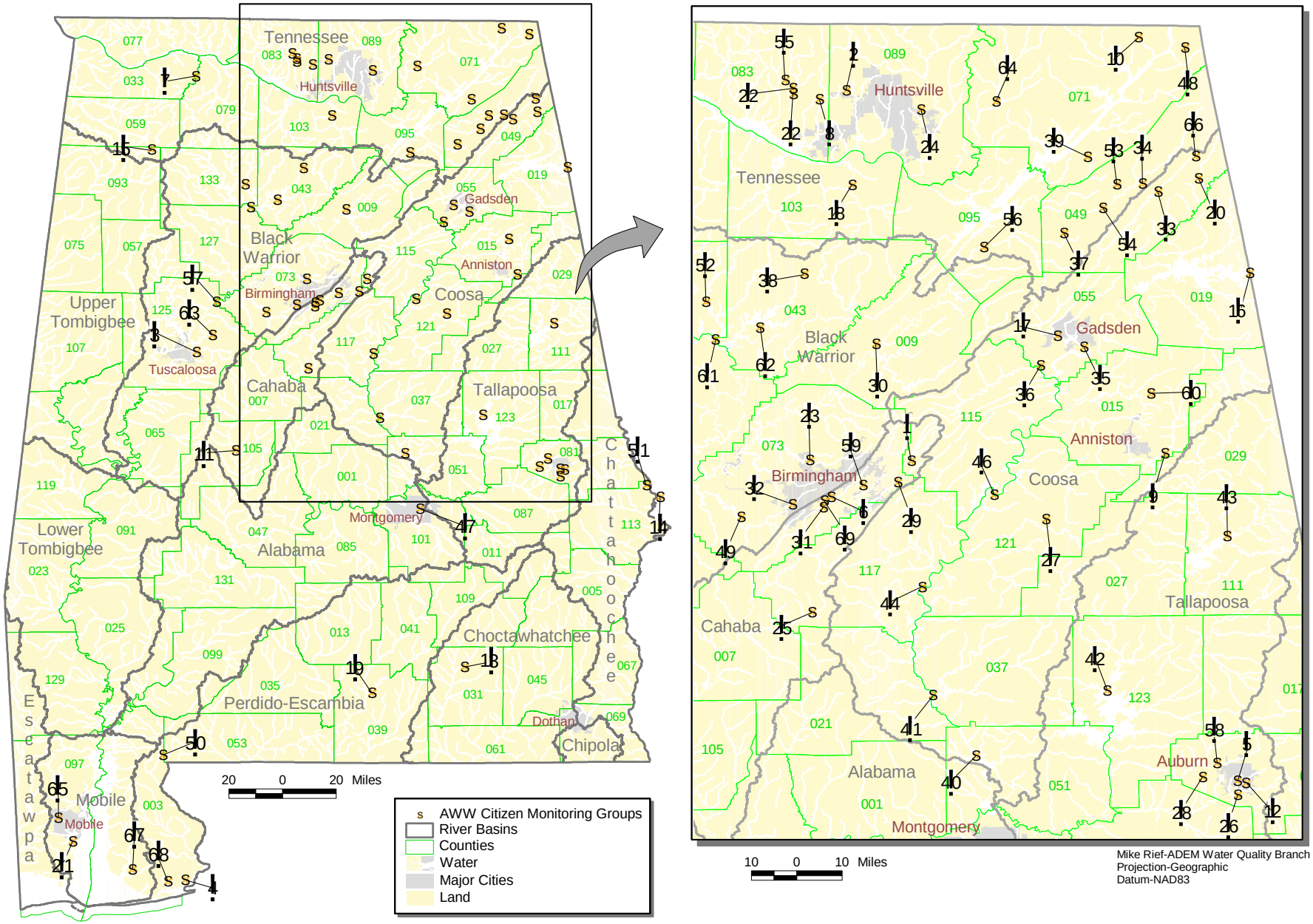


Table 5-5

Active Alabama Water Watch Volunteer Monitoring Groups

Index	Location	Group
1	Acmar Moody Enviro Justice Society	ACMAR
2	Academy of Science & Foreign Language	ASFL
3	AL Enviro Council/ Tuscaloosa	AECT
4	Alabama Coastwatch	COAST
5	Auburn Outing Club	AOC
6	B'ham Zoo/Botanical Gardens	ZOO/BBG
7	Big Nance/Town Creek Water Watch	BN/TCWW
8	Bob Jones High School	BJHS
9	Boys & Girls Club Calhoun Co.	BGCCC
10	Bridgeport Middle School	BPMS
11	Cahaba Basin Project/Judson College	CBP/JUD
12	Chewacla Water Watch	CHEW
13	Coastal Plain Streams Water Watch	CPSWW
14	Columbus High School	CHS
15	Cool Runnings	COOL
16	Coosa River Basin Initiative	CRBI
17	Coosa River Society	COOSRS
18	Cotaco School Environmental Club	COTACO
19	Covington Co. Clean Water Coalition	CCCWC
20	Desoto State Park	DESOTO
21	Dog River Clearwater Revival	DOGRIVER
22	East Limestone Enviro. Club	ELIME
23	Five Mile Creek Action Committee	FMCAC
24	Flint River Action Team	FRAT
25	Friends & Assoc. of the Little Cahaba Org.	FALCO
26	Friends of Chewacla-Uphapee Watershed	CHEWUP
27	Friends of Choccolocco Creek	CHOCCO
28	Friends of Hodnett Creek	HODNETT
29	Friends of Little Cahaba	LILCA
30	Friends of Locust Fork River	FLFR
31	Friends of Shades Creek	SHADES
32	Friends of Valley Creek	FOVC
33	Ft. Payne FFA	FPFFA
34	Ft. Payne High School Science	FPHSS
35	Gadsden Area Water Watch	GAWW
36	Gadsden Christian Home Educators	GCHE
37	Geraldine High School Science	GHSS
38	Hanceville High School Envirothon Team	HANCE
39	Jackson Co. SWCD	JC/SWCD
40	Lake Jordan HOBO	LJHOBO
41	Lake Mitchell HOBO	LMHOBO
42	Lake Watch of Lake Martin	LWLM
43	Lake Wedowee Property Owners Assoc.	LWPOA

Table 5-5 (cont.)

Index	Location	Group
44	Lay Lake HOBO	LLHOBO
45	Limestone Water Watch	LIME
46	Logan Martin Lake Protection Assoc.	LMLPA
47	Montgomery Water Watch	MWW
48	North Sand Mountain School	NSAND
49	Oak Grove School Biology Club	OAK
50	Perdido High School	PERDHS
51	Phenix City Intermediate School	PCI
52	Phi Theta Kappa-Calhoun Comm College	PTK/CCC
53	Plainview High School	PVHS
54	Plainview High School FFA	PVFFA
55	Retired Senior Volunteer Prog. of Limestone Co.	RSVP/LIME
56	Retired Senior Volunteer Prog. of Marshall Co.	RSVP
57	Sand Rock Water Quality Team	SANDRK
58	Save Our Saugahatchee	SOS
59	Sierra Club-Cahaba Group	SCCG
60	Sigma Nu Fraternity-Jackson St Univ.	SN/JSU
61	Smith Lake Civic Association	SLCA
62	Smith Lake Enviro. Preservation Committee	SLEPC
63	Strokers Paddle Club	SPC
64	Three Springs School	TSS/PRR
65	Univ. of South AL Eco-Club	USAECO
66	Valley Head School	VALLEY
67	Weeks Bay Water Watch	WBWW
68	Wolf Bay Watershed Watch	WOLF
69	Cahaba River Society	CRS

Part VI Public Health

1 Fish Tissue Monitoring Program 2000-2001

Results from the Fiscal Year 2001 (fall 2000) fish tissue monitoring program reveal that most fish sampled from river basins targeted for sampling last fall do not have elevated levels of contaminants, according to the Alabama Department of Environmental Management (ADEM). However, polychlorinated biphenyl (PCB) levels in a composite sample of striped bass from upper Lay Reservoir and a composite sample of channel catfish from upper Neely Henry Reservoir were above Food and Drug Administration guideline levels.

No, or very little, bioaccumulation of pollutants was detected in bass and catfish from Claiborne, Dannelly, and Jones Bluff Reservoirs within the Alabama River basin. Similar results were recorded in fish from Guntersville Reservoir in the Tennessee River basin; Harris, Martin, Yates, and Thurlow Reservoirs in the Tallapoosa River basin; and Weiss Reservoir in the Coosa River basin.

As part of the monitoring program, ADEM also checked fish for dioxin from four locations below bleach kraft paper mills. Bass and catfish from below these discharges to the Tennessee River, Tombigbee River, Alabama River, and Conecuh River showed no or very low levels of dioxin in tissue. These results are a continuation of the downward trend established over the last several years following changes instituted by the mills and the initiation of required testing.

The data indicate that PCBs exceeded the FDA guideline of two parts per million (ppm) in a composite sample of striped bass collected in the vicinity of Elliot Island in upper Lay Reservoir. One fish from a sample of six spotted bass also exceeded FDA levels for PCBs at this location. PCB levels in a composite sample of channel catfish collected at Croft Ferry in upper Neely Henry Reservoir also exceeded the FDA level. Composite samples of additional fish species collected from these locations did not exceed the guideline level.

Data from the monitoring program have been forwarded to the Alabama Department of Public Health (ADPH) to determine if new fish consumption advisories or changes to existing advisories will be necessary.

A total of 363 fish were collected from 31 locations in15 water bodies. The FY 2001 sampling included water bodies that have not been sampled in the past as well as some currently under fish consumption advisories issued by the Alabama Department of Public Health.

All samples were analyzed by the ADEM Environmental Laboratory for contaminants with the potential to bioaccumulate (PCBs, arsenic, chlordane, toxaphene, mercury, mirex, DDT, DDD, DDE, dieldrin, dursban, endrin, heptachlor, heptachlorepoxide, endosulfan, hexachlorobenzene, lindane, and certain heavy metals). Bioaccumulation is the process through which low levels of a contaminant in the environment are concentrated in the bodies of plants and animals. Fish are collected in the fall of each year, when their systems are preparing for winter and most pollutants of concern would be expected to be stored at the highest concentrations.

ADEM's monitoring program also included an evaluation of the physical condition of important sport and/or commercial fish species. All fish evaluated were found to be in good to excellent condition. Fish were also checked for external anomalies, such as lesions, tumors, parasites and deformities. Some 86 percent of the fish checked had no anomalies. The most commonly observed anomalies were lesions on the body surface. The occurrence of lesions on fish during spring and fall may be the result of bacterial infections associated with changing water temperatures, spawning stress or a combination of natural occurrences.

These infections are not dangerous to the consumer and the fish are edible if properly prepared.

Results from the FY2000 (fall 1999) fish tissue monitoring program reveal that most water bodies sampled do not have fish with elevated levels of contaminants, according to the Alabama Department of Environmental Management (ADEM). However, PCB levels in fish from the Logan Martin Reservoir and Choccolocco Creek, chlordane levels in fish from Three-Mile Creek and mercury levels in one fish from the Mobile River were at or above Food and Drug Administration guidelines.

No or very little bioaccumulation of pollutants was detected in bass and catfish from Bear Creek, Cedar Creek, Little Bear Creek and Wheeler Reservoirs all within the Tennessee River basin. Similar results were recorded from Gantt and Point A reservoirs in the Conecuh River basin, West Point, Harding and W.F. George reservoirs in the Chattahoochee River basin, the Alabama River near Claiborne, the Tombigbee River in Clarke County, Halls Mill Creek, Rabbit Creek and Mobile River in Mobile County.

As part of the monitoring program, ADEM also checked fish for dioxin from three locations below bleach kraft paper mills. Bass and catfish from below these discharges to the Tombigbee River, the Alabama River and the Mobile River showed no or very low levels of dioxin in tissue. These results are a continuation of the downward trend established over the last several years since the requirement for dioxin testing has been in effect.

The data indicate that PCBs exceeded the FDA guideline of two parts per million (ppm) in largemouth bass, striped bass, blue catfish and black crappie from Choccolocco Creek. PCB levels in largemouth bass, striped bass and black crappie from locations on Logan Martin Reservoir upstream and downstream of Choccolocco Creek also exceeded FDA limits.

Speckled trout and Atlantic croaker collected from one of the two locations sampled on Three-Mile Creek contained chlordane levels exceeding the FDA limit of 0.3 ppm. Chlordane is an organochlorine insecticide used extensively for the control of termites. Most uses of chlordane were banned in 1988.

One largemouth bass from a sample of six taken from the Mobile River near Cold Creek exceeded the FDA guideline of one ppm for mercury. Additional samples of bass and catfish from four other locations in the Mobile River basin did not reveal any mercury exceeding the FDA guideline.

Research indicates that under certain water chemistry conditions, common to “black-water” coastal streams, mercury is prone to bioaccumulate in predatory fish species. Technical experts theorize that the source of the mercury may be from naturally occurring conditions prevalent in coastal waters or may be the result of atmospheric deposition from industrial releases. The neighboring states of Florida and Mississippi have encountered similar situations.

Data from the testing program have been forwarded to the Alabama Department of Public Health to determine if changes to existing fish consumption advisories or the addition of new ones will be necessary.

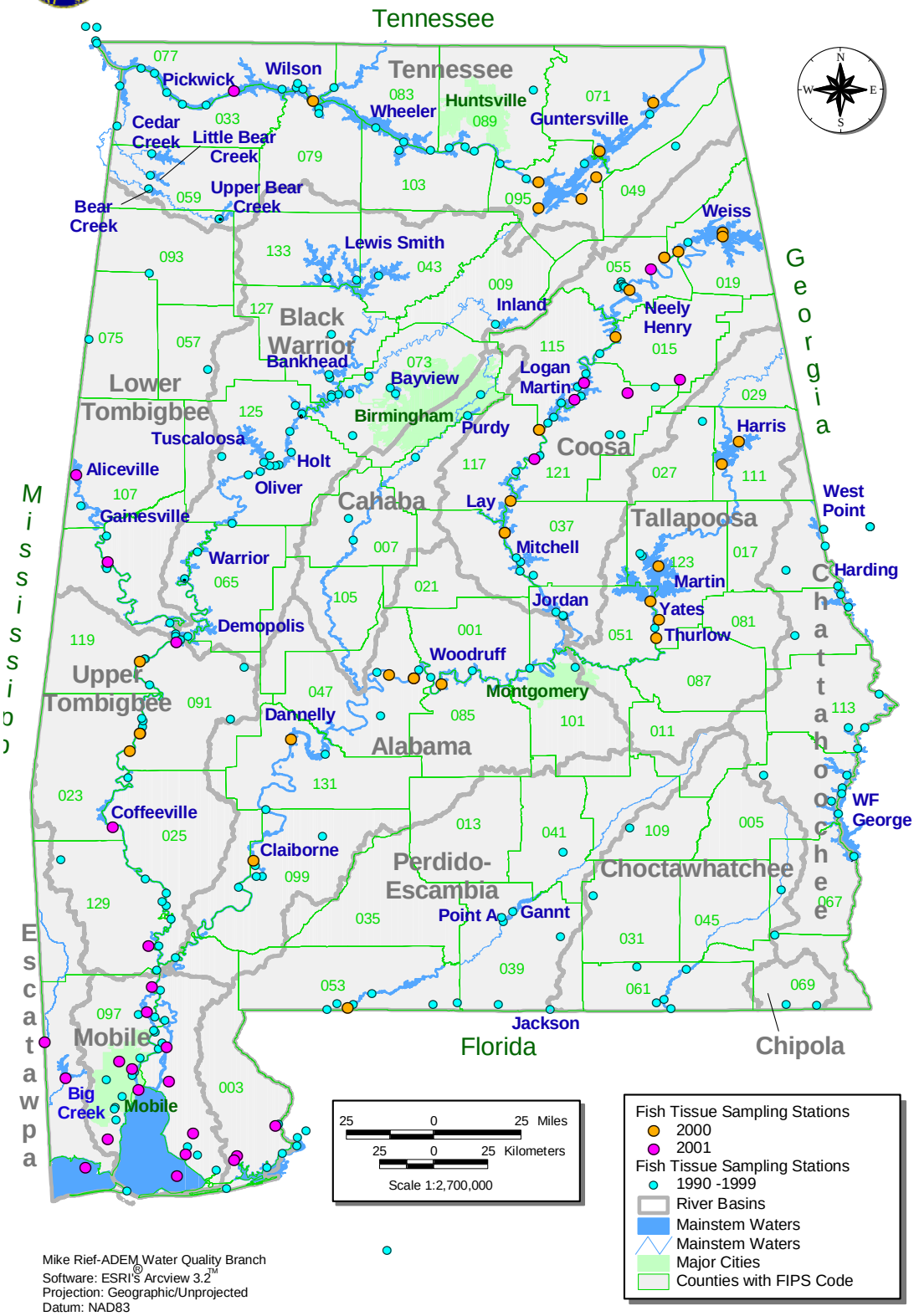
A total of 397 fish were collected from 17 water bodies in 36 locations. The 1999 sampling included water bodies that have not been sampled in the past as well as some currently under fish consumption advisories issued by the Alabama Department of Public Health. Water bodies not previously sampled included four tributary water bodies each in the Mobile and Tennessee River basins, five locations from the Chattahoochee River basin and a site on Point A reservoir in the Conecuh River.

All samples were analyzed by the ADEM Environmental Laboratory for contaminants with the potential to bioaccumulate (PCBs, arsenic, chlordane, toxaphene, mercury, mirex, DDT, DDD, DDE, dieldrin, dursban, endrin, heptachlor, heptachlorepoxide, endosulfan, hexachlorobenzene, lindane, and certain heavy metals). Bioaccumulation is the process through which small concentrations of a contaminant in the environment become higher concentrations in the bodies of plants and animals. Fish are collected in the fall of each year, the time when most pollutants of concern would be stored at the highest concentrations.

ADEM's monitoring program also included an evaluation of the physical condition of important sport and/or commercial fish species. All fish evaluated were found to be in good to excellent condition. Fish were also checked for external anomalies, such as sores, tumors, parasites and deformities. Some 86 percent of the fish checked had no anomalies. The most commonly observed anomalies were sores on the body surface. Many fishermen report seeing sores on fish in the spring and fall. Sores may be the result of bacterial infections associated with changing water temperatures, spawning stress or a combination of natural occurrences. These infections are not dangerous to the consumer and the fish are edible if properly prepared.

Figure 6-1

Fish Tissue Sampling Stations



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

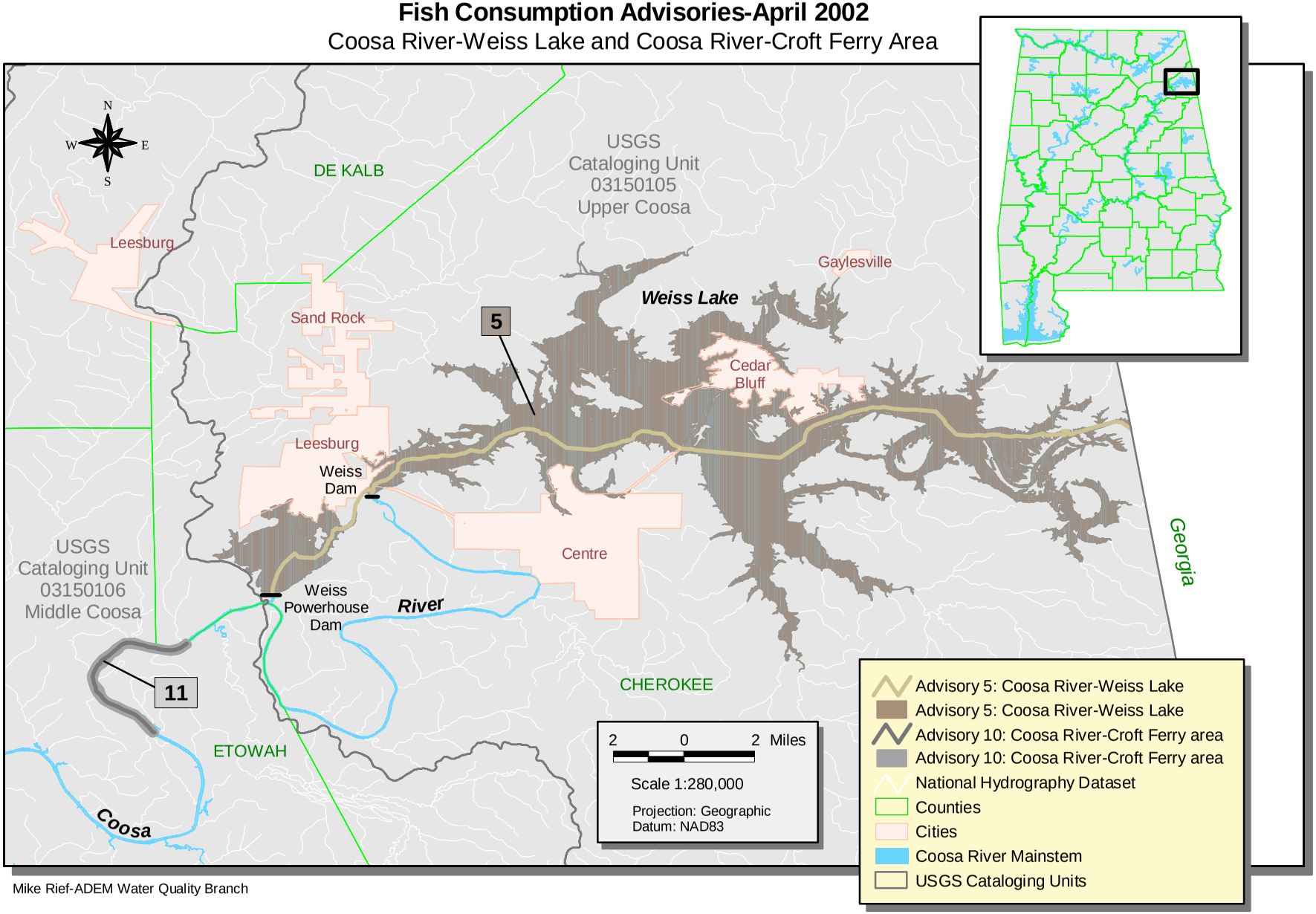
Table 6-1
2002 Alabama Fish Consumption Advisories

Map Index	USGS CU*	Waterbody	County(ies)	Fish Species	Location of Advisory	Pollutant(s)	Advisory Type
1	03160204	Bay Minette Creek	Baldwin	Bass: Largemouth	Entire Creek	Mercury[4]	No Consumption[1]
2	03160204	Chickasaw Creek	Mobile	Bass: Largemouth	Entire Creek	Mercury[4]	No Consumption[1]
3	03150106	Choccolocco Creek	Calhoun Talladega	All Species	South of Oxford DS* to Logan Martin Lake	PCBs[3]	No Consumption[1]
4	03160204	Cold Creek Swamp	Mobile	All Species	From confluence of Cold Creek with the Mobile River west through swamp	Mercury[4]	No Consumption[1]
5	03150105	Coosa River (Weiss)	Cherokee	Catfish: over 1 lb.	From AL/GA stateline to Weiss Dam	PCBs[3]	Limited Consumption[2]
6	03150106	Coosa River (Logan Martin)	Calhoun St. Clair Talladega	Catfish: over 1 lb.	From Neely Henry Dam to Riverside AL	PCBs[3]	Limited Consumption[2]
7	03150106	Coosa River (Logan Martin & Lay)	St. Clair Talladega	Bass: Striped Catfish over 1 lb. Crappie	Between Riverside AL and Vincent AL	PCBs[3]	No Consumption[1]
8	03150106	Coosa River (Lay)	St. Clair Shelby Talladega	Bass: Spotted-Striped Catfish over 1 lb. Crappie	Between Logan Martin Dam and Seaboard Coast Line RR*	PCBs[3]	No Consumption[1]
9	03150107	Coosa River (Lay)	Chilton Coosa St. Clair Shelby Talladega	Bass: Spotted-Striped Catfish: Blue Crappie	Between Logan Martin Dam and Lay Dam	PCBs[3]	No Consumption[1]
10	03150107	Coosa River (Lay)	St. Clair	Bass: Spotted	In upper Lay Reservoir approximately 2 miles DS* of Logan Martin and 1/2 mile DS* from Kelley Creek	PCBs[3]	Limited Consumption[2]
11	03150106	Coosa River (Neely Henry)	Etowah	Catfish: Channel	In the Croft Ferry area of Neely Henry Reservoir (APCO RM* 54)	PCBs[3]	No Consumption[1]
12	03170008	Escatawpa River	Mobile	Bass: Largemouth-Spotted	Entire river	Mercury[4]	No Consumption[1]
13	03160205	Fish River	Baldwin	Bass: Largemouth	Entire river	Mercury[4]	No Consumption[1]
14	03160205	Fowl River	Mobile	Bass: Largemouth	Entire river	Mercury[4]	No Consumption[1]
15	n/a	Gulf Coast (Gulf of Mexico)	Baldwin Mobile	King Mackerel: over 39 in.	Entire coast	Mercury[4]	No Consumption[1]
15	n/a	Gulf Coast (Gulf of Mexico)	Baldwin Mobile	King Mackerel: under 39 in.	Entire coast	Mercury[4]	Limited Consumption[2]
16	06030002	Huntsville Spring Branch & Indian Creek	Madison	Buffalo: Bigmouth-Smallmouth	From Redstone Arsenal to the Tennessee River	DDT[3]	No Consumption[1]
17	03160204	Mobile River	Mobile	Bass: Largemouth	At and south of the confluence of Cold Creek	Mercury[4]	Limited Consumption[2]
18	03140106	Styx River	Baldwin	Bass: Largemouth	Entire river	Mercury[4]	No Consumption[1]
18	03140106	Styx River	Baldwin	Catfish: Channel	Entire river	Mercury[4]	Limited Consumption[2]
19	03160204	Tensaw River	Baldwin Mobile	Bass: Largemouth	Entire river	Mercury[4]	Limited Consumption[2]
20	03160204	Three Mile Creek	Mobile	Atlantic Croaker	DS* of Gulf Mobile & Ohio RR* to 1 mi. US* of confluence with Mobile River	Chlordane[3]	No Consumption[1]
20	03160204	Three Mile Creek	Mobile	Bass: Striped Trout: Speckled	DS* of Gulf Mobile & Ohio RR* to 1 mi. US* of confluence with Mobile River	Chlordane[3]	Limited Consumption[2]
21	03160203	Tombigbee River	Washington	Bass: Largemouth Catfish: Channel	Olin Basin at RM 60.5	DDT[3] Mercury[4]	No Consumption[1]

1 No consumption advisory - Everyone should avoid eating the designated species of fish in the defined area.
2 Limited consumption advisory - Women of reproductive age and children less than 15 years old should avoid eating the designated species of fish from these areas. Other people should limit their consumption of the particular species to one meal per month.
3 The U.S. EPA regards chlordane, DDT, and PCBs as probable human carcinogens. This indicates cancer causing ability determined in laboratory animals but not in humans.
4 Mercury is non-carcinogenic. In extremely high levels, mercury affects the nervous system, kidney and fetus.
*Abbreviations: CU = Cataloging Unit, DS=Downstream, US = Upstream, RM = River Mile, RR = Railroad, APCO – Alabama Power Company

Fish Consumption Advisories-April 2002

Coosa River-Weiss Lake and Coosa River-Croft Ferry Area



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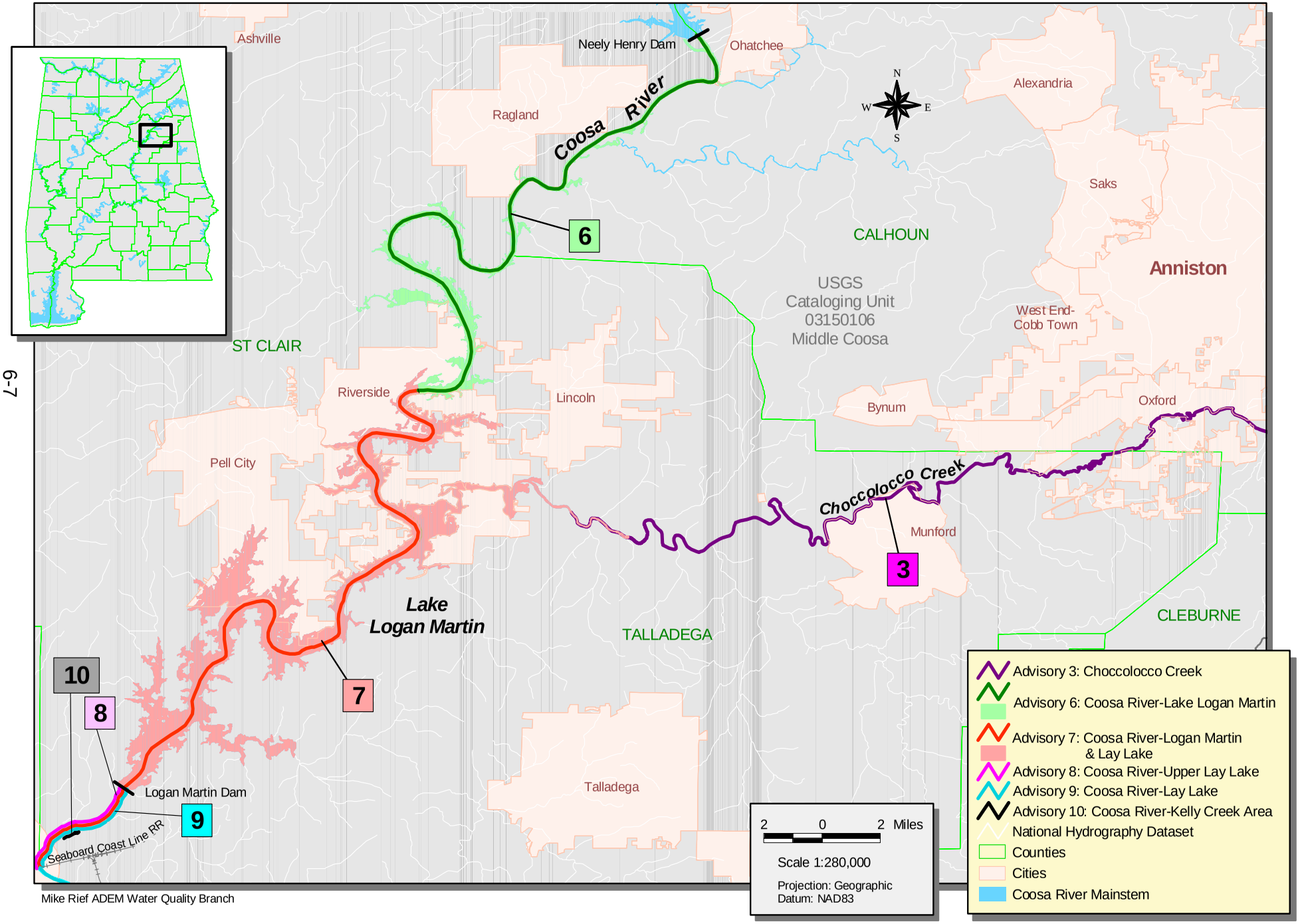
Fish Consumption Advisories-April 2002

Coosa River-Lake Logan Martin Area



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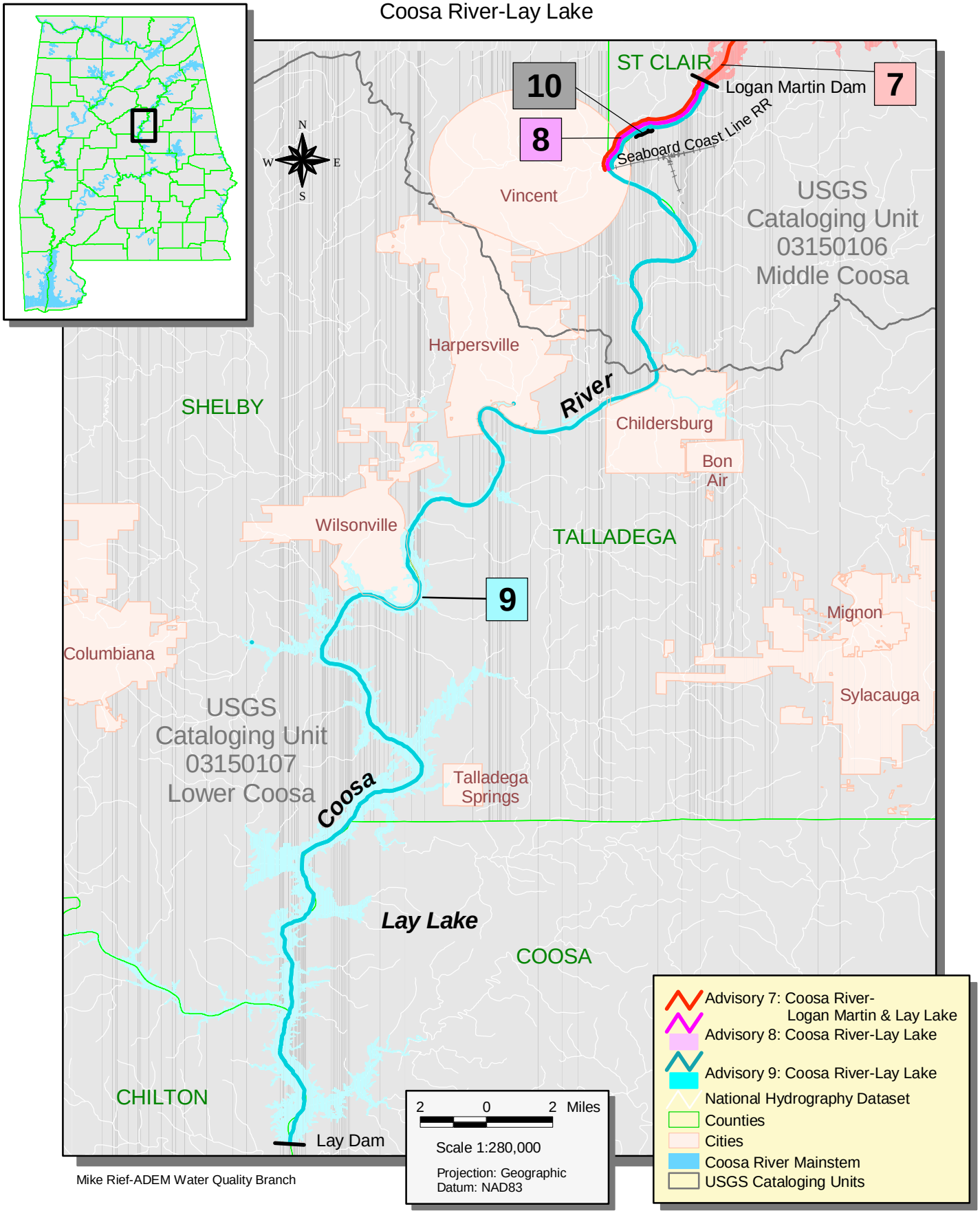
Fish Consumption Advisories-April 2002

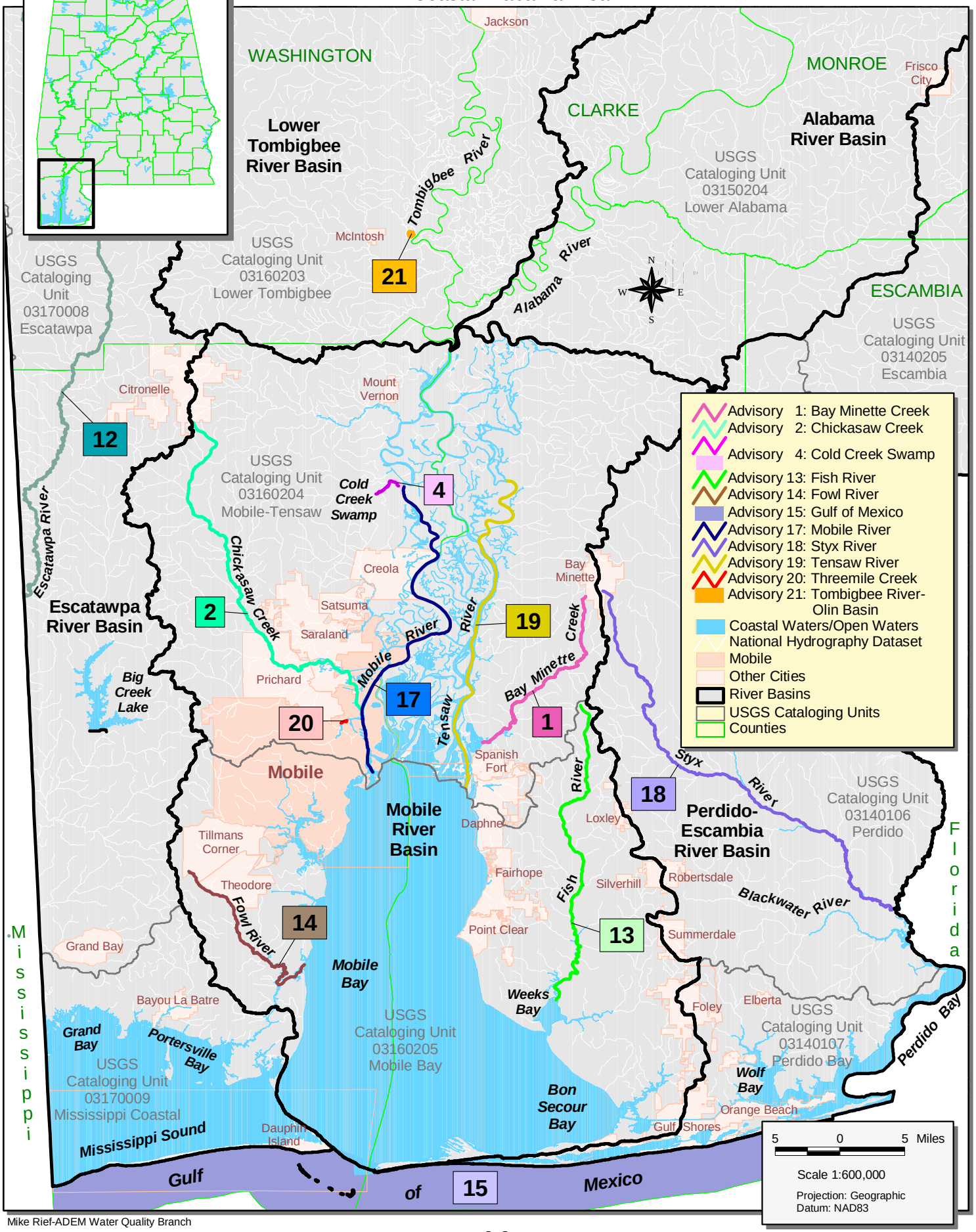
Coosa River-Lay Lake



Mike Rief-ADEM Water Quality Branch

Fish Consumption Advisories-April 2002

Coastal Alabama Area



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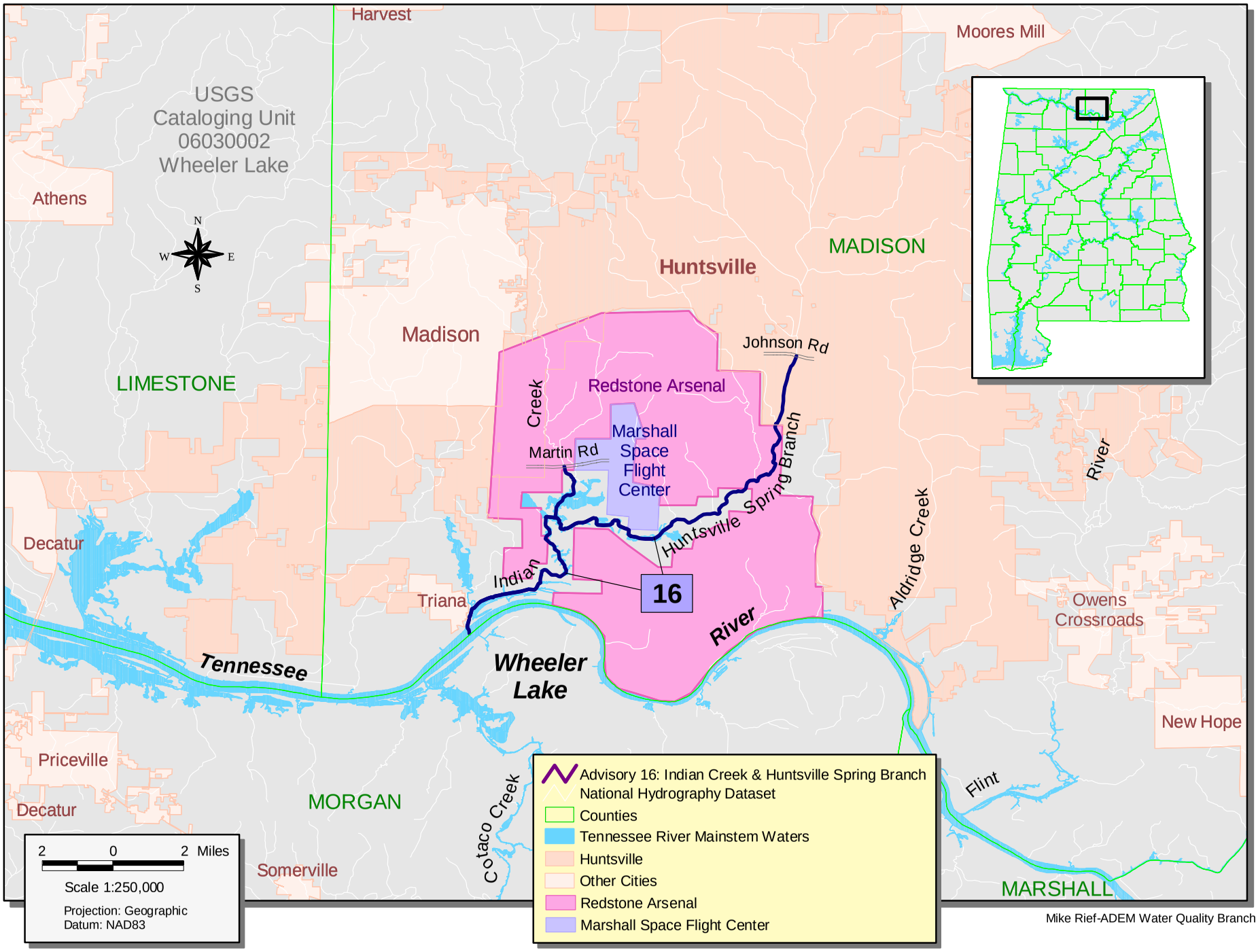
Fish Consumption Advisories-April 2002

Indian Creek & Huntsville Spring Branch



Mike Rief-ADEM Water Quality Branch

3 Fish Kills 2000-2002

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 6-2 contains the reported fish kill incidents for 2000 and 2001.

Table 6-2
Fish Kills During 2000 and 2001

Waterbody and County	Date	Waterbody Type	Size Affected	Cause(s) of Concern	Source(s) of Pollutants	No. of Fish Killed
Bayou Sara Mobile Co.	1/29/2000	river	<0.5 mi.	natural occurrence	N/A	undetermined
Bayou Sara Mobile Co.	2/6/2000	river	<0.5 mi.	natural occurrence	N/A	undetermined
Griffin Creek Jefferson Co.	3/2/2000	stream	<0.5 mi.	high pH from concrete pour	municipal	300
Pinchgut Creek Jefferson Co.	4/17/2000	stream	>0.5 mi.	asphalt sealer	private co.	2,153
Tennessee River Morgan Co.	6/21/2000	river	>0.5 mi.	herbicide	private co.	10
Valley Creek Jefferson Co.	7/27/2000	stream	<0.5 mi.	undetermined	undetermined	undetermined
UT to Dry Creek Jackson Co.	8/7/2000	stream	<0.5 mi.	undetermined	undetermined	undetermined
Pinhook Creek Madison Co.	8/9/2000	stream	<0.5 mi.	undetermined	undetermined	undetermined
Lower Crab Creek Baldwin Co.	9/26/2000	stream	<0.5 mi.	natural occurrence	N/A	289
Indian Creek Madison Co.	10/6/2000	stream	0.5 mi.	sewage spill	municipal	1,356
Tennessee River Morgan Co.	10/10/2000	river	<0.5 mi.	acid spill	private co.	800
Big Wills Creek DeKalb Co.	10/26/2000	stream	>0.5 mi.	sewage spill	municipal	3,261
Bayou Sara Mobile Co.	10/27/2000	river	>0.5 mi.	natural occurrence	N/A	226
Indian Creek Madison Co.	10/28/2000	stream	<0.5 mi.	sewage spill	municipal	20
Point A Lake Covington Co.	11/3/2000	lake	<0.5 mi.	fertilizer	private co.	200
Steam Plant Canal Greene Co.	1/14-15/01	stream	<0.5 mi.	thermal spike	private co.	605

Table 6-2 (cont.)

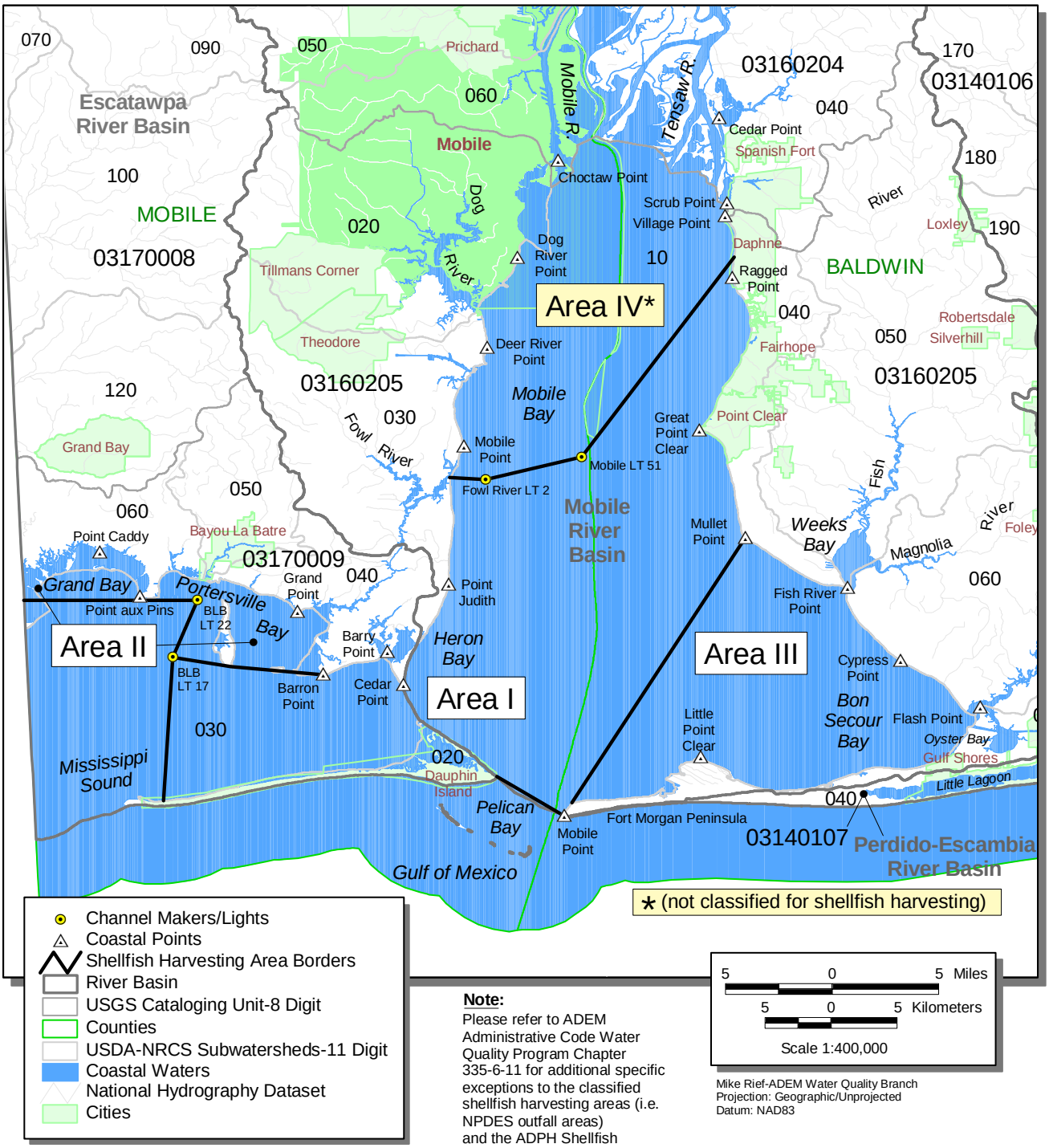
Alabama River Dallas/Wilcox Co.s	1/29/2001	river	>0.5	natural occurrence	N/A	undetermined
Joe Tucker Lake Shelby Co.	4/14/2001	reservoir	>.5 mi.	pesticide	undetermined	4,839
Riley Maze Creek Cullman Co.	6/24/2001	stream	<0.5	undetermined	undetermined	40
UT to Valley Creek Jefferson Co.	6/24/2001	stream	<0.5	petroleum	private co.	53
Tallapoosa River Macon Co.	7/4/2001	river	>0.5	undetermined	undetermined	undetermined
Bavar Creek Cullman Co.	9/1/2001	stream	<0.5	petroleum	private co.	919
Coosa River/Mitchell Dam Chilton Co.	8/5/2001	river	>0.5	undetermined	undetermined	384

4 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 6-2 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 6-3 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 6-9

Oyster/Shellfish Harvesting Areas that are Open or Closed by the Alabama Department of Public Health



Note:
Please refer to ADEM Administrative Code Water Quality Program Chapter 335-6-11 for additional specific exceptions to the classified shellfish harvesting areas (i.e. NPDES outfall areas) and the ADPH Shellfish Harvesting Notices

Table 6-3

Shellfish Harvesting Area Closures/Reopenings

Action Time of Notice	Action Date of Notice	Areas Classified for Shellfish Harvesting		
		Area I	Area II	Area III
4:00 p.m.	1/29/2002	Closed	Closed	Closed
6:00 a.m.	12/31/2001	Open	Open	Open
4:00 p.m.	12/23/2001	Closed	Closed	Closed
4:00 p.m.	4/21/2001	Open	Open	Open
4:00 p.m.	4/9/2001	Closed	Closed	Closed
4:00 p.m.	4/6/2001	Open	Open	Open
4:00 p.m.	3/4/2001	Closed	Closed	Closed
6:00 a.m.	4/10/2000	Closed	Closed	Closed
6:00 a.m.	4/24/2000	Open	Open	Open
6:00 a.m.	3/26/1999	Open	Open	Open
4:00 p.m.	3/17/1999	Closed	Closed	Closed
6:00 a.m.	2/19/1999	Open	Open	Open
6:00 a.m.	2/18/1999	Closed	Open	Closed
6:00 a.m.	2/1/1999	Closed	Closed	Closed
6:00 a.m.	10/27/1998	Open	Open	Open
7:00 a.m.	10/9/1998	Open	Open	Closed
4:00 p.m.	9/28/1998	Closed	Closed	Closed
3:00 p.m.	1/10/1998	Closed	Closed	Closed
7:00 a.m.	12/30/1997	Open	Open	Open
7:00 a.m.	12/29/1997	Closed	Closed	Closed
6:00 a.m.	7/29/1997	Open	Open	Open
4:00 p.m.	7/23/1997	Closed	Closed	Closed
6:00 a.m.	7/2/1997	Open	Open	Open
4:00 p.m.	6/24/1997	Closed	Closed	Closed
6:00 a.m.	6/20/1997	Open	Open	Open
4:00 p.m.	6/13/1997	Open	Closed	Open
7:00 a.m.	5/16/1997	Open	Open	Open
4:00 p.m.	5/10/1997	Closed	Closed	Closed
7:00 a.m.	5/9/1997	Open	Open	Open
4:00 p.m.	5/4/1997	Closed	Closed	Closed
7:00 a.m.	2/11/1997	Open	Open	Open
4:00 p.m.	11/10/1996	Closed	Closed	Closed
7:00 a.m.	4/10/1996	Open	Open	Open
7:00 a.m.	3/26/1996	Open	Open	Open
4:00 p.m.	3/12/1996	Closed	Closed	Closed
4:00 p.m.	12/22/1995	Closed	Closed	Closed
4:00 p.m.	5/2/1994	Open	Open	Open
4:00 p.m.	4/4/1994	Closed	Closed	Closed
4:00 p.m.	3/23/1994	Open	Open	Open
12:01 a.m.	11/12/1990	Closed	Open	Closed

5 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 6-4 lists advisories issued from the Mobile Office of the Bureau of Environmental Services as well as those outside coastal Alabama.

Table 6-4
Public Notices of Sewage Release-Baldwin and Mobile County Health Departments

Date	Location	Coastal Area Waterbody	Pollutant	Comments
7/26/01	Daphne	D'Olive Creek	Fecal coliform	one-time event
7/27/01	Loxley	Corn Branch	Fecal coliform	one-time event
7/31/01	Loxley	Corn Branch	Fecal coliform	one-time event
8/01/01	Fairhope	Mobile Bay	Fecal coliform	one-time event
8/13/01	Daphne-Hwy 98	Mobile Bay	Fecal coliform	one-time event
8/13/01	Daphne-Lake Forest	Tiawasee Creek	Fecal coliform	one-time event
8/13/01	Daphne	D'Olive Creek	Fecal coliform	one-time event
8/13/01	Loxley	Corn Branch	Fecal coliform	one-time event
8/13/01	Foley	Bon Secour River	Fecal coliform	one-time event
8/16/01	Magnolia Springs	Magnolia River	Fecal coliform	one-time event
8/31/01	Daphne	D'Olive Creek	Fecal coliform	one-time event
1/10/00	West of Cody Rd & South of Pine Run Rd	Milkhouse Creek	Fecal coliform	one-time event
4/18/00	Union St	Three Mile Creek	Fecal coliform	one-time event
4/28/00	Wasson Ave, Chickasaw, near I-65	Gum Tree Creek	Fecal coliform	one-time event
5/4/00	Off US Hwy 90, west of Knollwood Dr	Halls Mill Creek	Fecal coliform	one-time event
8/9/00	Cottage Hill Rd, between Royal Carriage Dr So & Blue Ridge Blvd	Milkhouse Creek	Fecal coliform	one-time event
8/30/00	Bay Front Rd	Mobile Bay	Fecal coliform	one-time event
11/24/00	North of Airport Blvd	Montilmar Creek	Fecal coliform	one-time event
11/25/00	West of Hillcrest Rd	Halls Mill Creek	Fecal coliform	one-time event
11/29/00	Hounds Run North & Foreman	Twelve Mile Creek	Fecal coliform	one-time event
12/9/00-12/10/00	Oakleigh Trace Subdivision	Spring Creek	Fecal coliform	one-time event
12/10/00	Brookline Dr	Spring Creek	Fecal coliform	one-time event
12/10/00 12/13/00	Cottrell St & Gayle St Giblin Rd	Mobile Bay Rabbit Creek	Fecal coliform	one-time event
7/26/01	Dr. M.L. King Ave, Eslava St, North Hallet St, 1-10 & Broad St	Three Mile Creek	Fecal coliform	one-time event
7/26/01	US Hwy 90	Halls Mill Creek	Fecal coliform	one-time event
8/11/01-8/12/01	Mohawk St & Elizabeth	Three Mile Creek	Fecal coliform	one-time event
	1659 Government St	Three Mile Creek	Fecal coliform	one-time event
	Broad St at 1-10	Three Mile Creek	Fecal coliform	one-time event
	100 block of Demouy Ave	Three Mile Creek	Fecal coliform	one-time event
	Luarel St & Davitt St	Three Mile Creek	Fecal coliform	one-time event
	Stanton Rd & Mobile St	Three Mile Creek	Fecal coliform	one-time event
	2000 block of Gimon C West	Eslava Creek	Fecal coliform	one-time event
	Hurtel St & Michigan Ave	Eslava Creek	Fecal coliform	one-time event
	Mobile St	Eslava Creek	Fecal coliform	one-time event
9/7/01	Hillcrest Rd & south of Cedar Bend Court	Twelve-Mile Creek	Fecal coliform	one-time event
12/6/01	Jefferson & Selma Sts	Mobile River	Fecal coliform	one-time event

6 Public Water Supply/Drinking Water

Approximately 850,000,000 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. Five hundred and sixty-nine (569) community systems, eighty-four (84) transient non-community systems and thirty-three (33) 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-four (94) percent meet trihalomethane standards, eighty-six (86) meet haloacetic acid standards and one hundred (100) percent meet inorganic and radiological drinking water standards. These water treatment facilities are required to employ Grade III or Grade IV 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. More than ninety-three (93) percent of the Community Systems and eighty-six (86) percent of the Non-community Systems met the bacteriological quality standard of the Department. More than ninety-one (91) percent of the community systems and approximately seventy-five (75) 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. Two (2) systems exceeded the lead or copper action level out of the 247 community and non-transient, non-community systems that were sampled in 2000 and 2001. These systems are required to begin a public education program for lead violations, formulate a corrosion control plan, and continue sampling every six 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). One system incurred a tetrachloroethylene maximum contaminant level violation. More than ninety (90) percent of the community systems and approximately eighty-eight (88) percent of the non-transient non-community systems required to monitor in 2000 and 2001 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.

In a final note highlighting Alabama's Drinking Water Program, the US EPA, in a report released February 6, 2002, ranked Alabama (583 community water systems) second in the Nation behind Rhode Island (83 community water systems) for water system compliance. This type of Statewide compliance is indicative of the abundant high quality surface and ground waters in Alabama.

Table 6-5
Surface Source Public Water Systems with Compliance Violations

Name of Facility	Municipality Served	Name of Waterbody	Contaminants with Percent Violations
Athens Water Department	Athens	Elk River	Haloacetic Acids -12.5%
Decatur Utilities	Decatur	Tennessee River	Haloacetic Acids -12.5%
Five Star Water Supply District	Prattville	Lake Jordan	Haloacetic Acids -25%
Golden Rod Broilers	Industry	Lake Ingram	Haloacetic Acids -12.5%
Goodwater Utilities Board	Goodwater	Hatchet Creek	Total Trihalomethanes-12.5%
Grant Water Works Board	Grant	Guntersville Lake	Haloacetic Acids -12.5%
Heflin Water Works	Heflin	Cahulga Creek	Haloacetic Acids -12.5%
Jackson Water Works and Sewer Board	Jackson	Tombigbee River	Total Trihalomethanes-12.5%
Northeast Morgan County Water Authoritv	Rural Morgan Countv	Tennessee River	Haloacetic Acids and Total Trihalomethanes-12.5%
Section-Dutton Water System	Rainsville	Tennessee River	Haloacetic Acids -12.5%
Sumiton Water Works Board	Sumiton	Mulberry Fork	Haloacetic Acids -25%
Wedowee Water, Sewer and Gas Board	Wedowee	Lake Wedowee	Total Trihalomethanes-12.5%

During the past two years, Montevallo has been the only public water supply ground water system with chronic contaminant detection.

Table 6-6
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 6-7
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 6-8
Public Water Supply Synthetic Organic Chemicals (non-volatile/SOVs)

Synthetic Organic Chemicals (non-volatile)	MCL in mg/L
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 6-9
Public Water Supply Total Trihalomethanes

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

Table 6-10
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

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.

6.1 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.

6.2 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.

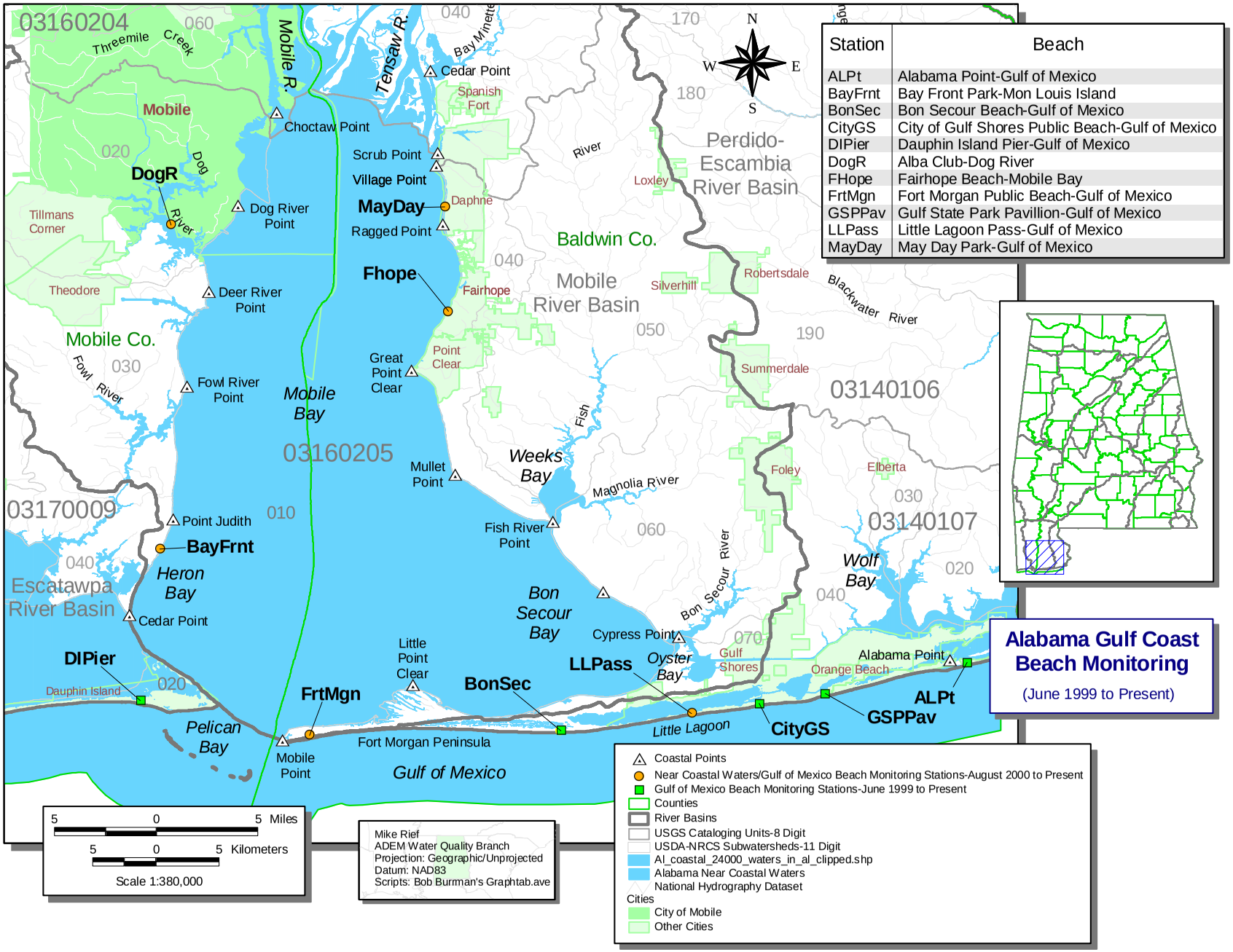
A Wellhead Protection Plan Guidance Document is in the final stages of preparation. The guidance document provides important information for developing and implementing a Wellhead Protection Program at the local level. The Department proposes to mail the guidance document to each water system that utilizes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

7 Coastal Beach Monitoring

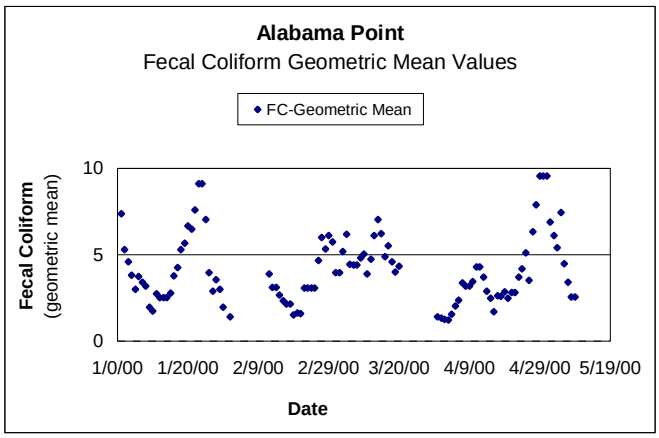
The Coastal Alabama Recreational Water Quality Monitoring Program (Beach Monitoring) is the forth monitoring program in place during the reporting period. The Alabama coastal beaches are a major tourist attraction as well as a lifestyle staple for Alabama residents. Alabama has approximately 50 miles of Gulf beach and an estimated 65-70 miles of estuarine beaches where the adjacent waters are classified for swimming under the State's Water Use Classification System. In an effort to increase public awareness and provide valuable water quality information, ADEM and the Alabama Department of Public Health (ADPH), under a grant from the EPA's Gulf of Mexico Program, have implemented a bacteriological water quality monitoring and notification program. This program involves the routine collection of water samples from a number of high-use public recreational areas. Samples are collected twice per week during the summer months and once per month during the cooler months. These samples are analyzed for bacteriological indicators (Fecal Coliform and Enterococci bacteria). These bacteria by themselves are not considered harmful to humans but often occur in the presence of potential human pathogens. The indicator bacteria used (Enterococci) and the threshold concentration, which triggers an advisory, are based on recommendations provided by the EPA in the documents Ambient Water Quality Criteria for Bacteria (1986) and Water Quality Standards Handbook, second addition (1983). All data from this program and current information concerning swimming advisories is available to the public on ADEM's website at www.adem.state.al.us. This information is also made available to the public through press releases to the general media or upon request to the ADEM or the ADPH. Monitoring for this program has resulted in the issuance of seven swimming advisories by the ADPH. Publicity generated through this program has indirectly lead to the upgrade and improved monitoring of sewer collection lines in Mobile and Baldwin Counties. A high flow contingency plan for the city of Daphne has been implemented where excess sewage flow can be diverted to an alternative temporary storage site. A map and graphs for each beach monitoring station's Fecal Coliform and Enterococcus geomean results are on the following pages.

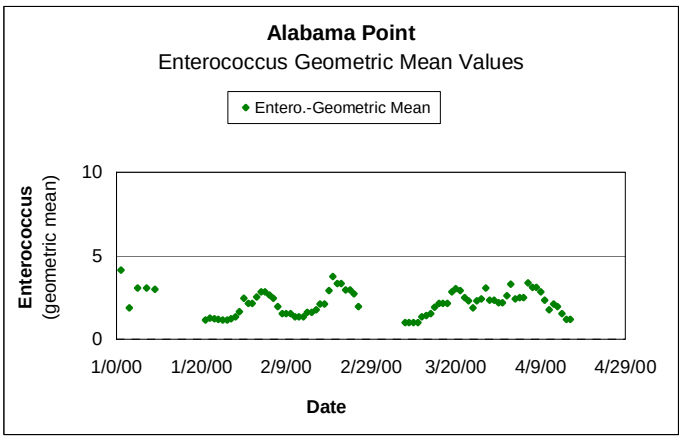
Figure 6-9

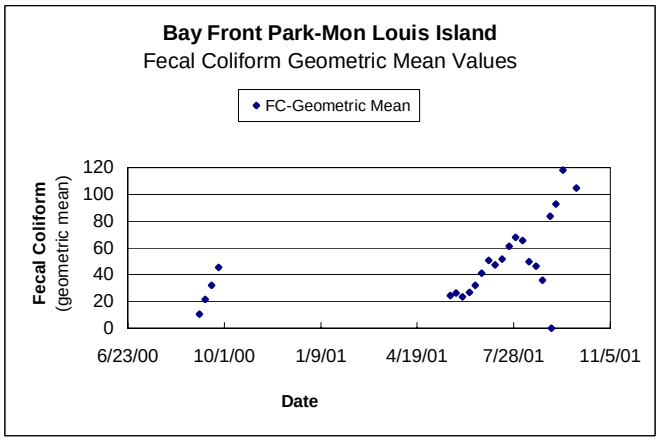
Coastal Beach Monitoring

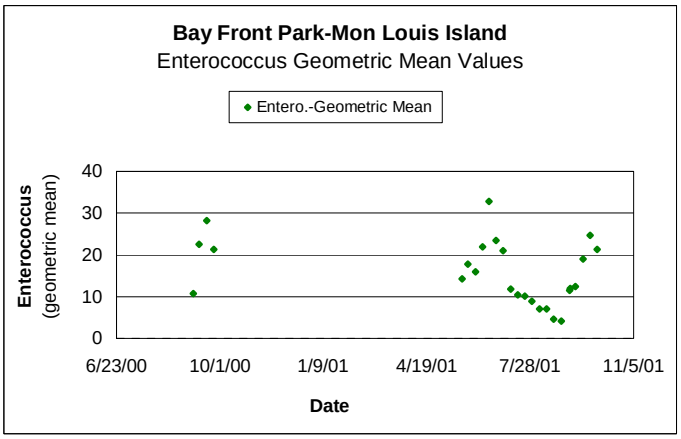


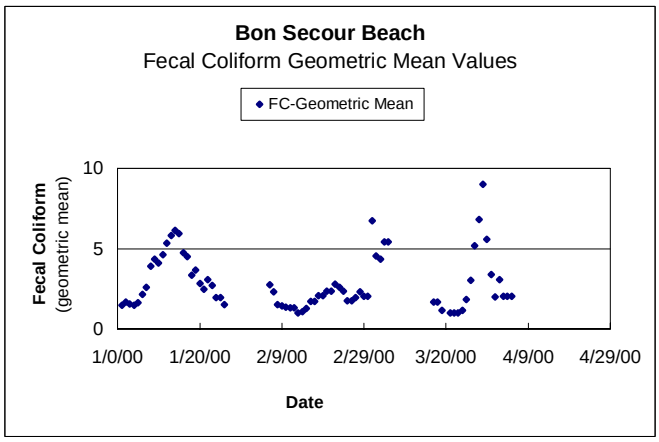
Coastal Beach Monitoring Station Graphs

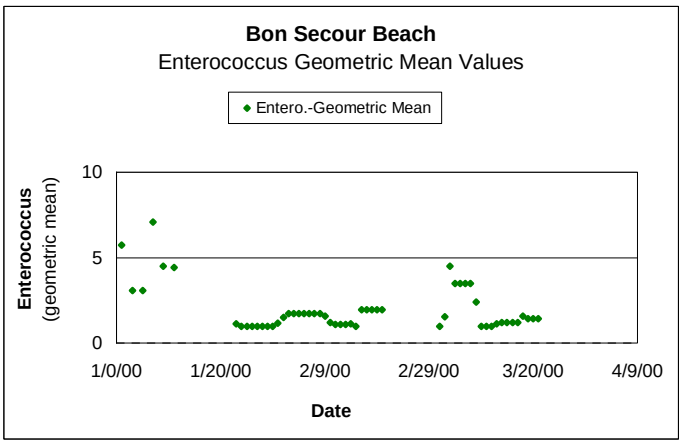


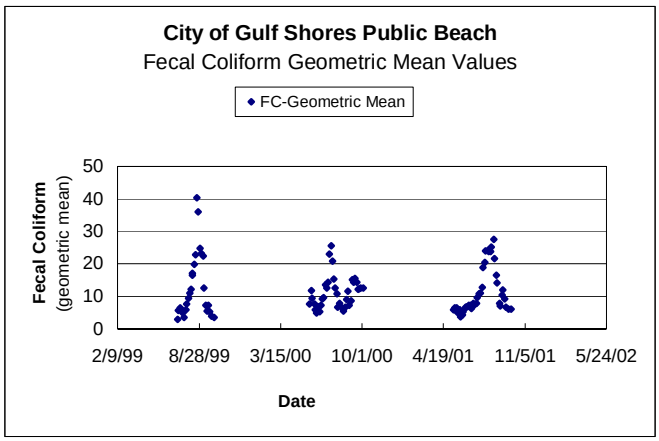











City of Gulf Shores Public Beach
Fecal Coliform Geometric Mean Values
FC-Geometric Mean
Fecal Coliform (geometric mean)
50
40
30
20
10
0
2/9/99
8/28/99
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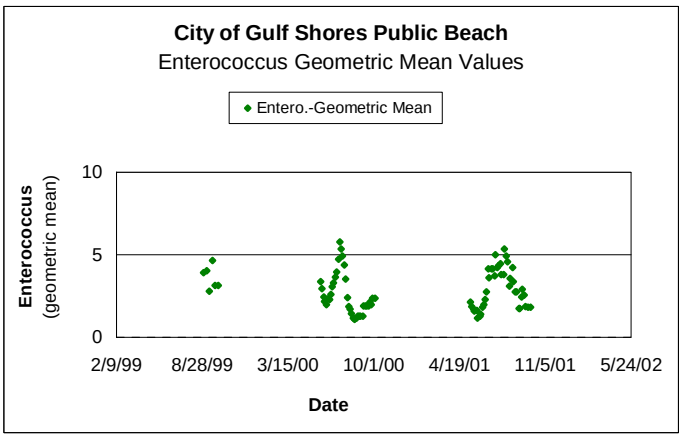
11/5/01
5/24/02
Date


City of Gulf Shores Public Beach
Enterococcus Geometric Mean Values
Entero.-Geometric Mean
Enterococcus (geometric mean)
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5
0
2/9/99
8/28/99
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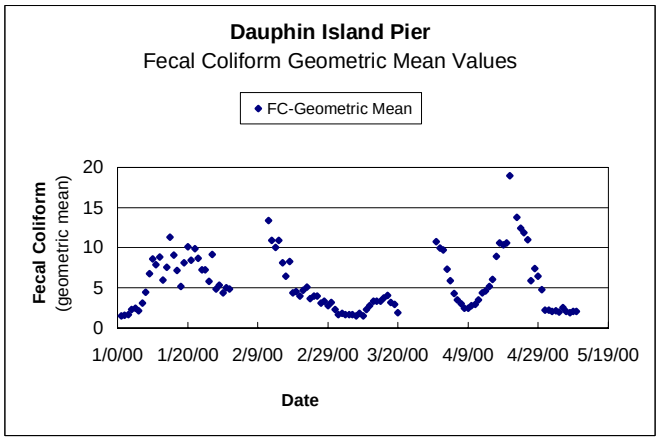
11/5/01
5/24/02
Date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FC-Geometric Mean
Fecal Coliform (geometric mean)
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15
10
5
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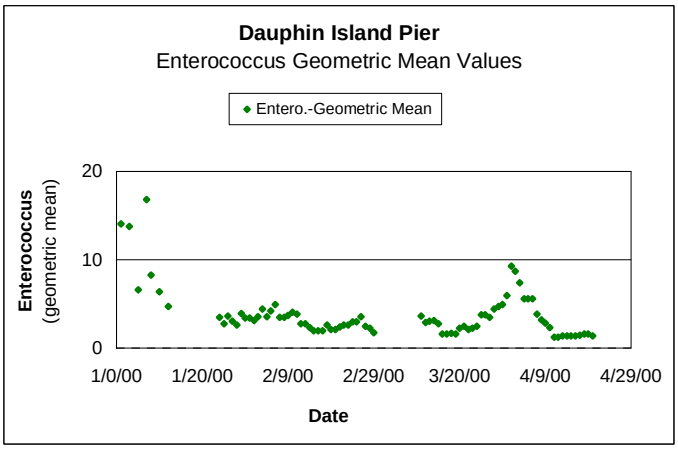
4/29/00
5/19/00
Date


Dauphin Island Pier
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Entero.-Geometric Mean
Enterococcus (geometric mean)
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10
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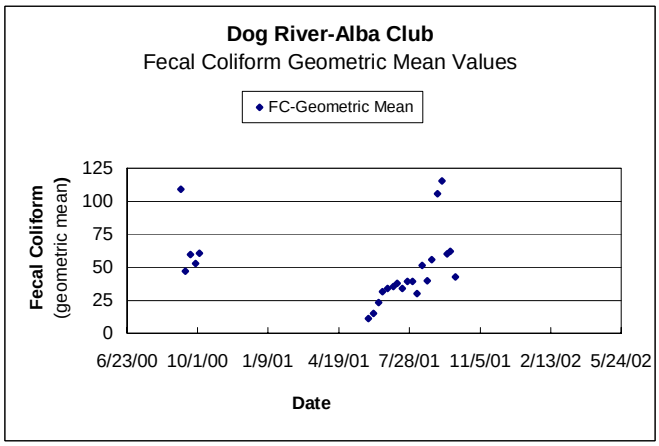
4/9/00
4/29/00
Date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Fecal Coliform Geometric Mean Values
FC-Geometric Mean
Fecal Coliform (geometric mean)
125
100
75
50
25
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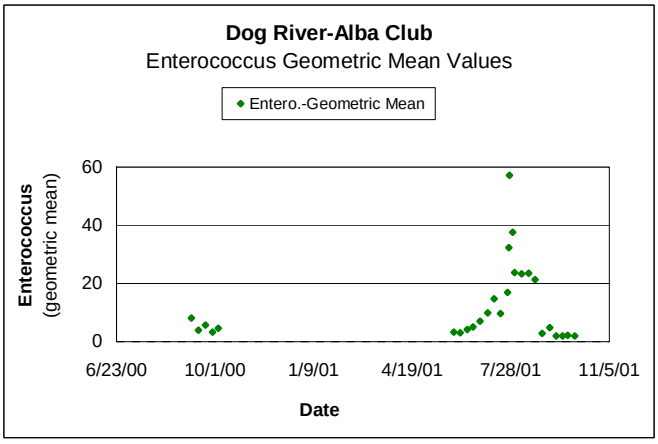
2/13/02
5/24/02
Date


Dog River-Alba Club
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Entero.-Geometric Mean
Enterococcus (geometric mean)
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20
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6/23/00
10/1/00
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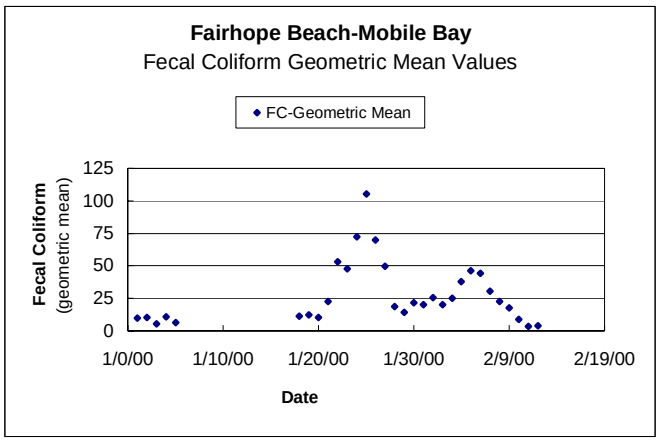
Date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FC-Geometric Mean
Fecal Coliform (geometric mean)
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1/30/00
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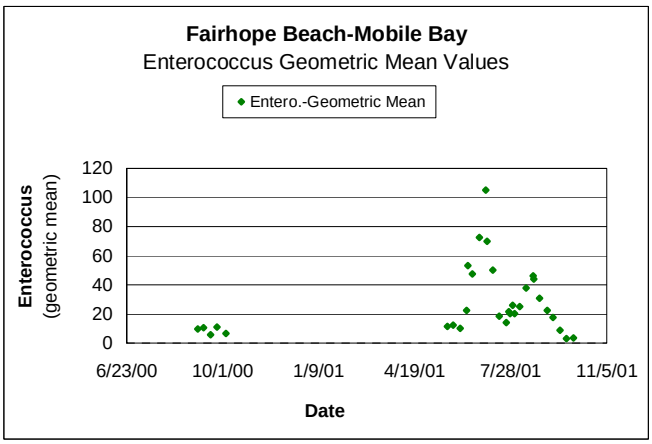
2/19/00
Date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Entero.-Geometric Mean
Enterococcus (geometric mean)
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4/19/01
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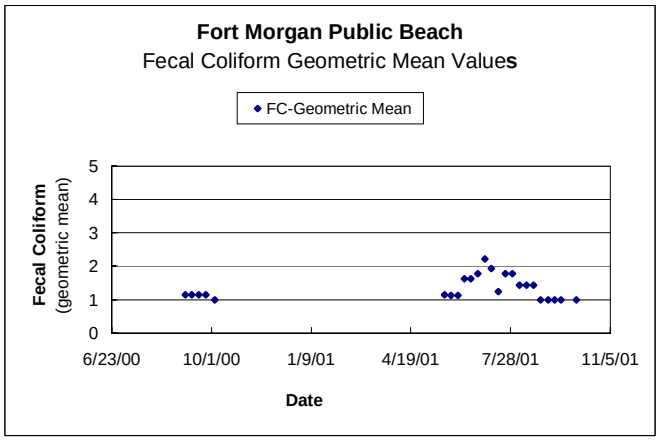
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FC-Geometric Mean
Fecal Coliform (geometric mean)
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1/9/01
4/19/01
7/28/01
11/5/01
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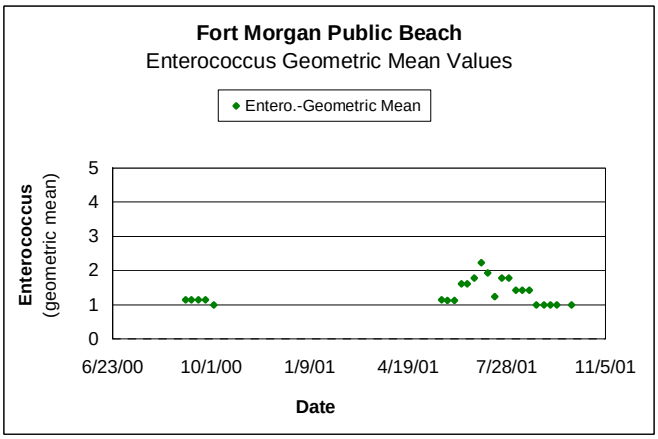
Fort Morgan Public Beach
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Entero.-Geometric Mean
Enterococcus (geometric mean)
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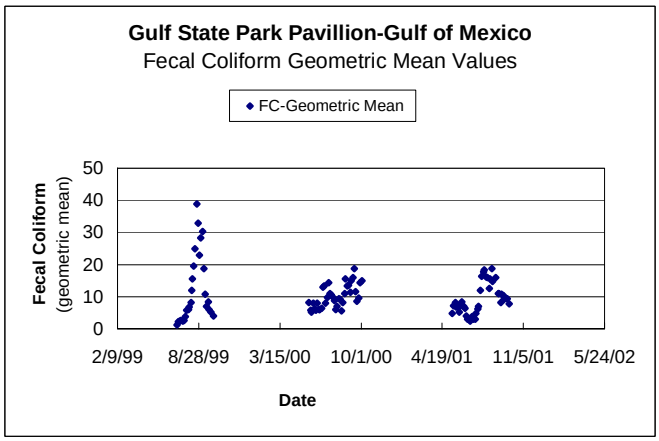
7/28/01
11/5/01
Date


Gulf State Park Pavillion-Gulf of Mexico
Fecal Coliform Geometric Mean Values
FC-Geometric Mean
Fecal Coliform (geometric mean)
50
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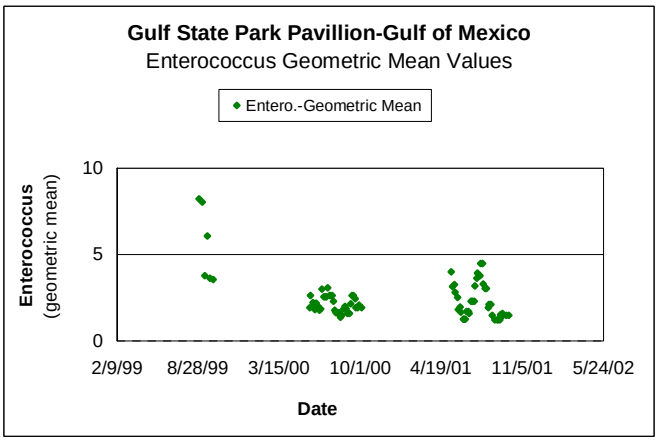
11/5/01
5/24/02
Date


Gulf State Park Pavillion-Gulf of Mexico
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Entero.-Geometric Mean
Enterococcus (geometric mean)
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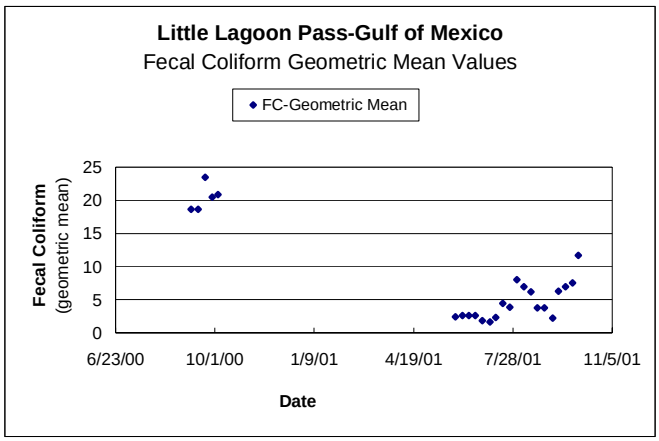
Little Lagoon Pass-Gulf of Mexico
Fecal Coliform Geometric Mean Values
FC-Geometric Mean
Fecal Coliform
(geometric mean)
25
20
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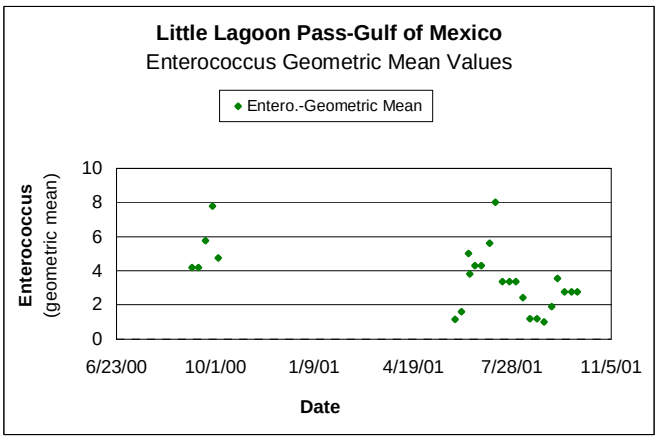
1/9/01
4/19/01
7/28/01
11/5/01
Date


Little Lagoon Pass-Gulf of Mexico
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Entero.-Geometric Mean
Enterococcus
(geometric mean)
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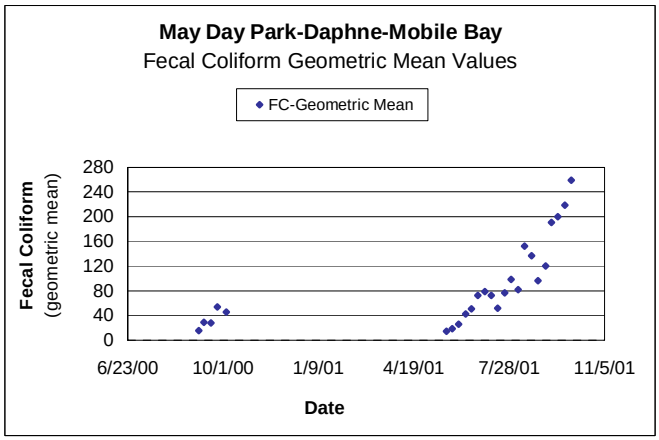
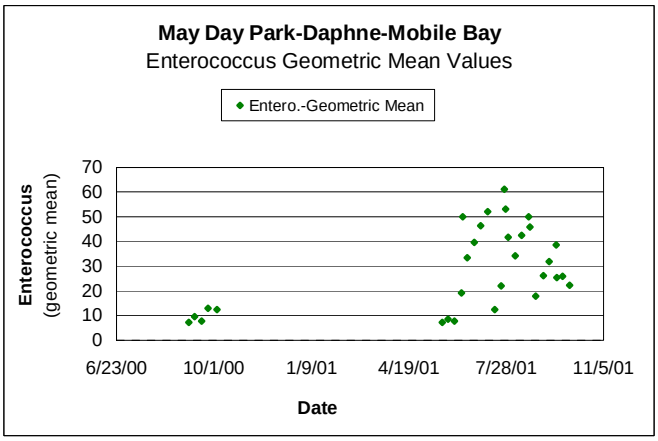

May Day Park-Daphne-Mobile Bay
Fecal Coliform Geometric Mean Values
FC-Geometric Mean
Fecal Coliform
(geometric mean)
280
240
200
160
120
80
40
0
6/23/00
10/1/00
1/9/01
4/19/01
7/28/01
11/5/01
Date


May Day Park-Daphne-Mobile Bay
Enterococcus Geometric Mean Values
Entero.-Geometric Mean
Enterococcus
(geometric mean)
70
60
50
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30
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10
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6/23/00
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1/9/01
4/19/01
7/28/01
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Date

Part VII River and Streams
1 Introduction

In the last five years ADEM has assessed more than 1,100 river and stream locations as a part of six major long-term riverine-focused monitoring programs. Data collected from each of these programs contribute to the overall understanding of Alabama's surface water quality and provides valuable into the sources of impairments to Alabama's mainstem rivers and reservoirs. Five of the six monitoring programs are described in Part VII. The Nonpoint Source Assessment Program comprises Part V.

- Nonpoint Source Assessment Program
- Point Source Assessment Program
- Ecoregion Reference Assessment Program
- Upland Alamap Monitoring and Assessment Program
- Clean Water Act §303(d) Support Assessment/Monitoring Program
- Fixed Ambient Trend Monitoring Program

Figure 7-1

Alabama's Surface Water Monitoring Programs- Recent Stations

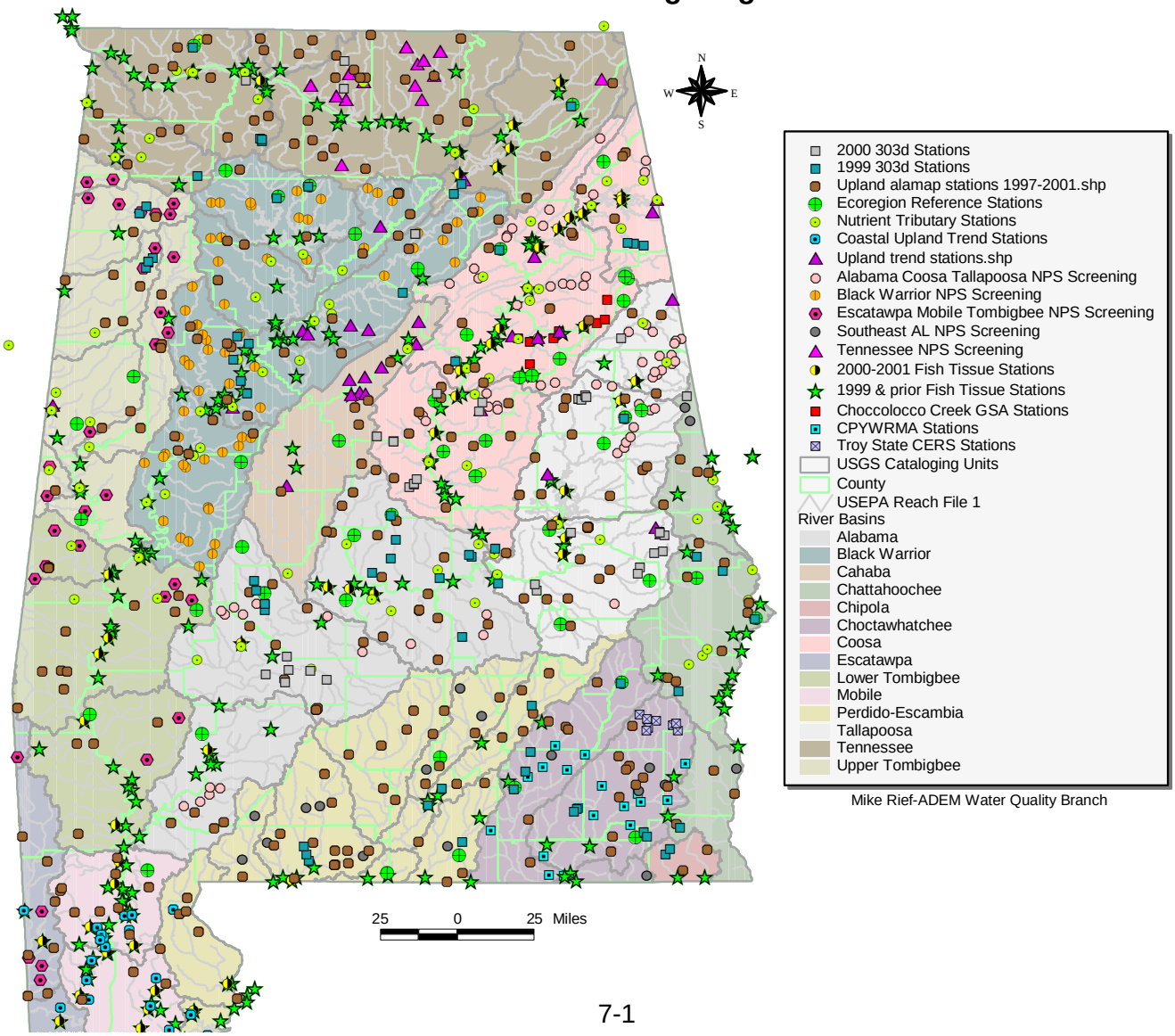


Figure 7-1 contains 1,192 stations surface water sampling stations. These stations represent the majority of the sites sampled professionally and to a large extent by ADEM staff. These stations have been sampled between 1997 and 2001. The only exception to this is some of the fish tissue sampling stations represent data collected during the early and mid-1990s. Other agencies, as listed in Table 7-1, have contributed valuable information, time, and resources in surface and ground water management program development, sampling efforts and analysis, flow information, data contribution and management, and GIS development, whether through contracts and cooperative efforts. The Alabama Water Watch (AWW) Program and Association routinely provide quality citizen volunteer monitoring data to ADEM. Figure 7-1 does not represent all the sampling efforts of the AWW Program and Association. The AWW Program is playing an integral role in educating the public, young and old, on water quality and its protection. The ADEM and AWW Program/Association staff meet to discuss water quality issues. With so much water to manage and diminishing program funds the "Alabama Water Watchers" play a key role in identifying waters that need immediate or long-term attention. See **Part V Nonpoint Source Management Program** for a map and further summary information on the AWW Program.

Table 7-1
Alabama State Agencies Involved with Water Quality/Quantity/Natural Resources

ACES	Alabama Cooperative Extension Service
ADAI	Alabama Department of Agriculture and Industries
ADCNR-SLD	Alabama Department of Conservation and Natural Resources-State Lands Division
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

Section 2 contains tables summarizing the river and stream assessments based on most of the data represented in Figure 7-1. Section 3 contains map(s) for each river basin of both full support and non support waters. A table summarizing the full support waters and the non support Draft 2000 §303(d) List waters (river, stream, lake, estuary, and wetland) accompanies each river basin map. Sections 4 through 8 describe the Upland Alamap Program, the Nutrient Tributary Study, the Ecoregion Reference Station Program, the §303(d) Sampling Program, and the Upland Trend Stations. Section 9 contains a table of the modeling activites of ADEM's Water Quality Branch.

2 Summary Tables for §305(b) Full Support Assessements

Table 7-2
All Studies/Stations Used in Full Support Assessments
Total Miles per River Basin

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Alabama	53	603.9	2,675.4	**3,279.3**
Black Warrior	82	963.5	1,470.6	**2,434.2**
Cahaba	57	423.2	747.4	**1,170.6**
Chattahoochee	16	224.6	741.5	**966.1**
Choctawhatchee	48	168.9	628.9	**797.8**
Coosa	67	1,452.2	3,064.2	**4,516.4**
Escatawpa	5	56.1	107.4	**163.5**
Lower Tombigbee	14	213.2	667.2	**880.4**
Perdido-Escambia	16	176.4	451.7	**628.0**
Tallapoosa	50	379.4	514.8	**894.2**
Tennessee	48	149.0	369.9	**519.0**
Upper Tombigbee	48	314.1	706.1	**1,020.2**
Total	**504**	**5,124.4**	**12,145.3**	**17,269.7**

Table 7-3
Ecoregion Reference Stations
Total Miles per River Basin

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Alabama	12	88.5	170.8	**259.3**
Black Warrior	6	42.2	44.5	**86.7**
Cahaba	1	7.6	7.9	**15.5**
Chattahoochee	2	26.3	49.9	**76.1**
Choctawhatchee	3	21.3	49.9	**71.2**
Coosa	13	164.3	224.4	**388.7**
Lower Tombigbee	2	16.1	64.3	**80.4**
Perdido-Escambia	3	35.6	110.6	**146.2**
Tallapoosa	6	111.5	191.1	**302.5**
Tennessee	2	22.2	52.4	**74.6**
Upper Tombigbee	3	46.1	63.8	**109.9**
Total	**53**	**581.7**	**1,029.5**	**1,611.2**

Table 7-4
Alabama-Coosa-Tallapoosa River Basins NPS Screening

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Alabama	16.0	211.2	579.3	**790.4**
Coosa	27.0	352.6	727.8	**1,080.4**
Tallapoosa	26.0	192.8	172.1	**364.9**
Total	**69.0**	**756.5**	**1,479.2**	**2,235.7**

Table 7-5
Black Warrior River Basin NPS Screening

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Black Warrior	58	678.1	945.4	**1,623.5**

Table 7-6
LowerCahaba River Basin NPS Screening

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Cahaba	39	361.9	702.4	**1,064.3**

Table 7-7
South Alabama River Basins NPS Screening

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Chattahoochee	3.0	27.1	46.5	**73.6**
Choctawhatchee	6.0	59.7	143.9	**203.6**
Perdido-Escambia	3.0	121.4	217.9	**339.3**
Total	**12.0**	**208.3**	**408.3**	**616.5**

Table 7-8
Escatawpa-Mobile-Tombigbee River Basins NPS Screening

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
ESRB	5.0	56.1	107.4	**163.5**
LTRB	9.0	105.0	286.9	**391.9**
UTRB	19.0	200.6	448.2	**648.8**
Total	**33.0**	**361.6**	**842.5**	**1,204.2**

Table 7-9
Tennessee River Basin NPS Screening

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Tennessee	31	44	117.6	**161.6**

Table 7-10
Nutrient Tributary Study

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Alabama	7.0	111.1	628.9	**740.1**
Black Warrior	10.0	224.6	439.4	**664.0**
Cahaba	2.0	12.1	8.6	**20.7**
Chattahoochee	6.0	119.7	482.7	**602.4**
Coosa	11.0	188.3	503.4	**691.7**
Lower Tombigbee	3.0	92.1	316.0	**408.1**
Tallapoosa	2.0	18.2	20.9	**39.1**
Tennessee	7.0	74.2	185.0	**259.2**
Upper Tombigbee	3.0	67.4	194.2	**261.5**
Total	**51.0**	**907.6**	**2,779.1**	**3,686.7**

Table 7-11
1999 §303(d) Sampling

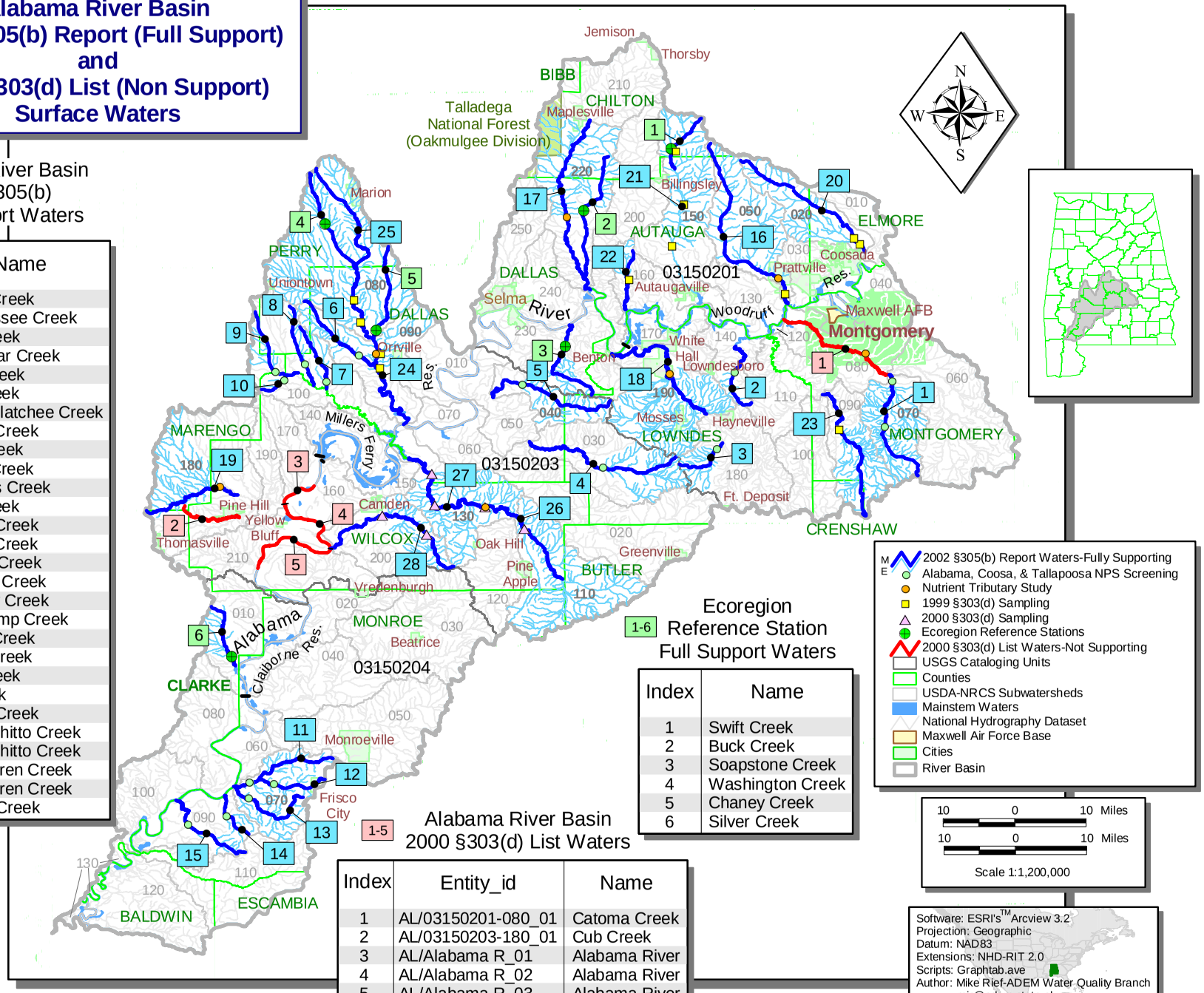
River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Alabama	12.0	112.9	813.1	**926.0**
Black Warrior	8.0	18.6	41.4	**60.0**
Chattahoochee	5.0	51.6	162.5	**214.1**
Choctawhatchee	8.0	25.2	120.3	**145.5**
Coosa	6.0	705.2	1,455.7	**2,160.8**
Perdido-Escambia	10.0	19.3	123.2	**142.5**
Tennessee	8.0	8.7	14.9	**23.5**
Total	**57.0**	**941.4**	**2,731.0**	**3,672.4**

Table 7-12
2000 §303(d) Sampling

River Basin	Stations	Miles Monitored	Miles Evaluated	Total
Alabama	6.0	80.2	483.3	**563.5**
Coosa	10.0	41.8	152.9	**194.7**
Tallapoosa	16.0	57.0	130.8	**187.8**
Total	**32.0**	**178.9**	**767.0**	**946.0**

Figure 7-2

Alabama River Basin 2002 §305(b) Report (Full Support) and 2000 §303(d) List (Non Support) Surface Waters



Index	Name
1	Ramer Creek
2	Tallawassee Creek
3	Lake Creek
4	Dry Cedar Creek
5	Mush Creek
6	Bear Creek
7	Little Chilatchee Creek
8	Rogers Creek
9	Sand Creek
10	Glover Creek
11	Randons Creek
12	Bear Creek
13	Lovetts Creek
14	Baileys Creek
15	Wallers Creek
16	Autauga Creek
17	Mulberry Creek
18	Big Swamp Creek
19	Turkey Creek
20	Mortar Creek
21	Swift Creek
22	Ivy Creek
23	Pintlala Creek
24	Bogue Chitto Creek
25	Bogue Chitto Creek
26	Pine Barren Creek
27	Pine Barren Creek
28	Pursley Creek

Index	Name
1	Swift Creek
2	Buck Creek
3	Soapstone Creek
4	Washington Creek
5	Chaney Creek
6	Silver Creek

Index	Entity_id	Name
1	AL/03150201-080_01	Catoma Creek
2	AL/03150203-180_01	Cub Creek
3	AL/Alabama R_01	Alabama River
4	AL/Alabama R_02	Alabama River
5	AL/Alabama R_03	Alabama River

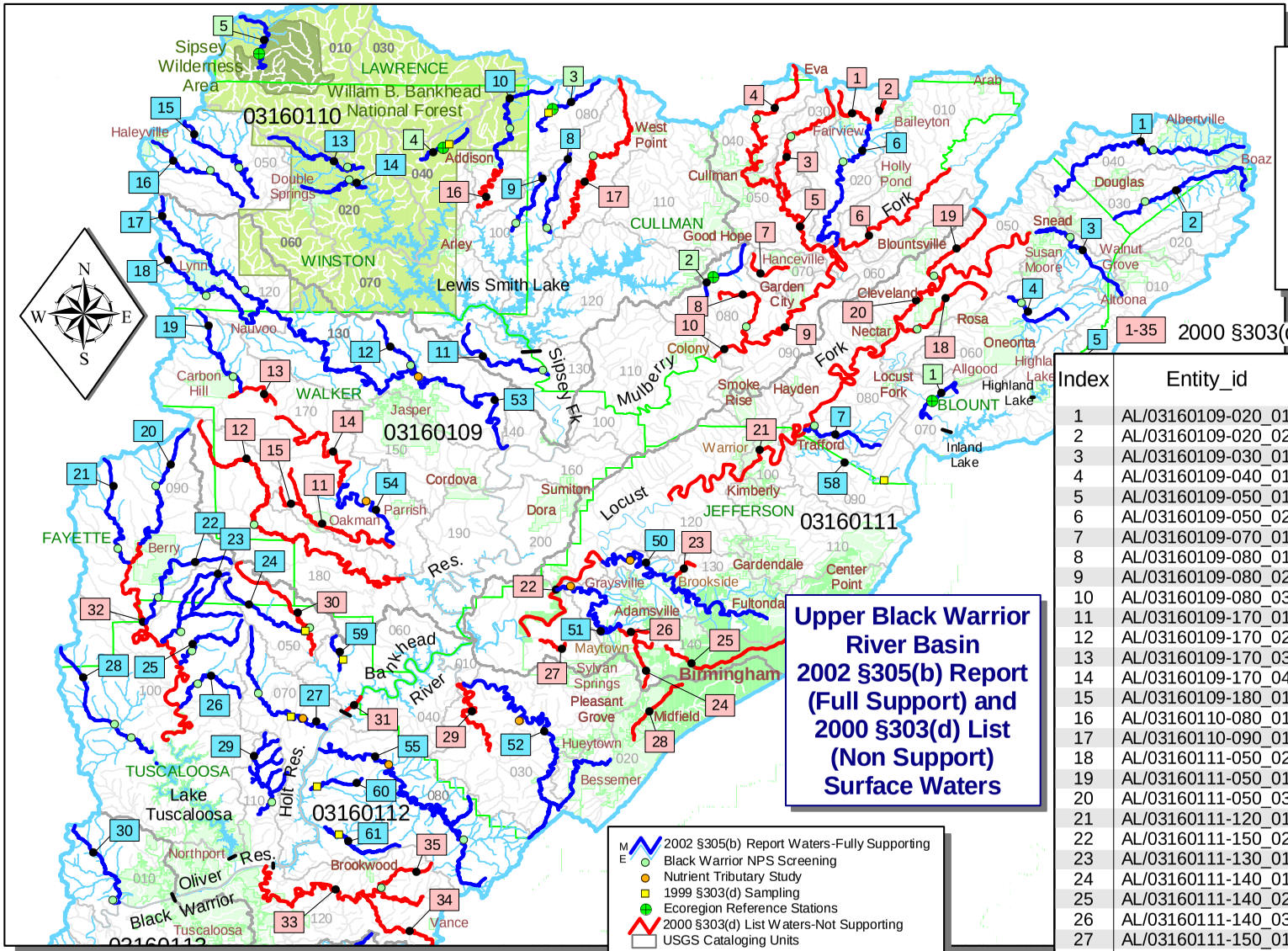
Table 7-13
Alabama River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	12	88.5	170.8	**259.3**
Nutrient Tributary Study	7	111.1	628.9	**740.1**
Alabama-Coosa-Tallapoosa NPS Screening	16	211.2	579.3	**790.4**
1999 §303(d) Sampling	12	112.9	813.1	**926.0**
2000 §303(d) Sampling	6	80.2	483.3	**563.5**
Total	**53**	**603.9**	**2,675.4**	**3,279.3**

Table 7-14
Alabama River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03150201-080_01	Catoma Creek	Partial	R	M	Montgomery	F&W	OE/DO	Urban runoff/Storm sewers Pasture Grazing	23.2 miles	Alabama River / Ramer Creek
AL/03150203-180_01	Cub Creek	Non	R	H	Wilcox	F&W	Nutrients OE/DO	Unknown source	8.1 miles	Beaver Creek / Its Source
AL/Claiborne Res_01	Alabama River	Partial	R	L	Wilcox	PWS	Nutrients OE/DO	Dam construc. Flow reg/mod	5.0 miles 292 acres	Beaver Creek / Rockwest Creek
AL/Claiborne Res_03	Alabama River	Partial	R	L	Wilcox	PWS	Nutrients OE/DO	Dam construc. Flow reg/mod	10.2 miles 775 acres	Pursley Creek/ Beaver Creek /
AL/Claiborne Res_02	Alabama River	Partial	R	L	Wilcox	PWS F&W	Nutrients OE/DO	Industrial Nonirrigated Crop prod.	12.6 miles 626 acres	Bear Creek / Pursley Creek

Figure 7-3



1-35 2000 §303(d) List Waters

Index	Entity_id	Name
1	AL/03160109-020_01	Duck Creek
2	AL/03160109-020_02	Long Branch
3	AL/03160109-030_01	Brindley Creek
4	AL/03160109-040_01	Eightmile Creek
5	AL/03160109-050_01	Broglen River
6	AL/03160109-050_02	Mulberry Fork
7	AL/03160109-070_01	Mud Creek
8	AL/03160109-080_01	Thacker Creek
9	AL/03160109-080_02	Mulberry Fork
10	AL/03160109-080_03	Mulberry Fork
11	AL/03160109-170_01	Cane Creek
12	AL/03160109-170_02	Black Branch
13	AL/03160109-170_03	Lost Creek
14	AL/03160109-170_04	Lost Creek
15	AL/03160109-180_01	Wolf Creek
16	AL/03160110-080_01	Rock Creek
17	AL/03160110-090_01	Crooked Creek
18	AL/03160111-050_02	Dry Creek
19	AL/03160111-050_01	Graves Creek
20	AL/03160111-050_03	Locust Fork
21	AL/03160111-120_01	Locust Fork
22	AL/03160111-150_02	Locust Fork
23	AL/03160111-130_01	Newfound Creek
24	AL/03160111-140_01	Camp Branch
25	AL/03160111-140_02	Village Creek
26	AL/03160111-140_03	Bayview Lake
27	AL/03160111-150_01	Short Creek
28	AL/03160112-020_01	Opossum Creek
29	AL/03160112-030_01	Mud Creek
30	AL/03160112-050_01	Big Yellow Creek
31	AL/Bankhead Res_01	Black Warrior River
32	AL/03160112-100_01	North River
33	AL/03160112-120_01	Hurricane Creek
34	AL/03160112-120_02	Little Hurricane Cr
35	AL/03160112-120_03	N. Fk. Hurricane Cr

Figure 7-4

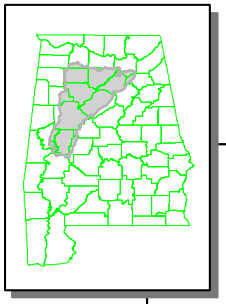
1-63 Black Warrior River Basin
2002 §305(b) Full Support Waters

Index	Name
1	Slab Creek
2	Clear Creek
3	Whippoorwill Creek
4	Calvert Prong
5	Blackburn Fork Creek
6	Duck Creek
7	Longs Creek
8	Whetstone Creek
9	White Oak Creek
10	Rock Creek
11	Mill Creek
12	Spring Creek
13	Sandy Creek
14	Cane Creek
15	Right Fork Clear Creek
16	Clear Creek
17	Splunge Creek
18	Blackwater Creek
19	Mill Creek
20	North River
21	Clear Creek
22	Cedar Creek
23	Tyro Creek
24	Little Yellow Creek
25	Bear Creek
26	Cripple Creek
27	Blue Creek
28	Binion Creek
29	Yellow Creek
30	Big Creek
31	Lye Branch

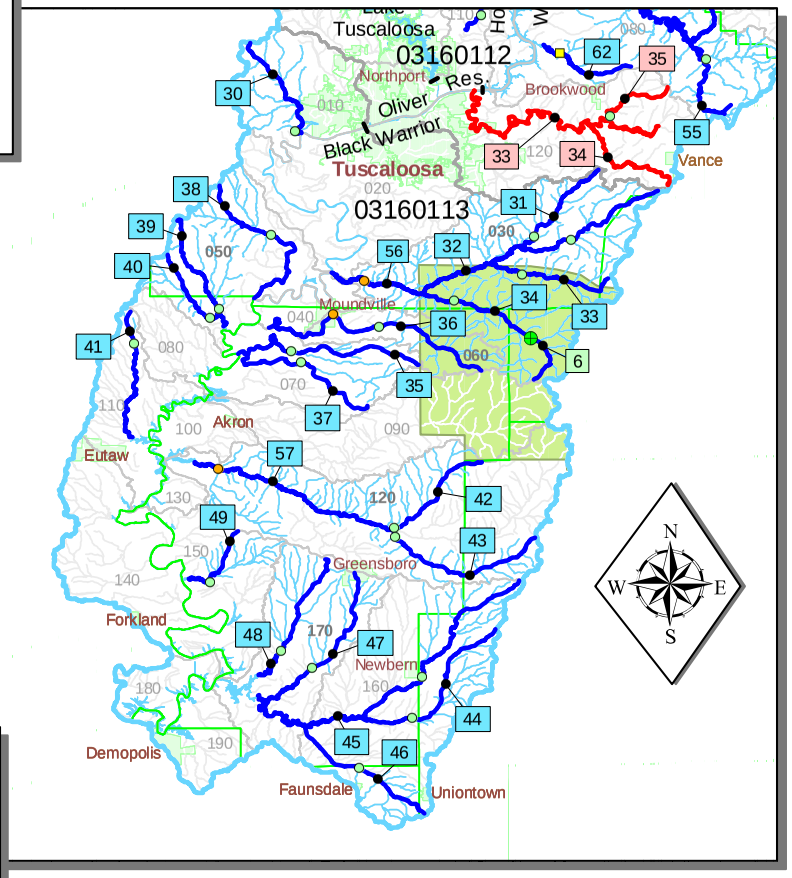
Index	Name
32	Big Sandy Creek
33	Bear Creek
34	South Sandy Creek
35	Millians Creek
36	Elliotts Creek
37	Gabriel Creek
38	Grant Creek
39	Buck Creek
40	Little Buck Creek
41	Minter Creek
42	Sparks Creek
43	Big Brush Creek
44	Dry Creek
45	Big Prairie Creek
46	Cottonwood Creek
47	Little Prairie Creek
48	Big German Creek
49	Hines Creek
50	Fivemile Creek
51	Village Creek
52	Valley Creek
53	Blackwater Creek
54	Lost Creek
55	Davis Creek
56	Big Sandy Creek
57	Big Brush Creek
58	Inman Creek
59	Gurley Creek
60	Clifty Creek
61	Pegues Creek
62	Daniel Creek

1-6 Ecoregion Reference Station
Full Support Waters

Index	Name
1	Hendrick Mill Creek
2	Marriott Creek
3	Blevens Creek
4	Inman Creek
5	Thompson Creek
6	South Sandy Creek



Lower Black River Basin
2002 §305(b) Report (Full Support)
and
2000 §303(d) List (Non Support)
Surface Waters



M
E
2002 §305(b) Report Waters-Fully Supporting
Black Warrior NPS Screening
Nutrient Tributary Study
1999 §303(d) Sampling
Ecoregion Reference Stations
2000 §303(d) List Waters-Not Supporting
USGS Cataloging Units
Counties
USDA-NRCS Subwatersheds
Mainstem Waters
Mainstem Waters
National Hydrography Dataset
Sipsey Wilderness Area
William B. Bankhead National Forest
Cities
River Basin

5 0 5 Miles
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Scale 1:850,000

Software: ESRI's™ Arcview 3.2
Projection: Geographic
Datum: NAD83
Extensions: NHD-RIT 2.0
Scripts: Graphtab.ave
Author: Mike Rief-ADEM Water Quality Branch
mjr@adem.state.al.us
334-271-7829

Table 7-15
Black Warrior River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	6	42.2	44.5	**86.7**
Nutrient Tributary Study	10	224.6	439.4	**664.0**
Black Warrior NPS Screening	58	678.1	945.4	**1,623.5**
1999 §303(d) Sampling	8	18.6	41.4	**60.0**
Total	**82**	**963.5**	**1,470.6**	**2,434.2**

Table 7-16
Black Warrior River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03160109-020_01	Duck Creek	Non	R	H	Cullman	F&W	OE/DO	Pasture Grazing Int. animal feeding oper.	6.4 miles	Duck River / Its Source
AL/03160109-020_02	Long Branch	Partial	R	M	Cullman	F&W	Ammonia OE/DO Pathogens	Int. animal feeding oper. Pasture Grazing	2.0 miles	Wolf Creek / Its Source
AL/03160109-030_01	Brindley Creek	Non	R	H	Cullman	PWS	Ammonia Nutrients OE/DO Pathogens	Urban runoff/ Storm sewers	18.8 miles	Broglen River / Its Source
AL/03160109-040_01	Eightmile Creek	Partial	R	L	Cullman	F&W	Pathogens	Urban runoff Pasture Grazing	23.0 miles	Broglen River / Its Source
AL/03160109-050_01	Broglen River	Partial	R	M	Cullman	F&W	Pathogens	Urban runoff Pasture Grazing	12.0 miles	Mulberry Fork / Its Source
AL/03160109-050_02	Mulberry Fork	Non	R	H	Blount Cullman	F&W	Siltation Other habitat alter.	Agriculture	18.4 miles	Broglen River / Blount Co Rd 6
AL/03160109-070_01	Mud Creek	Non	R	H	Cullman	F&W	OE/DO	Urban runoff/ Storm sewers	4.7 miles	AL Hwy 31 / Its Source

Table 7-16 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03160109-080_01	Thacker Creek	Non	R	H	Cullman	F&W	Ammonia OE/DO Pathogens	Pasture Grazing	9.5 miles	Mulberry Fork / Its Source
AL/03160109-080_02	Mulberry Fork	Non	R	H	Blount Cullman	F&W	Nutrients	Agriculture Industrial Municipal	2.5 miles	Marriott Creek / Mill Creek
AL/03160109-080_03	Mulberry Fork	Non	R	H	Blount Cullman	F&W	Nutrients Siltation Other habitat alter.	Agriculture Industrial Municipal	20 miles	Mill Creek / Broglen River
AL/03160109-170_01	Cane Creek	Partial	R	M	Walker	F&W LWF	Metals Nutrients pH OE/DO Siltation	Surface mining-aband. Municipal	14.7 miles	Lost Creek / Its Source
AL/03160109-170_02	Black Branch	Non	R	H	Walker	F&W	Metals pH Siltation Other habitat alter.	Surface mining-aband.	3.1 miles	Cane Creek/ Its Source
AL/03160109-170_03	Lost Creek	Partial	R	H	Walker	F&W	Siltation Other habitat alter.	Surface mining-aband.	12.8 miles	US Hwy 78 Carbon Hill / US Hwy 78 N of Cedrum
AL/03160109-170_04	Lost Creek	Partial	R	H	Walker	F&W	Siltation Other habitat alter.	Surface mining-aband.	17.3 miles	Mill dam @ Cedrum / AL Hwy 69 @ Oakman
AL/03160109-180_01	Wolf Creek	Partial	R	H	Walker	F&W	Siltation Other habitat alter.	Surface mining-aband.	37.2 miles	Lost Creek / AL Hwy 102
AL/03160110-080_01	Rock Creek	Partial	R	M	Winston	F&W	OE/DO Pathogens	Pasture Grazing Int. animal feeding oper.	5.0 miles	Smith Lake / Blevens Creek
AL/03160110-090_01	Crooked Creek	Partial	R	M	Cullman	F&W	Ammonia OE/DO Pathogens	Int. animal feeding oper. Pasture Grazing	28.0 miles	Smith Lake / Its Source
AL/03160111-050_02	Dry Creek	Partial	R	M	Blount	F&W	Nutrients Ammonia OE/DO Pathogens	Pasture Grazing	11.2 miles	Locust Fork / Its Source
AL/03160111-050_01	Graves Creek	Non	R	H	Blount	F&W	OE/DO	Pasture Grazing Industrial	10.2 miles	Locust Fork / Its Source

Table 7-16 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03160111-050_03	Locust Fork	Partial	R	H	Blount	F&W	Siltation Other habitat alter.	Agriculture Surface mining-aband.	21.8 miles	Little Warrior River / Blount Co Rd 30
AL/03160111-120_01	Locust Fork	Partial	R	H	Blount Jefferson	F&W	Nutrients Siltation Other habitat alter.	Agriculture Surface mining-aband.	47.3 miles	Jefferson Co Rd 77 / Little Warrior River /
AL/03160111-150_02	Locust Fork	Partial	R	L	Jefferson	F&W	OE/DO	Urban Runoff/ Storm Sewers	16.3 miles	Short Creek/ Fivemile Creek /
AL/03160111-130_01	Newfound Creek	Partial	R	M	Jefferson	F&W	Biology	Urban runoff/ Storm sewers	3.0 miles	Fivemile Creek / Impoundment
AL/03160111-140_01	Camp Branch	Non	R	L	Jefferson	F&W	Metals pH Siltation Other habitat alter.	Surface mining-aband. Subsurface mining-aband. Mill tailings-aband. Mine tailings-aband. Landfills	10.0 miles	Bayview Lake / Its Source
AL/03160111-140_02	Village Creek	Non	R	L	Jefferson	A&I	Nonpriority Organics Metals Ammonia pH Siltation OE/DO	Industrial Municipal Urban runoff/ Storm sewers Surface mining-aband. Subsurface mining-aband. Mill tailings-aband. Mine tailings-aband.	12.6 miles	Jefferson Co Rd 65 / Woodlawn Bridge
AL/03160111-140_03	Bayview Lake	Non	L	L	Jefferson	A&I	Ammonia OE/DO Siltation Pesticides	Municipal Urban runoff/ Storm sewers Industrial Spills Surface mining-aband.	440 acres	Bayview Lake Dam / Village Creek
AL/03160111-150_01	Short Creek	Non	R	L	Jefferson	F&W	Metals	Subsurface mining-aband. Mine tailings-aband.	3.0 miles	Jefferson Co Rd 39 / 3 miles upstream
AL/03160112-020_01	Opossum Creek	Non	R	H	Jefferson	A&I	OE/DO	Industrial Urban runoff/ Storm sewers	7.1 miles	Valley Creek / Its Source

Table 7-16 (cont.)

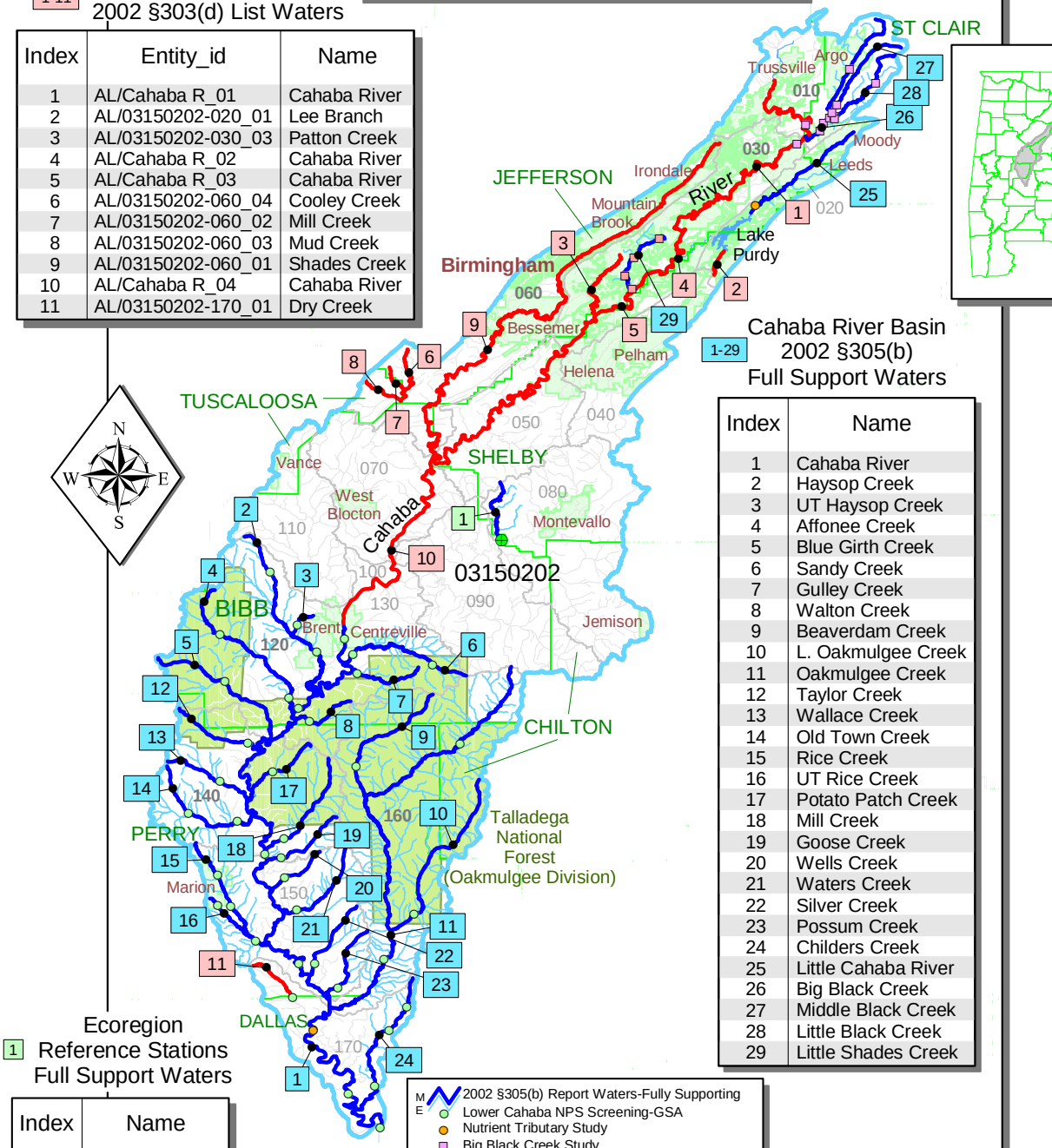
WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03160112-030_01	Mud Creek	Non	R	H	Jefferson	F&W	pH Siltation	Unknown source	5.1 miles	Valley Creek / Big Branch
AL/03160112-050_01	Big Yellow Creek	Non	R	H	Tuscaloosa	S F&W	Metals	Surface mining-aband.	20.7 miles	Bankhead Lake / Its Source
AL/Bankhead Res_01	Black Warrior River	Partial	R	L	Tuscaloosa	PWS S F&W	OE/DO	Dam construc.	2.0 miles 451 acres	Bankhead Dam / Big Yellow Creek
AL/03160112-100_01	North River	Partial	R	H	Fayette Tuscaloosa	F&W	Nutrients Siltation Other habitat alter.	Surface mining-aband.	38 miles	Lake Tuscaloosa / Ellis Creek
AL/03160112-120_01	Hurricane Creek	Non	R	H	Tuscaloosa	F&W	Metals (Al, Fe) Pathogens Turbidity	Surface mining-aband. Land development	31.4 miles	Black Warrior River / Coal Creek
AL/03160112-120_02	Little Hurricane Creek	Non	R	H	Tuscaloosa	F&W	Metals (Al, As, Cu, CrT, Fe) Pathogens	Surface mining-aband.	10 miles	Hurricane Creek / Its Source

Figure 7-5

Cahaba River Basin 2002 §305(b) Report (Full Support) and 2000 §303(d) List (Non Support) Surface Waters

1-11 Cahaba River Basin 2002 §303(d) List Waters

Index	Entity_id	Name
1	AL/Cahaba R_01	Cahaba River
2	AL/03150202-020_01	Lee Branch
3	AL/03150202-030_03	Patton Creek
4	AL/Cahaba R_02	Cahaba River
5	AL/Cahaba R_03	Cahaba River
6	AL/03150202-060_04	Cooley Creek
7	AL/03150202-060_02	Mill Creek
8	AL/03150202-060_03	Mud Creek
9	AL/03150202-060_01	Shades Creek
10	AL/Cahaba R_04	Cahaba River
11	AL/03150202-170_01	Dry Creek



1-29 Cahaba River Basin 2002 §305(b) Full Support Waters

Index	Name
1	Cahaba River
2	Haysop Creek
3	UT Haysop Creek
4	Affonee Creek
5	Blue Girth Creek
6	Sandy Creek
7	Gulley Creek
8	Walton Creek
9	Beaverdam Creek
10	L. Oakmulgee Creek
11	Oakmulgee Creek
12	Taylor Creek
13	Wallace Creek
14	Old Town Creek
15	Rice Creek
16	UT Rice Creek
17	Potato Patch Creek
18	Mill Creek
19	Goose Creek
20	Wells Creek
21	Waters Creek
22	Silver Creek
23	Possum Creek
24	Childers Creek
25	Little Cahaba River
26	Big Black Creek
27	Middle Black Creek
28	Little Black Creek
29	Little Shades Creek

1 Ecoregion Reference Stations Full Support Waters

Index	Name
1	Mayberry Creek

M E
- 2002 §305(b) Report Waters-Fully Supporting
- Lower Cahaba NPS Screening-GSA
- Nutrient Tributary Study
- Big Black Creek Study
- Little Shades Creek Study
- Ecoregion Reference Stations
- 2000 §303(d) List Waters-Not Supporting
- USGS Cataloging Units
- Counties
- USDA-NRCS Subwatersheds
- Mainstem Waters
- Mainstem Waters
- National Hydrography Datset
- Talladega National Forest (Oakmulgee Division)
- Cities
- River Basin/USGS Cataloging Unit 03150202

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Software: ESRI's™ Arcview 3.2
Projection: Geographic
Datum: NAD83
Extensions: NHD-RIT 2.0
Scripts: Graphtab.ave
Author: Mike Rief-ADEM Water Quality Branch
mjr@adem.state.al.us
334-271-7829

Table 7-17
Cahaba River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	1	7.6	7.9	**15.5**
Nutrient Tributary Study	2	12.1	8.6	**20.7**
Lower Cahaba NPS Screening	39	361.9	702.4	**1,064.3**
Big Black Creek Study	11	34.2	20.9	**55.1**
Little Shades Creek Study	4	7.5	7.6	**15.1**
Total	**57**	**423.2**	**747.4**	**1,170.6**

Table 7-18
Cahaba River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/Cahaba R_01	Cahaba River	Partial	R	H	Jefferson Shelby	F&W	Nutrients Siltation	Urban runoff/ Storm sewers Municipal	17.4 miles	Buck Creek/ US Hwy. 280
AL/03150202-020_01	Lee Branch	Non	R	H	Shelby	F&W	Pathogens	Urban runoff/ Storm sewers	2.5 miles	Lake Purdy/ Its Source
AL/03150202-030_03	Patton Creek	Partial	R	L	Jefferson	F&W	OE/DO	Urban runoff/ Storm sewers	5.0 miles	Cahaba River/ Its Source
AL/Cahaba R_02	Cahaba River	Partial	R	H	Jefferson Shelby	OAW PWS F&W	Siltation Other habitat alter.	Urban runoff/ Storm sewers	36.9 miles	US Hwy. 280/ I-59
AL/Cahaba R_03	Cahaba River	Partial	R	H	Shelby	OAW F&W	Nutrients Siltation Pathogens Other habitat alter.	Municipal Urban runoff/ Storm sewers Land development	26.5 miles	Shades Creek/ Buck Creek
AL/03150202-060_04	Cooley Creek	Partial	R	M	Jefferson	F&W	Pathogens	Pasture Grazing Onsite wastewater systems	3.8 miles	Mill Creek/ Its Source

Table 7-18 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/03150202-060_02	Mill Creek	Partial	R	M	Jefferson	F&W	Pathogens	Pasture Grazing	5.4 miles	Mud Creek/ Its Source
AL/03150202-060_03	Mud Creek	Partial	R	M	Jefferson	F&W	Pathogens	Pasture Grazing	3.7 miles	Tannehill Iron Works/ Its Source
AL/03150202-060_01	Shades Creek	Non	R	L	Jefferson	F&W	Siltation OE/DO Other habitat alter. Pathogens Turbidity	Collection system failure Hwy/road/bridge constr. Land development Urban runoff/ Storm sewers Removal of riparian veg. Bank/shoreline mod.	55.0 miles	Cahaba River/ Its Source
AL/Cahaba R_04	Cahaba River	Partial	R	H	Bibb Shelby	OAW	Nutrients Other habitat alter.	Municipal Urban runoff/ Storm sewers Land development	24 miles	AL Hwy. 82/ Shades Creek
AL/03150202-170_01	Dry Creek	Non	R	M	Dallas	F&W	Pathogens	Pasture Grazing	4.5 miles	Dallas Co. Rd. 201/ Its Source

Figure 7-6

Chattahoochee River Basin 2002 §305(b) Report (Full Support) and 2000 §303(d) List (Non Support) Surface Waters

1-2 Chattahoochee River Basin 2000 §303(d) List Waters

Index	Entity_id	Name
1	AL/03130003-180_01	Barbour Creek
2	AL/03130004-060_01	Poplar Spring Branch

1-10 Chattahoochee River Basin 2002 §305(b) Full Support Waters

Index	Name
1	Wehadkee Creek
2	Bennett Mill Creek
3	Osanippa Creek
4	Halawakee Creek
5	Uchee Creek
6	N. Fk Cowikee Creek
7	M. Fk Cowikee Creek
8	S. Fk Cowkiee Creek
9	Uchee Creek

1-2 Ecoregion Reference Stations Full Support Waters

Index	Name
1	Brush Creek
2	Ihagee Creek

M E
- 2002 §305(b) Report Waters-Fully Supporting
- Southeast Alabama NPS Screening
- Nutrient Tributary Study
- 1999 §303(d) Sampling
- Ecoregion Reference Stations
- 2000 §303(d) List Waters-Not Supporting
- USGS Cataloging Units
- Counties
- USDA-NRCS Subwatersheds
- Mainstem Waters
- National Hydrography Dataset
- Fort Benning
- Eufaula National Wildlife Refuge
- Cities
- River Basin

10 0 10 Miles
10 0 10 Kilometers
Scale 1:1,100,000

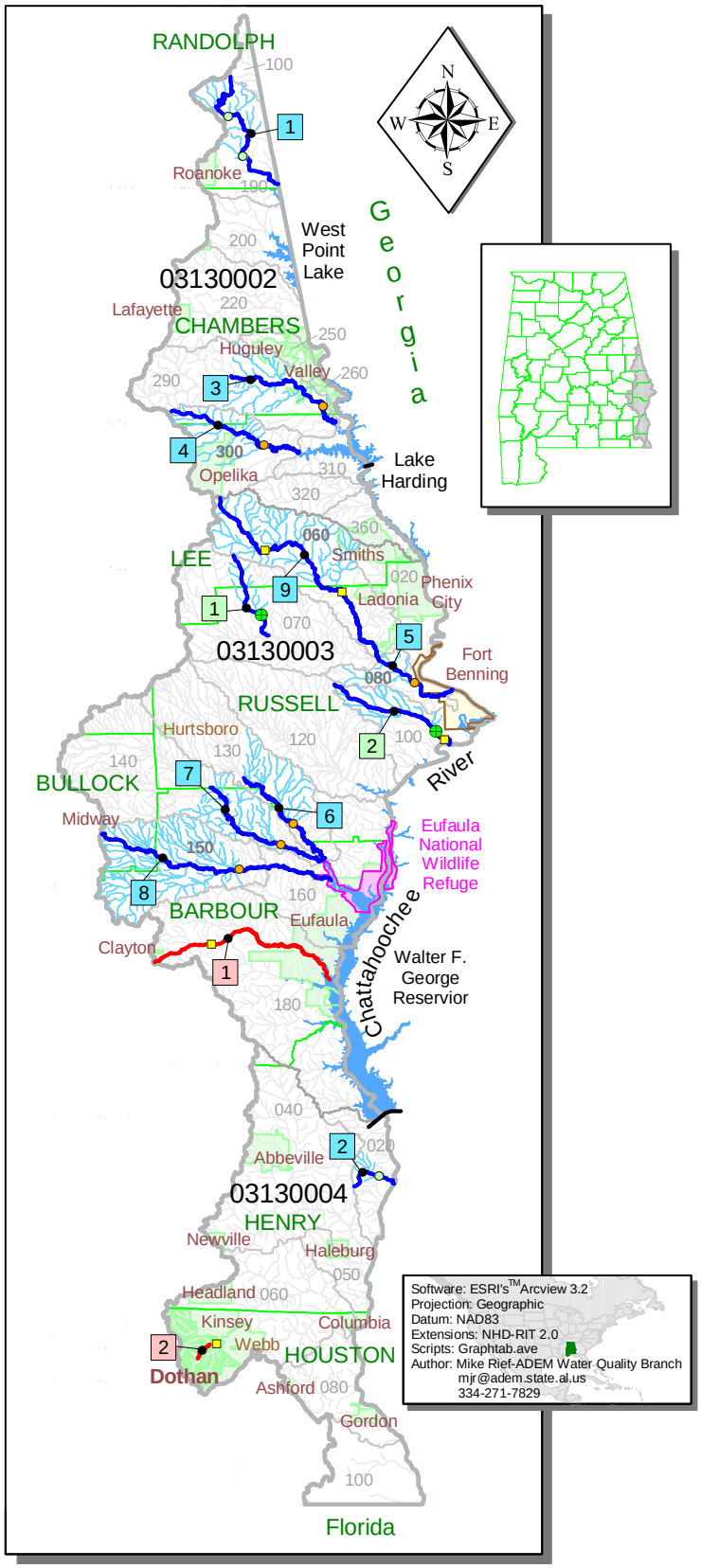


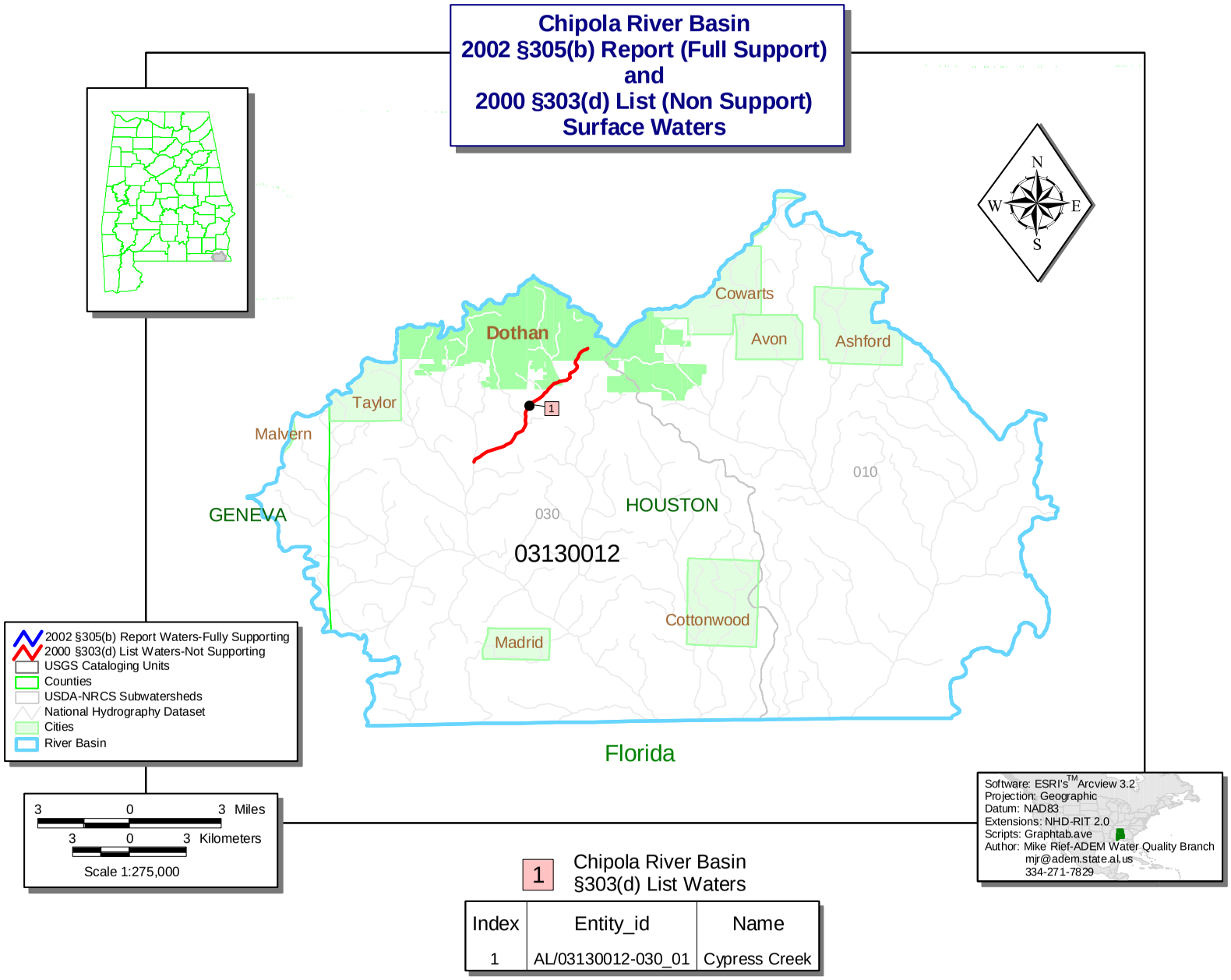
Table 7-19
Chattahoochee River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	2	26.3	49.9	**76.1**
Nutrient Tributary Study	6	119.7	482.7	**602.4**
Southeast Alabama NPS Screening	3	27.1	46.5	**73.6**
1999 §303(d) Sampling	5	51.6	162.5	**214.1**
Total	**16**	**224.6**	**741.5**	**966.1**

Table 7-20
Chattahoochee River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03130003-180_01	Barbour Creek	Non	R	H	Barbour	F&W	Siltation	Agriculture	21.9 miles	Chattahoochee River/ Its Source
AL/03130004-060_01	Poplar Spring Branch	Non	R	H	Houston	F&W	pH	Industrial	2.0 miles	Omussee Creek/ Ross Clark Circle

Figure 7-7



Index	Entity_id	Name
1	AL/03130012-030_01	Cypress Creek

Table 7-21
Chipola River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03130012-030_01	Cypress Creek	Partial	R	M	Houston	F&W	Nutrients OE/DO	Municipal Urban runoff/ Storm sewers	5.3 miles	Limestone Creek/ Its Source

Figure 7-8

Choctawhatchee River Basin 2002 §305(b) Report (Full Support) and 2000 §303(d) List (Non Support) Surface Waters

1-5 Choctawhatchee River Basin §303(d) List Waters

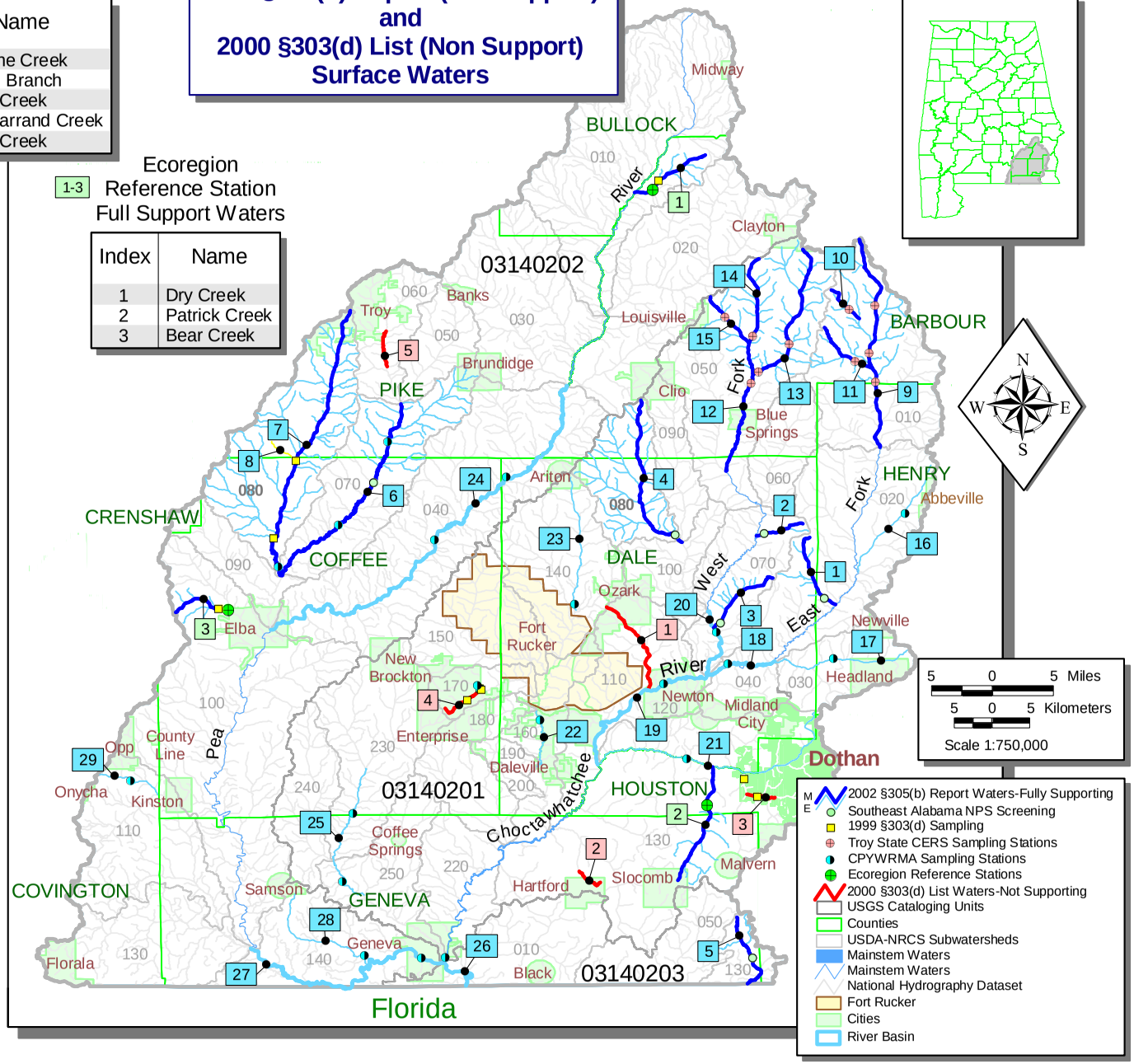
Index	Entity_id	Name
1	AL/03140201-110_01	Hurricane Creek
2	AL/03140201-130_01	Dowling Branch
3	AL/03140201-130_02	Beaver Creek
4	AL/03140201-150_01	UT to Harrand Creek
5	AL/03140202-060_01	Walnut Creek

1-31 Choctawhatchee River Basin §305(b) Full Support Waters

Index	Name
1	Deal Creek
2	Walnut Creek
3	Big Creek
4	Judy Creek
5	Holmes Creek
6	Whitewater Creek
7	Big Creek
8	Fishpond Creek
9	East Fk Choctawhatchee R
10	Winn (McSwain) Creek
11	Hamm Creek
12	West Fk Choctawhatchee R
13	Lindsey Creek
14	Pauls Creek
15	Jackson Creek
16	Poor Creek
17	Blackwood Creek
18	East Fk Choctawhatchee R
19	Choctawhatchee R
20	West Fk Choctawhatchee R
21	Little Choctawhatchee R
22	Claybank Creek
23	Bear Creek
24	Pea River
25	Double Bridges Creek
26	Choctawhatchee R
27	Pea River
28	Sandy Creek
29	Shotbag Creek

1-3 Ecoregion Reference Station Full Support Waters

Index	Name
1	Dry Creek
2	Patrick Creek
3	Bear Creek



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Projection: Geographic
Datum: NAD83
Extensions: NHD-RIT 2.0
Scripts: Graphtab.ave
Author: Mike Rief-ADEM Water Quality Branch
mjr@adem.state.al.us
334-271-7829

Table 7-22
Choctawhatchee River Basin Full Support Waters
Rivers and Streams
(miles)

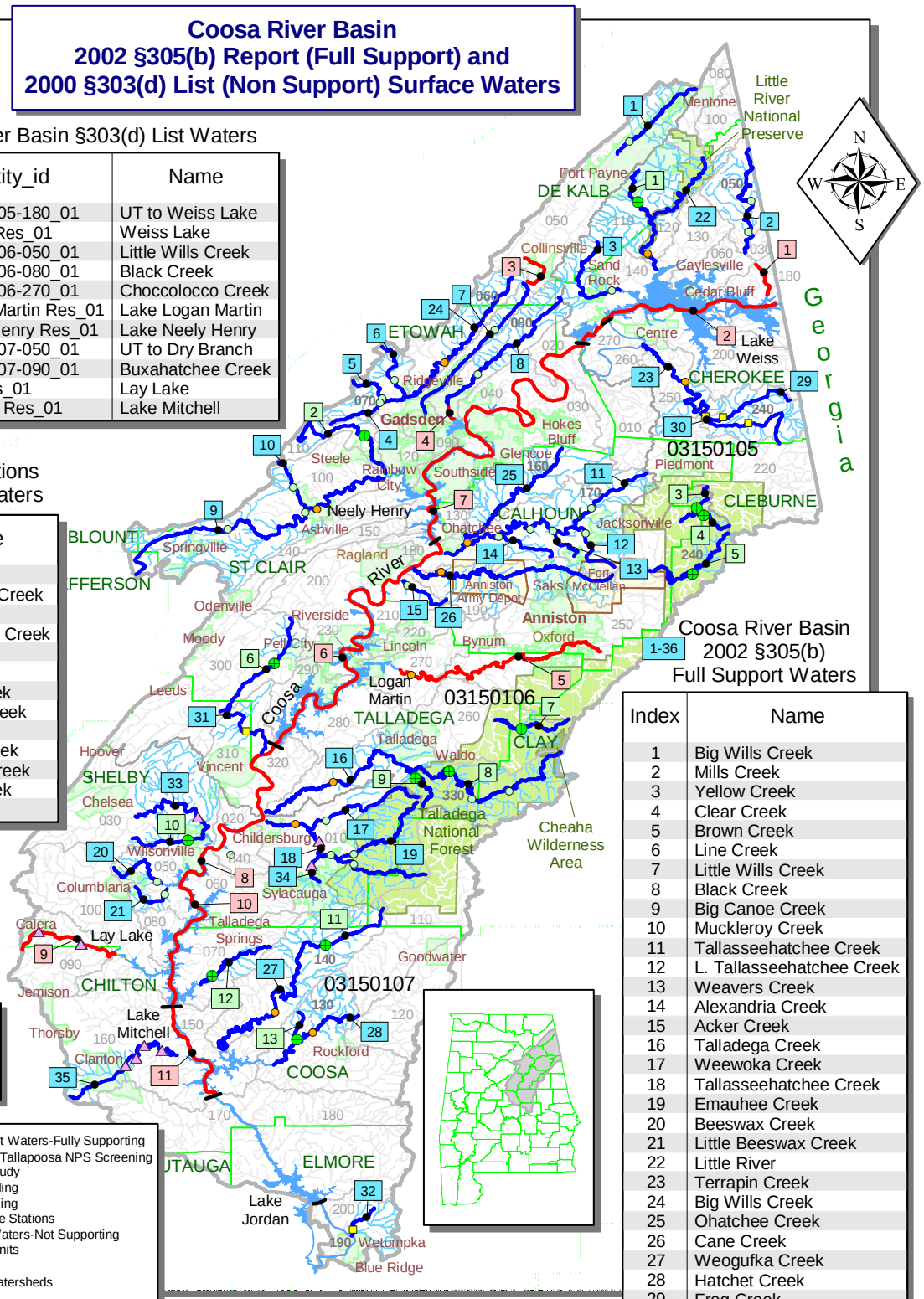
Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	3	21.3	49.9	**71.2**
Southeast Alabama NPS Screening	6	59.7	143.9	**203.6**
1999 §303(d) Sampling	8	25.2	120.3	**145.5**
Troy State CERS Sampling	11	62.7	123.0	**185.6**
CPYRWMA Sampling	20		191.9	**191.9**
Total	**48**	**168.9**	**628.9**	**797.8**

Table 7-23
Choctawhatchee River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
Hurricane Creek	Non	R	H	Dale	F&W	Pathogens	Agriculture	8.5 miles	Choctawhatchee River/ Its Source
Dowling Branch	Non	R	H	Geneva	F&W	OE/DO Pathogens	Municipal Urban runoff/ Storm sewers	2.1 miles	Cox Mill Creek/ Its Source
Beaver Creek	Non	R	H	Houston	F&W	Nutrients OE/DO	Municipal Urban runoff/ Storm sewers	2.5 miles	Newborn Creek/ Dothan WWTP
UT to Harrand Creek	Partial	R	M	Coffee	F&W	Nutrients	Urban runoff/ Storm sewers	4.0 miles	Harrand Creek/ Its Source
Walnut Creek	Partial	R	M	Pike	F&W	Unknown toxicity	Municipal	3.0 miles	Troy WWTP/ DS of Pike Co. Rd. 59

Figure 7-9

Coosa River Basin
2002 §305(b) Report (Full Support) and
2000 §303(d) List (Non Support) Surface Waters



1-11 Coosa River Basin §303(d) List Waters

Index	Entity_id	Name
1	AL/03150105-180_01	UT to Weiss Lake
2	AL/Weiss Res_01	Weiss Lake
3	AL/03150106-050_01	Little Wills Creek
4	AL/03150106-080_01	Black Creek
5	AL/03150106-270_01	Choccolocco Creek
6	AL/Logan Martin Res_01	Lake Logan Martin
7	AL/Neely Henry Res_01	Lake Neely Henry
8	AL/03150107-050_01	UT to Dry Branch
9	AL/03150107-090_01	Buxahatchee Creek
10	AL/Lay Res_01	Lay Lake
11	AL/Mitchell Res_01	Lake Mitchell

1-13 Ecoregion Reference Stations Full Support Waters

Index	Name
1	Bear Creek
2	Little Canoe Creek
3	Dry Creek
4	Choccolocco Creek
5	Shoal Creek
6	Wolf Creek
7	Cheaha Creek
8	Talladega Creek
9	Dry Creek
10	Fourmile Creek
11	Weogufka Creek
12	Panther Creek
13	Jones Creek

1-36 Coosa River Basin 2002 §305(b) Full Support Waters

Index	Name
1	Big Wills Creek
2	Mills Creek
3	Yellow Creek
4	Clear Creek
5	Brown Creek
6	Line Creek
7	Little Wills Creek
8	Black Creek
9	Big Canoe Creek
10	Muckleroy Creek
11	Tallasseehatchee Creek
12	L. Tallasseehatchee Creek
13	Weavers Creek
14	Alexandria Creek
15	Acker Creek
16	Talladega Creek
17	Weewoka Creek
18	Tallasseehatchee Creek
19	Emauhee Creek
20	Beeswax Creek
21	Little Beeswax Creek
22	Little River
23	Terrapin Creek
24	Big Wills Creek
25	Ohatchee Creek
26	Cane Creek
27	Weogufka Creek
28	Hatchet Creek
29	Frog Creek
30	Hurricane Creek
31	Kelley Creek
32	Taylor Creek
33	Yellowleaf Creek
34	Shirtee Creek
35	Walnut Creek

5 0 5 Miles
5 0 5 Kilometers
Scale 1:1,100,000

- 2002 §305(b) Report Waters-Fully Supporting
- Alabama, Coosa, & Tallapoosa NPS Screening
- Nutrient Tributary Study
- 1999 §303(d) Sampling
- 2000 §303(d) Sampling
- Ecoregion Reference Stations
- 2000 §303(d) List Waters-Not Supporting
- USGS Cataloging Units
- Counties
- USDA-NRCS Subwatersheds
- Mainstem Waters
- National Hydrography Dataset
- Cheaha Wilderness Area
- Talladega National Forest
- Little River National Preserve
- Ft. McClellan/Anniston Army Depot
- Cities
- River Basin

Software: ESRI's™Arcview 3.2
Projection: Geographic
Datum: NAD83
Extensions: NHD-RIT 2.0
Scripts: Graphtab.ave
Author: Mike Rief-ADEM Water Quality Branch
mjr@adem.state.al.us
334-271-7829

Table 7-24
Coosa River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	13	164.3	224.4	**388.7**
Nutrient Tributary Study	11	188.3	503.4	**691.7**
Alabama-Coosa-Tallapoosa NPS Screening	27	352.6	727.8	**1,080.4**
1999 §303(d) Sampling	6	705.2	1,455.7	**2,160.8**
2000 §303(d) Sampling	10	41.8	152.9	**194.7**
Total	**67**	**1,452.2**	**3,064.2**	**4,516.4**

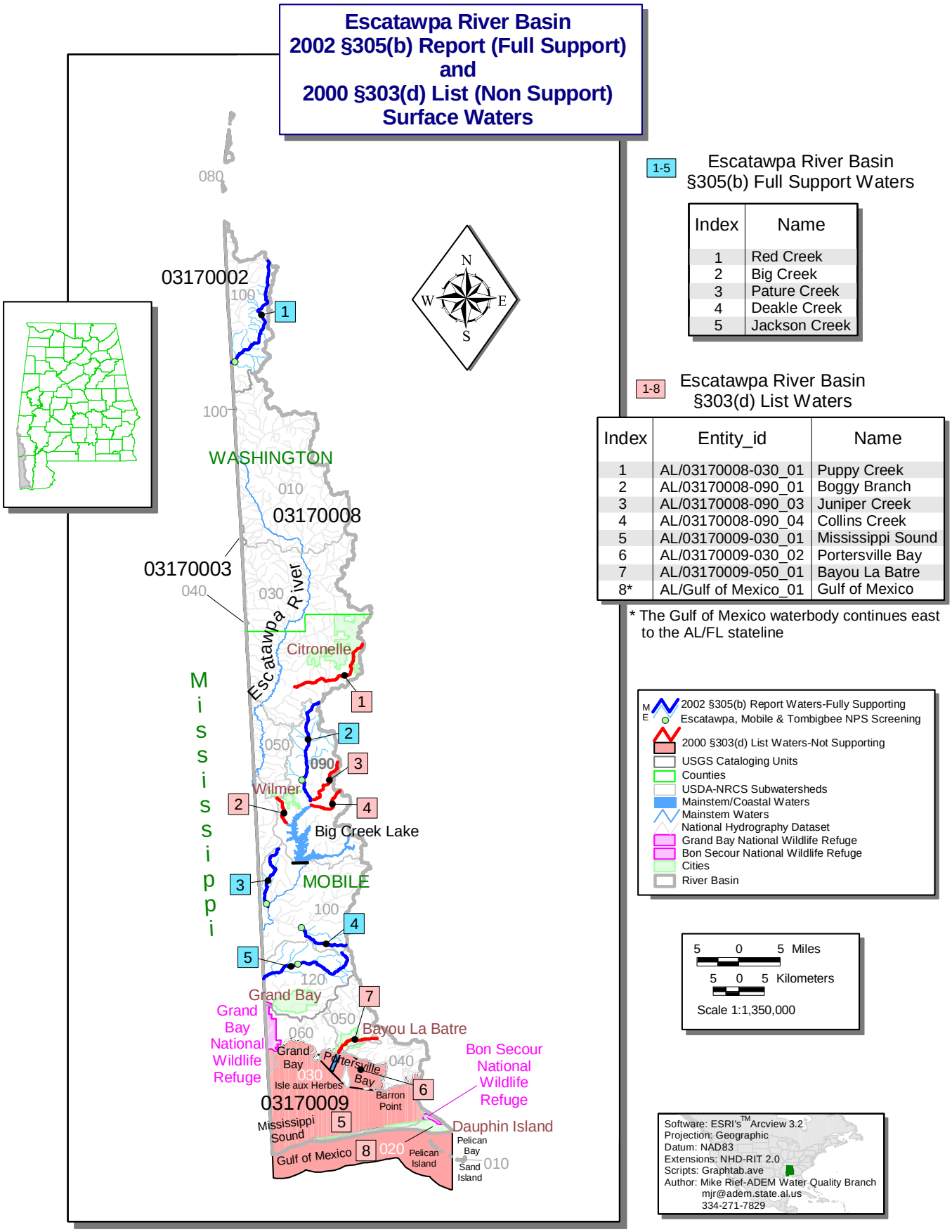
Table 7-25
Coosa River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/03150105-180_01	UT to Weiss Lake	Non	R	H	Cherokee	F&W	Ammonia Nutrients OE/DO Pathogens	Agriculture	4.4 miles	Blayplay Creek/ Its Source
AL/Weiss Res_01	Weiss Lake	Partial	L	M	Cherokee	PWS S F&W	Priority Organics Nutrients pH	Sources outside state Flow reg/mod	30200 acres	Weiss Dam/ AL-GA State Line
AL/03150106-050_01	Little Wills Creek	Partial	R	H	DeKalb	F&W	Nutrients	Urban runoff/ Storm sewers	5.5 miles	Big Wills Creek/ Its Source
AL/03150106-080_01	Black Creek	Non	R	L	Etowah	A&I	Priority Organics Ammonia OE/DO	Industrial Contaminated sediments Urban runoff/ Storm sewers	3.0 miles	Big Wills Creek/ Forest Avenue
AL/03150106-270_01	Choccolocco Creek	Non	R	L	Talladega	F&W	Priority Organics	Contaminated sediments	34.2 miles	Lake Logan Martin/ Hillabee Creek
AL/Logan Martin Res_01	Lake Logan Martin	Partial	L	L	St. Clair	F&W S	Nutrients OE/DO Priority Organics	Flow reg/mod Contaminated sediments Urban runoff/ Storm sewers	15263 acres	Logan Martin Dam/ Neely Henry Dam

Table 7-25 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/Neely Henry Res_01	Lake Neely Henry	Partial	L	M	Etowah	PWS S F&W	Nutrients pH OE/DO	Industrial Municipal Flow reg/mod Upstream sources	11235 acres	Neely Henry Dam/ Weiss Dam
AL/03150107-050_01	UT to Dry Branch	Partial	R	H	Shelby	F&W	Nutrients	Municipal Urban runoff/ Storm sewers	1.5 miles	Dry Branch/ Its Source
AL/03150107-090_01	Buxahatchee Creek	Partial	R	H	Chilton Shelby	F&W F&W	Nutrients	Municipal Urban runoff/ Storm sewers	13 miles	Waxahatchee Creek/ Its Source
AL/Lay Res_01	Lay Lake	Partial	L	L	Talladega	PWS S F&W	Priority Organics Nutrients OE/DO	Flow reg/mod Contaminated sediments Upstream sources	12000 acres	Lay Dam/ Logan Martin Dam
AL/Mitchell Res_01	Lake Mitchell	Partial	L	L	Coosa	PWS S F&W	Nutrients OE/DO	Urban runoff/ Storm sewers Flow reg/mod	5850 acres	Mitchell Dam/ Lay Dam

Figure 7-10


Escatawpa River Basin
2002 §305(b) Report (Full Support)
and
2000 §303(d) List (Non Support)
Surface Waters
1-5
Escatawpa River Basin
§305(b) Full Support Waters
Index | Name
1 | Red Creek
2 | Big Creek
3 | Pature Creek
4 | Deakle Creek
5 | Jackson Creek
1-8
Escatawpa River Basin
§303(d) List Waters
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1 | AL/03170008-030_01 | Puppy Creek
2 | AL/03170008-090_01 | Boggy Branch
3 | AL/03170008-090_03 | Juniper Creek
4 | AL/03170008-090_04 | Collins Creek
5 | AL/03170009-030_01 | Mississippi Sound
6 | AL/03170009-030_02 | Portersville Bay
7 | AL/03170009-050_01 | Bayou La Batre
8* | AL/Gulf of Mexico_01 | Gulf of Mexico
* The Gulf of Mexico waterbody continues east to the AL/FL stateline
2002 §305(b) Report Waters-Fully Supporting
Escatawpa, Mobile & Tombigbee NPS Screening
2000 §303(d) List Waters-Not Supporting
USGS Cataloging Units
Counties
USDA-NRCS Subwatersheds
Mainstem/Coastal Waters
Mainstem Waters
National Hydrography Dataset
Grand Bay National Wildlife Refuge
Bon Secour National Wildlife Refuge
Cities
River Basin
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5 0 5 Kilometers
Scale 1:1,350,000
Software: ESRI's Arcview 3.2
Projection: Geographic
Datum: NAD83
Extensions: NHD-RIT 2.0
Scripts: Graphtab.ave
Author: Mike Rief-ADEM Water Quality Branch
mjr@adem.state.al.us
334-271-7829
N
W
E
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03170002
03170008
03170003
03170009
WASHINGTON
MOBILE
Mississippi
Escatawpa River
Citronelle
Wilmer
Big Creek Lake
Grand Bay
Grand Bay National Wildlife Refuge
Bayou La Batre
Portersville Bay
Isle aux Herbes
Barron Point
Bon Secour National Wildlife Refuge
Dauphin Island
Pelican Bay
Pelican Island
Sand Island
Mississippi Sound
Gulf of Mexico

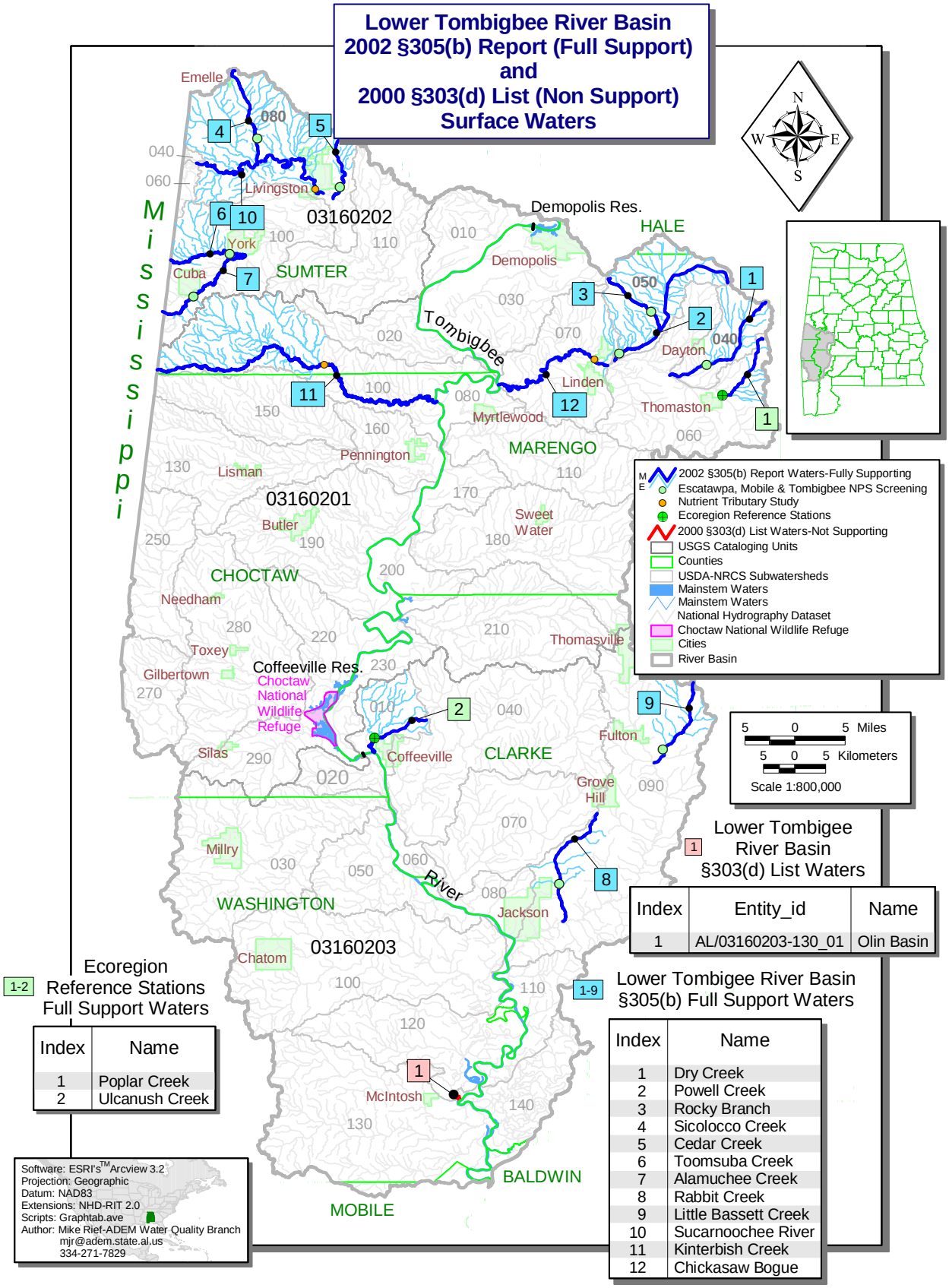
Table 7-26
Escatawpa River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Escatawpa-Mobile-Tombigbee NPS Screening	5	56.1	107.4	**163.5**

Table 7-27
Escatawpa River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03170008-030_01	Puppy Creek	Non	R	L	Mobile	F&W	Pathogens Nutrients	Urban runoff/ Storm sewers	10.0 miles	AL Hwy. 217 / Its Source
AL/03170008-090_01	Boggy Branch	Partial	R	M	Mobile	F&W	Metals (Fe)	Natural sources	3.6 miles	Big Creek Lake / Its Source
AL/03170008-090_03	Juniper Creek	Non	R	H	Mobile	F&W	Pathogens	Pasture Grazing	6.6 miles	Big Creek / Its Source
AL/03170008-090_04	Collins Creek	Partial	R	H	Mobile	F&W	Pathogens	Pasture Grazing Onsite wastewater systems	8.1 miles	Big Creek / Its Source
AL/03170009-030_01	Mississippi Sound	Partial	E	M	Mobile	SH F&W S	Pathogens	Urban runoff/ Storm sewers	146.5 mi^2	Segment classified for shellfish harvsting
AL/03170009-030_02	Portersville Bay	Non	E	L	Mobile	SH F&W S	Pathogens	Municipal Industrial	23.2 mi^2	1000 ft. W. of outfall / Bayou La Batre Utilities Outfall
AL/03170009-050_01	Bayou La Batre	Non	R	L	Mobile	F&W	OE/DO Pathogens	Urban runoff/ Storm sewers	4.0 miles	Portersville Bay / Its Source

Figure 7-11


Lower Tombigbee River Basin
2002 §305(b) Report (Full Support)
and
2000 §303(d) List (Non Support)
Surface Waters
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W
E
S
Emelle
Livingston
York
Cuba
SUMTER
03160202
Demopolis Res.
Demopolis
HALE
Dayton
Thomaston
Linden
Myrtlewood
Tombigbee
Mississippi
MARENGO
Pennington
Lisman
03160201
Butler
Sweet Water
CHOCTAW
Needham
Toxey
Gilbertown
Coffeeville Res.
Choctaw National Wildlife Refuge
Coffeeville
Thomasville
Silas
CLARKE
Fulton
Grove Hill
Millry
WASHINGTON
Jackson
River
03160203
Chatom
McIntosh
BALDWIN
MOBILE
2002 §305(b) Report Waters-Fully Supporting
Escatawpa, Mobile & Tombigbee NPS Screening
Nutrient Tributary Study
Ecoregion Reference Stations
2000 §303(d) List Waters-Not Supporting
USGS Cataloging Units
Counties
USDA-NRCS Subwatersheds
Mainstem Waters
Mainstem Waters
National Hydrography Dataset
Choctaw National Wildlife Refuge
Cities
River Basin
5 0 5 Miles
5 0 5 Kilometers
Scale 1:800,000
Lower Tombigee River Basin §303(d) List Waters
Index | Entity_id | Name
1 | AL/03160203-130_01 | Olin Basin
Lower Tombigee River Basin §305(b) Full Support Waters
Index | Name
1 Dry Creek
2 Powell Creek
3 Rocky Branch
4 Sicolocco Creek
5 Cedar Creek
6 Toomsuba Creek
7 Alamuchee Creek
8 Rabbit Creek
9 Little Bassett Creek
10 Sucarnoochee River
11 Kinterbish Creek
12 Chickasaw Bogue
Ecoregion Reference Stations Full Support Waters
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2 Ulcanush Creek
Software: ESRI's™ Arcview 3.2
Projection: Geographic
Datum: NAD83
Extensions: NHD-RIT 2.0
Scripts: Graphtab.ave
Author: Mike Rief-ADEM Water Quality Branch
mjr@adem.state.al.us
334-271-7829

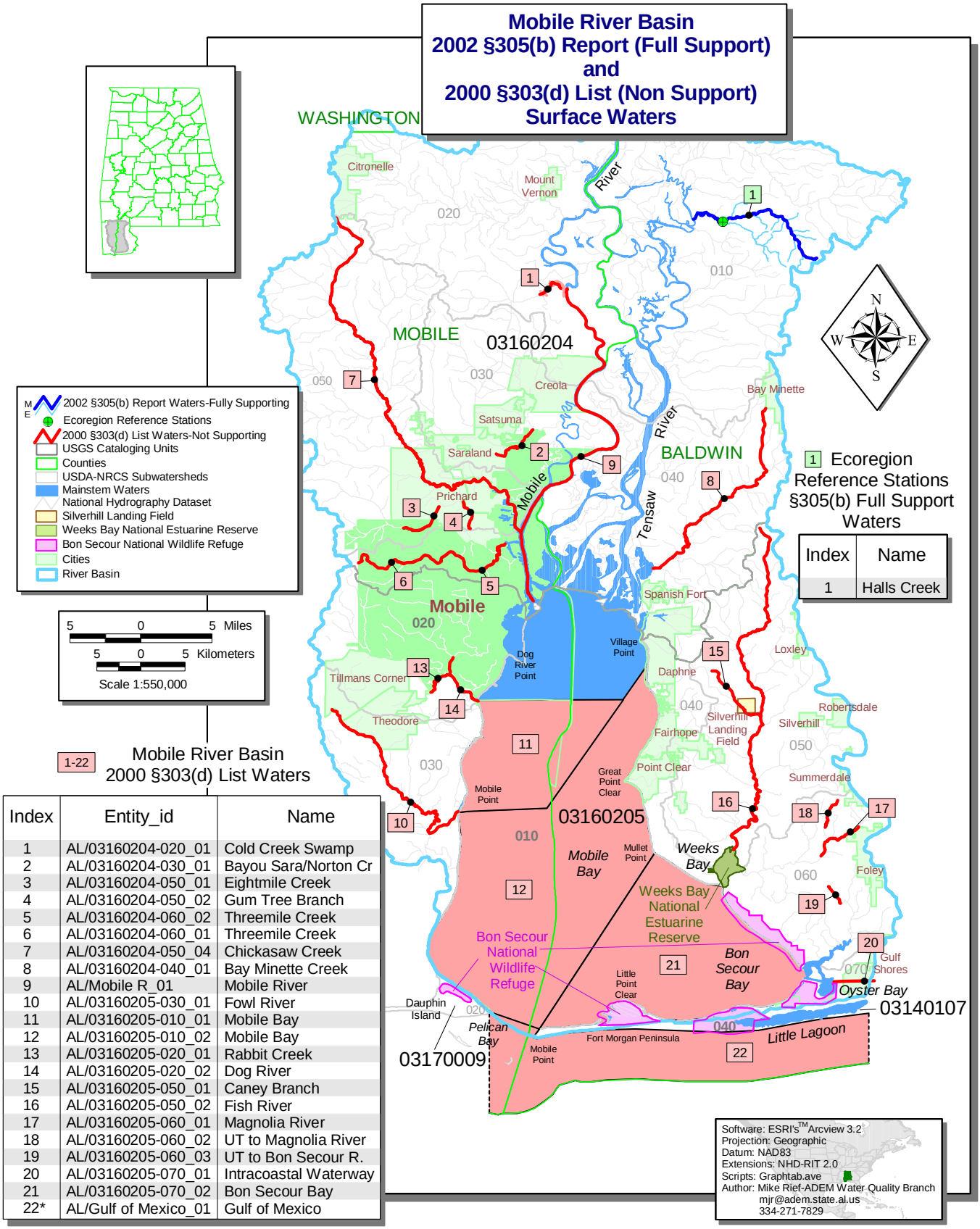
Table 7-28
Lower Tombigbee River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	2	16.1	64.3	**80.4**
Nutrient Tributary Study	3	92.1	316.0	**408.1**
Escatawpa-Mobile-Tombigbee NPS Screening	9	105.0	286.9	**391.9**
Total	**14**	**213.2**	**667.2**	**880.4**

Table 7-29
Lower Tombigbee River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03160203-130_01	Olin Basin	Non	L	L	Washington	F&W	Pesticides Metals (Hg)	Contaminated sediments	65 acres	All of Olin Basin

Figure 7-12



Index	Entity_id	Name
1	AL/03160204-020_01	Cold Creek Swamp
2	AL/03160204-030_01	Bayou Sara/Norton Cr
3	AL/03160204-050_01	Eightmile Creek
4	AL/03160204-050_02	Gum Tree Branch
5	AL/03160204-060_02	Threemile Creek
6	AL/03160204-060_01	Threemile Creek
7	AL/03160204-050_04	Chickasaw Creek
8	AL/03160204-040_01	Bay Minette Creek
9	AL/Mobile R_01	Mobile River
10	AL/03160205-030_01	Fowl River
11	AL/03160205-010_01	Mobile Bay
12	AL/03160205-010_02	Mobile Bay
13	AL/03160205-020_01	Rabbit Creek
14	AL/03160205-020_02	Dog River
15	AL/03160205-050_01	Caney Branch
16	AL/03160205-050_02	Fish River
17	AL/03160205-060_01	Magnolia River
18	AL/03160205-060_02	UT to Magnolia River
19	AL/03160205-060_03	UT to Bon Secour R.
20	AL/03160205-070_01	Intracoastal Waterway
21	AL/03160205-070_02	Bon Secour Bay
22*	AL/Gulf of Mexico_01	Gulf of Mexico

* The Gulf of Mexico §303(d) segment continues east to the AL/FL stateline and west to the AL/MS stateline

Table 7-30
Mobile River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Escatawpa-Mobile-Tombigbee NPS Screening	5	56.1	107.4	**163.5**

Table 7-31
Mobile River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/03160204-020_01	Cold Creek Swamp	Partial	E	L	Mobile	F&W	Metals (Hg)	Contaminated sediments Flow reg/mod	1.0 mi2	Cold Creek with Mobile R./ West through swamp
AL/03160204-030_01	Bayou Sara/ Norton Creek	Partial	R	H	Mobile	S F&W	Nutrients	Unknown source	3.7 miles	Saraland WWTP/ Gunnison Creek
AL/03160204-050_01	Eightmile Creek	Partial	R	M	Mobile	PWS F&W	Pathogens	Collection system failure Urban runoff/ Storm sewers	3.2 miles	AL Hwy. 45/ Highpoint Blvd.
AL/03160204-050_02	Gum Tree Branch	Non	R	H	Mobile	F&W	Pathogens	Collection system failure Urban runoff/ Storm sewers	2.2 miles	Eightmile Creek/ Its Source
AL/03160204-060_02	Threemile Creek	Non	R	L	Mobile	A&I	OE/DO Chlordane	Municipal Collection system failure Hwy/road/bridge constr. Land development Unknown source	0.5 miles	Telegraph Road/ Illinois Central Gulf RR
AL/03160204-060_01	Threemile Creek	Non	R	L	Mobile	A&I	OE/DO	Municipal Collection system failure Hwy/road/bridge construc. Land development	13.5 miles	Illinois Central Gulf RR/ Its Source
AL/03160204-050_04	Chickasaw Creek	Non	R	H	Mobile	LWF F&W	Mercury	Unknown source	35.7 miles	Mobile River/ Its Source

Table 7-31 (cont.)

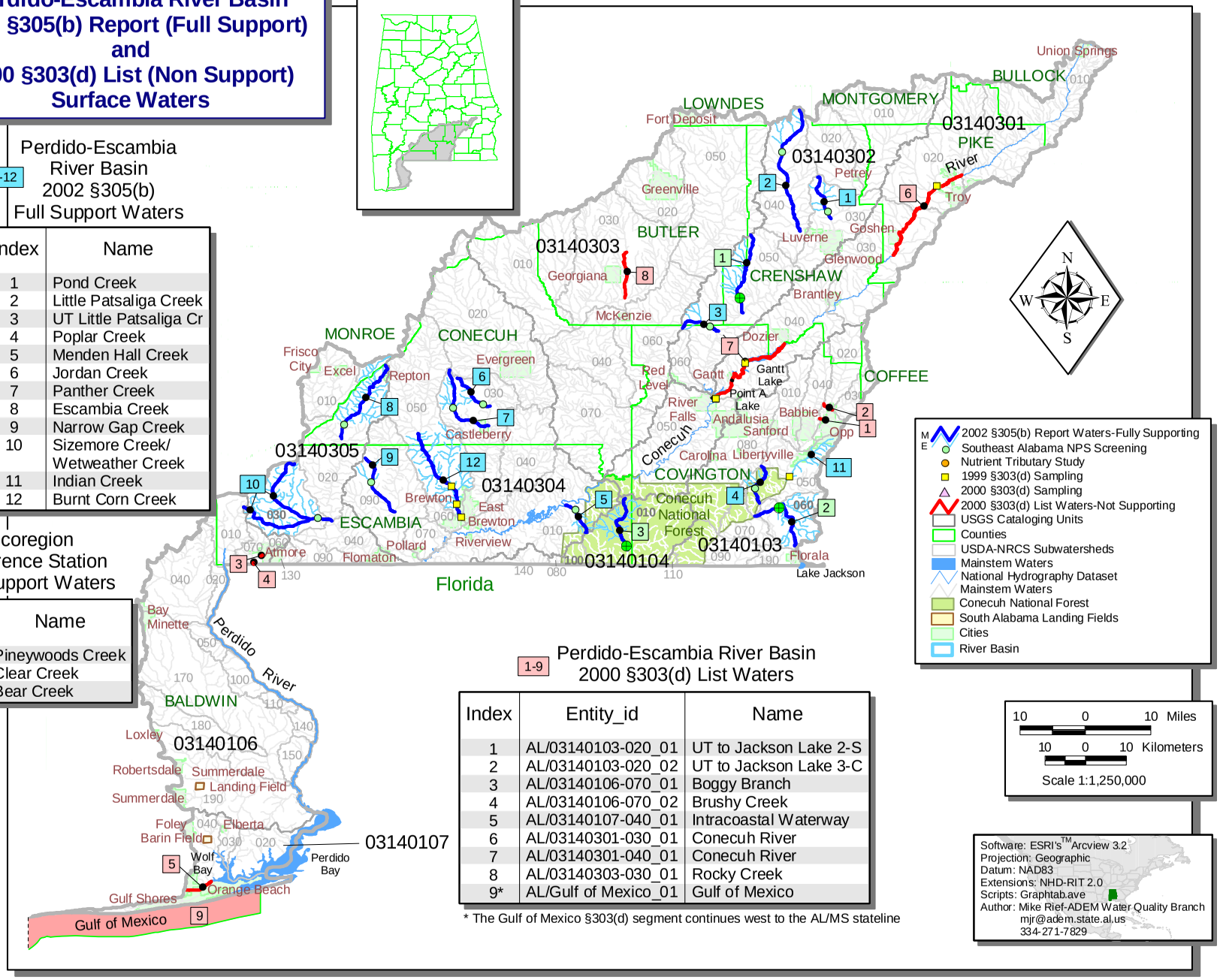
WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/03160204-040_01	Bay Minette Creek	Non	R	H	Baldwin	F&W	Mercury	Unknown source	16.6 miles	Bay Minette/ Its Source
AL/Mobile R_01	Mobile River	Partial	R	L	Mobile	LWF F&W	Mercury	Unknown source	29.5 miles	Mobile Bay/ Cold Creek
AL/03160205-030_01	Fowl River	Non	R	H	Mobile	S F&W	Mercury	Unknown source	16.9 miles	Mobile Bay/ Its Source
AL/03160205-010_01	Mobile Bay	Partial	E	L	Mobile	SH F&W S	OE/DO	Urban runoff/ Storm sewers	50.0 mi2	Southwest bay
AL/03160205-010_02	Mobile Bay	Partial	E	M	Mobile	SH F&W	Pathogens	Urban runoff/ Storm sewers	198.5 mi2	Segment classified for shellfish harvsting
AL/03160205-020_01	Rabbit Creek	Non	R	L	Mobile	F&W	OE/DO Pathogens	Onsite wastewater sys. Urban runoff/ Storm sewers	3.0 miles	Dog River/ AL Hwy. 163
AL/03160205-020_02	Dog River	Non	R	L	Mobile	F&W S	OE/DO Pathogens	Land development Onsite wastewater sys. Urban runoff/ Storm sewers	4.0 miles	Mobile River/ 4 miles upstream
AL/03160205-050_01	Caney Branch	Partial	R	M	Baldwin	F&W	Pathogens	Pasture grazing-riparian	5.0 miles	Fish River/ Its Source
AL/03160205-050_02	Fish River	Non	R	L	Baldwin	F&W S	Mercury Pathogens	Unknown source Pasture grazing	31.5 miles	Weeks Bay/ Its Source
AL/03160205-060_01	Magnolia River	Partial	R	M	Baldwin	F&W	OE/DO	Land development	6.3 miles	Baldwin Co. Rd. 49/
AL/03160205-060_02	UT to Magnolia River	Partial	R	M	Baldwin	S F&W	Pathogens	Onsite wastewater sys. Agriculture	3.0 miles	Baldwin Co. Rd. 24 Baldwin Co. Rd. 24/ Its Source
AL/03160205-060_03	UT to Bon Secour R.	Non	R	H	Baldwin	F&W	Pathogens	Pasture grazing Urban runoff/ Storm sewers	2.3 miles	Baldwin Co. Rd. 65/ Its Source

Table 7-31 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/03160205-070_01	Intracoastal Waterway	Non	R	L	Baldwin	F&W	OE/DO	Natural sources Urban runoff/ Storm sewers	2.2 miles	Oyster Bay/ Alabama Hwy. 59
AL/03160205-070_02	Bon Secour Bay	Partial	E	M	Baldwin	SH S F&W	Pathogens	Onsite wastewater sys. Urban runoff/ Storm sewers	121.3 mi2	Segment classified for shellfish harvsting
AL/Gulf of Mexico_01	Gulf of Mexico	Non	E	L	Mobile	SH S F&W	Mercury	Unknown source	238 mi2	Mississippi/ Florida

Figure 7-13

Perdido-Escambia River Basin 2002 §305(b) Report (Full Support) and 2000 §303(d) List (Non Support) Surface Waters



1-12 Perdido-Escambia River Basin 2002 §305(b) Full Support Waters

Index	Name
1	Pond Creek
2	Little Patsaliga Creek
3	UT Little Patsaliga Cr
4	Poplar Creek
5	Menden Hall Creek
6	Jordan Creek
7	Panther Creek
8	Escambia Creek
9	Narrow Gap Creek
10	Sizemore Creek/ Wetweather Creek
11	Indian Creek
12	Burnt Corn Creek

1-3 Ecoregion Reference Station Full Support Waters

Index	Name
1	Pineywoods Creek
2	Clear Creek
3	Bear Creek

1-9 Perdido-Escambia River Basin 2000 §303(d) List Waters

Index	Entity_id	Name
1	AL/03140103-020_01	UT to Jackson Lake 2-S
2	AL/03140103-020_02	UT to Jackson Lake 3-C
3	AL/03140106-070_01	Boggy Branch
4	AL/03140106-070_02	Brushy Creek
5	AL/03140107-040_01	Intracoastal Waterway
6	AL/03140301-030_01	Conecuh River
7	AL/03140301-040_01	Conecuh River
8	AL/03140303-030_01	Rocky Creek
9*	AL/Gulf of Mexico_01	Gulf of Mexico

* The Gulf of Mexico §303(d) segment continues west to the AL/MS stateline

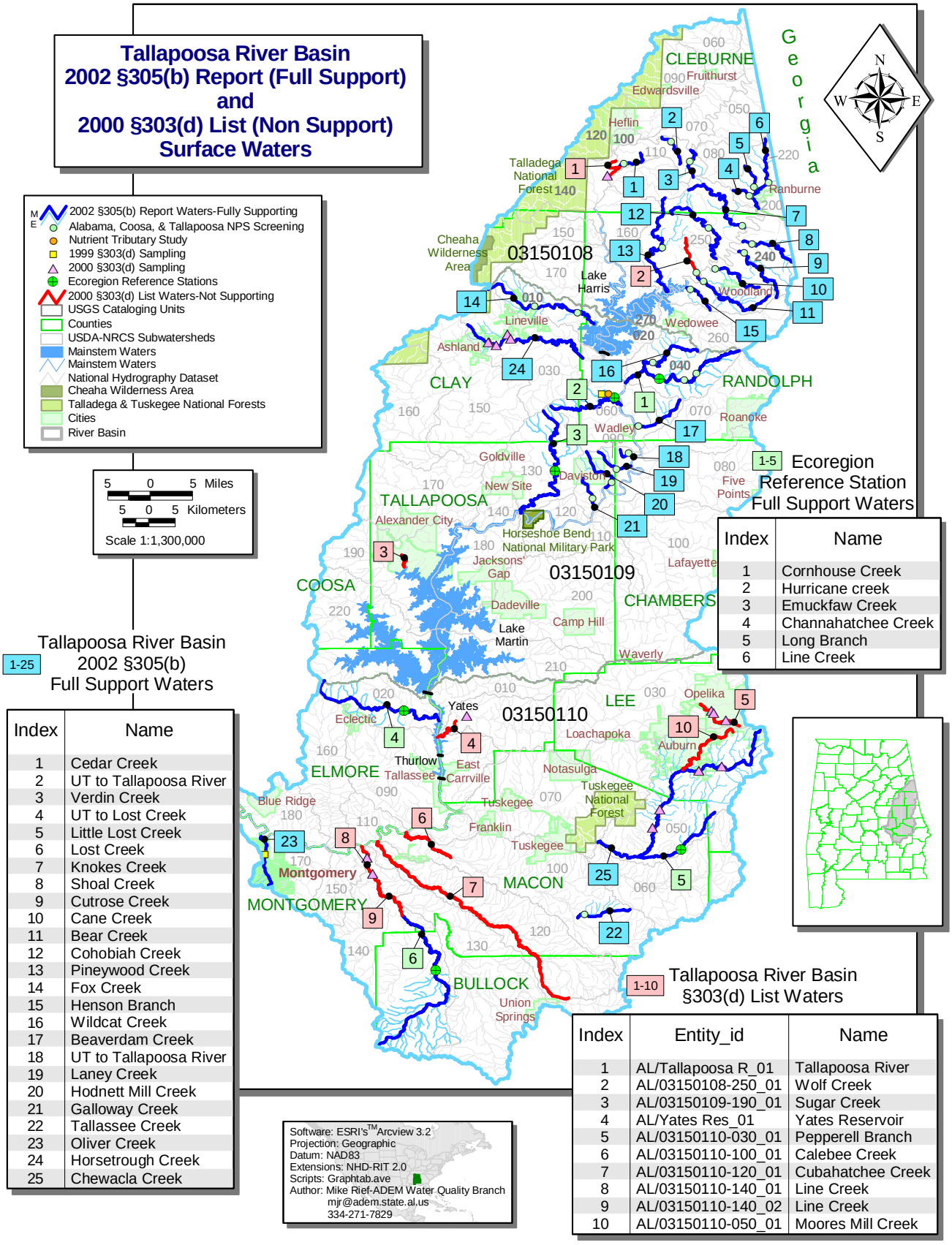
Table 7-32
Perdido-Escambia River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	3	35.6	110.6	**146.2**
Southeast Alabama NPS Screening	3	121.4	217.9	**339.3**
1999 §303(d) Sampling	10	19.3	123.2	**142.5**
Total	**16**	**176.4**	**451.7**	**628.0**

Table 7-33
Perdido-Escambia River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03140103-020_01	UT to Jackson Lake 2-S	Non	R	H	Covington	F&W	OE/DO Pathogens	Int. animal feeding oper. Pasture grazing	1.3 miles	W.F. Jackson Lake / Its Source
AL/03140103-020_02	UT to Jackson Lake 3-C	Non	R	H	Covington	F&W	OE/DO Pathogens	Int. animal feeding oper. Pasture grazing	0.2 miles	W.F. Jackson Lake / Its Source
AL/03140106-070_01	Boggy Branch	Partial	R	L	Escambia	F&W	OE/DO Zinc Chlorides	Industrial	0.2 miles	Atmore WWTP / Masland Carpets WWTP
AL/03140106-070_02	Brushy Creek	Non	R	H	Escambia	F&W	OE/DO	Industrial Municipal Urban runoff/ Storm sewers	0.2 miles	Al/Fla. State Line/ Boggy Branch
AL/03140107-040_01	Intracoastal Waterway	Non	E	L	Baldwin	F&W	OE/DO	Natural sources Urban runoff/ Storm sewers	5 miles	AL Hwy. 59 / Wolf Bay
AL/03140301-030_01	Conecuh River	Non	R	L	Pike	F&W	Siltation OE/DO	Nonirrigated crop prod. Pasture grazing	24.7 miles	Broadhead Creek / Mannings Creek
AL/03140301-040_01	Conecuh River	Non	R	L	Covington	F&W S	Siltation OE/DO Pathogens	Nonirrigated crop prod. Flow reg/mod Pasture grazing	18.0 miles	Point A Dam / Hornet Creek
AL/03140303-030_01	Rocky Creek	Non	R	H	Butler	F&W	Unknown toxicity toxicity	Unknown source	8.0 miles	Persimmon Creek / Co. Rd. N of Chapman

Figure 7-14



Index	Name
1	Cornhouse Creek
2	Hurricane creek
3	Emuckfaw Creek
4	Channahatchee Creek
5	Long Branch
6	Line Creek

Index	Name
1	Cedar Creek
2	UT to Tallapoosa River
3	Verdin Creek
4	UT to Lost Creek
5	Little Lost Creek
6	Lost Creek
7	Knokes Creek
8	Shoal Creek
9	Cutrose Creek
10	Cane Creek
11	Bear Creek
12	Cohobiah Creek
13	Pineywood Creek
14	Fox Creek
15	Henson Branch
16	Wildcat Creek
17	Beaverdam Creek
18	UT to Tallapoosa River
19	Laney Creek
20	Hodnett Mill Creek
21	Galloway Creek
22	Tallassee Creek
23	Oliver Creek
24	Horsetrough Creek
25	Chewacla Creek

Index	Entity_id	Name
1	AL/Tallapoosa R_01	Tallapoosa River
2	AL/03150108-250_01	Wolf Creek
3	AL/03150109-190_01	Sugar Creek
4	AL/Yates Res_01	Yates Reservoir
5	AL/03150110-030_01	Pepperell Branch
6	AL/03150110-100_01	Calebee Creek
7	AL/03150110-120_01	Cubahatchee Creek
8	AL/03150110-140_01	Line Creek
9	AL/03150110-140_02	Line Creek
10	AL/03150110-050_01	Moores Mill Creek

Table 7-34
Tallapoosa River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	6	111.5	191.1	**302.5**
Nutrient Tributary Study	2	18.2	20.9	**39.1**
Alabama-Coosa-Tallapoosa NPS Screening	26	192.8	172.1	**364.9**
2000 §303(d) Sampling	16	57.0	130.8	**187.8**
Total	**50**	**379.4**	**514.8**	**894.2**

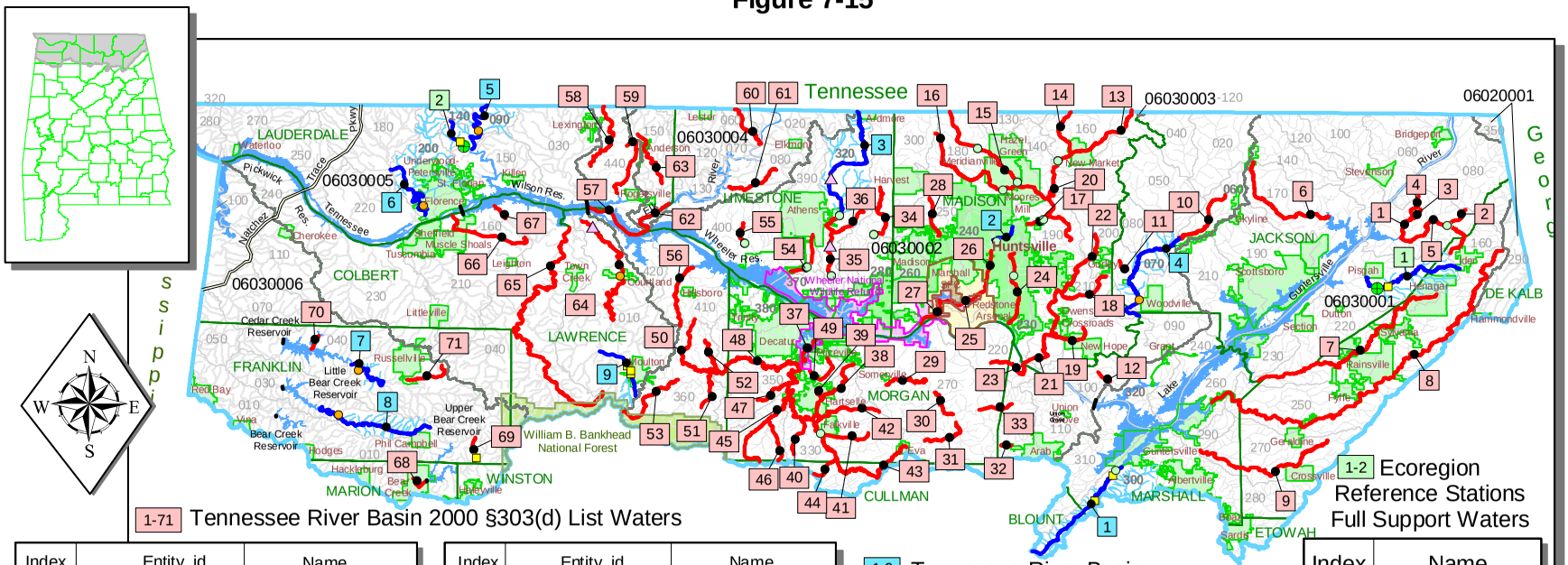
Table 7-35
Tallapoosa River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/Tallapoosa R_01	Tallapoosa River	Non	R	M	Cleburne	F&W	OE/DO	Industrial Municipal Nonirrigated crop prod. Pasture grazing Flow reg/mod	4.3 miles	Dam-Cleb. Co. Rd. 36/ Cleburne Co. Rd. 19
AL/03150108-250_01	Wolf Creek	Non	R	M	Randolph	F&W	Ammonia OE/DO Pathogens	Int. animal feeding oper.	4.0 miles	L. Tallapoosa River/ Its Source
AL/03150109-190_01	Sugar Creek	Non	R	H	Tallapoosa	F&W	Metals (Cu) Chlorides Nutrients Color	Municipal	4.8 miles	Elkahatchee Creek/ Sugar Cr Alex City
AL/Yates Res_01	Yates Reservoir (Sougahatchee Creek Embayment)	Non	L	H	Tallapoosa	PWS Swimming F&W	Nutrients OE/DO	Industrial Municipal Nonirrigated crop prod. Pasture grazing	224 acres	Soug. Cr. Embayment/ NW1/4, S 21, T19N, R22E
AL/03150110-030_01	Pepperell Branch	Non	R	H	Lee	A&I	Nutrients	Industrial	6.5 miles	Sougahatchee Creek/ Its Source
AL/03150110-100_01	Calebee Creek	Non	R	H	Macon	F&W	Siltation Other habitat alter.	Surface mining Agriculture	10 miles	Tallapoosa River/ Macon Co. Rd. 9

Table 7-35 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS/ US Locations
AL/03150110-120_01	Cubahatchee Creek	Non	R	H	Macon	S F&W	Siltation Other habitat alter.	Surface mining Agriculture	41 miles	Tallapoosa River/ Its Source
AL/03150110-140_01	Line Creek	Non	R	M	Macon	F&W	Siltation Other habitat alter.	Surface mining Agriculture	10.0 miles	Tallapoosa River/ Johnsons Creek
AL/03150110-140_02	Line Creek	Non	R	M	Macon	F&W	Siltation	Surface mining Agriculture	5.1 miles	Johnsons Creek/ Panther Creek
AL/03150110-050_01	Moores Mill Creek	Non	R	L	Lee	F&W S	Siltation	Land development Urban runoff/ Storm sewers	10.1 miles	Chewacla Creek/ Its Source

Figure 7-15



1-71 Tennessee River Basin 2000 §303(d) List Waters

1-9 Tennessee River Basin 2002 §305(b) Full Support Waters

1-2 Ecoregion Reference Stations Full Support Waters

Index	Entity_id	Name
1	AL/06030001-160_01	Dry Creek
2	AL/06030001-160_02	Hogue Creek
3	AL/06030001-160_03	Warren Smith Creek
4	AL/06030001-160_04	Rocky Branch
5	AL/06030001-160_05	Coon/Flat Rock Creek
6	AL/06030001-170_01	Mud Creek
7	AL/06030001-220_01	South Sauty Creek
8	AL/06030001-250_01	Town Creek
9	AL/06030001-270_01	Scarham Creek
10	AL/06030002-060_01	Guess Creek
11	AL/06030002-070_01	Cole Spring Branch
12	AL/06030002-100_01	L. Paint Rock Creek
13	AL/06030002-160_01	Mountain Fork
14	AL/06030002-160_02	Hester Creek
15	AL/06030002-180_01	Brier Fork
16	AL/06030002-180_02	Beaverdam Creek
17	AL/06030002-190_01	Chase Creek
18	AL/06030002-210_01	Goose Creek
19	AL/06030002-210_02	Yellow Bank Creek
20	AL/06030002-210_03	Flint River
21	AL/06030002-190_02	Flint River
22	AL/06030002-200_01	Hurricane Creek
23	AL/06030002-220_01	Cane Creek
24	AL/06030002-230_01	Aldridge Creek
25	AL/06030002-240_01	Huntsville Spring Br.
26	AL/06030002-240_02	Huntsville Spring Br.
27	AL/06030002-250_01	Indian Creek
28	AL/06030002-250_02	Indian Creek
29	AL/06030002-270_01	Town Creek
30	AL/06030002-270_02	Cotaco Creek
31	AL/06030002-270_03	West Fork Cotaco Cr.
32	AL/06030002-270_04	Mill Pond Creek
33	AL/06030002-270_05	Hughes Creek
34	AL/06030002-300_01	Limestone Creek
35	AL/06030002-320_01	Piney Creek
36	AL/06030002-320_02	French Mill Creek

Index	Entity_id	Name
37	AL/06030002-330_01	Flint Creek
38	AL/06030002-330_02	Shoal Creek
39	AL/06030002-330_03	Town Branch
40	AL/06030002-330_04	Mack Creek
41	AL/06030002-330_05	Robinson Creek
42	AL/06030002-330_06	Cedar Creek
43	AL/06030002-330_07	East Fork Flint Creek
44	AL/06030002-330_09	Indian Creek
45	AL/06030002-340_01	Crowdabout Creek
46	AL/06030002-340_02	Herrin Creek
47	AL/06030002-350_01	No Business Creek
48	AL/06030002-350_02	West Flint Creek
49	AL/06030002-350_03	Village Branch
50	AL/06030002-360_01	Big Shoal Creek
51	AL/06030002-360_02	McDaniel Creek
52	AL/06030002-360_03	Flat Creek
53	AL/06030002-360_04	Elam Creek
54	AL/06030002-390_01	Swan Creek
55	AL/06030002-400_01	Round Island Creek
56	AL/06030002-410_01	Mallard Creek
57	AL/Wheeler Res_01	Tennessee River
58	AL/06030002-440_01	Second Creek
59	AL/06030002-440_02	First Creek
60	AL/06030004-060_01	Shoal Creek
61	AL/06030004-080_01	Big Creek
62	AL/Wheeler Res_02	Elk River
63	AL/06030004-150_01	Anderson Creek
64	AL/06030005-010_01	Big Nance Creek
65	AL/06030005-040_01	Town Creek
66	AL/06030005-160_01	Pond Creek
67	AL/06030005-160_02	McKiernan Creek
68	AL/06030006-010_02	Bear Creek
69	AL/06030006-010_01	Little Dice Branch
70	AL/06030006-040_01	Lost Creek
71	AL/06030006-040_02	Harris Creek

Index	Name
1	Big Spring Creek
2	Pinhook Creek
3	Piney Creek
4	Paint Rock River
5	Shoal Creek
6	Cypress Creek
7	Cedar Creek
8	Little Bear Creek
9	Crow Branch

Index	Name
1	Bryant Creek
2	Indiancamp Creek

Software: ESRI's™ Arcview 3.2
Projection: Geographic
Datum: NAD83
Extensions: NHD-RIT 2.0
Scripts: Graphtab.ave
Author: Mike Rief-ADEM Water Quality Branch
mjr@adem.state.al.us
334-271-7829

MEMO
- 2002 §305(b) Report Waters-Fully Supporting
- Alabama, Coosa, & Tallapoosa NPS Screening
- Nutrient Tributary Study
- 1999 §303(d) Sampling
- 2000 §303(d) Sampling
- Ecoregion Reference Stations
- 2000 §303(d) List Waters-Not Supporting
- USGS Cataloging Units
- Counties
- USDA-NRCS Subwatersheds
- Mainstem Waters
- Mainstem Waters
- National Hydrography Dataset
- Redstone Arsenal
- Marshall Space Flight Center
- William B. Bankhead National Forest
- Wheeler National Wildlife Refuge
- Cities
- River Basin

Tennessee River Basin
2002 §305(b) Report (Full Support)
and
2000 §303(d) List (Non Support)
Surface Waters

10 0 10 Miles
10 0 10 Kilometers
Scale 1:1,300,000

Table 7-36
Tennessee-Escambia River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	2	22.2	52.4	**74.6**
Nutrient Tributary Study	7	74.2	185.0	**259.2**
Tennessee NPS Screening	31	44.0	117.6	**161.6**
1999 §303(d) Sampling	8	8.7	14.9	**23.5**
Total	**48**	**149.0**	**369.9**	**519.0**

Table 7-37
Tennessee River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/06030001-160_01	Dry Creek	Non	R	H	Jackson	F&W	Metals pH Siltation	Surface Mining - aband.	8.0 miles	Coon Creek/ Its Source
AL/06030001-160_02	Hogue Creek	Non	R	H	Jackson	F&W	Nutrients pH OE/DO	Surface Mining - aband.	2.4 miles	Flat Rock Creek/ Its Source
AL/06030001-160_03	Warren Smith Creek	Non	R	H	Jackson	F&W	pH Siltation	Surface mining-aband.	3.0 miles	Dry Creek/ Ross Branch
AL/06030001-160_04	Rocky Branch	Non	R	L	Jackson	F&W	pH Siltation	Surface mining-aband.	3.6 miles	Dry Creek/ Its Source
AL/06030001-160_05	Coon/Flat Rock Creek	Partial	R	L	Jackson	F&W	Metals pH Siltation	Surface mining-aband. Mine tailings-aband.	20.0 miles	Tennessee River/ Its Source
AL/06030001-170_01	Mud Creek	Partial	R	L	Jackson	F&W	OE/DO	Nonirrigated crop prod. Pasture grazing	18 miles	Tennessee River/ Its Source
AL/06030001-220_01	South Sauty Creek	Partial	R	L	DeKalb	F&W	pH	Unknown source	32 miles	Lake Guntersville/ Its Source

Table 7-37 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/06030001-250_01	Town Creek	Partial	R	L	DeKalb	F&W	pH	Unknown	63.3 miles	Lake Guntersville/ Its Source
AL/06030001-270_01	Scarham Creek	Non	R	H	Marshall	F&W	Pesticides Ammonia Siltation OE/DO Pathogens	Nonirrigated crop prod. Specialty crop prod. Int. animal feeding oper. Pasture grazing	24 miles	Short Creek/ Its Source
AL/06030002-060_01	Guess Creek	Non	R		Jackson	F&W	Unknown toxicity OE/DO Pathogens	Unknown source Pasture grazing	10.8 miles	Paint Rock River/ Bee Branch
AL/06030002-070_01	Cole Spring Branch	Partial	R	L	Jackson	F&W	Siltation OE/DO	Pasture grazing	2.1 miles	Bridge at Jones Farm/ Jeep Trail Crossing
AL/06030002-100_01	L. Paint Rock Creek	Partial	R	L	Marshall	F&W	Siltation OE/DO	Pasture grazing	2.0 miles	Merrill Road Bridge/ Jeep Trail Crossing
AL/06030002-160_01	Mountain Fork	Non	R	H	Madison	F&W	Pathogens	Pasture grazing	14.5 miles	Flint River/ Its Source
AL/06030002-160_02	Hester Creek	Partial	R	M	Madison	F&W	Nutrients Pathogens	Pasture grazing	7.2 miles	Mountain Fork/ AL/TN stateline
AL/06030002-180_01	Brier Fork	Partial	R	L	Madison	F&W	Unknown toxicity Siltation	Nonirrigated crop prod.	3.9 miles	Flint River/ AL/TN stateline
AL/06030002-180_02	Beaverdam Creek	Partial	R	M	Madison	F&W	Siltation	Nonirrigated crop prod. Land development	19 miles	Brier Fork Its Source
AL/06030002-190_01	Chase Creek	Partial	R	L	Madison	F&W	Siltation OE/DO	Agriculture Urban runoff/ Storm Sewers	2.2 miles	Acuff Spring/ Hwy. 72
AL/06030002-210_01	Goose Creek	Non	R	H	Madison	F&W	Unknown toxicity OE/DO	Agriculture	8.5 miles	Flint River/ Its Source
AL/06030002-210_02	Yellow Bank Creek	Partial	R	M	Madison	F&W	OE/DO	Agriculture	5.6 miles	Flint River/ Its Source

Table 7-37 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/06030002-210_03	Flint River	Partial	R	M	Madison	PWS F&W	OE/DO	Agriculture	21.5 miles	Tennessee River/ Hurricane Creek
AL/06030002-190_02	Flint River	Partial	R	M	Madison	F&W	Pathogens	Pasture grazing	13.7 miles	Hwy. 72/ Mountain Fork
AL/06030002-200_01	Hurricane Creek	Non	R	H	Madison	F&W	Pathogens	Pasture grazing	7.8 miles	Flint River/ Gurley Pike Road
AL/06030002-220_01	Cane Creek	Non	R	L	Madison	F&W	Siltation OE/DO	Agriculture	5.1 miles	Tennessee River/ Gooch Creek
AL/06030002-230_01	Aldridge Creek	Partial	R	L	Madison	F&W	Siltation OE/DO	Pasture grazing Urban runoff/ Storm Sewers	11 miles	Tennessee River/ Its Source
AL/06030002-240_01	Huntsville Spring Br.	Non	R	L	Madison	F&W	Priority Organics	Contaminated sediments	10.4 miles	Indian Creek/ Johnson Rd. (Huntsville Field)
AL/06030002-240_02	Huntsville Spring Br.	Partial	R	L	Madison	F&W	Metals	Urban runoff/ Storm Sewers	4.4 miles	Johnson Rd./ Hwy. 431
AL/06030002-250_01	Indian Creek	Non	R	L	Madison	F&W	Priority Organics	Contaminated sediments	7.2 miles	Tennessee River/ Martin Rd. (Redstone Arsenal)
AL/06030002-250_02	Indian Creek	Partial	R	L	Madison	F&W	Siltation OE/DO	Nonirrigated crop prod. Land development Urban runoff/ Storm Sewers	6.9 miles	AL Hwy. 72/ Its Source
AL/06030002-270_01	Town Creek	Non	R	H	Morgan	F&W	OE/DO	Agriculture	8.4 miles	Cotaco Creek/ Its Source
AL/06030002-270_02	Cotaco Creek	Non	R	H	Morgan	F&W	Pathogens	Agriculture	5.1 miles	Guyer Branch/ W. Fork Cotaco Cr.
AL/06030002-270_03	West Fork Cotaco Cr.	Partial	R	M	Morgan	F&W	Pathogens Siltation	Agriculture	7.5 miles	AL Hwy.67/ Frost Creek
AL/06030002-270_04	Mill Pond Creek	Non	R	H	Marshall	F&W	Siltation Pathogens	Agriculture	1.3 miles	Hog Jaw Creek/ Perkins Creek
AL/06030002-270_05	Hughes Creek	Partial	R	M	Morgan	F&W	Siltation	Agriculture	2.9 miles	Cotaco Creek/ Its Source
AL/06030002-300_01	Limestone Creek	Non	R	L	Limestone	F&W	Siltation OE/DO	Nonirrigated crop prod. Pasture grazing	9.3 miles	AL Hwy.72/ Leslie Creek

Table 7-37 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/06030002-320_01	Piney Creek	Partial	R	L	Limestone	F&W	Pesticides Siltation OE/DO	Nonirrigated crop prod. Pasture grazing	11.2 miles	Church Site/ Pepper Road Bridge
AL/06030002-320_02	French Mill Creek	Non	R	H	Limestone	F&W	Pathogens	Pasture grazing	4.9 miles	Piney Creek/ UT in Pine Swamp
AL/06030002-330_01	Flint Creek	Non	R	H	Morgan	PWS F&W A&I	Siltation OE/DO Pathogens Nutrients	Municipal Nonirrigated crop prod. Pasture grazing Int. animal feeding oper. Urban runoff/ Storm Sewers	40.0 miles	Alabama Hwy. 67/ Its Source
AL/06030002-330_02	Shoal Creek	Non	R	L	Morgan	F&W	OE/DO Pathogens	Agriculture Urban runoff/ Storm Sewers	10.9 miles	Flint Creek/ Its Source
AL/06030002-330_03	Town Branch	Non	R	L	Morgan	F&W	OE/DO	Urban runoff/ Storm Sewers	1.9 miles	Shoal Creek/ Its Source
AL/06030002-330_04	Mack Creek	Partial	R	L	Morgan	F&W	Siltation OE/DO	Pasture grazing	5.4 miles	Flint Creek/ Its Source
AL/06030002-330_05	Robinson Creek	Non	R	L	Morgan	F&W	Siltation OE/DO	Agriculture	6.3 miles	Flint Creek/ Its Source
AL/06030002-330_06	Cedar Creek	Non	R	H	Morgan	F&W	OE/DO Pathogens	Agriculture	8.7 miles	Flint Creek/ Its Source
AL/06030002-330_07	East Fork Flint Creek	Partial	R	M	Cullman	F&W	OE/DO Pathogens	Pasture grazing	14.9 miles	Flint Creek/ Its Source
AL/06030002-330-09	Indian Creek	Partial	R	M	Morgan Cullman	F&W	OE/DO	Pasture grazing	4.2 miles	Flint Creek/ Its Source
AL/06030002-340_01	Crowdabout Creek	Non	R	H	Morgan	F&W	Siltation Pathogens OE/DO	Nonirrigated crop prod. Pasture grazing Int. animal feeding oper.	15.0 miles	Flint Creek/ Its Source

Table 7-37 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/06030002-340_02	Herrin Creek	Non	R	M	Morgan	F&W	Ammonia Nutrients Siltation OE/DO	Pasture grazing	6.3 miles	Crowdabout Creek/ Its Source
AL/06030002-350_01	No Business Creek	Non	R	L	Morgan	F&W	OE/DO Pathogens	Nonirrigated crop prod. Pasture grazing	6.3 miles	Flint Creek/ Johnson Chapel Creek
AL/06030002-350_02	West Flint Creek	Partial	R	M	Morgan	F&W	Siltation Pathogens OE/DO	Nonirrigated crop prod. Pasture grazing Int. animal feeding oper.	19.4 miles	Flint Creek/ McDaniel Creek
AL/06030002-350_03	Village Branch	Partial	R	L	Morgan	F&W	Siltation OE/DO	Agriculture	5.7 miles	Moss Spring Branch/ Its Source
AL/06030002-360_01	Big Shoal Creek	Partial	R	M	Lawrence	F&W	OE/DO	Pasture grazing	13.3 miles	West Flint Creek/ Its Source
AL/06030002-360_02	McDaniel Creek	Partial	R	L	Lawrence	F&W	Siltation OE/DO	Agriculture	3.9 miles	West Flint Creek/ AL Hwy. 36 bridge
AL/06030002-360_03	Flat Creek	Non	R	H	Lawrence	F&W	Ammonia Nutrients Siltation OE/DO	Pasture grazing	7.3 miles	West Flint Creek/ Its Source
AL/06030002-360_04	Elam Creek	Partial	R	M	Lawrence	F&W	OE/DO	Pasture grazing	11.9 miles	Rocky Branch/ Its Source
AL/06030002-390_01	Swan Creek	Non	R	L	Limestone	A&I F&W	Siltation OE/DO	Nonirrigated crop prod. Pasture grazing Urban runoff/ Storm Sewers	7.9 miles	Tennessee River/ Town Creek
AL/06030002-400_01	Round Island Creek	Partial	R	L	Limestone	F&W	Siltation OE/DO	Nonirrigated crop prod. Pasture grazing	3.6 miles	Browns Ferry Road/ Beauchamp Branch
AL/06030002-410_01	Mallard Creek	Partial	R	L	Lawrence	F&W	Siltation OE/DO	Agriculture	10.2 miles	Wheeler Reservoir/ Its Source
AL/Wheeler Res_01	Tennessee River	Partial	R	L	Lawrence	PWS S F&W	pH Temp./thermal mod.	Industrial Flow reg/mod Dam construc. Unknown source	10.0 miles	Wheeler Dam/ Elk River

Table 7-37 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/06030002-440_01	Second Creek	Non	R	H	Lauderdale	F&W	Pathogens OE/DO	Pasture grazing	11.6 miles	Lauderdale Co. Rd. 76/ AL/TN State Line
AL/06030002-440_02	First Creek	Non	R	H	Lauderdale	S F&W	Pathogens	Pasture grazing	10.0 miles	AL Hwy. 72/ Its Source
AL/06030004-060_01	Shoal Creek	Non	R	H	Limestone	F&W	Pathogens	Pasture grazing	7.0 miles	Elk River/ AL/TN State Line
AL/06030004-080_01	Big Creek	Partial	R	M	Limestone	F&W	OE/DO	Pasture grazing	7.7 miles	Elk River/ Its Source
AL/Wheeler Res_02	Elk River	Partial	R	L	Limestone	S F&W	pH OE/DO	Pasture grazing Nonirrigated crop prod.	6.0 miles	Wheeler Reservoir/ Anderson Creek
AL/06030004-150_01	Anderson Creek	Partial	R	M	Lauderdale	F&W	Siltation	Pasture grazing Nonirrigated crop prod.	9.0 miles	Snake Road bridge/ Its Source
AL/06030005-010_01	Big Nance Creek	Non	R	H	Lawrence	F&W	Pesticides Ammonia Siltation OE/DO Pathogens	Nonirrigated crop prod. Int. animal feeding oper. Landfills Pasture grazing	24.0 miles	Wilson Lake/ Its Source
AL/06030005-040_01	Town Creek	Partial	R	L	Lawrence	F&W	OE/DO	Nonirrigated crop prod. Pasture grazing	46.0 miles	Wheeler Reservoir/ Its Source
AL/06030005-160_01	Pond Creek	Non	R	L	Colbert	A&I	Metals OE/DO	Nonirrigated crop prod. Natural sources Urban runoff/ Storm Sewers	12.0 miles	Tennessee River/ Its Source
AL/06030005-160_02	McKiernan Creek	Non	R	H	Colbert	F&W	Ammonia Nutrients Siltation OE/DO	Agriculture	2.2 miles	Tennessee River/ Shegog Creek
AL/06030006-010_02	Bear Creek	Non	R	H	Marion	S F&W	Metals (Al)	Surface mining-aband.	3.0 miles	Mill Creek/ U. Bear Creek Dam
AL/06030006-010_01	Little Dice Branch	Partial	R	M	Franklin	F&W	Siltation	Surface mining-aband.	3.6 miles	Bear Creek/ Its Source

Table 7-37 (cont.)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/06030006-040_01	Lost Creek	Partial	R	L	Franklin	F&W	pH	Surface mining-aband.	2.0 miles	Cedar Creek/ Its Source
AL/06030006-040_02	Harris Creek	Non	R	H	Franklin	F&W	Siltation OE/DO	Pasture grazing	5.9 miles	Mud Creek/ Its Source

Figure 7-16

Upper Tombigbee River Basin 2002 §305(b) Report (Full Support) and 2000 §303(d) List (Non Support) Surface Waters

1-22 Upper Tombigbee River Basin 2002 §305(b) Waters

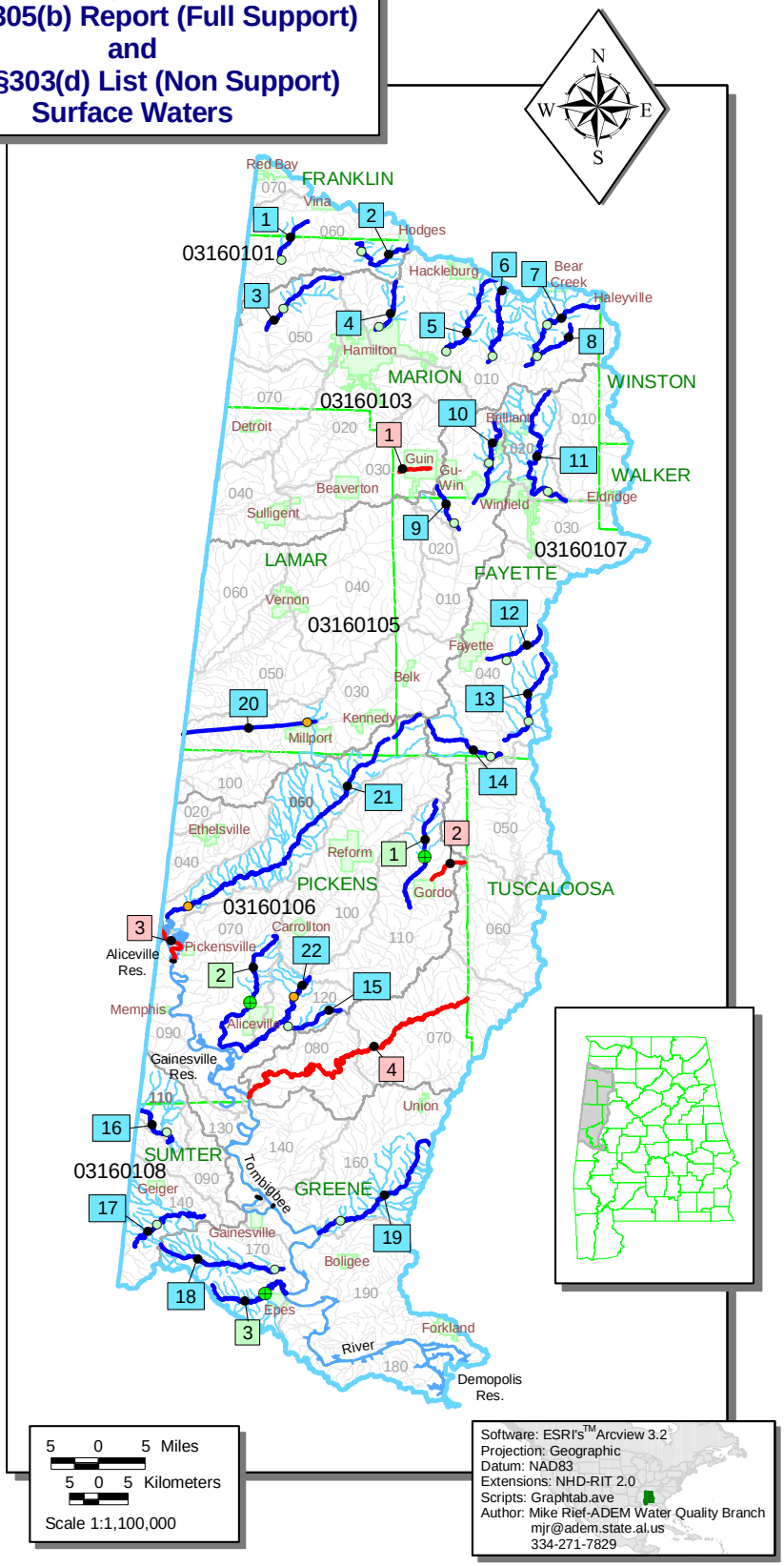
Index	Name
1	Bluegut Creek
2	Bull Mountain Creek
3	Hurricane Creek
4	Stevens Creek
5	Camp Creek
6	Barn Creek
7	West Branch
8	Hobson Creek
9	Sugar Creek
10	East Branch
11	Little New River
12	Boxes Creek
13	Davis Creek
14	Bear Creek
15	Cow Creek
16	Woodward Creek
17	Bodka Creek
18	Factory Creek
19	Brush Creek
20	Luxapallila Creek
21	Coal Fire Creek
22	Lubbub Creek

1-3 Ecoregion Reference Stations §305(b) Full Support Waters

Index	Name
1	Bear Creek
2	Blubber Creek
3	Jones Creek

1-4 Upper Tombigbee River Basin 2000 §303(d) Waters

Index	Entity_id	Name
1	AL/03160103-030_01	Purgatory Creek
2	AL/03160106-110_01	Little Bear Creek
3	AL/Aliceville Res_01	Tombigbee River
4	AL/03160107-080_01	Sispey River



- 2002 §305(b) Report Waters-Fully Supporting
- Escatawpa, Mobile & Tombigbee NPS Screening
- Nutrient Tributary Study
- Ecoregion Reference Stations
- 2000 §303(d) List Waters-Not Supporting
- USGS Cataloging Units
- Counties
- USDA-NRCS Subwatersheds
- Mainstem Waters
- National Hydrography Dataset
- Cities
- River Basin

Table 7-38
Upper Tombigbee River Basin Full Support Waters
Rivers and Streams
(miles)

Station Type	Station Count	Monitored Miles	Evaluated Miles	Total
Ecoregion Reference Stations	3	46.15	63.76	**109.91**
Nutrient Tributary Study	3	67.36	194.18	**261.55**
Escatawpa-Mobile-Tombigbee NPS Screening	19	200.56	448.21	**648.76**
Total	**25**	**314.07**	**706.15**	**1,020.22**

Table 7-39
Upper Tombigbee River Basin Non Support Waters-*Draft 2000 §303(d) List*
Rivers and Streams
(miles)

WaterbodyID	Waterbody Name	Support Status	WBTYPE	Rank	County	Uses	Causes	Sources	Size	DS / US Locations
AL/03160103-030_01	Purgatory Creek	Partial	R	H	Marion	PWS F&W	pH	Surface mining-aband.	3.0 miles	Wickett Creek/ Hughes/Reedy Branches
AL/03160106-110_01	Little Bear Creek	Partial	R	L	Pickens	F&W	OE/DO	Urban runoff/ Storm sewers	3.9 miles	Pickens Co. Rd. 4/ Its Source
AL/Aliceville Res_01	Tombigbee River	Partial	R	L	Pickens	F&W S	OE/DO	Dam construc. Flow reg/mod	5.0 miles	Beville Dam/ AL-MS State Line
AL/03160107-080_01	Sispey River	Partial	R	M	Pickens	F&W	Metals (Fe)	Surface mining-aband.	4.4 miles	Tombigbee River/ Tuscaloosa Co. line

4 Upland Alamap Wadeable Stream Random Sampling Station Program Alabama Monitoring and Assessment Plan (Upland ALAMAP)

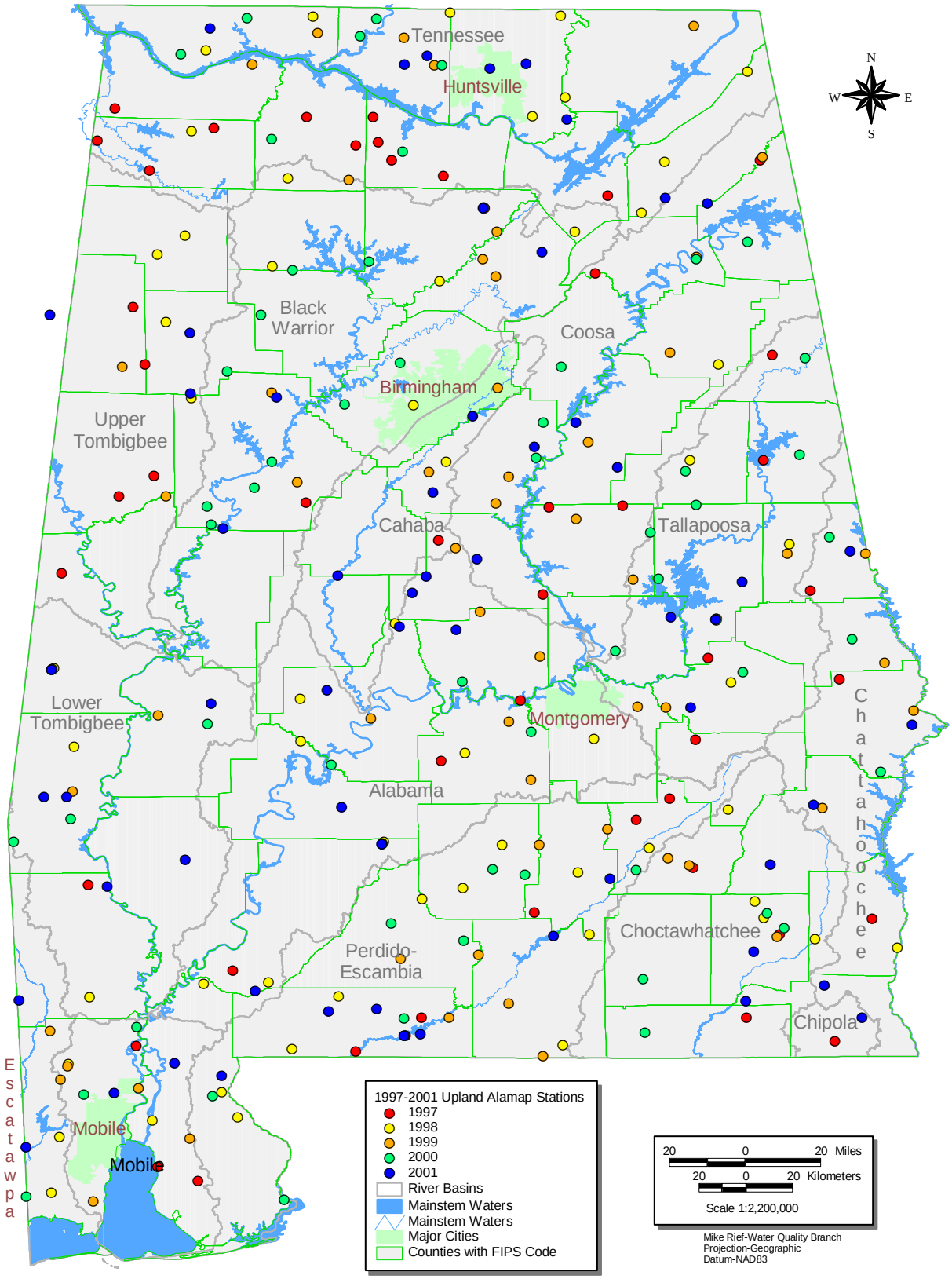
The Alabama Monitoring and Assessment Program (ALAMAP) is a statewide monitoring effort developed to provide data that can be used to estimate the current status of all streams and coastal/estuarine waters within the state using environmental indicators.

The Upland ALAMAP program is designed to enhance the current ambient monitoring program developed during the 1970's. Stations in the historical ambient monitoring program were generally selected to monitor trends in water quality downstream of specific existing point sources. To augment this type of monitoring, 60 stations on wadeable streams are selected statewide each year by EPA-Gulf Breeze using a probabilistic (random) design (Summers and Engle 1996) and are sampled annually during August. The characteristics of these sites are representative of the proportion of these characteristics found in the true population, and therefore reflect the condition of 100% of the wadeable streams in Alabama. The data collected at these stations will statistically represent all upland stream miles and, along with data from similarly conducted monitoring within the coastal area, will result in an assessment of percent impaired waters throughout the state with a measurable confidence level. (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.

Upland ALAMAP sampling began in August of 1997 and has taken place each August through FY-2001. August 2001 sampling completed the state of Alabama's first five-year reporting cycle. EPA-Gulf Breeze is presently analyzing the data for wadeable stream overall use support assessment statements for dissolved oxygen, temperature, pH, and fecal coliform. For further information on Alabama's Upland Alamap Program contact Mr. Lee Davis at (334) 260-2759 or mld@adem.state.al.us.

Figure 7-17

1997-2001 Upland Alabama Wadeable Stream
Random Sampling Stations



5 Tributary Nutrient Study

The purpose of the Tributary Nutrient Study was to determine which tributary watersheds contribute the highest nutrient loads to Alabama's most eutrophic reservoirs. This study, in conjunction with the effort to collect nutrient data for point sources, has provided data necessary to estimate relative nutrient contributions from point and nonpoint sources. ADEM contracted with TVA, the University of Alabama, Auburn University, and Auburn University-Montgomery to collect ambient water quality data at 86 locations, which included both reservoir tailrace and tributary locations. During 1999 sites were sampled once per month from June through November and twice per month from December through May plus two storm event samples. Flow measurements were made at ungaged sites. Duplicate samples were sent to the ADEM Lab at least quarterly. The following parameters were sampled at each site:

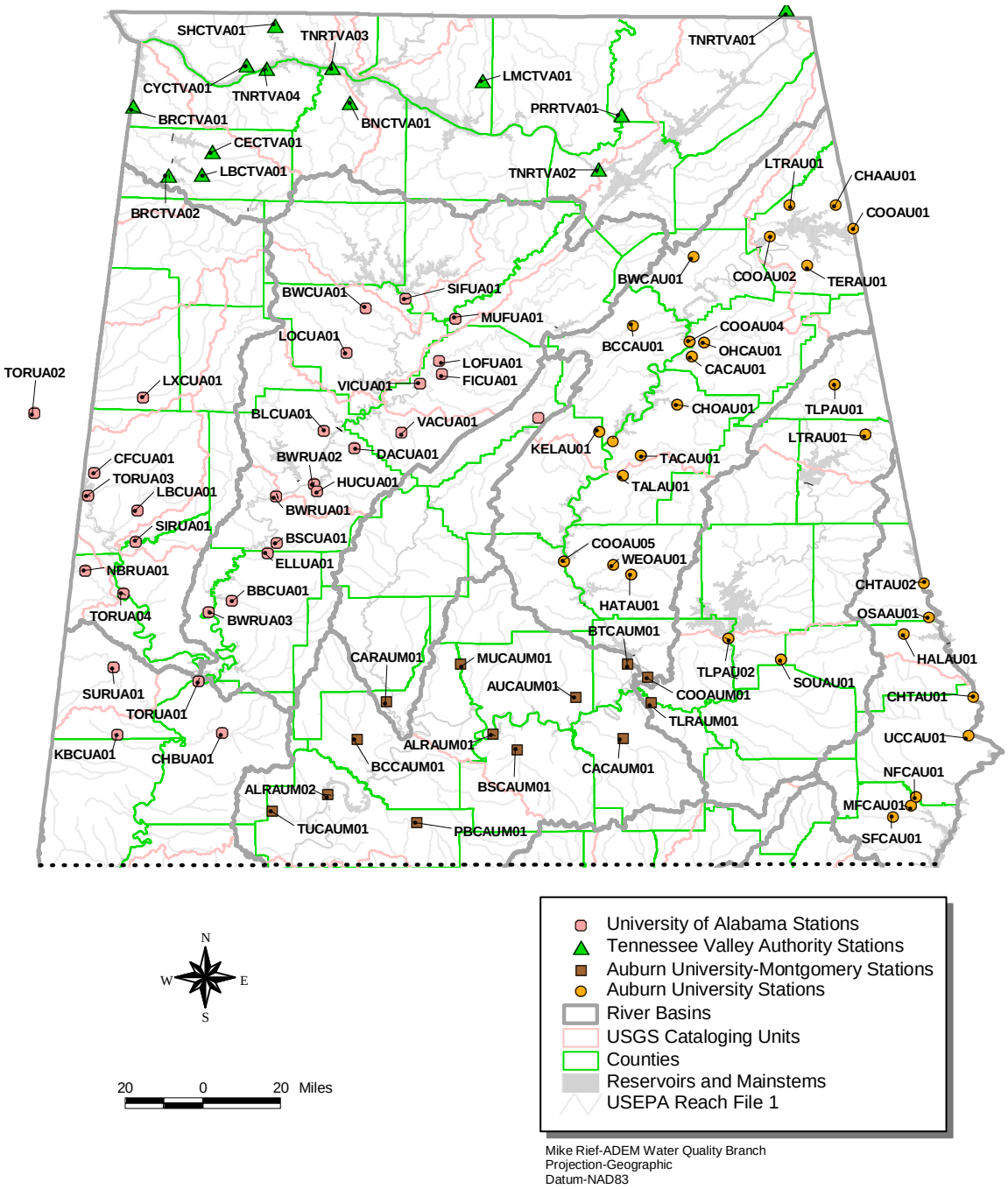
- Stream Flow
- Water Temperature
- Total Stream Depth
- Sample Depth
- pH
- Conductivity
- Turbidity
- Dissolved Oxygen
- Total Kjeldahl Nitrogen
- Ammonia
- Nitrite + Nitrate
- Total Phosphorus
- Suspended Sediment
- Total Dissolved Solids

In addition to this ambient monitoring, major municipal and industrial NPDES dischargers that were not already submitting data on nutrients in their effluent were asked to monitor their discharges for flow, total phosphorus, ammonia nitrogen, and nitrate-nitrite nitrogen. This data was collected at least monthly with some facilities collecting data weekly. This information will be used in conjunction with the tributary and reservoir monitoring to estimate nonpoint source nutrient loads.

The FLUX computer program developed by the U.S. Army Corps of Engineers Waterways Experiment Station may be used to estimate tributary mass loadings from grab sample concentration data and daily flow records. A final report is planned for completion sometime during 2001. For further information on Alabama's Nutrient Tributary Study contact Mr. Lynn Sisk at (334) 271-7826 or ls@adem.state.al.us.

Figure 7-18

1999 Reservoir Tributary Study
Nutrient Sampling Stations



Mike Rief-ADEM Water Quality Branch
Projection-Geographic
Datum-NAD83

6 Ecoregional Reference Condition Development

Increased emphasis continues to be placed upon biological monitoring in the ongoing effort to describe and protect fishable and swimmable waters. Aquatic macroinvertebrate and, to a lesser extent, fish community data are used extensively in stream studies such as NPS basin screening assessments, water quality demonstration studies, §303(d) monitoring, and other special studies and intensive surveys. Assessments conducted at established ecoregional reference stations continue to provide excellent information related to development of baseline, or least-impacted, water quality, habitat quality and biological integrity.

In 1998, an EPA §319 grant was used to complete the ecoregion/subecoregion delineation for the entire State (initiated in 1990). The joint poster map for Alabama and Georgia subecoregions and their respective characteristics is in draft form and has been circulated for peer review. Reconnaissance of the 1998 NRCS/EPA-provided candidate reference sites began in spring 2000 and was completed during winter 2001. Field Operations personnel completed reconnaissance of approximately 175 sites to determine their suitability for assessment as reference sites in ecoregions 45, 65, 67, 68 and 71. Detailed watershed reconnaissance, habitat assessment and *in situ* field data were collected for each candidate site. Data compilation was completed and approximately 28 of these sites were selected for instream aquatic macroinvertebrate, habitat, and chemical water quality assessments during 2000-01. Of these, 14 sites were assessed during FY00 as part of the Alabama, Coosa and Tallapoosa Basins NPS Screening Assessment. Due to the drought conditions experienced across Alabama during 2000, a number of the locations scheduled for assessments were dry or non-flowing at the time of the macroinvertebrate assessment site-visit. These locations will be re-evaluated as time allows. The remaining candidate sites will be assessed during the FY01 Escatawpa, Tombigbee and Mobile Basins NPS Screening Assessment.

A total of forty-eight ecoregional reference stations have been identified across the State. These sites are located in all of Alabama's non-tidally influenced ecoregions and have been assessed annually for a period of one-to-nine years each. It is our continuing goal to establish and monitor multiple reference stations in all non-tidally influenced sub-ecoregions of the State. For further information on Alabama's Ecoregions contact Ms. Vickie Hulcher at (334) 260-2747 or vjh@adem.state.al.us.

Figure 7-19

Ecoregion Reference Stations
Subregions of Alabama's Ecoregions-River Basins-Counties

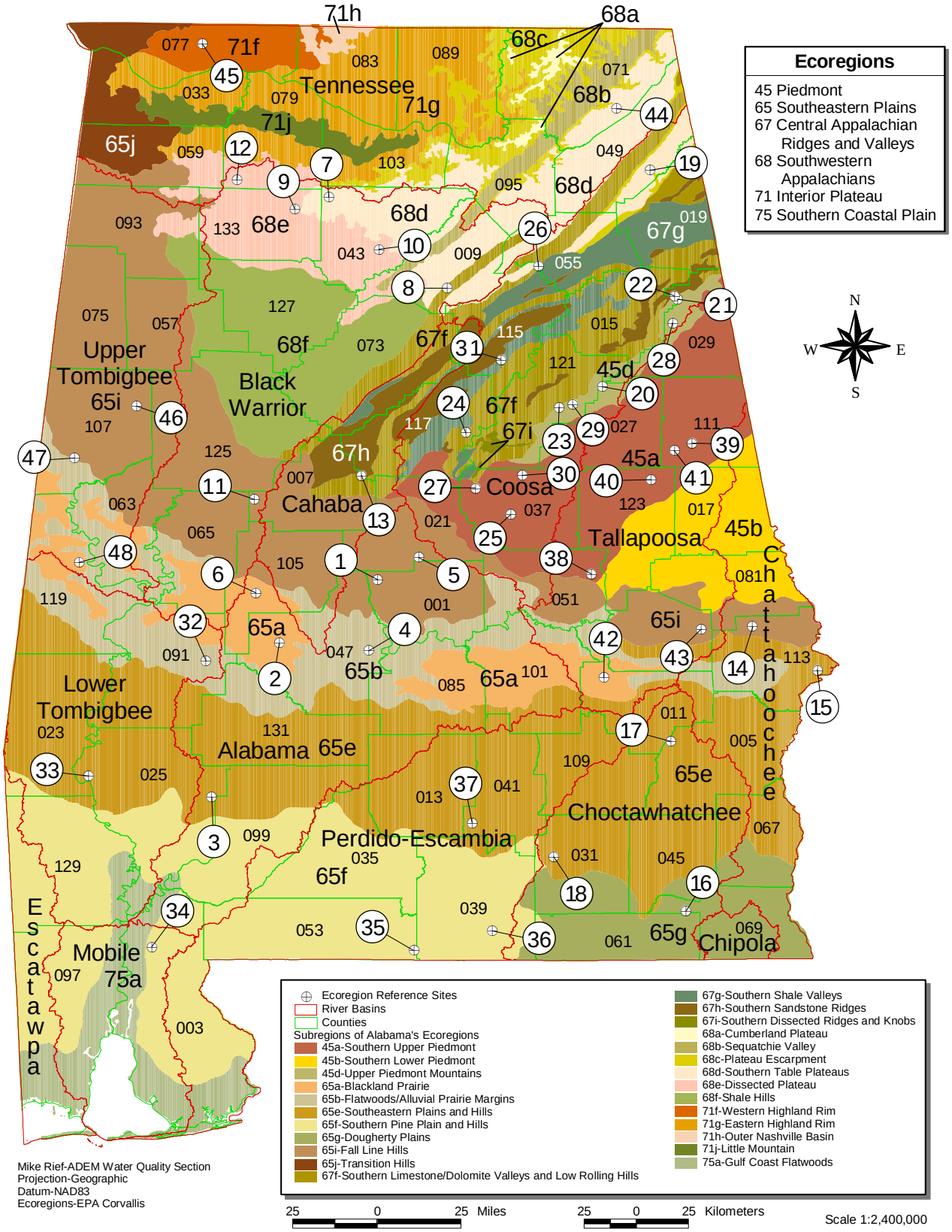


Table 7-40 Alabama Ecoregion Reference Stations

Index	Station	Stream Name	River Basin	Lat	Lon
1	BCKA-26	Buck Creek	Alabama	32.6265	-86.8693
2	CYD-1	Chaney Creek	Alabama	32.3544	-87.2894
3	SRC-1	Silver Creek	Alabama	31.6952	-87.5816
4	SPD-1	Soapstone Creek	Alabama	32.3222	-86.9063
5	SWFC-1	Swift Creek	Alabama	32.7217	-86.6920
6	WASP-1	Washington Creek	Alabama	32.5700	-87.3914
7	BLVC-1	Blevens Creek	Black Warrior	34.2674	-87.0776
8	HNMB-4	Hendrick Mill Branch	Black Warrior	33.8761	-86.5689
9	INMW-1	Inman Creek	Black Warrior	34.2153	-87.2245
10	MRTC-1	Marriott Creek	Black Warrior	34.0421	-86.8628
11	SSB-1	South Sandy	Black Warrior	32.9699	-87.3978
12	TPSL-1	Thompson Creek	Black Warrior	34.3409	-87.4711
13	MAYB-1	Mayberry	Cahaba	33.0713	-86.9385
14	BCR-1	Brush Creek	Chattahoochee	32.4247	-85.2607
15	IHGR-1	Ihagee Creek	Chattahoochee	32.2385	-84.9807
16	BRH-1	Bear Creek	Choctawhatchee	31.2077	-85.5462
17	DRYB-1	Dry Creek	Choctawhatchee	31.9347	-85.6104
18	PATC-1	Patrick Creek	Choctawhatchee	31.4384	-86.1121
19	BERD-9	Bear Creek	Coosa	34.3809	-85.6979
20	CHEC-6	Cheaha Creek	Coosa	33.4528	-85.9027
21	CHOC-2	Choccolocco Creek	Coosa	33.8295	-85.5817
22	DRYC-2	Dry Creek	Coosa	33.8424	-85.5942
23	DRYT-9	Dry Creek	Coosa	33.3657	-86.0896
24	FRMS-9	Fourmile Creek	Coosa	33.2565	-86.4898
25	JNSC-16	Jones Creek	Coosa	32.9049	-86.2976
26	LCNE-1	Little Canoe Creek	Coosa	33.9701	-86.1789
27	PNTC-11	Panther Creek	Coosa	33.0184	-86.4474
28	SHLC-3	Shoal Creek	Coosa	33.7253	-85.6012
29	TCT-5	Talladega Creek	Coosa	33.3784	-86.0303
30	WGFC-1	Weogufka Creek	Coosa	33.0726	-86.2480
31	WLFS-9	Wolf Creek	Coosa	33.5688	-86.3382
32	PPM-1	Poplar Creek	Lower Tombigbee	32.2773	-87.6067
33	ULCC-1	Ulcanush Creek	Lower Tombigbee	31.7841	-88.1081
34	HLB-1	Halls Creek	Mobile	31.0529	-87.8368
35	BRE-1	Bear Creek	Perdido-Escambia	31.0376	-86.7126
36	CLC-1	Clear Creek	Perdido-Escambia	31.1215	-86.3758
37	PYW-1	Pineywoods Creek	Perdido-Escambia	31.5838	-86.4619
38	CHNE-18	Channahatchee Creek	Tallapoosa	32.6502	-85.9509
39	CRHR-9	Cornhouse Creek	Tallapoosa	33.2120	-85.5181
40	EMKT-14	Emuckfaw Creek	Tallapoosa	33.0553	-85.6949
41	HCR-1	Hurricane Creek	Tallapoosa	33.1803	-85.5941
42	LINB-1	Line Creek	Tallapoosa	32.2088	-85.8975
43	LBM-1	Long Branch	Tallapoosa	32.4132	-85.4812
44	BYTJ-1	Bryant Creek	Tennessee	34.6466	-85.8430
45	INCL-1	Indian Camp Creek	Tennessee	34.9243	-87.6211
46	BRP-1	Bear Creek	Upper Tombigbee	33.3696	-87.9036
47	BLBP-1	Blubber Creek	Upper Tombigbee	33.1473	-88.1705
48	JNS-1	Jones Creek	Upper Tombigbee	32.7016	-88.1478

7 Alabama's §303(d) Listed Waters
2000 §303(d) Sampling/OtherAmbient Sampling

During 2000 monthly sampling of 1998 §303(d) List waters was performed at the following waterbodies. Data was used in the development of the Draft 2000 §303(d) List contained in Appendix B.

- Catoma Creek
- Pine Barren Creek*
- Pursley/Gravel Creeks and Town Branch*
- Graves Creek
- Buxahatchee/Watson Creeks
- Tallasseehatchee/Shirtee/Weewoka Creeks*
- Walnut Creek
- North Fork Yellowleaf/Yellowleaf Creeks*
- Chewacla Creek*
- Calebee Creek
- Cubahatchee Creek
- Horsetrough Creek*
- Line (Oakfuskee) Creek
- Pepperell Branch
- Sougahatchee/Loblockee Creeks*
- Tallapoosa River
- Big Nance/Crooked Creeks
- Piney/French Mill Creeks
- Pond Creek

* Not on 1998 Alabama §303(d) List

Intensive Studies were performed on the four waterbodies listed below. In addition to use for §303(d) List review, collected data was/will also be used in Total Maximum Daily Load (TMDL) or Wasteload Allocation (WLA) development.

- Graves Creek
- Buxahatchee Creek
- Horsetrough Creek*
- Tallapoosa River

* Not on 1998 Alabama §303(d) List

During 2000 the seven TMDLs for five waterbodies were developed, noticed, and are presently in draft format awaiting EPA Region 4 approval.

- Crooked Creek-Ammonia & Dissolved Oxygen
- Long Branch-Ammonia & Dissolved Oxygen
- Duck Creek-Dissolved Oxygen
- Tallapoosa River-Dissolved Oxygen
- Graves Creek-Dissolved Oxygen

Table 7-41 represents the TMDLs that have been developed during 2000 and 2001 by the ADEM Water Quality Branch and TetraTech, Inc., put on public notice, and sent to Region 4 EPA for approval.

Table 7-41
2000-2001 Total Maximum Daily Loads

Waterbody Name	Waterbody ID	River Basin	County	Pollutant
Crooked Creek	AL/03160110-090_01	Black Warrior	Cullman	Low Dissolved Oxygen/ Ammonia as Nitrogen
Duck River	AL/03160109-020_01	Black Warrior	Cullman	Low Dissolved Oxygen
Graves Creek	AL/03160111-050_01	Black Warrior	Blount	Low Dissolved Oxygen
Long Branch	AL/03160109-020_02	Black Warrior	Cullman	Low Dissolved Oxygen/ Ammonia as Nitrogen
Rock Creek	AL/03160110-080_01	Black Warrior	Winston	Low Dissolved Oxygen
Thacker Creek	AL/03160109-080_01	Black Warrior	Cullman	Low Dissolved Oxygen/ Ammonia as Nitrogen
Tallapoosa River	AL/Tallapoosa R_01	Tallapoosa	Cleburne	Low Dissolved Oxygen
Aldridge Creek	AL/06030002-230_01	Tennessee	Madison	Low Dissolved Oxygen
Aldridge Creek	AL/06030002-230_01	Tennessee	Madison	Siltation
Big Nance Creek	AL/06030005-010_01	Tennessee	Lawrence	Low Dissolved Oxygen/ Ammonia as Nitrogen
Big Nance Creek	AL/06030005-010_01	Tennessee	Lawrence	Pathogens
Big Nance Creek	AL/06030005-010_01	Tennessee	Lawrence	Pesticides
Big Nance Creek	AL/06030005-010_01	Tennessee	Lawrence	Siltation
Cane Creek	AL/06030002-220_01	Tennessee	Madison	Low Dissolved Oxygen
Cane Creek	AL/06030002-220_01	Tennessee	Madison	Siltation
Chase Creek	AL/06030002-190_01	Tennessee	Madison	Low Dissolved Oxygen
Chase Creek	AL/06030002-190_01	Tennessee	Madison	Siltation
Cole Spring Branch	AL/06030002-070_01	Tennessee	Jackson	Low Dissolved Oxygen
Cole Spring Branch	AL/06030002-070_01	Tennessee	Jackson	Siltation
Crowdabout Creek	AL/06030002-340_01	Tennessee	Morgan	Siltation
Flat Creek	AL/06030002-360_01	Tennessee	Lawrence	Siltation
Flint Creek	AL/06030002-330_01	Tennessee	Morgan	Siltation
Harris Creek	AL/06030006-040_02	Tennessee	Franklin	Low Dissolved Oxygen
Harris Creek	AL/06030006-040_02	Tennessee	Franklin	Siltation
Herrin Creek	AL/06030002-340_02	Tennessee	Morgan	Siltation
Indian Creek	AL/06030002-250_02	Tennessee	Madison	Low Dissolved Oxygen
Indian Creek	AL/06030002-250_02	Tennessee	Madison	Siltation
L. Paint Rock Creek	AL/06030002-100_01	Tennessee	Marshall	Low Dissolved Oxygen
L. Paint Rock Creek	AL/06030002-100_01	Tennessee	Marshall	Siltation
Limestone Creek	AL/06030002-300_01	Tennessee	Limestone	Low Dissolved Oxygen
Limestone Creek	AL/06030002-300_01	Tennessee	Limestone	Siltation

Table 7-41 (cont.)

Waterbody Name	Waterbody ID	River Basin	County	Pollutant
Mack Creek	AL/06030002-330_04	Tennessee	Morgan	Siltation
Mallard Creek	AL/06030002-410_01	Tennessee	Lawrence	Low Dissolved Oxygen
Mallard Creek	AL/06030002-410_01	Tennessee	Lawrence	Siltation
McDaniel Creek	AL/06030002-360_02	Tennessee	Lawrence	Siltation
Robinson Creek	AL/06030002-330_05	Tennessee	Morgan	Siltation
Round Island	AL/06030002-400_01	Tennessee	Limestone	Low Dissolved Oxygen
Round Island	AL/06030002-400_01	Tennessee	Limestone	Siltation
Scarham Creek	AL/06030001-270_01	Tennessee	Marshall	Low Dissolved Oxygen/ Ammonia as Nitrogen
Scarham Creek	AL/06030001-270_01	Tennessee	Marshall	Pathogens
Scarham Creek	AL/06030001-270_01	Tennessee	Marshall	Pesticides
Scarham Creek	AL/06030001-270_01	Tennessee	Marshall	Siltation
Swan Creek	AL/06030002-390_01	Tennessee	Limestone	Low Dissolved Oxygen
Swan Creek	AL/06030002-390_01	Tennessee	Limestone	Siltation
Village Branch	AL/06030002-350_03	Tennessee	Morgan	Siltation
West Flint Creek	AL/06030002-350_02	Tennessee	Morgan	Siltation

8 Upland Trend Stations

Upland Trend Stations sampling frequency presently occurs 3 times a year during the months of May, August, and October.

The following parameters are sampled at all the stations.

Parameter	STORET Code	Parameter	STORET Code
water tmperature	(00011)	total dissolved solids	(00515)
air temperature	(00021)	total suspended solids	(00530)
turbidity	(00076)	nitrates	(00620)
specific conductance	(00095)	hardness	(00900)
dissolved oxygen	(00300)	fecal coliform	(31613)
pH	(00400)	phosphates	(70505)

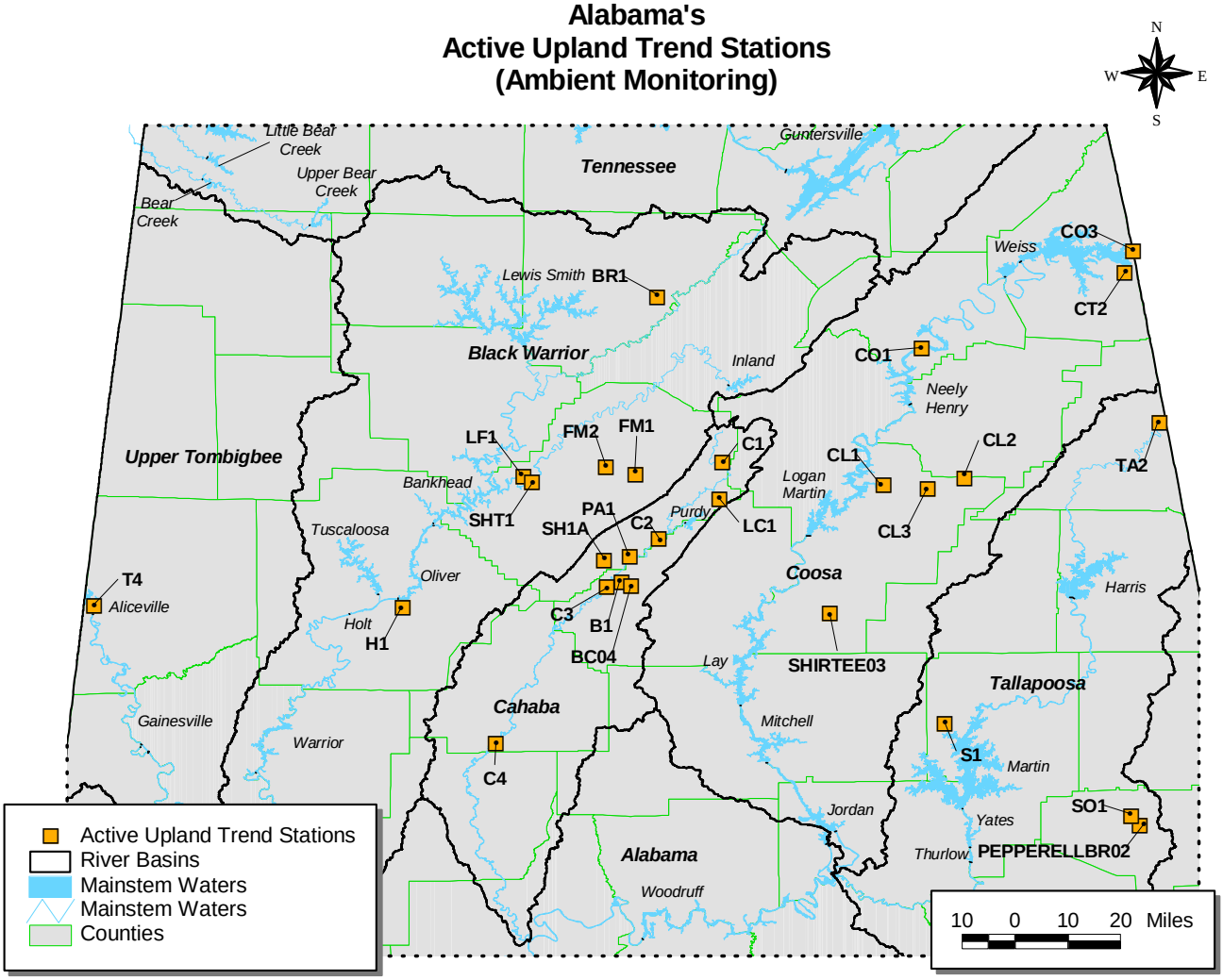
The following parameters are sampled at selected stations.

Parameter	STORET Code	Parameter	STORET Code
biochemical oxygen demand	(00310)	cyanide	(00720)
chemical oxygen demand	(00335)	chlorides	(00940)
alkalinity	(00410)	phenolics	(32730)
volatile suspended solids	(00535)	flow	(00060)
total kjeldahl nitrogen	(00625)		

Please consult Appendix C for a thorough discussion of Alabama's surface water monitoring program. For further information on Alabama's Trend Stations contact Mr. Hugh Cox at (334) 260-2759 or hec@adem.state.al.us.

Figure 7-20

Alabama's Active Upland Trend Stations (Ambient Monitoring)



Station	Description	Latitude	Longitude
B1	Buck Creek above dam @ Helena	33.296944	-86.842639
BC04	Buck Creek off Shelby Co. Rd. 52	33.285833	-86.816111
BR1	Broglen River @ AL Hwy 91 crossing	34.075583	-86.744667
C1	Cahaba River @ Camp Coleman	33.624722	-86.566667
C2	Cahaba River @ Caldwell Ford Bridge	33.415278	-86.740000
C3	Cahaba River west of Helena	33.284417	-86.882556
C4	Cahaba River southeast of Harrisburg	32.857222	-87.186111
CL1	Choccolocco Cr @ Talladega Co. Rd. 326 crossing	33.561917	-86.126306
CL2	Choccolocco Cr @ Talladega Co. Rd. 103 crossing	33.581944	-85.905556
CL3	Choccolocco Cr @ Talladega Co. Rd. 399 crossing	33.551389	-86.005278
CO1	Coosa River @ AL. Hwy 77 crossing	33.935444	-86.023111
CO3	Coosa River @ the AL./GA.State Line	34.200000	-85.444722
CT2	Chattooga River near Cherokee County Road 140 @ AL/GA State Line	34.141670	-85.468111
FM1	Five Mile Creek @ US Hwy 31	33.591111	-86.803611
FM2	Five Mile Creek @ AL Hwy 105	33.611111	-86.885556
H1	Hurricane Creek @ Tuscaloosa Co. Rd. 116	33.228611	-87.439000
LC1	Little Cahaba River south of Leeds	33.524444	-86.575556
LF1	Locust Fork of Black Warrior River near Powhatan	33.583333	-87.110056
PA1	Patton Creek @ Paradise Lake	33.367222	-86.819444
PEPPERELLBR02	Pepperell Branch @ US Hwy 29	32.634444	-85.425278
S1	Sugar Creek @ AL. Hwy 63	32.910444	-85.960361
SH1A	Shades Creek @ AL Hwy 150	33.355278	-86.890556
SHIRTEE03	Shirtee Creek @ Talladega Co. Rd. 24	33.211667	-86.273056
SHT1	Short Creek @ Coosa Co. Rd. 61	33.569167	-87.086972
SO1	Sougahatchee Creek @ Lee Co. Rd. 35	32.659528	-85.450444
T4	Tombigbee River @ AL Hwy 70	33.233333	-88.283333
TA2	Tallapoosa River @ bridge crossing east of Muscadine	33.732722	-85.372167

Mike Rief ADEM Water Quality Branch Projection-Geographic Datum-NAD83

9 Point Source Assessment-ADEM Water Quality Branch Modeling Activities

Table 7-42 ADEM WQ Branch Models 2000-2001

1st Quarter FY00 (Oct-Dec)

Stream	Discharger	County	Permit No.	No. of WLAs / Comments	Miles Assessed
Cahaba River	Jefferson Co. Cahaba River WWTP	Jefferson	AL0023027	1	44.6
White Creek	Honeycutt Laundrymat	Blount	AL0059901	2/seasonal	3.06
Cahaba Valley Creek Buck Creek	Helena WWTP Pelham WWTP Alabaster WWTP	Jefferson	AL0023116 AL0054666 AL0025828	5	12.2
Deakle Creek	Wendy Oaks WWTP	Mobile	Proposed	2/seasonal	5.82
Black Warrior River	Eutaw WWTP	Greene	AL0044067	5	

2nd Quarter FY00 (Jan-March)

Stream	Discharger	County	Permit No.	No. of WLAs / Comments	Miles Assessed
Marriott Creek	Country Park	Cullman	AL0060976	8/seasonal, various QW	10.8
Tennessee River	Cherokee WWTP	Colbert	AIL0022594	1	47.8
Tennessee River	Florence Cypress Creek WWTP	Lauderdale	AL0023884	1	47.8
Scarham Creek	Town of Crossville Sewer	Dekalb	Proposed	2/seasonal	6.18
Tennessee River	Priceville WWTP	Dekalb	AL0060577	1	76
Tennessee River	Sheffield WWTP	Colbert	AL0050121	1	47.8
Coosa River	Paradise Isle Condos	St.Clair	AL0050385	2/seasonal	
Cahaba Valley Buck Creek Cahaba River	Helena WWTP Pelham WWTP Alabaster WWTP Jefferson Co. Cahaba Valley Creek WWTP	Jefferson	AL0023116 AL0054666 AL0025828 AL0023027	2/seasonal	12.2
Pole Creek	West End School	Etowah	AL0060089	2/seasonal	6.3
Rock Creek	Curry High School	Walker	AL0041726	2/seasonal	6.3
Whitewater Creek	City of Troy	Coffee	Proposed	2/seasonal	19.6
Riley Maze Creek	Riley Maze WWTP discharge	Marshall	AL0020303	2/seasonal	7.75
Mulberry Fork	Dodge City WWTP	Cullman	Proposed	2/seasonal	13.54
Locust Fork	Kimberly WWTP	Jefferson	Proposed	2/seasonal	29.2
Tallapoosa River	Tuskegee North WWTP	Macon	AL0048763	2/seasonal	

Table 7-42 (cont.)

2nd Quarter FY00 (Jan-March) cont.					
Stream	**Discharger**	**County**	**Permit No.**	**No. of WLAs / Comments**	**Miles Assessed**
Chattahoochee River	Lanett WWTP	Chambers	AL0023159	1	6.15
UT to Catoma Creek	Pike Road Plantation	Montgomery	AL0059561	2/seasonal	14.2
Yellowleaf Creek	Cheyenne Environmental	Shelby		2/seasonal	8.57
Little Canoe Creek	Odenville Springville Lagoon St. Clair Correctional	St. Clair	AL0070084 AL0050903 AL0043494	2/seasonal	16.8

3rd Quarter FY00 (April-June)					
Stream	**Discharger**	**County**	**Permit No.**	**No. of WLAs / Comments**	**Miles Assessed**
Beaverdam Creek	Baynon Creek WWTP	Madison	Proposed	2/Seasonal	7.3
Tennessee River-Lake Guntersville	River Bend Marina	Marshall	AL0042366	1	No Model
Cahaba River	Brimingham Riverview WWTP	Jefferson	AL0045969	1	44.6
Cahaba River	Hoover Riverchase WWTP	Jefferson	AL0041653	1	44.6
Brier Fork Flint River	Union Springs WWTP	Madison	Proposed	1	7.763
Swan Creek	Lawson Trailer Park	Limestone	AL0058670	1	2.94
Conecuh River	Jefferson Smurfitt Corporation	Escambia	AL0002682	2/seasonal	51.8
Black Warrior River	Southfresh Aquaculture	Greene	AL0073377	1	9.4
Valley Creek	numerous dischargers	Jefferson		wet weather flow analysis	
Buck Creek	Helena WWTP Pelham WWTP Alabaster WWTP	Jefferson	AL0023116 AL0054666 AL0025828	12	6.5
Chattahoochee River	Gordon	Houston	Proposed	1	1.9
Mobile River	Town of Lemoyne	Mobile	AL0073598	1	4.4
UT to Locust Fork	Susan Moore High School	Blount	AL0050563	2	5.66
Black Warrior River	Greensboro	Hale	AL0057193	1	15.6

Table 7-42 (cont.)

4th Quarter FY00 (July-Sept)					
Stream	**Discharger**	**County**	**Permit No.**	**No. of WLAs / Comments**	**Miles Assessed**
Mobile River	Town of Lemoyne	Mobile	AL0073598	1/effluent DO to 0	4.40
Big Wills Creek	Cagles	DeKalb	AL0002241	1	36.44
Hollinger Creek	Town of Bay Minette	Baldwin	AL0049867	2/seasonal	11.12
Murder Creek	North Brewton Lagoon	Escambia	AL0073580	1	2.89
Halawakee Creek	Opelika Eastside WWTP	Lee	AL0059218	2/seasonal	11.52
UT To Kelly Creek	Brecon-Talladega WWTP	Talladega	AL0022349	2/seasonal	5.07

1st Quarter FY01 (Oct-Dec)					
Stream	**Discharger**	**County**	**Permit No.**	**No. of WLAs / Comments**	**Miles Assessed**
Kelly Creek	Moody-Kelly Creek WWTP	St. Clair	AL0061581	1	6.6
Turkey Creek	Albertville Eastside WWTP	Jefferson	AL0020192	1	16.2
Fivemile Creek	Jefferson Co. Fivemile Creek WWTP	Jefferson	AL0026913	1	35.9
Fivemile Creek	Sloss ABC Coke	Jefferson	AL0003247 AL0003417	5/seasonal, A&I, F&W	35.9
Alexandria Creek	Alexandria Mall WWTP	Calhoun	Proposed	1	4
Calloway Creek	Elmore Correctional Facility	Elmore		1	3.7
Cahaba River	Trussville WWTP Gold Kist WWTP	Jefferson	AL0022934 AL0003395	4/revisions in 7Q10	
Town Creek	Jasper WWTP	Walker	AL0023418	4/UAA seasonal	
Cane Creek	Oakman WWTP	Walker	AL0025348	4/UAA seasonal	
Roans Creek	Steelwood WWTP	Baldwin	AL0070904	1	6.97
Tombigbee River-Gainesville Reservoir	Cochrane Park	Pickens	AL0029700	1	39.50
Woodland Mills Creek	Cotaco School	Morgan	AL0051861	1	2.00
Cane Creek	Oakman WWTP	Walker	AL0025348	2/UAA	10.03
Cahaba River	Hoover Riverchase WWTP	Jefferson	AL0041653	1	44.6
Cahaba River	Birmingham Riverview WWTP	Jefferson	AL0045969	1	44.6
Cahaba River	Jefferson Co Cahaba River WWTP	Jefferson	AL0023027	1	4.6
Town Creek	Crosscreek Subdivision	Morgan	AL0042943	1	6.18
Tennessee River-Lake Guntersville	Guntersville State Park	Marshall	AL0024627	1	No Model
Tennessee River	Hollywood Lagoon	Jackson	AL0062944	1	28.5

Table 7-42 (cont.)

1st Quarter FY01 (Oct-Dec) cont.					
Stream	**Discharger**	**County**	**Permit No.**	**No. of WLAs / Comments**	**Miles Assessed**
Tennessee River	Scottsboro Goose Pond WWTP	Jackson	AL0054461	1	28.5
Forman Branch	Sycamore WWTP	Talladega	AL0061573	2	3.47
Buck Creek	Alabaster WWTP	Shelby	AL0025828	6/UAA	

2nd Quarter FY01 (Jan-March)					
Stream	**Discharger**	**County**	**Permit No.**	**No. of WLAs / Comments**	**Miles Assessed**
UT Parkerson Mill Creek	Auburn SouthsideWWTP Trailer Parks	Lee	AL0050237	6	23.85
Omussee Creek	Dothan Omussee Creek WWTP	Houston	AL0022764	1	
Gumsuck Branch	Liberty Park WWTP	Shelby	AL0067814	1 (Wet Weather)	

3rd Quarter FY01 (April-June)					
Stream	**Discharger**	**County**	**Permit No.**	**No. of WLAs / Comments**	**Miles Assessed**
North Fork Yellowleaf Creek	Chelsea Middle School	Shelby	AL0051772	2 Seasonal	1.34
Caffee Creek	West Blockton WWTP	Bibb	First Issue	2 Seasonal	5.6
Five Mile Creek	Sloss ABC Coke	Jefferson	AL0003247 AL0003417	2 Seasonal	35.9
Buxahatchee Creek	Calera WWTP	Shelby	AL0050938	1	
Conecuh River	Gantt Beach Marina	Covington	First Issue	1	1.6
Lake Martin	Kowaliga Homeowner's Association	Elmore	AL0053538	1	
Alamuchee Creek	City of York Lagoon	Sumter	AL0023361	2 Seasonal	
Locust Fork	Morris-Kimberly WWTP	Jefferson	AL0073199	2	29.2
Cahaba River	Hoover Inverness WWTP (HCR)	Jefferson	AL0025852	1	

Table 7-42 (cont.)

4th Quarter FY01 (July-Sept)					
Stream	**Discharger**	**County**	**Permit No.**	**No. of WLAs / Comments**	**Miles Assessed**
Shoal Creek	Montevallo WWTP	Shelby	AL0023299	1	8.7
Mill Creek	Lafayette Mill Creek Lagoon	Chambers	AL0062839	1	2.3
Tallapoosa	Red Eagle Honor Farm	Montgomery	AL0051403	1	6.6
Turkey Creek	Jefferson Co Turkey Creek WWTP	Jefferson	AL0022926	2 Seasonal	16.2
Buck Creek	City of Pelham	Jefferson	AL0054666	1	6.5
Slab Creek	Boaz Slab Creek WWTP	Marshall	AL0049603	1	10.9
Rock Creek	Robertsdale WWTP	Baldwin	AL0042838	2 Seasonal	
Pepperell Branch	West Point Stevens	Lee	AL0002968	2 UAA	16.4
Sougahatchee Creek	Auburn Northside	Lee	AL0050245	2 UAA	16.4
Valley Creek	Valley Creek WWTP	Jefferson	AL0023655	UAA	
Village Creek	numerous dischargers	Jefferson		5 UAA	
Cahaba River	Gold Kist Poultry	Jefferson	AL0003395	2 revisions for summer	
Fivemile Creek	Sloss ABC Coke	Jefferson	AL0003247 AL0003417	7	35.9

The miles associated with Table 7-42 have not been added to any tables that summarize evaluated assessments. Eliminating overlap of these mileages with monitored waters would require the creation of a “models” GIS coverage. The present staffing levels of the Water Quality Branch make this task very difficult if not impossible. The unreasonable 2 year timeframe for gathering and analyzing data and presenting results in tables, graphs, and maps for the §305(b) report compounds the difficulty in creating a “models” GIS coverage, or completing other data layers (i.e. use classifications) that would aid in water quality analysis and use support determinations. A 3-5 year timeframe for the §305(b) should be something the EPA, Congress, and all affected parties should seriously consider to make this process not only more meaningful but more scientifically sound.

During 2002 Alabama will have a Draft §303(d) List awaiting approval from EPA Region 4. This is what is reported in this 2002 §305b Report. This list will eventually get approved and may be different form the waters identified in this section. The ADEM Water Quality Branch will also have a Draft 2002 §303(d) List for public notice and comment during the summer of 2002 for submittal October 1, 2002. There will be 3 versions of Alabama's Impaired Waters List circulating at the same time affecting agriculture, industry, transportaiton, construction, and local, state, and federal governments. This is another very valid reason for extending the time period for §303(d)/§305(b) development.

Table 7-43
Total Miles Assessed
Rivers and Streams

Support Status	Miles Monitored	Miles Evaluated	Total
Full Support	**5,124.4**	**12,145.3**	**17,269.7**
Non Support	1,979.1	706.1	**1,979.1**
Total	**7,103.5**	**12,145.3**	**19,248.8**

Table 7-44
Draft 2000 §303(d) Cause Mileages
Rivers and Streams

Cause	Miles	Percent of Total Impaired Miles
Ammonia	157.3	7.9%
Biology	3	0.2%
Chlordane	0.5	0.0%
Chlorides	5	0.3%
Color	4.8	0.2%
Mercury	130.2	6.6%
Metals	108.5	5.5%
Metals (Al)	9.4	0.5%
Metals (Al, As, Cu, CrT, Fe)	10	0.5%
Metals (Al, Fe)	31.4	1.6%
Metals (Cu)	4.8	0.2%
Metals (Fe)	8	0.4%
Metals (Zn)	0.2	0.0%
Nonpriority Organics	12.6	0.6%
Nutrients	382.9	19.3%
Organic Enrichment/Dissolved Oxygen	852.7	43.1%
Other habitat alteration	429.3	21.7%
Pathogens	638.3	32.3%
Pesticides	59.2	3.0%
PH	200.8	10.1%
Priority Organics	54.8	2.8%
Siltation	853.6	43.1%
Temperature/Thermal Modification	10	0.5%
Turbidity	86.4	4.4%
Unknown Toxicity	34.2	1.7%

Figure 7-21

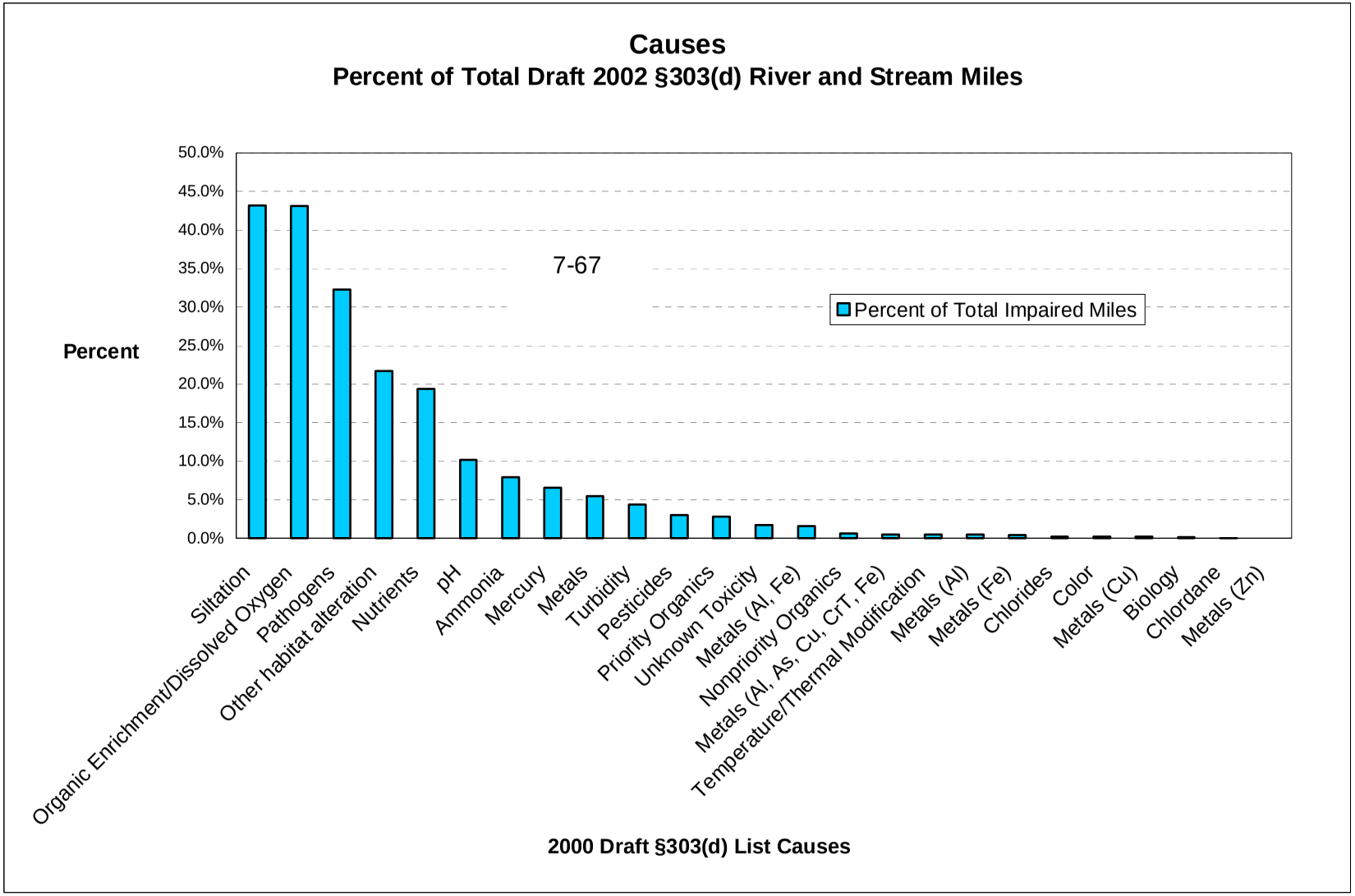
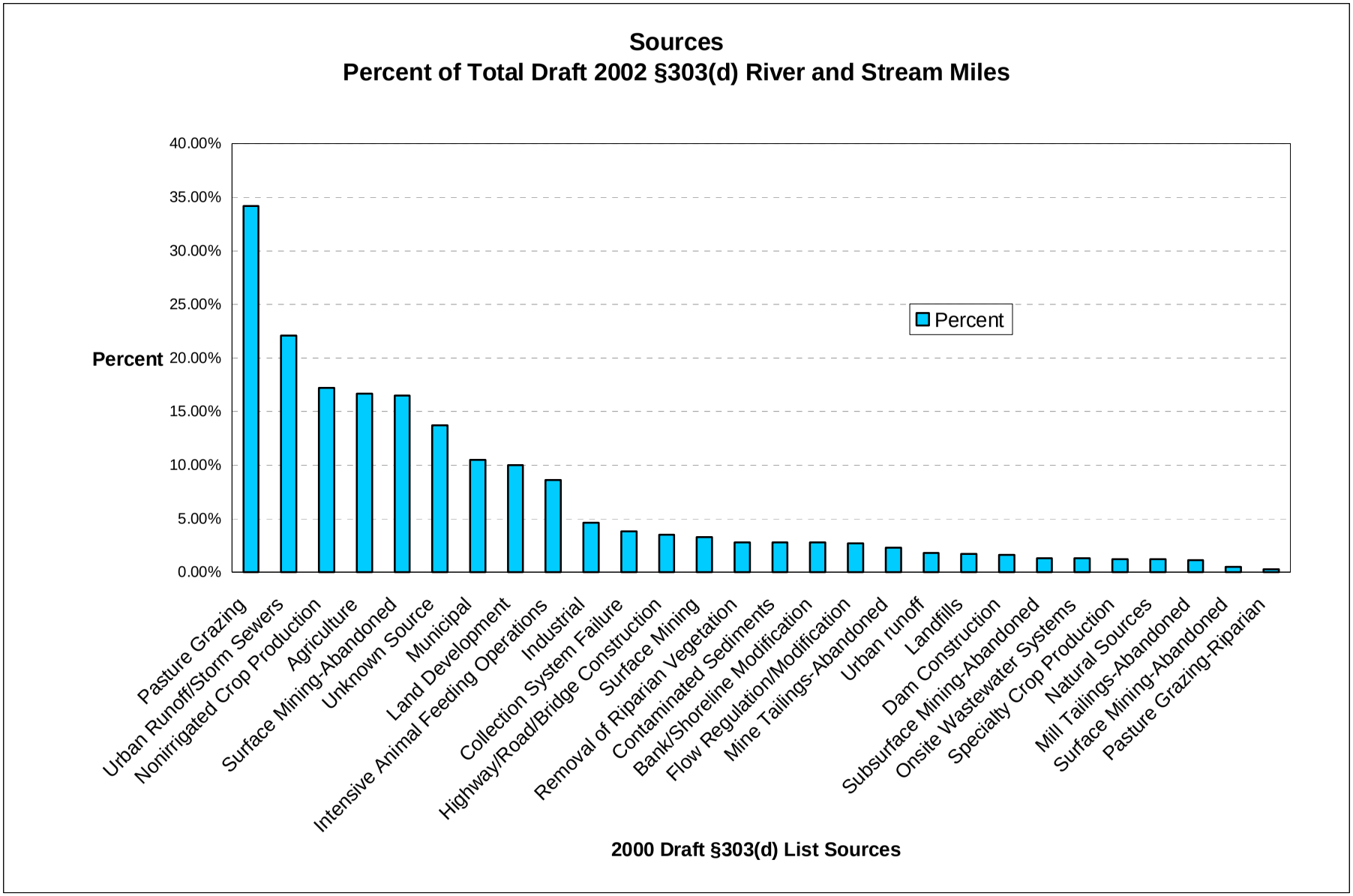

Causes
Percent of Total Draft 2002 §303(d) River and Stream Miles
Percent
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
7-67
Percent of Total Impaired Miles
Siltation
Organic Enrichment/Dissolved Oxygen
Pathogens
Other habitat alteration
Nutrients
pH
Ammonia
Mercury
Metals
Turbidity
Pesticides
Priority Organics
Unknown Toxicity
Metals (Al, Fe)
Nonpriority Organics
Metals (Al, As, Cu, CrT, Fe)
Temperature/Thermal Modification
Metals (Al)
Metals (Fe)
Chlorides
Color
Metals (Cu)
Biology
Chlordane
Metals (Zn)
2000 Draft §303(d) List Causes

Table 7-45
Draft 2000 §303(d) Source Mileages
Rivers and Streams

Source	Miles	Percent of Total Impaired Miles
Agriculture	329.9	16.7%
Bank/Shoreline Modification	55	2.8%
Collection System Failure	74.4	3.8%
Contaminated Sediments	54.8	2.8%
Dam Construction	32.2	1.6%
Flow Regulation/Modification	52.5	2.7%
Highway/Road/Bridge Construction	69	3.5%
Industrial	91.2	4.6%
Intensive Animal Feeding Operations	169.3	8.6%
Land Development	197.2	10.0%
Landfills	34	1.7%
Mill Tailings-Abandoned	22.6	1.1%
Mine Tailings-Abandoned	45.6	2.3%
Municipal	208.4	10.5%
Natural Sources	22.8	1.2%
Nonirrigated Crop Production	341.1	17.2%
Onsite Wastewater Systems	25.2	1.3%
Pasture Grazing	676.7	34.2%
Pasture Grazing-Riparian	5	0.3%
Removal of Riparian Vegetation	55	2.8%
Specialty Crop Production	24	1.2%
Subsurface Mining-Abandoned	25.6	1.3%
Surface Mining	66.1	3.3%
Surface Mining-Abandoned	10.4	0.5%
Surface Mining-Abandoned	325.9	16.5%
Unknown Source	271.7	13.7%
Urban runoff	35	1.8%
Urban Runoff/Storm Sewers	437.2	22.1%

Figure 7-21


Sources
Percent of Total Draft 2002 §303(d) River and Stream Miles
Percent
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Percent
Pasture Grazing
Urban Runoff/Storm Sewers
Nonirrigated Crop Production
Agriculture
Surface Mining-Abandoned
Unknown Source
Municipal
Land Development
Intensive Animal Feeding Operations
Industrial
Collection System Failure
Highway/Road/Bridge Construction
Surface Mining
Removal of Riparian Vegetation
Contaminated Sediments
Bank/Shoreline Modification
Flow Regulation/Modification
Mine Tailings-Abandoned
Urban runoff
Landfills
Dam Construction
Subsurface Mining-Abandoned
Onsite Wastewater Systems
Specialty Crop Production
Natural Sources
Mill Tailings-Abandoned
Surface Mining-Abandoned
Pasture Grazing-Riparian
2000 Draft §303(d) List Sources

Part VIII Watershed Protection in Alabama
1 The Watershed Protection Approach

The watershed protection approach strikes the best balance among efforts to control the cumulative impacts from point and nonpoint sources of pollution and provides a focused plan for faster resolution of problems. Alabama continues to implement many watershed protection projects throughout the State. The ADEM continues to use the base Section 319(h) grant to fund management measures for NPS impaired watersheds using the 5-year rotational river basin assessment approach. Incremental Section 319 funding is primarily used to target priority Section 303(d) listed watersheds statewide, and to implement total maximum daily limits (TMDLs). Table 8-1 and Figure 8-1 list watershed projects that are in various stages of initiation or completion. The table and map are not all-inclusive since some Section 319(h) funded projects are "statewide" in scope, and may directly or indirectly impact other watersheds in addition to those listed below.

Table 8-1
Alabama Watershed Projects Since 1986

Map Index	USGS Cataloguing Unit	Watershed Project	Funding Date
1	Tri-State Region	ACT/ACF Study	1994
2	03160111	Bayview Lake	1988; 1991
3	06030006	Bear Creek	1986,1990;1991; 2000
4	06030005	Big Nance	1999
5	03160109-113	Black Warrior River Basin	1999
6	03150202	Buck Creek	1995
7	03150202	Cahaba River Basin (lower)	1999
8	03150201	Catoma Creek	1995; 2002
9	03150106	Choccolocco Creek (lower)	1998
10	03150106	Choccolocco Creek (middle)	1996
11	03150105	Coosa River (upper)	2000; 2001
12	03150106	Coosa River (middle)	2000
13	06030002	Cotaco Creek	2000
14	03140201	Cottonwood / Big Prairie Creek	1990; 1991
15	03140201	Cypress Creek	2001
16	03160205	Dog River	1993
17	03140201	Double Bridges	1990
18	03160109	Duck River	1999
19	03160109	Eight Mile	1990;2000
20	03160205	Fish River/Weeks Bay	1993
21	06030002	Flint Creek	1992 - 1995
22	06030002	Flint River	2000
23	03140103	Lightwood-Knot Creek*	1995
24	03150201	Line Creek	2002
25	03140201	Little Choctawhatchee	1991
26	03150105	Little River	1996
27	06030002	Paint Rock	1995

Table 8-1 (cont.)

Map Index	USGS Cataloguing Unit	Watershed Project	Funding Date
28	06030002	Piney Creek	1999
29	03140301	Point A – Gantt Lake	2001
30	03160110	Ryan-Crooked-Rock Creek	1991;1996
31	06030001	Sand Mountain/Lake Guntersville	1986,1991,1992;1994;1995
32	03140303	Sepulga River	1998
33	06030001	Short - Scarham Creek	2001
34	06030001	South Sauty	2001
35	06030001	Town Creek	2001
36	03160111	Village Creek	1992
37	03160205	Weeks Bay	1994; 1995
38	03140107	Wolf Bay	2001

2 *Lightwood-Knot Creek National Water Quality Monitoring Project

The effectiveness of implementing NPS management measures is best documented by monitoring both land treatments and water quality. The USEPA's Section 319 National Monitoring Program is designed to document the effectiveness of NPS polluted runoff management technology and approaches through intensive monitoring and evaluation of a subset of watershed projects funded under CWA Section 319.

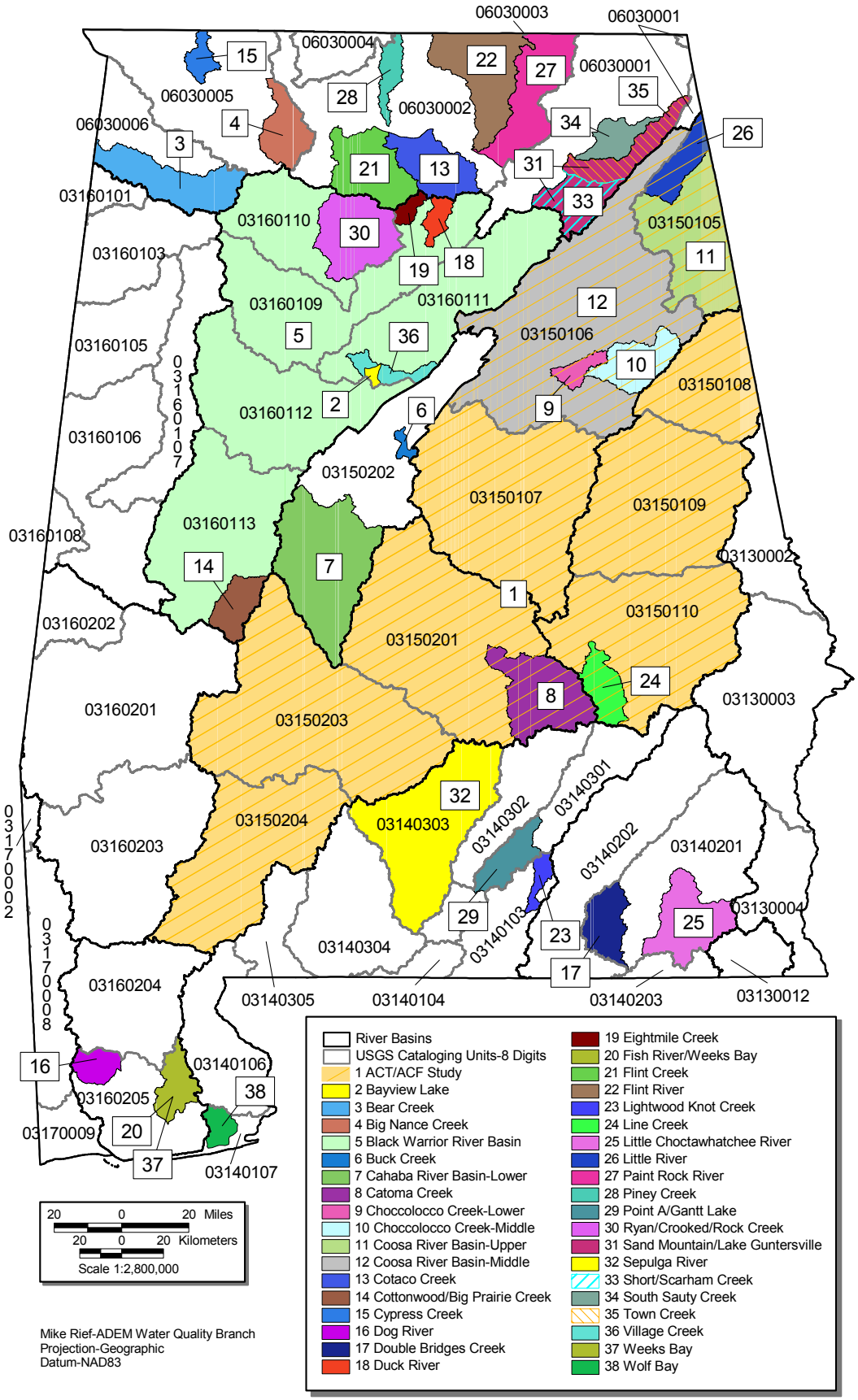
The Lightwood-Knot Creek National Water Quality Monitoring Project in Covington County is designed to document the effectiveness of installing NPS runoff measures to protect water quality in this 47,300-acre watershed. The project is a four-way paired watershed study (two treatment watersheds and two control watersheds). The project is facilitated by the Geological Survey of Alabama (GSA) with $750,000 provided by a FY95 Section 319 grant from EPA through ADEM. This seven-year duration project is one of only 17 projects in the nation (one of only two in the southeastern U.S.) to be selected by the USEPA for this special "one-time" national monitoring grant appropriation.

Excessive sedimentation of the 1,100 acre Lake Jackson is impairing aquatic habitat, increasing bridge maintenance costs and flooding potential, and reducing the lake's water holding capacity. Pollutant sources are also associated with agricultural fields, roads, and confined animal operations. About twenty-eight percent of the watershed is cropped. There are 15 poultry operations and one dairy that are potential sources of nutrient and fecal coliform pollutants. Management measures include installation of on-the-ground practices and citizen education and outreach activities.

Water quality monitoring began in 1996 and will continue through 2002. At least 30 parameters are being monitored, including metals and nutrients. Data is still being collected to assess the success of management measures installed since 1998. Data is being entered into the USEPA STORET database and ADEM databases. Biological data is entered into the USEPA BIOS database. Water Quality parameters and land use activities are being tracked using EPAs Nonpoint Source Management System (NPSMS) software. A final report is expected in the fall of 2002.

Figure 8-1

Alabama Watershed Projects 1986-2002



3 The Alabama Clean Water Partnership

The Alabama Clean Water Partnership (CWP) is a diverse and inclusive coalition of public-private interest groups and individuals working together to improve, protect and preserve water resources and aquatic ecosystems in Alabama. The CWP seeks to meet or exceed the goals of the Clean Water Act and the Alabama Water Pollution Control Act. Achieving State water quality standards and water use classifications is a priority. A river basin protection approach is used to ensure that individual watershed or subwatershed protection efforts are in harmony with one another, i.e., an upstream "cure" doesn't become or aggravate a downstream problem. The CWP is a non-profit 501(c) organization.

The CWP program in Alabama:

- Promotes improved communication, information sharing, and networking among stakeholders through websites, publications, and public meetings
- Consolidates data and information through a communications and technical assistance network
- Provides an effective coordination structure to prevent duplication of efforts, preclude wasteful use of limited resources, and make available technical assistance
- Provides opportunities for stakeholder collaboration in decision-making processes and implementation of management measures

Various levels of stakeholder participation, interest, and resources are available to meet natural resource protection needs. Essential to the success of pollution management is partnering. The CWP program strengthens new interest groups and enhances the efforts of established groups and processes already in place. The CWP program assist watershed stakeholders with planning, developing, and implementing programs that meet multiple watershed protection needs; eliminates duplication of efforts, and allows for effective and efficient use of available funding. High priority is directed to developing and implementing watershed-based plans. These plans allow community-based groups, units of government, industry, groups, and individuals to cooperatively implement strategies that concurrently meet the needs of all watershed protection interest.

A CWP Steering committee coordinates and oversees statewide partnership activities for 10 major river basins. Advisory, technical, education and outreach, and finance committees have been formed in each major river basin. Major river basins may be further delineated into smaller geographical areas (e.g., dam to dam; upper/middle/lower river sections, etc.). Each delineated river basin/sub-basin is represented by a local entity (government, nonprofit organization, public utility, or industry) that is eligible to receive and disburse public and/or private funding to implement CWP priorities. Committees meet at least quarterly.

Clean Water Partnership facilitators have been established in each of the following 10 major river basins to coordinate environmentally protective and economically feasible watershed protection management measures.

1. Cahaba
2. Black Warrior
3. Tennessee
4. Alabama-Tombigbee
5. Tallapoosa
6. Coosa
7. Chattahoochee-Chipola-Upper Perdido-Escambia
8. Choctawhatchee-Pea-Yellow
9. Conecuh-Sepulga
10. Coastal

4 Additional Watershed Protection Partnerships:

In addition to the many and varied Section 319 funded watershed projects, and resources provided by the Alabama Clean Water Partnership, protection of natural resources are often addressed through other programs. For example, during 2001, the NRCS signed contracts for one floodwater retardation structure and one channel restoration project, and at least 8 new long-term contracts were written for the Sand Mountain-Lake Guntersville area. In addition, the following resources are used to advance the watershed protection program in Alabama:

- *Conservation buffers* were installed on 16,000 acres to control erosion and sedimentation, abate streambank degradation, and protect water quality. Riparian forest and filter strips make up most of these acres.
- The *Alabama Soil Survey Program* data is a significant watershed protection plan development consideration and of primary importance for implementation of on-the-ground management measures. The NRCS has completed updating soil surveys for 35 of the 67 counties in Alabama. Nineteen counties in Alabama are Soil Survey Geographic (SSURGO) Database certified and available in digital format. Four counties are in the certification process, 3 counties are to be compiled and digitized in 2002, and map compilation, in preparation for SSURGO certification, will begin for 3 counties in 2002. An Alabama Public Television Program, "Discovering Alabama," developed and aired a "*Soils of Alabama*" video to raise public awareness of the significance of soils as a valuable natural resource. The video was produced in cooperation with NRCS and is available to school systems and the general public.
- The *Environmental Quality Incentives Program* (EQIP) is a voluntary USDA-FSA program that addresses serious threats to soil, water, and related natural resources. There are 50 priority areas in Alabama. In 2001, there were 650 conservation plans/contracts prepared on over 156,000 acres. At least 55% of the funds targeted water quality, 22% targeted erosion, and 28% was allocated to improve pasture grazing.
- The *USDA Forestry Incentives Program* (FIP) assisted 250 landowners (337 contracts) for a cost-share value of $1.08 M. Nearly 6.5 million trees were planted on over 10,000 acres and timber stand improvements applied on approximately 1,700 acres.
- The *Conservation Reserve Program* (CRP) provides a mechanism to establish permanent vegetation on environmentally sensitive land. Alabama has 479,990 acres enrolled with 121,921 acres in the continuous CRP (over 9,766 conservation planning contracts).
- The *Wetland Reserve Program* (WRP) assists landowners that want to voluntarily restore and protect wetlands on private property. Alabama has filed 13 WRP easements, including five perpetual and eight 30-year easements.
- The *Wildlife Habitat Incentives Program* (WHIP) is a voluntary program that helps citizens to enhance fish and wildlife on private lands. In FY2001, the NRCS funded 50 contracts for a total of $162,789. Alabama has at least 210 active WHIP contracts.
- The *Watershed Protection and Flood Prevention Act of 1954 (PL 83-566),* also known as the Small Watershed Program (SWP), is administered by the NRCS in cooperation with the U.S. Forest Service, Alabama Rural Development, the State

Soil and Water Conservation Committee and Districts, and local sponsors. It is the primary water resources implementation program of the USDA. The SWP addresses water quality; flooding; water supplies for municipal, agricultural and recreational uses; erosion and sedimentation; wetland creation and restoration; recreational opportunities; and habitat improvement for fish and wildlife.

The SWP currently benefits 60,000 Alabama citizens and provides direct benefits totaling $10 M annually (primarily through reduction of potential for flood damage). At least $350,000 was obligated to the Small Watershed Program in FY2001. There are 54 watershed projects in Alabama with 14 in the installation phase. At least 103 floodwater-retarding structures and 160 grade stabilization structures have been installed. Approximately 250 miles of streams have been restored. Table 7-2 summarizes PL-566 successes in Alabama.

Table 8-2
Major Benefits of the Small Watershed Protection Program (PL-566) in Alabama*

Average annual flood damage reduction	$10,500,000
Total acres benefited	$500,000
Number of farms benefited	7,600
Annual tons of reduced erosion	2,700,000
Annual tons of reduced animal waste	255,000
Bridges benefited	375
Miles of road protected	600
Annual recreation visitor days	90,000

*Derived from: Watershed Progress Report - Alabama. USDA-NRCS. Nov. 2001. Page i.
Robert N. Jones. State Conservationist

5 Watershed Dams at Risk

Many of the 108 small upstream dams constructed in Alabama in the last 39 years are reaching their 50-year design life. Dam failures could result in flash flooding, loss of life, and massive property damage. At least 64 watershed dams are in need of restoration and structural repairs at a projected cost of $20 M. At this time, there are no State funds available for repairs. Table 7-3 provides a call to action.

Table 8-3
Dam Repairs Needed in Alabama*

Number of dams needing repairs to protect downstream life and property	21
Number of dams needing repairs to safeguard municipal water supplies, provide flood control, and protect natural resources	43
Funding needed to protect people and natural resources	$20 M

Derived from: Watershed Progress Report - Alabama. USDA-NRCS. Nov. 2001. Page 45.
Robert N. Jones. State Conservationist

6 Watershed Based Plans

Watershed based plans integrate public and private efforts to restore impaired watersheds that do not meet clean water and natural resource protection management goals. The CWP program in Alabama is expending much resources, time, and coordination efforts to develop watershed protection plans. Plans are in various stages

of development. Developing useful and practical watershed based plans and coordinating partnerships takes time - especially if there is no history of cooperation among stakeholders. The process in Alabama uses an inclusive public participatory process; considers social, economic, and environmental issues; defines the pollution problem and sources, specifies management measures to address all pollutants of concern, and provides a means to monitor progress and evaluate results.

Watershed based plans are designed to be clear enough that local citizens can "identify" with them and specific enough that citizens willfully "adopt" them (i.e., local citizens understand their roles and responsibilities in the implementation process). Although many river basin plans are being developed, they are too large in scope and areal extent to comprehensively address specific sources and causes of pollution for a particular impaired watershed/sub-watershed located in the river basin. These plans should be reviewed at least annually and revised as needed.

Long-term watershed improvements cannot be effectively realized by following a rigidly structured management plan with a tight implementation schedule, especially if the primary means of implementation is to use a citizen voluntary approach. Therefore, Alabama's watershed based plans are designed to be dynamic in order to respond to changing watershed conditions, priorities, and feedback mechanisms. Efforts are underway to revisit or develop watershed-based plans that address implementation of TMDLs for Section 303(d) listed waterbodies.

Guidance to develop watershed-based plans has been developed by the Alabama Water Partnership (CWP). The Alabama guidance is based on the nationally recognized Indiana* guide, and includes, a.) "*Guidance for Planning and Developing a Watershed Restoration Action Strategy* (WRAS) (Dec. 2000); and b.), "*Supplement to Guidance for Planning and Developing a Watershed Restoration Action Strategy (WRAS): Useful Things to Know* (Dec. 2000). The Alabama CWP guidances are available from the ADEM Office of Education and Outreach. Additional watershed based plan guidelines are provided by USEPA and are presented in the, "*Supplemental Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories in FY2002 and Subsequent Years*." The suggested plan elements provide a reasonable assurance that load reductions will be achieved. The elements are available on the Internet at: http://www.epa.gov/owow/nps/Section319/fy2002.html.

*Watershed Action Guide for Indiana-Straight Talk on Developing Watershed Plans. Indiana Department of Environmental Management - Watershed Management Section. WATER Committee. Edited by Susan McCloud and Connie Stern. Nov. 1998.

Part IX Wetlands

9.1 Alabama Coastal Counties Wetland Management Plan

The Alabama Coastal Nonpoint Source Pollution Control Program (ACNPCP) has participated in the development of a "Alabama Coastal Counties Wetland Conservation Plan", which is due for release in March, 2001. ADEM Coastal Programs has received a Wetland Restoration Grant to implement restoration strategies and address State lands within the ACNPCP Management Area. ADEM Coastal Programs participates in the development and approval of wetland mitigation banks. Three local banks, totaling over 3,000 acres of wetlands, service the ACNPCP Management Area. Additionally the Alabama Department of Public Health has promulgated new rules effective January 2000, which prohibit the placement of onsite sewage disposal systems in flood prone, wetlands or hydric soil areas. This new rule is currently being tested in Baldwin County, Alabama.

The following narrative through page 10 contains the specifics of the FY2000 Wetland Restoration Grant.

Project Cooperators The Wetland Restoration Grant involves the following Agency and Public/Private Partnerships.

Regional, State and local agencies

- Alabama Department of Economic and Community Affairs (Coastal Programs, Team Member)
- Alabama Department of Environmental Management (Co-lead Coordination, Coastal Programs, CZARA/6217, Education and Outreach, Team Member)
- Alabama Department of Transportation (Technical Support)
- Alabama Dept. of Conservation & Natural Resources - Lands Division (Co-lead Coordination, Team Member, Technical Support, Restoration)
- Baldwin County Commission (Team Member, Technical Support)
- Baldwin County Soil and Water Conservation District (Team Member, Technical Support)
- Mobile Bay National Estuary Program (Team Member, Education and Outreach)
- Natural Resources Conservation Service (Team Member, Technical Support)
- The Nature Conservancy - Natural Heritage Program (Team Member, Technical Support)
- U.S. Army Corps of Engineers (Team Member, Technical Support)
- U.S. Fish and Wildlife Service (Team Member, Technical Support)
- Weeks Bay Watershed Project Coordinator (Team Member, Outreach and Education)

Public/Private Partnerships:

- Weeks Bay Watershed Project Citizen Advisory Committee (Team Member, Education and Outreach, Technical Support)
- Wolf Bay Watershed Watch (Team Member, Education and Outreach)

Targeted Project Area

With a current population estimated at 150,000 citizens, Baldwin County is one of the fastest population growth areas in Alabama (e.g., growth rate of approximately 26% from 1990-1996). The urban development boom is not expected to slow in this highly desirable area on the Gulf Coast. Indeed, the rate of wetland loss or degradation is expected to parallel the continued increase in development since waterfront and coastal areas are prime real estate development locations.

This project targets restoration and protection of priority tracts in approximately 50,000 acres of wetlands in Baldwin County as identified by USDA hydric soils maps. Many waterways in the project area are listed on the State of Alabama's latest CWA Section 303(d) list as impaired and include: Fish River, Magnolia River, Bon Secour Bay, and Mobile Bay. Surface water quality problems are generally attributed to runoff or nonpoint source pollution and include urban development, agriculture, dirt roads, and malfunctioning septic systems. Pollutants of concern include sediment, nutrients, pesticides, and bacteria.

A new Alabama Department of Transportation bridge is under construction in the Wolf Bay watershed. This bridge and the resulting connecting network of roads and associated transportation corridors dramatically increase the need for wetland protection and restoration in this ecologically sensitive area. The Wolf Bay and Weeks Bay Watersheds currently benefit from active grassroots stakeholder support dedicated to the protection of water quality and natural resources.

Project Area Significance

The U.S. EPA - Region 4 has identified the Mobile Bay coastal drainage area as a wetland restoration priority area. In addition, the Gulf of Mexico Program has identified the Mobile Bay area as a priority area for water quality and habitat improvement projects as well as for projects that will decrease nutrient loading. The Baldwin County Soil and Water Conservation District's Community Based/Locally Led Conservation Watershed Assessment have listed the Fish River (Weeks Bay Watershed), Wolf Creek Watershed, and Mobile Bay as critical need watershed protection priority areas. Weeks Bay is a Gulf of Mexico GEMs site and has been designated as an Outstanding National Resource Water (February 1992).

The Alabama Forever Wild Program, administered by the State Lands Division (ADCNR), recently allocated over $15 million to acquire pristine and impaired wetlands within the Mobile-Tensaw River Delta, an area nationally recognized as a National Natural Landmark by the National Parks Service. The majority of these wetlands encompass the Tensaw River/Lake Watershed, designated by ADEM as an Outstanding Alabama Waterway. This grant will provide wetland restoration and protection resources that will greatly enhance this significant and nationally recognized State of Alabama wetland acquisition effort.

Federally listed endangered species documented in coastal Baldwin County wetland areas include the Alabama red-bellied turtle (*Pseudemys alabamensis*) and the Alabama beach mouse *(Peromyseus polionotus ammobates*). Additionally, the federally threatened eastern indigo snake (Drymarchon corais couperi) and the flatwoods salamander (*Ambystoma cingulatum*) possibly occur in Baldwin County wetlands. An additional 57 plant and animal species are listed within the Mobile-Tensaw River Delta by the State Lands Division's Natural Heritage Section as being either State protected, federally listed under the Endangered Species Act, or recognized as rare.

Project Description

- **Wetland Identification**

Wetland types identified in the Baldwin County Wetland Advanced Identification (BC ADID) include **riverine** (overbank flooding of associated rivers and streams), **fringe** (shoreline of coastal ecosystems, marshes), **flat** (wet pine flats, pine savannas, and pitcher plant bogs), and **depressional** (grady ponds or interdunal swales).

The BC ADID project also identified highly functioning wetlands and connecting corridors. Protection and enhancement will ensure maintenance of the beneficial wetland functions. Many of the lower functioning ability wetlands identified through the ADID project are also suitable for restoration or enhancement activities. The primary land use surrounding the lower functioning wetlands is agriculture. Landowners are likely to be receptive to wetland restoration activities on areas that are too wet to farm.

- **Priority Project Target Areas**

Field efforts performed by the State Lands Division Team will focus on state lands (including submerged aquatic vegetation) in ***four principal areas***:

1. Forever Wild Tracts within the Mobile-Tensaw Delta
2. Weeks Bay
3. Perdido Bay

4. Other Team prioritized candidate wetland restoration sites (e.g., Wolf Bay, Bon Secour Bay, Fort Morgan Peninsula, Gulf Shores State Park, etc.)

These four principal areas have been selected because they support both ecologically and economically significant wetlands. Examples of the wetland types located in these four areas are: red river hardwood bottomlands supporting sloughs, muck swamp, deepwater swamp, oxbow lakes, river levees and meander scrolls, first and second bottoms, and backswamp; black river hardwood bottomlands supporting sloughs, muck swamp, deepwater swamp, oxbow lakes, river levees and meander scrolls, first and second bottoms, and backswamp; deepwater swamp; muck swamp; piney wet flatwoods (pine savannahs); hardwood wet flatwoods (bay/gum heads); seepage slope bogs; freshwater marsh; salt marsh; submerged aquatic vegetation beds (seagrass); scrub-shrub bogs; citronelle ponds (grady ponds); and maritime forests supporting inter-dune swale wetlands.

National Wetlands Inventory mapping for state lands will be ground-truthed to insure that habitat-type identification was correctly designated. Additional review of pertinent wetland delineation and classification will be incorporated (e.g., review of NRCS hydric soil maps).

Estimation of Wetlands Acreage Needing Restoration

The following estimates of wetlands needing restoration on state lands in the four principal areas of Baldwin County are based on recent field reconnaissance, aerial photography, anecdotal observations, recent natural resource surveys/reports (Weeks Bay NERR), and interviews with local natural resource managers. It is important to emphasize that these data are preliminary estimates, based on the best available information. However, it is fully expected that as these state lands are more thoroughly investigated, via the identification, evaluation, and restoration recommendations phases of this project, actual acres requiring restoration will both increase and decrease within the four principal focus areas.

Best estimates of wetlands needing restoration on state lands in the four principal focus areas of Baldwin County, shown through NWI coverage's in the attached maps, are:

1. Forever Wild Tracts within the Mobile-Tensaw Delta presently identified as needing restoration - about *10,000 acres*. Property recently acquired from Kimberly-Clarke Corporation, which has historically been managed for timber production, has numerous stands/sites which support impaired wetlands. Alterations and impacts include ditched drains, altered hydrology resulting from forest roads, species monoculture, and unnatural species composition resulting from timber harvest and random flood events during the growing season. For example, numerous stands in first and second bottoms were dominated by oak species prior to harvest, and began regenerating in oaks following harvest. Summer floods have resulted in high mortality of naturally regenerating oak saplings, and in-turn favored volunteer species such as cottonwood, ash and willow. Several stands which should be dominated by oak forest communities are presently dominated by the above mentioned three species, resulting in impaired natural communities and loss of species richness.
2. GIS coverages provided to SLD by Kimberly-Clarke Corporation allow for a partial delineation of recently harvested stands (see maps; delineated as "Stand Established," meaning the year re-growth began following harvest: 1985 to1989- 3,040 acres; 1990 to 1994- 3,018 acres; 1995 to 1997- 2,386 acres [1997 partial data-set]). However, harvest data (GIS) for 1997 and 1998 was unavailable from Kimberly-Clarke Corporation. Data derived through the evaluation phase of this grant for stands harvested during 1997 and 1998 are likely to increase the present estimate of acres requiring restoration on these tracts. Such restoration will likely involve tree planting for community restoration from monocultural species composition, as well as reduction of exotic species (e.g., chinese tallow tree; leaves toxic to aquatic invertebrates).
3. Weeks Bay - over *2,000 acres* of state lands (SLD and ADECA), as well as about 600 acres presently being considered for purchase by the Forever Wild Program. The predominant habitat within this area is classified by NWI maps (see attached GIS maps) as broad-leaved deciduous and needle – leaved evergreen forests (1,662 acres). This habitat is largely pine savannah being encroached by hardwood species because of a lack of naturally occurring fires and prescribed fires; an impaired

wetland community. While prescribed burning will likely be a primary restoration activity, the extent of other anthropogenic alterations and impairements will be more fully understood following the evaluation phase of this grant proposal. Additional restoration may involve replanting sea-grass beds in adjacent waters (state of Alabama submerged lands managed by SLD).

4. Perdido Bay - *420 acres* of Mental Health Trust Lands managed by SLD within Lillian Swamp, which are adjacent to 640 acres of an Alabama Department of Transportation Wetland Mitigation Bank (restoration plans presently being evaluated by ALDOT). The surrounding 2,600 acres of property is presently being reviewed by state and federal officials as an entrepreneurial Wetland Mitigation Bank. Thus restoration of impaired wetlands within the 420 acre tract managed by LD will compliment present state and private plans for wetland restoration within Lillian Swamp, an area identified in the1992 Fish and Wildlife Service National Wetlands Priority Conservation Regional Plan as a major interior wetland area, and a priority wetland for Alabama, a declared GEMS Site, and identified as an ecologically significant wetland within the 1988 *Statewide Comprehensive Outdoor Recreation Plan* for Alabama. The extent of other anthropogenic alterations and impairments will be more fully understood following the project's evaluation phase. A primary restoration activity will likely involve development and implementation of a prescribed burning program within needle-leaved evergreen palustrine forests (pine savannah) and adjacent broad-leaved evergreen scrub-shrub (pitcher plant bogs) habitats. Additional restoration may involve replanting sea-grass beds in adjacent waters (State of Alabama submerged lands managed by SLD).
5. Other candidate sites include, but are not limited to, state lands within Wolf Bay, Bon Secour Bay, Fort Morgan Peninsula, and Gulf Shores State Park. Wolf Bay is an area with tremendous wetland acreage, but no state owned wetlands other than submerged aqautic vegetation (SAV) within submerged lands of adjacent waters. Possible restoration activities for these candidate sites could include prescribed burning programs, replanting and posting sea-grass beds, and exotic species control programs.

Restoration

Allocation of restoration funds are tentatively scheduled to target the following four principal areas:

1) Forever Wild Tracts within the Mobile - Tensaw Delta - *50% of restoration funds*
2) Weeks Bay - *20% of restoration funds*
3) Perdido Bay - *20% of restoration funds*
4) Other candidate sites (e.g., Wolf Bay, Bon Secour Bay, Fort Morgan Peninsula, and Gulf Shores State Park) - *10% of restoration funds*

- ***Recommendations:*** Recommendations will be prepared for restoration of wetlands on state lands, based on data gathered during evaluation procedures. Recommendations will incorporate all data available for analyses, including any public domain GIS coverages. Recommendations will consider incorporation of restoration funds available through this grant, as well as other state and federal resource agency options.
- ***Implementation***: Restoration activities will be implemented on state lands as deemed appropriate via the Restoration Recommendations Process/Stage. Physical restoration of wetlands will use Wetland Grant federal funds augmented by SLD match (personnel). Restoration activities will make full use of resources available from grant Team Partners (e.g., trees of select species for replanting altered palustrine forest sites may be available from the Alabama Forestry Commission; heavy equipment necessary for correcting altered hydrology may be available through the Baldwin County Public Works Department).
- ***Monitoring***: Physical restoration of wetlands will be monitored and success/failure assessed through empirical pre- and post-restoration data. All restoration activities are expected to exhibit measurable success and failure criteria such as:

1) road beds holding water in up-stream areas of natural drains can be re-contoured with swales that allow water within drains to flow through road beds, resulting in restoration of natural hydro-periods for areas upstream and downstream of the road
2) man-made ditches draining wetlands can be plugged, and hydrology restored, with pre- and post-restoration conditions measured to evaluate success/failure
3) success/failure of habitat maintenance via implementation of prescribed burning in pine savannahs and pitcher plant bogs can be measured through pre- and post-analyses of species richness for wetland plants representative of those habitats
4) success/failure of planting of trees and other wetland specific plants intended to restore species richness and natural community composition (both terrestrial and aquatic) can be measured through data-derived species richness indices and monitoring of post-planting mortality, whereby planting criteria standards for wetland mitigation banking within Alabama would be applied
5) success/failure of control of exotic plants measured via monitoring of mortality of target non-native species following applied control treatments (e.g., herbicides approved for wetland sites, tree girdeling).

Evaluation

- Evaluation for ***replanting*** native hardwoods in bottomland forest sites will follow U.S. Department of Agriculture/Forest Service General Technical Report SO-26 A Practical Field Method of Site Evaluation for Commercially Important Southern Hardwoods by Baker and Bradfoot. Native oaks which are covered under this technique include swamp chestnut oak, cherrybark oak, nuttal oak, willow oak, shumard oak, and water oak. Oak seedlings from the Alabama Forestry Commission cost between $185-250/1,000 seedlings. Site evaluation may determine that more *advanced saplings are required for* some locations due to competition. Of the 10,000 acres within the Forever Wild Mobile-Tensaw Delta Tracts which have been identified as impacted, perhaps 6,000 acres necessitates planting to restore community/species balance. Standard planting of hardwoods is at a rate of 300 seedlings/acre, however, underplanting and micro-site planting will likely require only 150 seedlings/acre. Thus, a rough estimate of cost for seedlings (without cost of planting) to cover 6,000 acres is $166,500 to $225,000. Based on an estimate of acres that will require replanting, it is clear that this value exceeds resources available through this grant for this principal site. During the course of the project, efforts will be made to secure donations of seedlings (of some species) from the corporate timber industry. Efforts will also be made to pursue other mechanisms by which funds can be secured to purchase seedlings.
- Evaluation of ***wetland condition***, relative to the need for restoration, will be performed on state wetlands within the above four principal areas ("d" above). Evaluation methodology will focus on impact's which impair functional values of wetland habitats (e.g., flood retention, water filtration, fish and wildlife habitat). Specifically, evaluations will be conducted for exotic species (e.g., cogon grass, chinese tallow tree, Japanese climbing fern), hydrologic alteration (e.g., roads constricting natural drains), unnatural species composition related to anthropogenic effects (e.g., stand monoculture resulting from timber management and random fluctuations in hydro-period [flood induced tree mortality of oaks in 1st and 2nd bottoms]), altered ecological processes (e.g., restriction of fire in pine savannah wetlands), other habitats impairments (e.g., propellar scars in seagrass beds).
- Evaluation procedures will follow a selected ***standard methods protocol*** (e.g., Wetlands Rapid Assessment Process [WRAP]), following review of all applicable procedures. Empirical data will be gathered, and documentation procedures will incorporate digital and chemical photographs, DGPS, as well as data analysis that incorporates additional information coverages within the State Lands Division and other resource agency GIS.

Project Objectives and Deliverables

Note: Overall project milestones will generally follow those presented in "**9: Project Schedule**" below. However, tasks milestones for each of the four principal wetland areas may be implemented at various times and phases during the expected three year duration of the project.

Task 1. Identify wetland areas in need of restoration or enhancement.

Methods: Compile list of wetlands considered appropriate for restoration or enhancement activities based on input from Team members and other local, state, and federal stakeholders.
Milestones:

a. Identify low functioning wetlands as ranked by the BCADID.
b. Identify restoration recommendations suggested by the BC Wetland Conservation Plan.
c. Request local technical expertise in developing restoration lists (create Technical Advisory Committee).
d. Identify hydric soils listed as altered in the Baldwin County soil survey.
e. Identify wetlands listed as ditched or drained (d/h) on FWS National Wetland Inventory (NWI) maps.
f. Prioritize wetlands for restoration activities based on the above information. Ground truthing of maps and acquired information will be conducted before prioritized restoration activities proceed.

Task 2. Obtain landowner permission for restoration projects.

Methods: Secure MOAs or other agreements with landowners willing to participate in wetland restoration projects. Explain the importance of wetland function and restoration in regards to stormwater retention, flood control, nutrient/sediment sinks, etc. Cost share programs such as the Natural Resources Conservation Service Wetland Reserve Program will be promoted to offset landowner cost and provide a vehicle for long term preservation. Conservation easements and deed restrictions will be explored for long term management possibilities.
Milestones:

a. Use Baldwin County plat maps, tax assessor records, and local contacts to identify landowners whose property is suitable for restoration/enhancement projects. Field work will accompany to ensure accurate assessment of prioritization areas.
b. Approach landowner to request cooperation. Create restoration plans with input from landowners and technical input from Team members.

Task 3. Restore, enhance, or facilitate other activities that protect wetlands and improve functions.

Methods: Develop a restoration plan for each principal wetland area based on the technical advice of Team members. Return wetlands to historical functioning conditions. Use GPS and GIS technologies to facilitate restoration construction work such as plugging ditches, removing fill and/or sediment, implementing best management practices on surrounding lands, and removing invasive, exotic species.
Milestones:

a. Complete restoration or enhancement work to restore hydrology of impaired wetland areas.
b. Complete restoration or enhancement work to remove invasive, exotic species and plant native vegetation to improve habitat quality and environmental integrity.
c. Complete restoration or enhancement work to promote improved wetland functions, including implementation of best management practices on lands contributing stormwater to wetland areas.
d. Complete restoration or enhancement work to remove fill and/or sediment from impaired wetlands.

Task 4. Increase public awareness of wetlands and their importance.

Method: Develop educational program on wetlands in coastal Baldwin County and implement recognition program for landowners who participate in wetland restoration activities.
Milestones:

a. Partner with stakeholders to produce a wetland education program (e.g., Georgia Adopt-a-Wetland).
b. Facilitate a minimum of 10 presentations to target local governments, civic groups, and schools
c. Create or utilize current wetland educational brochures and handouts. Make these available at presentations and in public locations such as the Weeks Bay National Estuarine Research Reserve.
d. Promote National Wetlands Month activities in the project area.
e. Co-sponsor wetland technical workshops with Baldwin County, Weeks Bay Watershed Project, and the Army Corps of Engineers.

f. Investigate and facilitate posting of workshop outreach and training materials on an interactive web site, similar to the EPA "Watershed Academy" format, for statewide applications.
g. Implement a participating landowners recognition program using newsletters/press releases and/or placing of acknowledgment signage on properties.

Task 5. Monitor wetland restoration activities and successes.
Method: Evaluate wetland function restoration success based on subsequent site visits and observation of hydrology, established native vegetation, and proper installation/functioning of management measures.
Milestones:

a. Conduct site visits to restoration areas before, during, and after restoration activities to empirically assess, monitor water quality,and/or photo-document improvements or failures.
b. Based on restoration plan and desired wetland function enhancement/restoration, determine if function is likely to be improved through observation and onsite monitoring. Determine whether functioning has improved and goals have been achieved.
c. Develop contingency actions for wetlands where functions have not been adequately restored or other goals have not been achieved. Take additional actions to correct situations in which exotics re-invade the site, native plants do not survive, ditch plug failures, etc.

Table 9-1 Project Schedule (Fall 2001 - Fall 2003)

Activity	F 00	W 01	Sp 01	Sm 01	F 01	W 02	Sp 02	Sm 02	F 02	W 03	Sp 03	Sm 03	F 03
Reporting/Status Updates to EPA			X		X		X		X		X		X
Technical Advisory Committee Created	X												
Identify wetland areas in need of restoration or enhancement		X	X	X						X	X		
Create wetland restoration/enhancement plan for selected areas			X	X	X	X				X	X		
Seek ADEM & EPA project administrator approval for wetland restoration plans			X	X	X	X				X	X		
Obtain landowner permission for enhancement/restoration projects				X	X	X	X						
Restore, enhance, or implement activities which protect and/or improve wetland functions							X	X	X	X	X		
Monitoring of restoration success							X	X	X	X	X	X	X
Promote wetland restoration grant, participate in educational activities.		X		X		X		X		X		X	
Partner on wetland technical workshop.				X								X	
Press releases and landowner recognition program.				X	X	X	X	X	X	X	X	X	X

Long-term Onsite Management Support and Commitments

Local cooperators that will provide long-term management include the Weeks Bay National Estuarine Research Reserve (on properties within their boundaries), Wolf Bay Watershed Watch, Weeks Bay Watershed Project, Baldwin County Soil and Water Conservation District, Baldwin County Commission, and participating landowners. Each of these entities has exhibited a strong interest in wetland protection and are working to achieve

long-term, holistic restoration and protection of coastal natural resources. Landowner management commitments will be secured based on wetland restoration type and geographical location. Additionally, the use of deed restrictions and conservation easements will be explored and implemented where possible. Landowner participation in established programs that promote long term management, such as the NRCS Wetlands Reserve Program, will also be encouraged.

Integration with Other Programs in the Area and State

a. Resources provided by this grant provide a logical next step for wetland restoration activities identified by previous EPA-Region 4 wetland grants. For example, the BC ADID identified poorly functioning wetlands in the project area appropriate for restoration and/or enhancement efforts. In addition, the Baldwin County Wetland Conservation Plan will identify priority areas not included in the BC ADID project area for restoration activities through resource inventories and functional assessments.
b. Local environmental groups have been working to increase awareness of wetland functions and values. The Weeks Bay Watershed Project and the Wolf Bay Watershed Watch have a history of local stakeholder commitments have already implemented numerous water quality degradation solutions which are intricately tied to wetland functions. In addition, the Weeks Bay Watershed Project Management Plan lists habitat restoration and protection - in particular wetlands - as one of four categories for watershed water quality maintenance. Their support and willingness to partner on this grant project is definitive.
c. Alabama's Land Trust Program "Forever Wild" exemplifies the state's commitment to the preservation of unique coastal wetlands. A $15 million land acquisition represents a significant contribution toward maintenance of ecosystem functions within the Delta and also provides tremendous benefits to the commercial and recreational fisheries in the Mobile Bay Estuary downstream. Further, the acquisition initiative supports national wetland loss prevention and restoration efforts. Overall, this endeavor supports the protection, restoration, and monitoring of over 100,000 acres of state and federal wetlands within the Delta. Pending wetland acquisitions by Forever Wild in Baldwin County are not limited to the Delta area. Several active projects are on-going and include the Maritime Forest near Orange Beach, as well as tracts near Bon Secour National Wildlife Refuge, Gulf Shores State Park and the Weeks Bay National Estuarine Research Reserve.
d. State agency support is also high as demonstrated by Alabama Department of Environmental Management (ADEM) and the Alabama Department of Economic and Community Affairs (ADECA) Coastal Programs. These two programs offer invaluable technical advice and guidance based on years of work in the wetland arena.
e. The USDA-Natural Resources Conservation Service (NRCS) and the U.S. Fish and Wildlife Service (FWS) will serve as technical advisors to the project. These federal agencies have been partners in past endeavors regarding wetland issues and serve as important local landowner contacts. As wetland delineators, the U.S. Army Corps of Engineers will also partner.

Measureable Environmental Results

Environmental indicators and project success will be measured by:

a. The number of wetland acres protected, restored, and/or enhanced.
b. Visual inspection of the entire area for any problems such as re-invasion by exotic plants species.
c. Monitoring of wetland hydrology to assure that:

- a minimum of one primary hydrology indicator (inundation, saturation in the upper 12", water marks, drift lines, or sediment deposits) or,
- a minimum of two secondary hydrology indicators (oxidized root channels in the upper 12", water stained leaves, passing of the FAC-Neutral test) can be identified at all times with the exception of extended periods of little or no precipitation

d. Qualitative assessments of successful native plant communities established.

Wetland Grant Project Coordinator

This grant provides resources to support a Project Coordinator staff position. The Project Coordinator will be assigned to the ADEM Mobile Field Operations Office, and will coordinate grant activities between the project co-lead grant implementation agencies (ADEM, ADCNR); workplan cooperators and additional stakeholders as identified; and other coastal, natural resource, and wetland associated efforts.

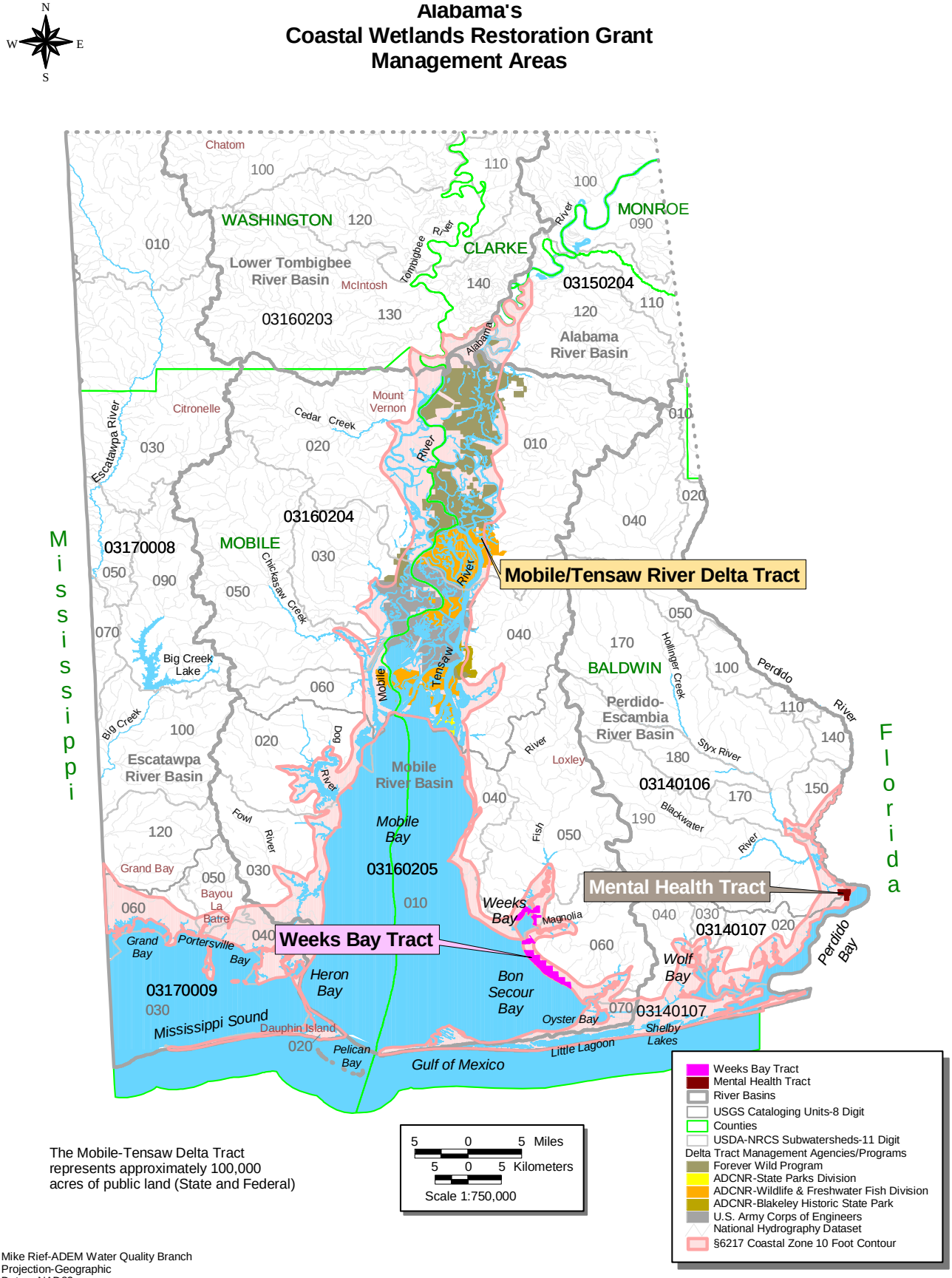
1. Specific project coordinator tasks are as follows:
   a. Provide technical assistance and local point-of-contact to stakeholders involved in this project
   b. Provide educational outreach and training coordination and assistance
   c. Prepare and submit semiannual and annual progress reports of project status and accomplishments
   d. Provide training for certification of citizen volunteer water quality monitors
   e. Facilitate grant implementation assistance to ADEM and ADCNR and other stakeholders:
      - plan , coordinate, form, and/or participate in wetland related stakeholder committees and meetings
      - track project activities and progress toward achievement of workplan goals and objectives
      - respond to public inquiries about the project and to wetland related matters in general
      - provide assistance in planning, installing, operating, and maintaining wetland restoration strategies
      - provide input into a long-term conservation plan for Baldwin County wetland acreage
   f. Provide and/or promote wetland educational outreach activities through multi-media presentations, task forces, work groups, committees, tours, etc.
   g. Establish, organize, and manage an Adopt-A-Wetland program similar to the Georgia Adopt-A-Wetland
   h. Submit annual project update newsletter articles to various newsletters, newspapers, and/or to other public outreach media

2. Outputs and Deliverables:
   a. *Semiannual* report of plans, accomplishments, and additional program needs including photographic documentation of individual project tasks for the duration of the project
   b. An *annual* report of plans, accomplishments, and additional program needs including photographic documentation of individual tasks for the duration of the project
   c. A *comprehensive final report* of accomplishments and additional program needs including photographic documentation of individual tasks within 60 days of grant end date
   e. Wetland educational outreach activities and Alabama Water Watch certified water quality monitoring citizen volunteers sampling wetland project areas
   g. Facilitated education outreach and training using conferences, workshops, electronic/slide presentations, tours, etc, to promote the project.

For further information pertaining to Alabama's Coastal Wetlands contact Mr. Jim Moore at in ADEM's Office of Education and Outreach at (334) 394-4359 or jmm@adem.state.al.us, Mr. Greg Lein at the Alabama Department of Conservation and Natural Resource's Natural Heritage Section at (334) 242-7998 or glein@dcnr.state.al.us, or Mr. Randy Shaneyfelt in ADEM's Mobile Field Office at (334) 432-6533 or rcs@adem.state.al.us.

.

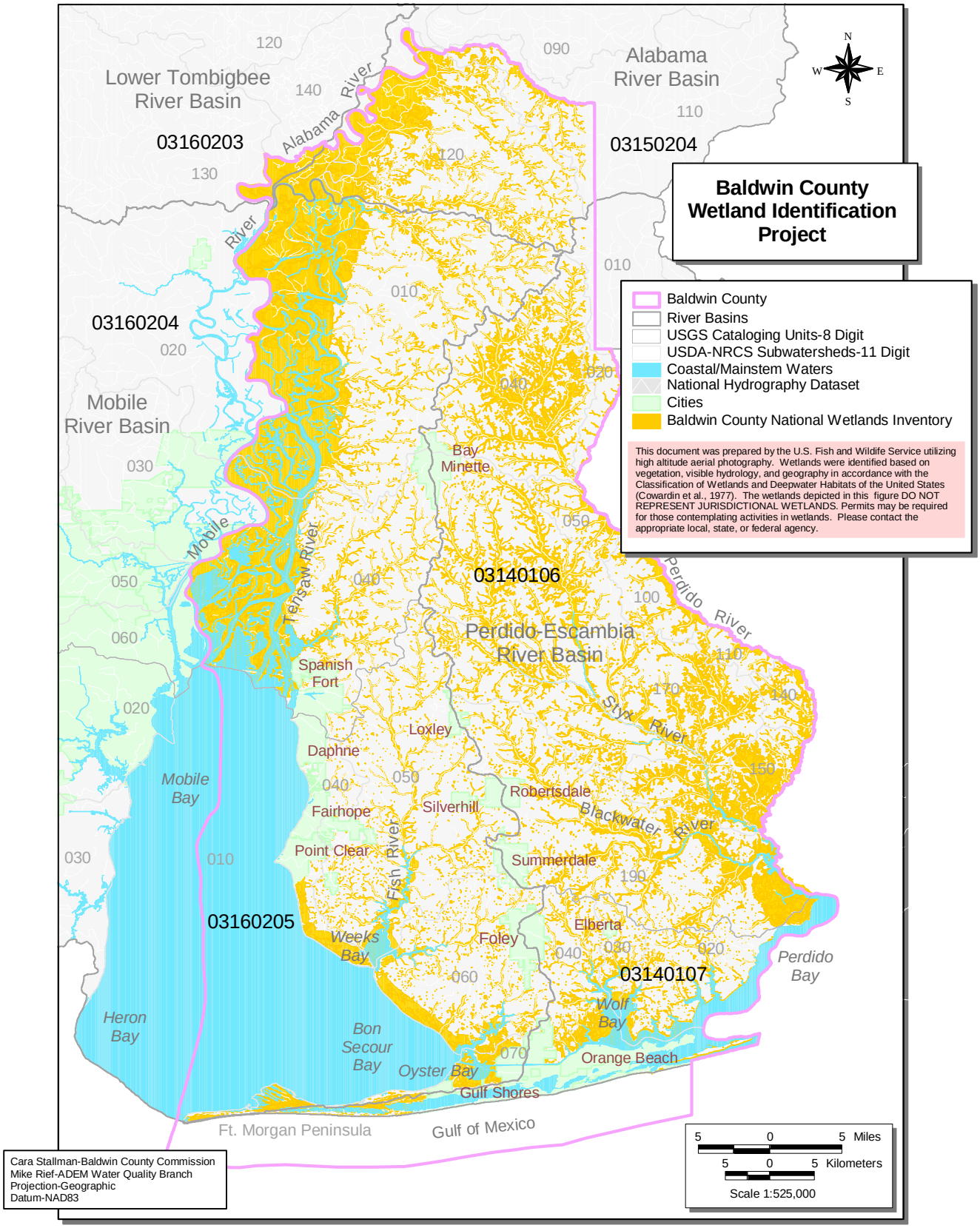
Figure 9-1
Alabama's Coastal Wetlands Restoration Grant Management Areas



The Mobile-Tensaw Delta Tract represents approximately 100,000 acres of public land (State and Federal)

Mike Rief-ADEM Water Quality Branch
Projection-Geographic
Datum-NAD83

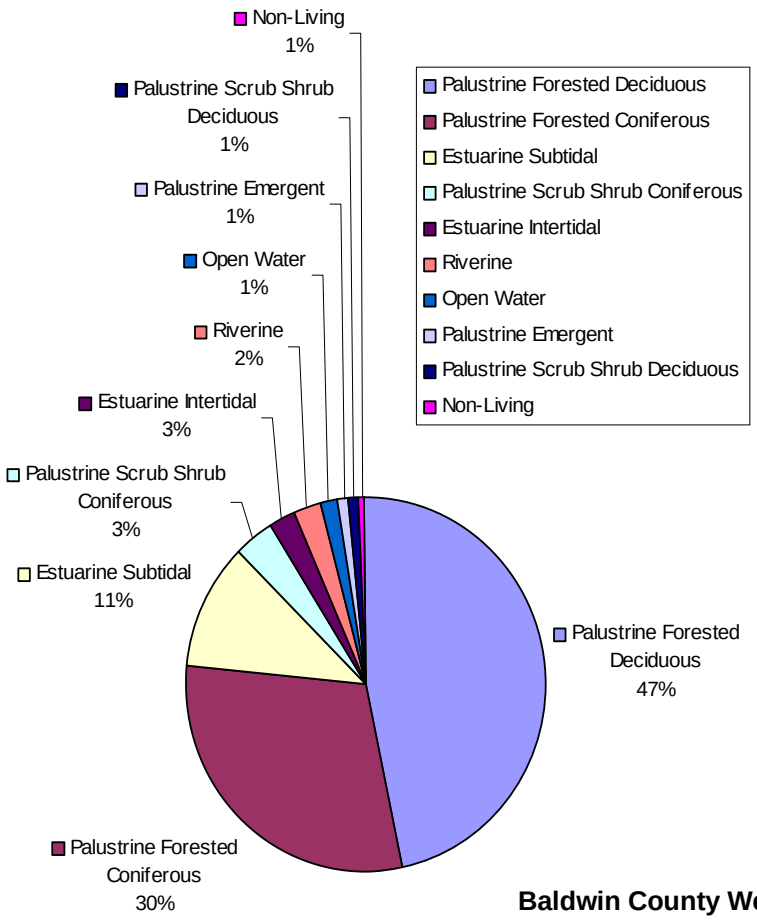
Figure 9-2


Baldwin County Wetland Identification Project
Baldwin County
River Basins
USGS Cataloging Units-8 Digit
USDA-NRCS Subwatersheds-11 Digit
Coastal/Mainstem Waters
National Hydrography Dataset
Cities
Baldwin County National Wetlands Inventory
This document was prepared by the U.S. Fish and Wildlife Service utilizing high altitude aerial photography. Wetlands were identified based on vegetation, visible hydrology, and geography in accordance with the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1977). The wetlands depicted in this figure DO NOT REPRESENT JURISDICTIONAL WETLANDS. Permits may be required for those contemplating activities in wetlands. Please contact the appropriate local, state, or federal agency.
Lower Tombigbee River Basin
03160203
Alabama River Basin
03150204
03160204
Mobile River Basin
03140106
Perdido-Escambia River Basin
03160205
03140107
Alabama River
Mobile River
Tensaw River
Perdido River
Styx River
Blackwater River
Fish River
Bay Minette
Spanish Fort
Loxley
Daphne
Fairhope
Silverhill
Point Clear
Robertsdale
Summerdale
Elberta
Foley
Weeks Bay
Mobile Bay
Heron Bay
Bon Secour Bay
Oyster Bay
Gulf Shores
Orange Beach
Wolf Bay
Perdido Bay
Ft. Morgan Peninsula
Gulf of Mexico
N
S
E
W
5 0 5 Miles
5 0 5 Kilometers
Scale 1:525,000
Cara Stallman-Baldwin County Commission
Mike Rief-ADEM Water Quality Branch
Projection-Geographic
Datum-NAD83

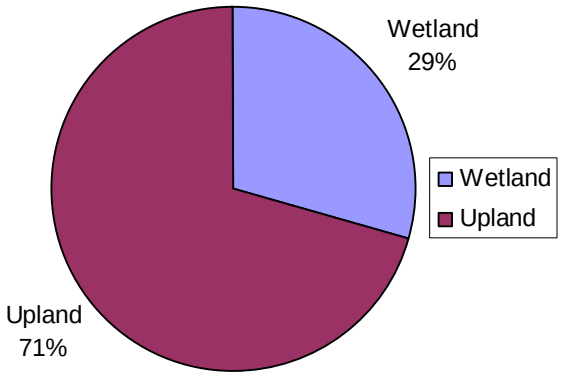
9.2 Baldwin County Wetlands Statistics

The Baldwin County Commission is in the final stages of National Wetland Inventory data verification. These are some preliminary statistics contributed by Ms. Cara Stallman.

Figure 9-3
Baldwin County Wetland Types
Pecent of Total County Wetlands



Baldwin County
Percent of Wetlands and Upland Areas



Baldwin County
Upland and Wetland Areas

	Miles^2	Acres	Percent of Baldwin County
Wetland	1,127.53	301,336.30	29.5%
Upland	470.84	721,621.35	70.5%
Total	1,598.37	1,022,957.65	

Baldwin County Wetland Types

Wetland Type	Miles^2	Acres	Percent Total Wetlands
Palustrine Forested Deciduous	220.29	140,987.10	46.79%
Palustrine Forested Coniferous	139.81	89,481.33	29.69%
Estuarine Subtidal	52.07	33,322.27	11.06%
Palustrine Scrub Shrub Coniferous	16.44	10,524.24	3.49%
Estuarine Intertidal	12.17	7,790.13	2.59%
Riverine	11.12	7,116.49	2.36%
Open Water	6.54	4,185.54	1.39%
Palustrine Emergent	6.16	3,943.74	1.31%
Palustrine Scrub Shrub Deciduous	3.40	2,178.71	0.72%
Non-Living	2.82	1,806.74	0.60%
Upland Land Area	1,127.53	721,621.35	
Total	1,598.37	1,022,957.65	

9.3 Alabama Wetlands Program

The following Executive Summary, Introduction, Methods, Results and Discussion, and References are from the *Alabama Wetlands Progam* document (Natural Heritage Section-State Lands Division-Alabama Department of Conservation and Natural Resources, 2001)

EXECUTIVE SUMMARY

The State of Alabama has a wealth of wetland resources that provide ecological and economic benefits to the public. With continued growth and development some of these wetland areas will be adversely impacted. Wetlands that are currently degraded can be restored to a more healthy and functional state to offset unavoidable impacts from development.

The purpose of the Alabama Wetlands Program pilot project was to locate potential wetland restoration sites using existing remote sensing data: overflight photos, National Wetland Inventory maps, and soil type maps. The projects focus was limited to areas that are experiencing rapid growth and consequently impacting wetlands. Degraded wetland sites were located in each of the study areas using remote sensing data. Tract sizes are highly variable and represent the viability of the potential restoration. A scoring system was developed to rank the sites within each watershed.

INTRODUCTION

Since the State of Alabama was settled by Europeans there has been an estimated loss of more than 50% of the overall wetland acres (Dahl 1990). With the instigation of the federal 'no-net- loss of wetlands' philosophy, unavoidable wetlands impacts associated with the process of development must be compensated or mitigated for. This means that when wetlands are damaged or destroyed the damage will be compensated for by creating, enhancing, or restoring wetlands. Ideally the restoration work will occur as close as possible to the impact site and preferably within the same watershed, often termed "within basin". The restoration work must also be conducted on similar wetland types, often termed "in-kind". For ecological reasons it is sometimes better, and easier, to group the restoration efforts for many small impacts into a single larger site, a 'wetland bank'.

The Alabama Department of Conservation and Natural Resources (ADCNR) three objectives in the Alabama Wetland Program pilot project, as per contract AGY8025 with ADEM, were to identify potential wetland restoration sites, develop a scoring system, and rank the sites within each study area. Using the U.S. Army Corp of Engineers (COE) wetland impact permit database, watersheds and counties were selected based on the greatest number of impacts. The two coastal counties, Baldwin and Mobile, have the greatest number of permits issued in the state. The Birmingham, Montgomery, and Tuscaloosa metropolitan areas are active permit areas and hence the Central Alabama River and Sipsey River were included in the project. The Black Warrior River was later added to better address wetland restoration within the basin affected by development in Birmingham and Tuscaloosa.

Potential restoration sites were identified using existing available digital and non-digital remote sensing data sources; aerial photography, National Wetland Inventory (NWI) maps, and U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil survey maps. When possible, potential restoration sites were ground-truthed from highway crossings to verify the impacts seen on the remote sensing images. Using Geographic Information System (GIS) software (ArcView®) individual site maps were created. With the GIS the different data sources are all georeferenced and overlaid onto 1:24,000 digital topographic maps. Each data source is a data layer that can be turned on and manipulated as needed. This allows the calculation of wetland or soil type acreage for each site and an acreage update if the site footprint changes.

A scoring system was developed to rank the sites within each area against other sites in that watershed or county. As per the project proposal the following components were included: size, wetland type, location within the watershed, location relative to other preservation or management areas, surrounding land use, surrounding land cover, presence of hydric soils, presence of source of hydrology, and results of GAP analysis. The first eight items were included in the scoring system. It was determined that meaningful GAP analysis can not be conducted for Alabama at this time. One additional category, plat coverage was added. Some components and concepts from the tract scoring procedures for the Alabama Forever Wild Program were incorporated in this scoring system. The final scoring system was reviewed by the Alabama-Mississippi Mitigation Bank Review Team (MBRT) and ADCNR biologist. Comments and concerns were addressed and incorporated into the scoring system. The finished scoring system (Appendix F) was then used to rank the restoration sites within each of the study areas.

METHODS

GIS Development

The project was initiated by delineating the study areas on 1:250,000 digital topographic maps in ArcView®, a GIS software (Figure 1). The Alabama River, Black Warrior River, and Sipsey River watersheds were available from the EPA via the BASINS 1.0 data system for Region 4. The Sipsey River watershed was usable without modification. The Alabama River study area began at Claiborne Dam and ran to the confluence of the Coosa and Tallapoosa Rivers. This required delineating the watershed for Claiborne Reservoir. The Cahaba River, draining into the Alabama River below Selma, was excluded from the study area; its watershed was delineated and removed from the watershed map. The Black Warrior River study area began at the confluence with the Tombigbee River and ran upstream to Tuscaloosa.

The National Wetland Inventory (NWI) quad maps were the second data layer acquired. The digital NWI maps for the Alabama River are available on the USFWS internet website (22 of the 35 quad maps were digitized). Some of the NWI maps for Baldwin and Mobile counties were also available through the website (20 quads). Additional NWI maps for the coastal counties were obtained from the Geological Survey of Alabama (GSA)(40 quads) and the USGS National Wetland Research Center (NWRC)(13 quads). There was no digital NWI coverage for either the Sipsey River or Black Warrior River. The digital NWI coverages were converted to a format compatible with the ADCNR topographic maps using ArcInfo®.

The NWI maps identify wetlands with a hierarchical coded classification system developed by Cowardin et al (1979). While this allows for precise identification it also leads to a great variety of coded types, Mobile and Baldwin Counties each have over 500 coded wetland types. In order to make this a less visually cluttered data layer, the wetland types were consolidated into 60 color and pattern coded types. This allowed quick visual assessment of the wetland types within a study area. The calculation of NWI wetland acreage on the individual sites was conducted using the original, and more specific, identification codes.

USDA NRCS soil survey data was used to develop the third data layer. Wilcox County was the only digital soils coverage available for the study area. Additional data layers were created in ArcView® using the published paper maps and a digitizing pad. The manual digitizing process was very time intensive and was only completed for the Alabama River and Sipsey River sites. The process, as conducted by ADCNR, is not highly accurate but it does represent a reasonable approximation of what would be found at a restoration site.

The last data layer identifies plat boundaries. This data layer was created in ArcView® using county plat books. This layer was used to identify the location of nearby state or federal properties that are managed for public use. This layer was also used to identify the number of

entities, individuals or corporations, encumbering a potential restoration site. As with the soil digitization layers, this layer is not highly accurate but it is a reasonable representation of existing plats.

While the soils and plat layers were being developed, USDA Farm Service Agency (FSA) county offices were being visited to examine aerial photography. Potential wetland restoration sites were identified by looking at paper copies of the countywide aerial photography while referencing the respective county soils book to identify areas with hydric soils. This was followed up by looking at recent aerial photography on color slides to locate additional sites and to better identify surrounding land use and land cover types.

Scoring System Development

A scoring system composed of nine unique criteria was developed to rank the tracts within each watershed or county. Some components for this scoring system were pulled from the ADCNR Natural Heritage Section - Forever Wild Ranking Protocols. Many principles and ideas were gleaned from island conservation biology concepts. Of the nine criteria initially proposed for the scoring system only one, GAP analysis, was dropped. In April 2001 the coordinator for Alabama GAP analysis estimated that Alabama was two or three years away from being able to conduct meaningful GAP analysis. Many of the concepts used in GAP analysis are represented in the other criteria. One category, plat coverage, was added to score how the site was encumbered. The logic behind the development of the categorical scoring is presented in the following sections.

In an effort to keep any one component from potentially overpowering the others, a multiplier was introduced to even out the final scores of each component. The intent was to make the potential maximum score “fall out” in the 12-16 point range for each category. As an example the ‘Size’ category has a maximum score of 7 points, by incorporating a multiplier of 2 it has the potential to score 14 points. See the score sheet example in Appendix F for multipliers associated with each category.

1) Size.

Within the concepts of island biogeography, larger tracts are thought to be more stable and could buffer themselves from minor disturbances. Conversely, smaller tracts would tend to be more susceptible to outside disturbances and a single natural or unnatural event could result in significant ecological damage. Species diversity increases as the tract size increases but this is generally a logarithmic type progression and overall diversity would not double when the tract size doubles.

The point scale for size is a two pronged approach with points being awarded strictly for the tract size and points for the ecological stability of the site (Table 9.3-1). Simple tract size follows a logarithmic type progression for acreage. The ecological aspects are pulled from the Forever Wild Program scoring protocol and reflect the ability of the site to maintain its biological integrity over time. In the Forever Wild Protocol if the site does not score a 2 or better then it is dropped. For this project, sites that did not score a 2 or better were either dropped or their footprint was altered to increase biological integrity.

Table 9.3-1 Size specific scoring criteria for the Alabama Wetland Project

1: Size.			
	less than 10 acres	0	
	10<50 acres	1	
	50<200 acres	2	
	200<1000 acres	3	
	>1000 acres	4	
	The site has sufficient acreage to support expansion of the natural features for which the site is to be purchased.	3	
	The site has enough acreage to support the natural features for which the site is to be purchased.	2	
	The site does not have sufficient acreage to support the existing natural features, but adjacent acreage may be available.	1	
	The site does not have sufficient acreage to support the existing natural features and no adjacent acreage is available for expansion.	0	
	Total #1		0

2) Wetland Type relative to occurrence and status of the type in the watershed.

Rarity of the Type.

Wetlands that are unusual relative to their watershed can provide refuges for plants and animals that require a specific habitat to survive. Tupelo gum swamps are not unusual in the Mobile Tensaw Delta but in the Paint Rock River Watershed they would be an oddity. In this case the more northern wetlands could provide a range extension for some species or be supporting flora and fauna not found in the southern wetlands.

Wetlands that are common in a particular watershed and that are not in danger of being converted to other uses would not be considered as high priority sites. However, if those same wetlands were common but as a whole they exist in a degraded capacity then the restoration of a tract to its functional capacity would warrant a higher ranking.

Points are accrued in the first part of this category based on the NWI wetland types on or expected to be on the site. The more wetland types that are present the more points that would accrue (Table 9.3-2).

NWI status and trends information is not available on a watershed basis. In their most detailed form the NWI status and trends reports make estimates on a statewide basis. In ArcView® a summary of the acreage by wetland types was done for each project area when NWI coverage was available. This summary was used to determine if wetland types were very common, common, somewhat common, or uncommon within the project areas. The Alabama River summary was used for the Sipsey River and Black Warrior River study areas.

Overall rarity of the wetland type should also be considered. Here again unusual wetland types can support uncommon flora and fauna. The USFWS in their Regional Wetlands Concept Plan (1992) has a list of important and priority wetlands in Alabama. This priority list was used to answer the final question in this section.

Table 9.3-2. Wetland type and rarity criteria for the Alabama Wetlands Project.

2: Wetland Type relative to occurrence and status of the type in the watershed. Rarity of the Type.				
		Estuarine Wetlands	0 1	
	Wetland Class:	FO - Forested	0 1	
		SS - Shrub/Scrub	0 1	
		EM - Emergent	0 1	
	Wetland Subclass:	1 - Broad-leaved deciduous	0 1	
		2 - Needle-leaved deciduous	0 1	
		3 - Broad-leaved evergreen	0 1	
		4 - Needle-leaved evergreen	0 1	
		1 - Persistent	0 1	
		2 - Nonpersistent	0 1	
	Water Regime:	A - Temporarily flooded	0 1	
		B - Saturated	0 1	
		C - Seasonally flooded	0 1	
		F - Semipermantly flooded	0 1	
		GH - Intermittently exposed/ Permanently flooded	0 1	
		PR - Tidal: Irregulary Flooded/Seasonal Tidal	0 1	
	The tract contains wetland types that are uncommon, somewhat common, common, very common in the watershed.		3 2 1 0	
	The tract contains wetlands that are very degraded, degraded, somewhat degraded, or not degraded.		3 2 1 0	
	The tract contains wetlands that are Nationally rare, somewhat rare, common, very common.		3 2 1 0	
	The tract contains wetlands that are recognized on a National Priority list.		3 0	
Total #2				0

3: Location within the watershed.

This category was developed with the location being in reference to developed areas. Wetlands above developed areas would provide an area for floodwater storage and help prevent flooding downstream. Wetlands below developed areas would help slow the water velocity and reduce flashiness of rain events downstream as well as filtering urban runoff. This criteria was modified from one of the Forever Wild Program scoring protocols (Table 9.3-3).

Location relative to institutions of higher learning would also affect the usefulness as an educational center or research area. This criteria was pulled from one of the Forever Wild Program scoring protocols.

Additionally, is the tract located adjacent to a waterway listed on the state 303d list? If so then the tract would serve as a buffer to prevent overland flow of nutrients into the waterway. During high water events the wetland could also serve as a nutrient or sediment sink for the waterway.

Table 9.3-3. Location criteria relative to population centers for the Alabama Wetland Project.

3: Location within the watershed.			
1. Relative to population centers.			
	Tract is located within 20 miles upstream of a population center of 250,000.	3	
	Tract is located within 20 miles downstream of a population center of 250,000, OR is located within 20 miles upstream of a population center of 100,000.	2	
	Tract is located within 20 miles downstream of a population center of 100,000, OR is located within 20 miles upstream of a population center of 50,000.	1	
	Tract is not located within 20 miles of a population center of 50,000.	0	
2. Suitability for educational/scientific use.			
	The site is within 50 miles of an academic institution which has biological research capability and an interest in using the site for research.	0 1	
	The site is within 50 miles of schools or institutes of higher learning which have the desire and ability to use the site for educational purposes.	0 1	
	Educational programs on the site are compatible with resource protection.	0 1	
3. Will the tract serve as a buffer zone or nutrient sink for a waterway listed on the state 303d list?		0 3	
Total #3			0

4: Location relative to other preservation or management areas.

Proximity to other federal, state, or local management areas would rank higher than being an isolated site (Table 9.3-4). Adjacent public land would increase the effective ecological size of a site. This ties back in with the size component and island biogeography concepts where larger sites are more stable. Isolated sites would score the lowest in this category. The one mile distance is an accepted limit for wildlife interaction between sites. When sites are more than 1 mile apart the wildlife interactions between sites is minimal. The plat coverage was used in this category to identify property managed for public usage.

Table 9.3-4. Location criteria relative to other public use areas for the Alabama Wetlands Program.

4: Location relative to other preservation or management areas.			
	Tract is an In-holding to an existing management area.	3	
	Tract is adjacent to an existing management area.	2	
	Tract is located within 1 mile of an existing management area.	1	
	Tract is isolated.	0	
Total #4			0

5: Surrounding Land Use.

The surrounding land usage could limit the success of a restoration project. While most restoration projects would have a buffer zone around the sensitive areas, severe outside influences could overwhelm the buffer area. Different land uses would have different influences on adjacent property. The land usage was determined from overflight photos and slides. In broad categories the land use ranking from highest to lowest is: River, Forestry, Agriculture, Residential, and Commercial (Table 9.3-5). Where natural grasslands exist they were grouped with forestry, as forestry impacts would be more similar than impacts from of agriculture. Tidally influenced marsh areas were included in the river category as both are aquatic influences on adjacent areas.

The percent columns represent the percentage of the site perimeter that is occupied by the land use type. Areas uphill from the site have a multiplier attached since uphill usage would affect the site more than a similar adjacent downhill area. The uphill/downhill multiplier is a good idea but can be difficult to determine.

Table 9.3-5. Surrounding land use criteria for the Alabama Wetlands Program.

5: Surrounding Land Use.								
Land Use	Points	% Uphill	Multi-plier	Total Uphill	Points	% Downhill	Total Downhill	Total Uphill + Downhill
River	4	---	---		4	0	0	0
Forestry	3	0	1.5	0	3	0	0	0
Agriculture	2	0	1.5	0	2	0	0	0
Residential	1	0	1.5	0	1	0	0	0
Commercial	0	0	1.5	0	0	0	0	0
Total of all Land Use Categories (#5)								0

6: Surrounding Land Cover.

As with the land use component surrounding land cover could limit the success of a restoration project. This is a more specific classification than the land use category. In the scale, types with similar levels of impact have been grouped. Here again a percentage multiplier and an uphill/downhill multiplier have been included (Table 9.3-6). With this category it is recognized that some land cover types can have negative impacts on adjacent properties. The final scores for this category can be negative. Land cover was determined from overflight photos and slides. On site verification was conducted when the sites were visually assessable from the highway.

Categories ranked from lowest to highest would be:

Riverine, Forested, Grassland, Cropland, Residential, Commercial.

Each category is further subdivided:

Forested:	Natural and Monoculture
	Mature, Intermediate, Early Successional
Grassland:	Natural, Pasture/hay, Sod
Cropland:	No till or Plowed Rowcrops
Residential:	High, medium, low density
Commercial:	<33%, 33<66%, 66<100% impermeable surface

During the scoring process some decisions were made on how to categorize difficult to determine and unusual land cover types. With forested sites when a determination of mature or intermediate stand age could not be made then scoring was completed using the intermediate subcategory. On several sites a cemetery served as adjacent property; after some deliberation the decision was made that impacts would be similar to those from low density residential areas. Highways and railroads were classified as light commercial impacts.

Table 9.3-6. Surrounding land cover criteria for the Alabama Wetlands Program.

6: Surrounding Land Cover.							
Land Cover	Points	% Uphill	Multiplier	Total Uphill	% Down	Total Downhill	Total Uphill + Downhill
Water Body / Mature natural forest	5	0	1.5	0	0	0	0
Intermediate natural forest / Mature monoculture	4	0	1.5	0	0	0	0
Early successional natural forest / Intermediate monoculture	3	0	1.5	0	0	0	0
Natural Grassland	2	0	1.5	0	0	0	0
Early Monoculture / Pasture/Hay	1	0	1.5	0	0	0	0
Sod Farm / No till cropland	0	0	1.5	0	0	0	0
Plowed rowcrops / Low density residential	-1	0	1.5	0	0	0	0
Medium density residential	-2	0	1.5	0	0	0	0
High density residential / Commercial < 33% impermeable surface	-3	0	1.5	0	0	0	0
Commercial 33 < 66% impermeable surface	-4	0	1.5	0	0	0	0
Commercial 66 < 100% impermeable surface	-5	0	1.5	0	0	0	0
Total for all Land Cover Categories (#6)							0

7: Presence of hydric soils.

All sites would need to have hydric soils in order to have jurisdictional wetlands. Hydric soils are those listed on the federal hydric soils list developed by NRCS. In the Sipsey River Watershed the soils are not on the list. However, the soils on the sites evaluated under this study are inundated for more than seven consecutive days during the growing season. Therefore, the hydric soils qualification is still being met.

For scoring purposes, the percentage of the site comprised of hydric soils is being used (Table 9.3-7). Where no digital coverage exist, a visual estimate from the soil maps is made. When this visual estimate methodology was used on tracts with digital coverage, there was usually no change in the score. In cases where the score did change, the overall site ranking remained in the same area; the ranking would not jump or fall five places based on a one point change in the hydric soil parameter

Table 9.3-7. Hydric soils criteria for the Alabama Wetlands Program.

7: Presence of hydric soils.				
	Percentage of the tract that is Hydric Soils:	80 - 100%	4	
		60 < 80%	3	
		40 < 60%	2	
		20 < 40%	1	
		< 20%	0	
Total #7				0

8: Presence of source(s) of hydrology.

If the hydrologic sources are contained within the perimeter of the site, then the influences of adjacent properties would be reduced. This is a percentage scale and sites that completely include the features affecting the hydrology score higher. For seep springs, upland bogs, grady ponds, and other isolated wetland types it might be possible to purchase the entire watershed and all the hydrologic features. With riverine wetlands it is not possible to buy the entire watershed. If the hydrology of the site is dominated by the influences of a third order or larger stream then the site is given one point (Table 9.3-8).

Table 9.3-8. Hydrologic source criteria for the Alabama Wetlands Program.

8: Presence of source(s) of hydrology.				
	The primary source affecting the hydrology of the tract is a river or large creek.		0 1	
	Percentage of the landscape features	75 < 100%	4	
	affecting the wetland hydrology that	0 < 75%	3	
	are incorporated into the tract.	25 < 50%	2	
		10 < 25%	1	
		< 10%	0	
Total #8				0

9. Plat Coverage.

Based on the ADCNR's land management experience, the fewer entities involved in land management decisions the more easily decisions are made. This is a 3 point scale where restoration sites on publicly owned lands score the highest. The plat coverage is used for this determination. In some instances restoration efforts could be successful if the site size was reduced and only the major owner(s) are included. Some potential restoration sites were dropped after it was determined that there were many owners and the plats were small.

Table 9.3-9. Plat criteria for the Alabama Wetlands Program.

9: Plat density.			
	Site is on Publically Owned/Managed Property	3	
	Site is owned by a single entity.	2	
	Site has two owners.	1	
	Site has three or more owners.	0	
Total #9			0

RESULTS AND DISCUSSION

Potential wetland restoration sites were successfully located in all of the study areas. The appendices contain maps for each site, a summary of the scoring criteria for each site and a summary of how the sites rank for each area. Within each study area the site scores have a 30 to 45 point variation, while the scores range from a low of 36.85 to a high of 93.84. Actual on-the-ground site verification may reveal that some of these sites do not meet the current standards for wetland restoration sites.

This report is by no means a comprehensive list of all potential restoration sites for each study area. There are undoubtedly many more restoration sites in each area. Many of the individual references for potential restoration sites could not be verified with remote sensing technologies available at the time. In some watersheds, the counties do not have soil type documents or NWI coverage and hence many sites have been overlooked (e.g. Lowndes County).

Since this project was initiated the regulatory world of wetlands has made progress. The MBRT has established itself and become very active in wetland restoration. Privately owned wetland mitigation banks have been permitted and are selling credits. Wetland regulations have been refined and in some instances, activities that were once permitted are now restricted. Sites that were once suitable for restoration credit no longer qualify if, given reasonable time, they can naturally restore themselves. New, less subjective, systems are being used, and refined, to assess wetland impacts and to calculate functional lift at restoration sites. Stream restoration, once a foreign concept, is becoming accepted and the MBRT is developing guidelines for stream restoration banks.

The world of digital data has also progressed rapidly. Instead of using contour intervals on topographic maps to determine the watershed area of a site, Digital Elevation Models (DEMs) are available that can calculate uphill area with contour intervals as low as one foot. Thanks to the GSA, digital NWI maps are now available for the Sipsey River and Black Warrior River watersheds, the gaps in the Alabama River Corridor have been filled, and for the coastal counties the elusive Stiggins Lake Quadrangle now exist in digital form. The NRCS is producing additional digital county soil coverages each year. Some counties that do not currently have a complete soil survey document will be getting digital coverages. The State of Alabama will soon begin developing a statewide digital plat coverage. The State of Alabama is developing a statewide GIS government users group to streamline the development of additional georeferenced data-layers.

During the course of this study, Alabama experienced a severe two year drought. The drought presented opportunities for timber harvest to occur in areas that would normally have been inaccessible. Many of these logged areas, previously forested in hardwoods, were replanted with pines. Unless these areas were mechanically site prepped they are not eligible as restoration sites until the pine trees have become well established. These wetland areas, planted to pines, will be potential restoration areas in seven to ten years if the pines are able to establish themselves.

REFERENCES

Cowardin et al. 1979. *Classification if Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service. Biological Services Program. FWS/OBS-79/31. 131 pp.

Dahl, T. E. 1990. *Wetland Losses in the United States 1780's to 1980's*. U.S. Department of the Interior, Fish and Wildlife Service, Washington D.C. 21 pp.

U.S. Fish and Wildlife Service. 1992. *Regional Wetlands Concept Plan Emergency Wetlands Resource Act - Southeast Region*, Atlanta, Georgia. 259 pp.

Figure 9.3-1

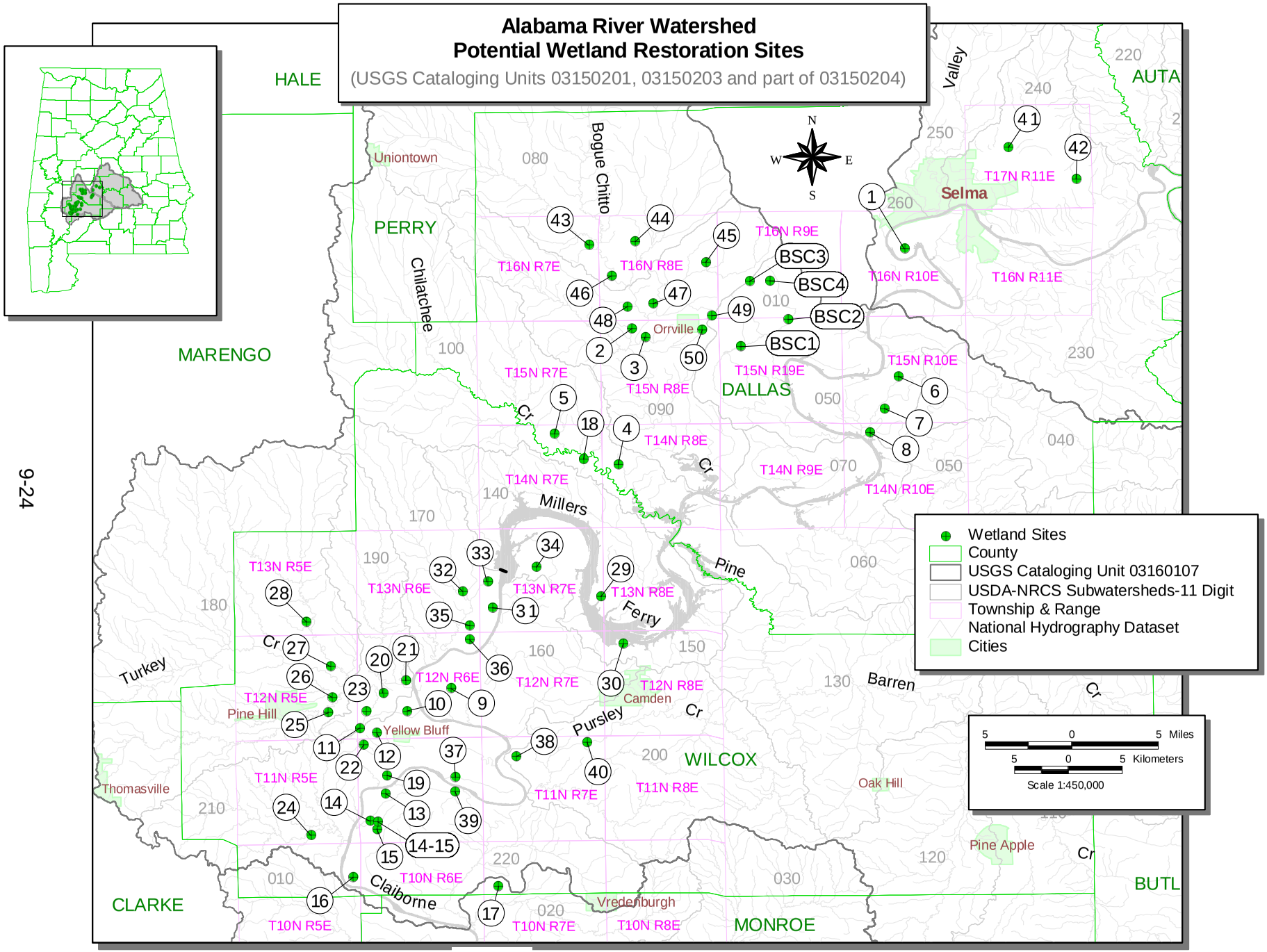

Alabama River Watershed
Potential Wetland Restoration Sites
(USGS Cataloging Units 03150201, 03150203 and part of 03150204)
HALE
PERRY
MARENGO
DALLAS
WILCOX
CLARKE
MONROE
BUTL
AUTA
Uniontown
Selma
Orrville
Camden
Pine Hill
Yellow Bluff
Thomasville
Vredenburgh
Oak Hill
Pine Apple
Bogue Chitto
Chilatchee
Millers
Pine
Ferry
Pursley
Turkey
Barren
Claiborne
Valley
T16N R9E
T16N R8E
T16N R7E
T16N R10E
T16N R11E
T17N R11E
T15N R7E
T15N R8E
T15N R19E
T15N R10E
T14N R8E
T14N R7E
T14N R9E
T14N R10E
T13N R5E
T13N R6E
T13N R7E
T13N R8E
T12N R6E
T12N R7E
T12N R8E
T12N R5E
T11N R5E
T11N R7E
T11N R8E
T10N R6E
T10N R5E
T10N R7E
T10N R8E
BSC1
BSC2
BSC3
BSC4
14-15
Wetland Sites
County
USGS Cataloging Unit 03160107
USDA-NRCS Subwatersheds-11 Digit
Township & Range
National Hydrography Dataset
Cities
5 0 5 Miles
5 0 5 Kilometers
Scale 1:450,000
Mike Rief-ADEM Water Quality Branch Projection-Geographic Datum-N

Table 9.3-10 Alabama River Watershed Potential wetland restoration Sites

Site	Rank	Score	Location TRS	County	Acreage	Current Land Use	Impact Type	Nearest Town
AL1	7	68.95	16N 10E 9,10,15,16	Dallas	781	Agriculture & Forestry	Vegetation Type	SW of Selma, in Kings Bend
AL2	41	50.60	15N 8E 4,5,32	Dallas	447	Agriculture	Vegetation Type	W of Orrville, Bouge Chitto Cr.
AL3	29	57.96	15N 8E 4,5,8,9	Dallas	548	Agriculture	Vegetation Type	W of Orrville, Bouge Chitto Cr.
AL4	30	56.93	14N 8E 7,18	Dallas	253	Forestry	Vegetation Type	S of Crumptonia, Chilatchee Cr
AL5	36	54.02	14N 7E 3	Dallas	165	Agriculture	Vegetation Type	S of Safford
AL6	26	59.28	15N 10E 21,22	Dallas	550	Agriculture	Vegetation Type & Hydrology	S of Selma
AL7	23	60.97	15N 10E 28,29 32,33	Dallas	392	Agriculture	Vegetation Type & Hydrology	S of Selma
AL8	9	68.13	14N 10E 5,6	Dallas	515	Forestry	Vegetation Type	S of Selma, Cedar Cr.
AL9	35	54.25	12N 6E 14,23	Wilcox	874	Forestry	Vegetation Type	NE of Yellow Bluff
AL10	19	62.52	12N 6E 28	Wilcox	460	Forestry	Vegetation Type	N of Yellow Bluff
AL11	49	47.10	12N 6E 31	Wilcox	168	Forestry	Vegetation Type	W of Yellow Bluff
AL12	32	56.16	12N 6E 31,32	Wilcox	378	Forestry	Vegetation Type	W of Yellow Bluff
AL13	15	65.98	11N 6E 17,20	Wilcox	234	Forestry	Vegetation Type	S of Yellow Bluff
AL14	8*	68.26*	11N 6E 30	Wilcox	143	Forestry	Vegetation Type	S of Yellow Bluff
AL15	34*	54.57*	11N 6E 31	Wilcox	92	Forestry	Vegetation Type	S of Yellow Bluff
AL16	18	63.47	10N 5E 11,12,13	Wilcox	589	Forestry	Vegetation Type	E of Lower Peach Tree
AL17	14	66.26	10N 7E 17,18	Wilcox	906	Forestry	Vegetation Type	E of Lower Peach Tree
AL18	4	71.44	14N 7E 11,12 13,14	Wilcox	507	Forestry	Vegetation Type	SW of Crumptonia
AL19	1	76.17	11N 6E 8,9,17	Wilcox	684	Forestry	Vegetation Type	S of Yellow Bluff
AL20	6	69.31	12N 6E 17,19,20	Wilcox	249	Forestry	Vegetation Type	NW of Yellow Bluff
AL21	21	61.39	12N 6E 16,21	Wilcox	322	Agriculture & Forestry	Vegetation Type	N of Yellow Bluff
AL22	11	67.92	12N 5E,6E 36,31 11N 1,6	Wilcox	412	Agriculture	Vegetation Type & Hydrology	W of Yellow Bluff
AL23	40	51.00	12N 6E 30	Wilcox	195	Agriculture	Vegetation Type & Hydrology	W of Yellow Bluff
AL24	12	67.12	11N 5E 34	Wilcox	367	Agriculture	Vegetation Type & Hydrology	N of Lower Peach Tree

Table 9.3-10 (cont.)

Site	Rank	Score	Location TRS	County	Acreage	Current Land Use	Impact Type	Nearest Town
AL25	50	46.84	12N 5E 23,26,27	Wilcox	680	Forestry	Vegetation Type & Hydrology	W of Yellow Bluff
AL26	46	47.80	12N 5E 23	Wilcox	229	Forestry	Vegetation Type	W of Yellow Bluff
AL27	54	40.70	12N 5E 11,12,13,14	Wilcox	515	Forestry	Vegetation Type & Hydrology	NW of Yellow Bluff
AL28	42	50.37	13N 5E 34	Wilcox	156	Forestry	Vegetation Type & Hydrology	N of Anne Manie
AL29	53	40.98	13N 7E 24,25 8E 19,30	Wilcox	194	Agriculture	Vegetation Type	W of Boykin
AL30	3	72.43	12N 8E 5,6,7	Wilcox	330	Agriculture & Forestry	Vegetation Type	E of Canton Bend
AL31	5	69.47	13N 7E 19,30	Wilcox	415	Agriculture	Vegetation Type & Hydrology	S of Midway
AL32	20	62.41	13N 6E 23,24	Wilcox	79	Agriculture	Vegetation Type	SW of Midway
AL33	24	60.24	13N 7E 18,19	Wilcox	356	Forestry	Vegetation Type	W of Midway
AL34	37	53.95	13N 7E 15,16	Wilcox	135	Agriculture	Vegetation Type & Hydrology	N of Millers Ferry
AL35	13	66.47	13N 6E 35,36	Wilcox	538	Forestry	Vegetation Type	SW of Midway
AL36	2	75.46	13N 6E,7E 31 12N 1,6,12	Wilcox	1039	Forestry	Vegetation Type	SW of Midway
AL37	28	58.65	11N 6E 10,11 13,14	Wilcox	750	Forestry	Vegetation Type	SE of Yellow Bluff
AL38	10	68.08	11N 7E 4,5,7,8,9	Wilcox	1520	Agriculture & Forestry	Vegetation Type	SE of Yellow Bluff
AL39	16	65.48	11N 6E 13,14,15 22,23,24	Wilcox	650	Agriculture	Vegetation Type & Hydrology	SE of Yellow Bluff
AL40	44	49.10	11N 7E 1,2	Wilcox	772	Agriculture & Forestry	Vegetation Type & Hydrology	SW of Camden
AL41	38	52.29	17N 11E 8,9,16,17	Dallas	670	Forestry	Vegetation Type	E of Selma
AL42	52	45.64	17N 11E 25	Dallas	221	Agriculture	Vegetation Type	E of Selma
AL43	39	51.43	16N 7E 12	Dallas	210	Forestry	Vegetation Type	NW of Orrville
AL44	51	46.22	16N 8E 5,6,8	Dallas	427	Forestry	Vegetation Type	N of Orrville
AL45	47	47.59	16N 8E 11,12,13 14,23,24	Dallas	803	Agriculture	Vegetation Type & Hydrology	N of Orrville

Table 9.3-10 (cont.)

Site	Rank	Score	Location TRS	County	Acreage	Current Land Use	Impact Type	Nearest Town
AL46	43	50.11	16N 7E 13,24 8E 18,19	Dallas	869	Agriculture & Forestry	Vegetation Type & Hydrology	NW of Orrville
AL47	33	55.50	16N 8E 27,28 32,33	Dallas	808	Agriculture & Forestry	Vegetation Type & Hydrology	W of Orrville
AL48	48	47.27	16N 8E 29,32,33	Dallas	1010	Agriculture & Forestry	Vegetation Type & Hydrology	W of Orrville
AL49	45	48.80	16N 8E 36 15N 1	Dallas	265	Agriculture	Vegetation Type & Hydrology	E of Orrville
AL50	55	36.85	15N 8E 1,2	Dallas	132	Agriculture	Vegetation Type & Hydrology	SE of Orrville
BSC1	31	56.30	15N 9E 7,8	Dallas	423	Agriculture & Forestry	Vegetation Type & Hydrology	SW of Selma
BSC2	22	61.00	16N 9E 34,35 15N 2,3	Dallas	1596	Forestry	Vegetation Type & Hydrology	SW of Selma
BSC3	25	60.14	16N 9E 21,28	Dallas	572	Forestry	Vegetation Type	SW of Selma
BSC4	27	58.74	16N 9E 20,29	Dallas	445	Forestry	Vegetation Type & Hydrology	SW of Selma

Figure 9.3-2

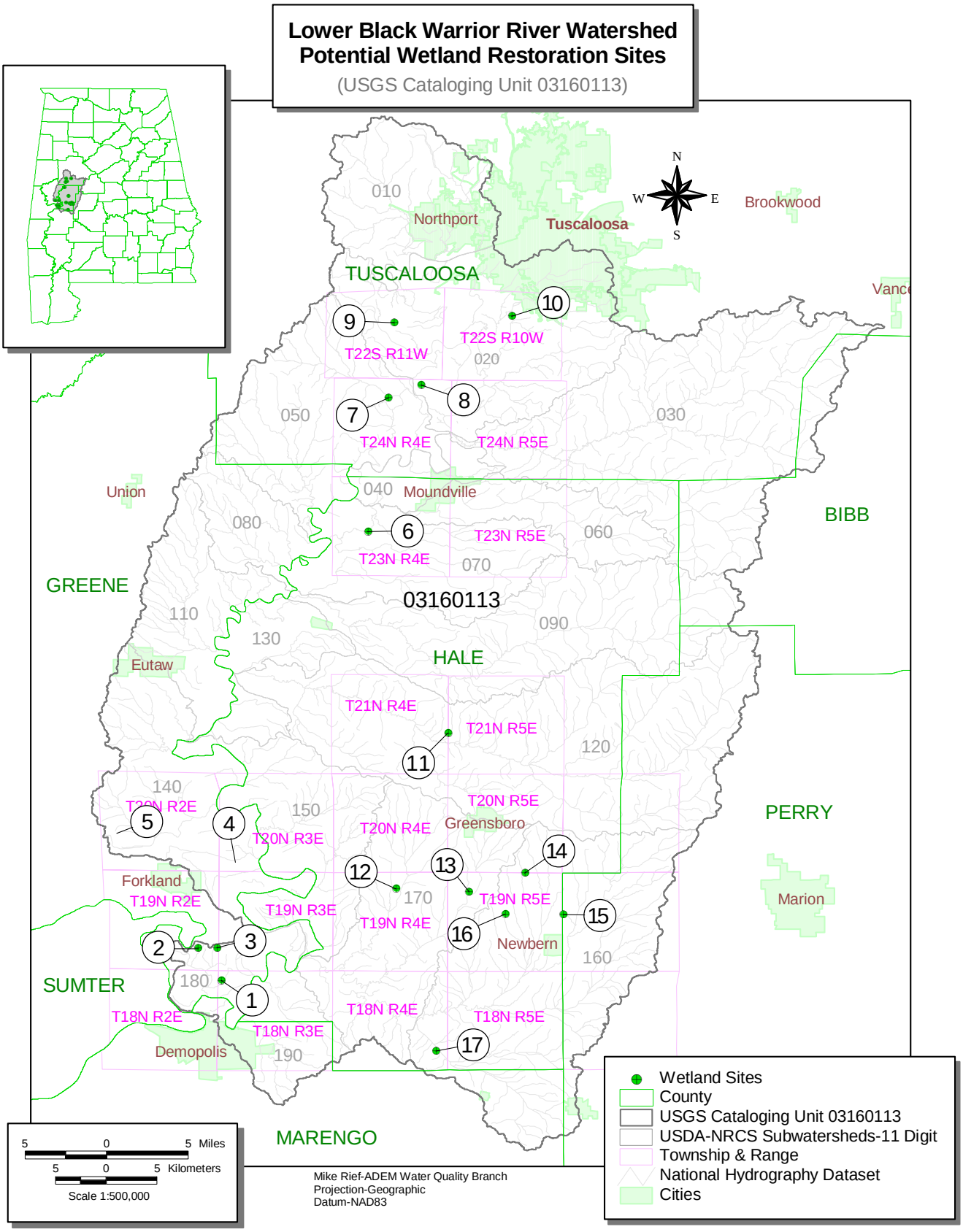

Lower Black Warrior River Watershed
Potential Wetland Restoration Sites
(USGS Cataloging Unit 03160113)
N
W
E
S
Brookwood
Northport
Tuscaloosa
TUSCALOOSA
010
020
030
040
050
060
070
080
090
110
120
130
140
150
160
170
180
190
T22S R11W
T22S R10W
T24N R4E
T24N R5E
T23N R4E
T23N R5E
Moundville
Union
BIBB
GREENE
03160113
HALE
Eutaw
T21N R4E
T21N R5E
T20N R2E
T20N R3E
T20N R4E
T20N R5E
Greensboro
PERRY
Marion
Forkland
T19N R2E
T19N R3E
T19N R4E
T19N R5E
Newbern
SUMTER
T18N R2E
T18N R3E
T18N R4E
T18N R5E
Demopolis
MARENGO
1
2
3
4
5
7
8
9
10
11
12
13
14
15
16
17
5 0 5 Miles
5 0 5 Kilometers
Scale 1:500,000
Mike Rief-ADEM Water Quality Branch
Projection-Geographic
Datum-NAD83
Wetland Sites
County
USGS Cataloging Unit 03160113
USDA-NRCS Subwatersheds-11 Digit
Township & Range
National Hydrography Dataset
Cities

Table 9.3-11 Lower Black Warrior River Potential Wetland Restoration Sites

Site	Rank	Score	Location TRS	County	Acreage	Current Land Use	Impact Type	Nearest Town
BW1	12	53.255	18N 2E,3E 1,6	Greene	741	Agriculture & Forestry	Vegetation Type & Hydrology	N of Demopolis
BW2	1	75.995	19N 2E 25,26 35,36	Greene	1746	Agriculture & Forestry	Vegetation Type & Hydrology	N of Demopolis
BW3	5	64.56	19N 3E 30,31	Greene	1073	Agriculture & Forestry	Vegetation Type	N of Demopolis
BW4	3	69.35	20N 2E 13,24 3E 18,19	Greene	1230	Forestry	Vegetation Type	N of Demopolis
BW5	9	60.74	20N 1E 16,21,28	Greene	1333	Agriculture & Forestry	Vegetation Type & Hydrology	N of Demopolis
BW6	2	72.79	23N 3E,4E 25 30 36 31,32 22N 1 6	Hale	2256	Agriculture & Forestry	Vegetation Type	SW of Moundville
BW7	14	49.62	24N 4E 9	Tuscaloosa	303	Forestry	Vegetation Type	SE of Tuscaloosa
BW8	6	62.90	24N 4E 2	Tuscaloosa	645	Agriculture & Forestry	Vegetation Type & Hydrology	SW of Tuscaloosa
BW9	17	45.60	22S 11W 10,15	Tuscaloosa	627	Agriculture & Forestry	Vegetation Type & Hydrology	W of Tuscaloosa
BW10	4	65.48	22S 10W 9,10 15,16	Tuscaloosa	740	Agriculture & Forestry & Commercial	Vegetation Type & Hydrology	S of Tuscaloosa
BW11	10	55.84	21N 4E,5E 19,24	Hale	898	Agriculture & Forestry	Vegetation Type	NW of Greensboro
BW12	11	53.61	20N 4E 34 19N 2,3,9,10 11,15,16	Hale	2440	Agriculture & Forestry	Vegetation Type & Hydrology	SW of Greensboro
BW13	13	52.78	19N 5E 5,7,8	Hale	736	Agriculture & Forestry	Vegetation Type & Hydrology	S of Greensboro
BW14	15	48.91	19N 5E 34,35 18N 2,3	Hale	1021	Agriculture & Forestry	Vegetation Type & Hydrology	SW of Newbern
BW15	7	61.595	18N 5E 13,18	Hale/Perry	970	Agriculture & Forestry	Vegetation Type & Hydrology	S of Newbern
BW16	8	61.225	18N 5E 15,16	Hale	1267	Agriculture & Forestry	Vegetation Type & Hydrology	S of Newbern
BW17	16	48.79	18N 4E 25,36 5E 31,32	Hale	1810	Agriculture	Vegetation Type & Hydrology	SW of Newbern

Figure 9.3-3

Sipsey River Watershed
Potential Wetland Restoration Sites
(USGS Cataloging Unit 03160107)

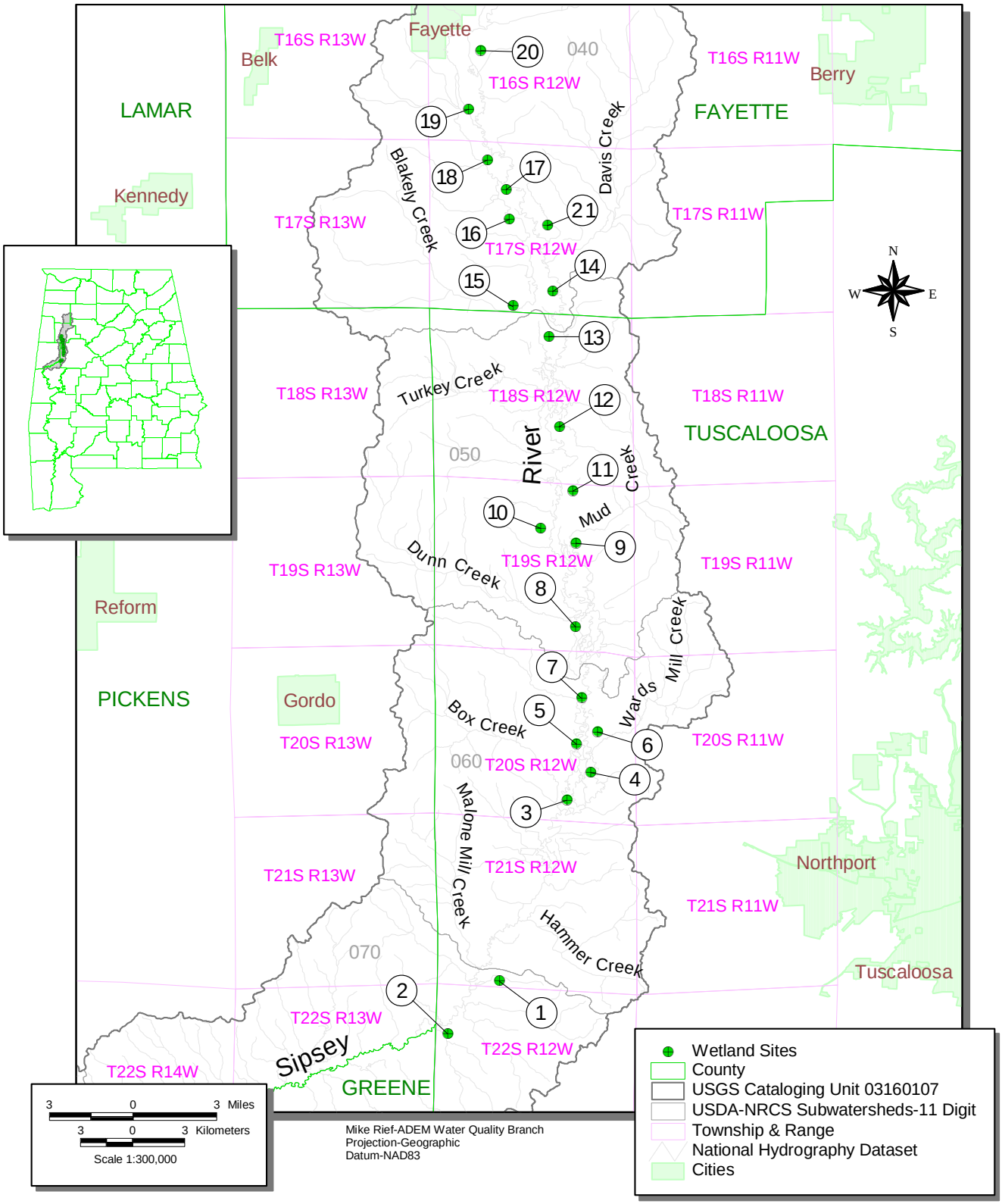


Table 9.3-12 Sipsey River Watershed Potential Wetland Restoration Sites

Site	Rank	Score	Location TRS	County	Acreage	Current Land Use	Impact Type	Nearest Town
S1	3	79.23	21S 12W 32,33 22S 4,5	Tuscaloosa	960	Forestry	Vegetation Type	SW of Buhl, E of Sipsey Tract
S2	4	78.38	22S 13W 17,18	Greene & Tuscaloosa	444	Forestry	Vegetation Type & Hydrology	NE of Jena, S of Sipsey Tract
S3	12	69.59	20S 12W 26,27 34,35	Tuscaloosa	775	Forestry	Vegetation Type & Hydrology	NW of Buhl
S4	5	77.69	20S 12W 23,26	Tuscaloosa	302	Forestry	Vegetation Type & Hydrology	NW of Buhl
S5	6	77.03	20S 12W 23	Tuscaloosa	190	Forestry	Vegetation Type	NW of Buhl
S6	18	61.73	20S 12W 13,14,23	Tuscaloosa	490	Forestry	Vegetation Type	NW of Buhl
S7	17	63.26	20S 12W 2,10,11,14	Tuscaloosa	850	Forestry	Vegetation Type	SE of Echola
S8	8	72.98	19S 12W 26,35	Tuscaloosa	237	Forestry	Vegetation Type	NE of Echola
S9	10	70.71	19S 12W 11,14,15	Tuscaloosa	753	Forestry	Vegetation Type	NW of Brownville
S10	19	60.62	19S 12W 10	Tuscaloosa	280	Agriculture	Vegetation Type	NW of Brownville
S11	2	80.31	19S 12W 34,35 18S 2,3	Tuscaloosa	935	Forestry	Vegetation Type	N of Brownville
S12	9	70.88	18S 12W 22,26,27	Tuscaloosa	874	Forestry	Vegetation Type	N of Brownville
S13	1	81.55	18S 12W 3,10	Tuscaloosa	480	Forestry	Vegetation Type	N of Brownville
S14	7	74.26	17S 12W 27,34	Fayette	1080	Forestry	Vegetation Type	E of Newtonville
S15	20	51.33	17S 12W 33	Fayette	107	Agriculture & Forestry	Vegetation Type & Hydrology	E of Newtonville
S16	15	67.74	17S 12W 16	Fayette	339	Agriculture & Forestry	Vegetation Type & Hydrology	N of Newtonville
S17	16	66.10	17S 12W 8,9	Fayette	363	Agriculture & Forestry	Vegetation Type & Hydrology	N of Newtonville
S18	14	68.40	17S 12W 5,8	Fayette	358	Forestry	Vegetation Type & Hydrology	N of Newtonville
S19	11	69.63	16S 12W 29-32	Fayette	1046	Agriculture & Forestry	Vegetation Type & Hydrology	S of Fayette
S20	21	49.70	16S 12W 17,20	Fayette	458	Agriculture & Forestry	Vegetation Type & Hydrology	SE of Fayette
S21	13	68.47	17S 12W 15,22	Fayette	1080	Forestry	Vegetation Type	NE of Newtonville

Figure 9.3-4

Baldwin and Mobile Counties
Potential Wetland Restoration Sites

(USGS Cataloging Units 03140106-7, 03150201, 03160203-4-5 , 03170008-9)

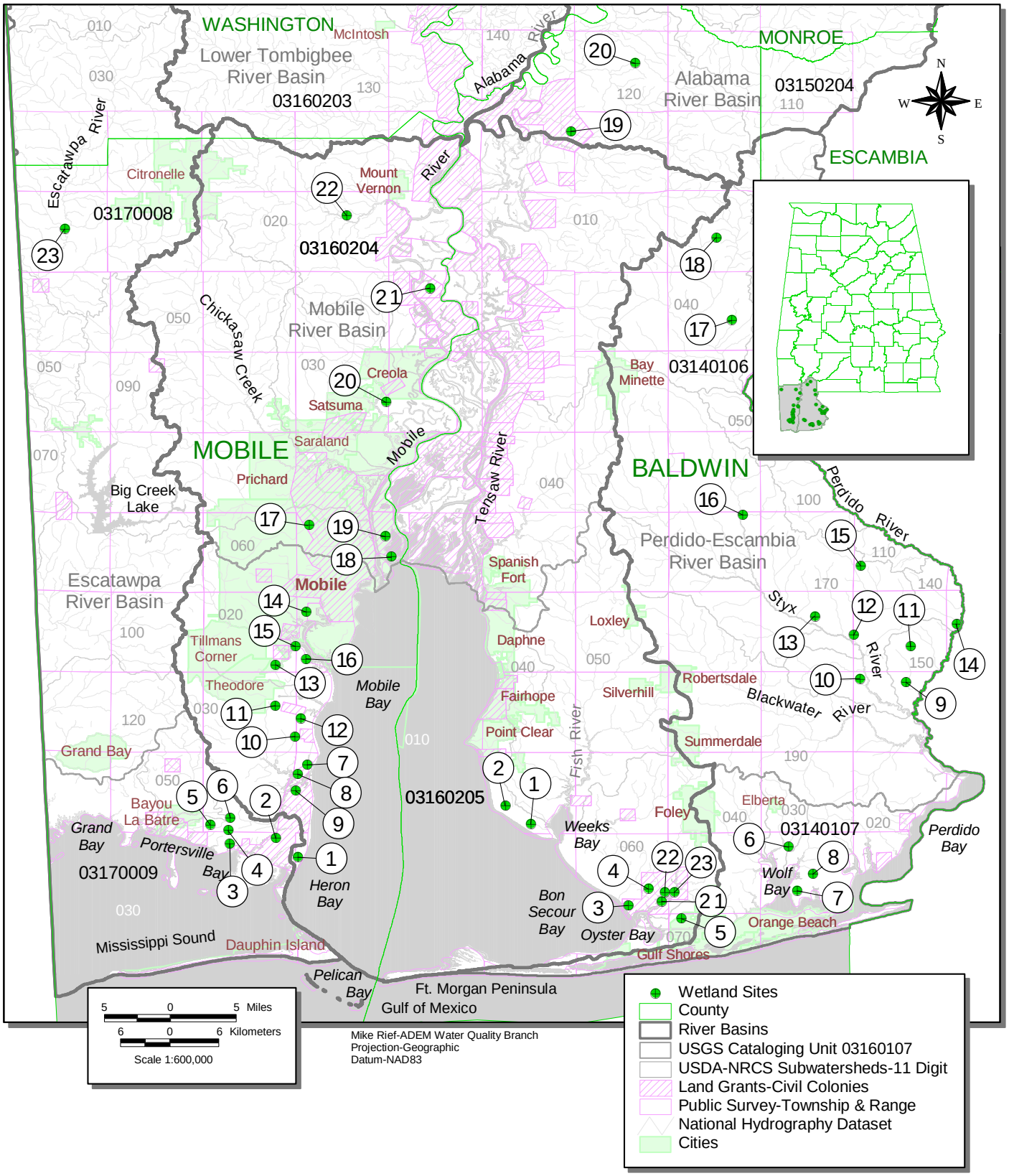


Table 9.3-13 Mobile County Potential Wetland Restoration Sites

Site	Rank	Score	Location TRS	County	Acreage	Current Land Use	Impact Type	Nearest Town
MC1	16	65.70	7S 1W 7	Mobile	97	Salt Marsh	Hydrology	S of Alabama Port
MC2	8	77.96	7S 2W 2	Mobile	262	Forestry	Vegetation Type & Hydrology	W of Alabama Port
MC3	10	75.39	7S 2W 4,5,8,9	Mobile	426	Forestry	Vegetation Type & Hydrology	E of Bayou La Batre
MC4	11	74.94	7S 2W 31,32,33 8S 4,5,6	Mobile	811	Agriculture	Vegetation Type & Hydrology	E of Bayou La Batre
MC5	14	67.13	7S 2W 31	Mobile	238	Agriculture	Vegetation Type & Hydrology	E of Bayou La Batre
MC6	7	79.61	7S 2W 28,29,32	Mobile	240	Agriculture	Vegetation Type & Hydrology	E of Bayou La Batre
MC7	21	61.13	7S 1W 9	Mobile	17	Salt Marsh	Hydrology	N of Mon Louis
MC8	23	47.14	7S 1W 9	Mobile	61	Agriculture	Vegetation Type & Hydrology	NW of Mon Louis
MC9	18	62.65	7S 2W 37 1W 33	Mobile	80	Agriculture	Vegetation Type & Hydrology	SW of Mon Louis
MC10	20	61.36	6S 2W 25,36 1W 30,31	Mobile	315	Agriculture	Vegetation Type & Hydrology	W of Bellefontaine
MC11	5	79.81	5S 2W 14	Mobile	175	Commercial	Vegetation Type & Hydrology	NW of Bellefontaine
MC12	15	66.93	6S 1W 18,19,37	Mobile	483	Forestry	Vegetation Type	NW of Bellefontaine
MC13	4	82.51	5S 2W 35	Mobile	141	Commercial	Vegetation Type & Hydrology	SE of Tillmans Corner
MC14	19	62.48	4S 1W 7,36	Mobile	78	Commercial	Vegetation Type & Hydrology	S of Mobile
MC15	13	67.33	5S 1W 1,19 2W 25	Mobile	17	Salt Marsh	Hydrology	S of Mobile
MC16	22	55.04	5S 1W 1	Mobile	43	Salt Marsh	Hydrology	S of Mobile
MC17	17	65.28	4S 1W 6,7	Mobile	128	Commercial	Vegetation Type & Hydrology	In Mobile
MC18	1	94.84	4S 1E 2	Mobile	85	Commercial	Vegetation Type & Hydrology	E of Mobile
MC19	3	88.32	4S 1W 00	Mobile	253	Commercial	Vegetation Type & Hydrology	E of Mobile
MC20	6	79.76	2S 1E 19,20 1W 24	Mobile	660	Forestry	Hydrology	E of Satsuma
MC21	2	91.52	1S 1E 4,5,40	Mobile	1217	Forestry	Hydrology	NE of Creola
MC22	9	77.22	1N 1W 9,10	Mobile	350	Forestry	Vegetation Type	W of Mount Vernon
MC23	12	74.31	1N 4W 15,22	Mobile	513	Forestry	Vegetation Type	W of Citronelle

Table 9.3-13 Baldwin County Potential Wetland Restoration Sites

Site	Rank	Score	Location TRS	County	Acreage	Current Land Use	Impact Type	Nearest Town
BC1	7	77.17	7S 2E 27,28 33,34,38	Baldwin	890	Forestry	Vegetation Type	South of Fairhope
BC2	16	70.59	7S 2E 19,20,29,30	Baldwin	442	Forestry	Vegetation Type	South of Fairhope
BC3	2	88.46	8S 3E 27,33,34 9S 7	Baldwin	470	Forestry	Vegetation Type	West of Bon Secour
BC4	23	54.84	8S 3E 26,38,39	Baldwin	255	Agriculture	Vegetation Type & ydrology	Northwest of Bon Secour
BC5	20	66.37	8S 4E 31,32 9S 5,6	Baldwin	1,256	Commercial	Vegetation Type & Hydrology	Northwest of Gulf Shores
BC6	4	79.36	8S 5E 8	Baldwin	88	Agriculture	Vegetation Type & Hydrology	East of Miflin
BC7	8	77.07	8S 5E 21,28	Baldwin	442	Forestry	Vegetation Type & Hydrology	Southeast of Miflin
BC8	22	59.25	8S 5E 22	Baldwin	80	Agriculture	Vegetation Type & Hydrology	Southeast of Miflin
BC9	1	95.88	5S 6E 25,26,27,28 33,34,35,36 6S 1,2,3,4,5,6 7,8,9,10,11 15,16,17	Baldwin	6,710	Forestry	Vegetation Type	North of Seminole
BC10	3	80.73	6S 6E 6 5S 31	Baldwin	650	Forestry	Vegetation Type	South of Fairhope
BC11	15	70.70	5S 6E 26,27,28 21,22	Baldwin	1965	Forestry	Vegetation Type	North of Seminole
BC12	14	71.55	5S 6E 18,19 5E 13,14	Baldwin	390	Forestry	Vegetation Type	N of Seminole
BC13	12	73.12	5S 5E 9,10,15,16	Baldwin	863	Forestry	Vegetation Type	North of Seminole
BC14	21	65.74	5S 7E 18	Baldwin	185	Forestry	Vegetation Type	Northeast of Seminole
BC15	13	72.99	4S 6E 19,30	Baldwin	661	Forestry	Vegetation Type	East of Gateswood
BC16	17	70.54	3S 3E 35 4S 2	Baldwin	341	Forestry	Vegetation Type	East of Stapleton
BC17	6	78.61	1S 4E 14,23,26,27	Baldwin	740	Forestry	Vegetation Type	Southeast of Dyas
BC18	19	68.46	1N 4E 15,16, 21,22	Baldwin	990	Forestry	Vegetation Type	East of Rabun
BC19	10	74.31	2N 2E 56	Baldwin	275	Forestry	Vegetation Type	West of Tensaw
C20	18	69.15	3N 3E 15	Baldwin	440	Agriculture	Vegetation Type & Hydrology	Northwest of Blacksher
BC21	5	79.33	8S 3E 40	Baldwin	17	Commercial	Hydrology	Southeast of Bon Secour
BC22	9	74.98	8S 3E,4E 25,30	Baldwin	238	Forestry	Hydrology	East of Bon Secour
BC23	11	73.54	8S 4E 30	Baldwin	24	Commercial	Hydrology	East of Bon Secour

Table 9-3

Statewide Wetlands Landuse Data Estimates by River Basin

River Basins		Total	Woody Wetlands		Emergent Wetlands		Total Wetlands
		Acres	Percent of RB	Acres	Percent of RB	Acres	Acres
Alabama		3,707,839	10.35%	383,794	0.39%	14,292	398,085
Black Warrior		3,934,894	3.38%	132,936	0.15%	5,813	138,749
Cahaba		1,135,698	5.90%	67,028	0.16%	1,855	68,882
Chattahoochee		1,584,962	4.14%	65,554	0.20%	3,202	68,756
Chipola		157,907	13.63%	21,515	0.33%	518	22,033
Choctawhatchee		1,911,634	6.09%	116,422	0.24%	4,515	120,937
Coosa		3,380,685	1.18%	39,992	0.16%	5,468	45,461
Escatawpa		614,555	6.52%	40,049	1.99%	12,235	52,285
Lower Tombigbee		2,488,088	12.05%	299,805	0.28%	7,061	306,866
Mobile		1,118,408	13.61%	152,162	2.26%	25,315	177,477
Perdido-Escambia		3,270,846	5.97%	195,147	0.22%	7,136	202,283
Tallapoosa		2,501,214	3.84%	96,060	0.16%	3,988	100,047
Tennessee		4,329,619	3.27%	141,780	0.26%	11,337	153,116
Upper Tombigbee		2,287,320	11.35%	259,526	0.42%	9,709	269,234
Totals	Acres	**32,423,668**		**2,011,768**		**112,444**	**2,124,212**
	Square Miles	**50,662**		**3,143**		**175**	**3,319**

The combined woody and emergent wetland acreage comprises 6.55% of Alabama.

The landuse data used for wetland size determinations was acquired from EPA Region IV. The following information is pertains to this data set.

Data sources:

The primary source of data for this project was leaves-off (primarily spring) Landsat TM data, acquired in 1988, 1990, 1991, 1992 and 1993. While most of the leaves-off data sets were acquired in spring, a few were from late autumn due to the difficulties in acquiring cloud-free TM data. These data sets were referenced to Albers Conical Equal Area coordinates (see table 1). Additionally, leaves-on (summer) TM data sets were acquired and referenced. The south-central and north-central portions of Region IV were processed as one unit and later split for distribution purposes; in total, 40 TM scenes were analyzed. Data sets used are provided in Table 2. In addition, other intermediate scale spatial data were acquired and utilized. These included 3-arc second Digital Terrain Elevation Dataset (DTED) and derivative DTED products (slope, shaded relief, and relative elevation), population density and housing units density data at the census block level, USGS land use and land cover data (LUDA), National Wetlands Inventory (NWI) data, and STATSGO soils information (available water and organic carbon).

Methods:

The general procedure of this project was to (1) mosaic multiple spring TM scenes and classify them using an unsupervised classification algorithm, (2) interpret and label classes into sixteen land cover categories using aerial photographs as

reference data, (3) resolve confused classes using the appropriate ancillary data source(s), and (4) incorporate land cover information from leaves-on TM data, NWI data, and other data sources to refine and augment the "basic" classification developed above.

The entire area (north-central and south-central portions of Region IV) was analyzed as one large mosaic consisting of 20 leaves-off scenes. For mosaicking purposes, a base scene was selected, and other scenes were normalized to mimic spectral properties of the base scene following histogram equalization using pixels in regions of spatial overlap.

Following mosaicking, mosaicked scenes were clustered into 100 spectrally distinct classes using the Cluster algorithm developed by Los Alamos [1]. Clusters were assigned into Anderson level 1 and 2 land cover classes using National High Altitude Photography program (NHAP) aerial photographs as reference information. Almost invariably, individual spectral classes were confused between/among two or more "targeted" land cover classes. Separation of spectral classes into meaningful land cover units was accomplished using ancillary data. Briefly, for a given confused spectral class, digital values of the various ancillary data layers were compared to determine: (1) which data layers were the most effective for splitting the confused class into the appropriate land cover units, and (2) the appropriate thresholds for splitting the classes. Models were then developed using one to several data sets to split each confused class into the desired land cover categories. As an example, a spectral class might be confused between row crop and high-intensity residential areas. In order to split this particular class into more meaningful land cover units, population density and housing units density data were assessed to determine if they could be used to split the class into the respective categories, and if so, to define the appropriate thresholds to be used in the class splitting model.

Following the above class splitting steps, a "first order" classification product was constructed from the clustered leaves-off data. Leaves-on data were then clustered with the goal of refining certain land cover features not easily discriminated using leaves-off TM data. Land cover classes that were spatially but not spectrally distinct in the leaves-off data (barren areas, clearcuts) were digitized off the screen from the leaves-on data. These digitized data layers were used in conjunction with clustered leaves-on data to define barren and cleared areas which were then incorporated into the classification product. A digitized layer outlining wetland areas was also used to refine the wetlands information. "Other grasses", consisting largely of parks, urban lawns, and golf courses, were defined at this point by using hand-digitized information and LUDA urban information to separate "other grasses" from "hay/pasture". Similarly, high-intensity residential and high-intensity commercial/industrial areas were separated by using a threshold in the population density data.

Caveats and Concerns:

While we believe that the approach taken has yielded a very good general land cover classification product for a very large region, it is important to indicate to the user where there might be some potential problems. The biggest concerns are listed below:

1) Quantitative accuracy checks have yet to be conducted. We plan to make comparisons with existing data sets in order to develop a general overview regarding the quality of the land cover data set developed. Feedback from users of the data will be greatly appreciated.

2) Some of the leaves-off data sets were not temporally ideal. In this project, leaves-off data sets are heavily relied upon for discriminating between hay/pasture and row crop, and also for discriminating between forest classes. The success of discriminating between these classes using leaves-off data sets hinges on the time of data acquisition. When hay/pasture areas are non-green, they are not easily distinguishable from other agricultural areas using remotely sensed data. However, there is a temporal window during which hay and pasture areas green up before most other vegetation (excluding evergreens, which have different spectral properties); during this window these areas are easily distinguishable from other crop areas. The discrimination between evergreen and deciduous forest is likewise optimized by selecting data in a temporal window where deciduous vegetation has yet to leaf out. Due to double-cropping practices and the long-growing season in this portion of the country, it's difficult to acquire a single-date of imagery that adequately differentiates between both deciduous/conifer and hay-pasture/row crop.

3) The data sets used cover a range of years, and changes that have taken place across the landscape over the time period may not have been captured. While this is not viewed as a major problem for most classes, it is possible that some land cover features change more rapidly than might be expected (e.g. hay one year, row crop the next).

4) Wetlands classes are extremely difficult to extract from Landsat TM spectral information alone. The use of ancillary information such as National Wetlands Inventory (NWI) data is highly desireable. NWI data were not available in digital format for much of this area. Manual digitizing was used in combination with spectral information to derive much of the wetlands information, a procedure that isn't able to provide the level of detail of NWI data. It is suspected that forested wetlands are underestimated in areas where NWI wasn't available.

5) Accurate definition of the transitional barren class was extremely difficult. The majority of pixels in this class correspond to clear-cut forests in various stages of regrowth. Spectrally, fresh clear-cuts are very similar to row-crops in the leaves-off data. Manual correction of coding errors was performed to improve differentiation between row-crops and clear-cuts, but some errors may still be found. As regrowth occurs in a clear-cut region, the definition of transitional barren verses a forested class becomes problematic. An attempt was made to classify only fresh clear-cuts or those in the earliest stages of regrowth, but there are likely forested regions classed as transitional barren and vice versa.

6) Due to the confusion between clear-cuts, regrowth in clear-cuts, forested areas, and shrublands, no attempts were made to populate the shrubland classes. Any shrubland areas that exist in this area are classed in their like forest class, i.e. deciduous shrubland is classed as deciduous forest, etc.

Part X Concerns and Recommendations

In recognition of limited resources, efforts to protect water resources must be based on credible science and coordinated management of available resources. Continued cooperation and collaboration of all partners, education, and promotion and implementation of voluntary and mandatory compliance with best management practices (BMPs) remains a priority.

Animal waste runoff is another special problem. Toward a solution, a proactive approach has been implemented with agricultural stakeholders through Confined Animal Feeding Operation (CAFO) Registration by Rule. Erosion and sedimentation continues to be a long-term concern. From a quantity perspective statewide, sediment is generally the leading stream pollutant. This problem is difficult to address in a comprehensive manner since many land-disturbance activities can and do produce water quality degradation. The Department has placed emphasis on erosion and sedimentation 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, with a commensurate increase in the number of compliance actions in this arena. The federally mandated NPDES Phase II Stormwater Program for construction and urban areas will provide a mechanism to address this issue, although funding for program development and implementation remains problematic.

Funding of the Water Quality Program and ever increasing mandates will continue to provide challenges. 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.

Protection of water resources must be based on credible science. Implementation of management measures must be based on sufficiently detailed watershed protection plans with measurable goals. In Alabama, the Clean Water Partnership program promotes efficient and effective implementation of technically sound, environmentally protective, and economically achievable management measures using a grass-roots approach. The partnership is composed of a diverse and inclusive coalition of public and private interest groups and individuals who are working in collaboration to improve, protect, and preserve water resources and aquatic ecosystems in Alabama. State and local funding is needed to institutionalize this successful endeavor. It is recommended that adequate state funding be provided to base permanent facilitators in each basin or subbasin to coordinate projects and programs and to enhance citizen interest and input into decision-making processes.

Watersheds provide logical geo/physical boundaries for identifying and mitigating sources and causes of pollution. Watershed management is a better way to coordinate people, resources, programs, and information more efficiently. The state has instituted rotational river basin/watershed, local community based, and citizen volunteer water quality monitoring approaches to identify nonpoint source impaired, threatened, and unimpaired waters. These approaches provide data and information that is essential to the development of holistic watershed protection plans. However, in order to plan, develop and coordinate actual implementation of these plans, additional staff, time, expertise, and other resources must be augmented. In addition, as resources allow and as practical, it is recommended that other media be assessed using the river basin/watershed assessment approach and incorporated into a holistic air, land, and water resource protection plan.

Regardless of pollutant cause, source, or media, citizen input, cooperation, and collaboration must be garnered through education and outreach, technical assistance, technology transfer and funding resources. High priority should be assigned to providing stakeholder understanding of the value of limited natural resources and encouraging protective actions. Building citizen awareness, educating stakeholders about their roles and responsibilities, identifying processes and issues, and motivating individuals to implement management measures will assure long-term water quality protection success in Alabama. At a minimum, it is recommended that all resource providers comprehensively identify audiences, concerns, goals and objectives, constraints to implementation, measures of success, and feed-back loops in order to provide a clear sense of direction and prevent duplication of efforts - before expenditure of project funds.

Water quality assessment and resource protection efforts should emphasize shared decision-making processes, integrate diverse and inclusive partnerships, and provide a clear understanding of the many and varied problems impacting a waterbody. In Alabama, voluntary and enforceable mechanisms are in-place, complementary, and are effective in assuring long-term protection of water quality. However, as competing demands for limited resources endure, additional information becomes available, priorities change, or complex issues emerge, watershed protection plans must be designed to be iterative, particularly as related to TMDL plan implementation. Stakeholders must be involved in the early stages of plan development, encouraged to assume ownership, and voluntarily accept responsibility for providing solutions. Certain elements and structure of the plans can be adapted to the entire watershed, or to specific source or causes of impairments. However, it is recommended that all plans in Alabama be based on a similar format, especially if the impairments to be addressed are both point and nonpoint source related and/or the plan will serve as a TMDL implementation plan.

In addition to the traditional NPDES point source discharge permitting program and voluntary implementation of nonpoint source management measures, various innovative and alternative approaches should be considered. This will ensure that long-term watershed and natural resource protection is well integrated with economic sustainable and social goals such as initiatives that focus on human and ecoregional health, recreation, and cultural, social, or other issues. Efforts should focus on achieving clearly defined goals and objectives using the combined resources of federal, state, local and private programs. These efforts may include, but are not limited to: pollutant trading, issuing discharge permits using a rotating river basin or watershed approach, encouraging local-issue enforcement/assistance from municipalities and counties, supporting additional home-rule authorities, establishing tax value and land use incentives, providing education and outreach to decision makers and public officials, and/or focusing on other creative approaches to advance protection of the resource. The views of regulators, local governments, agricultural groups, environmental groups, industry, and citizens must be considered when developing the details of how these initiatives will be designed and implemented. Substantial increases in agency staff and funding will be needed to effect significant alternative processes.

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 10-1. 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 GIS software are an integral part of this process. 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." A recent Executive Order signed by the Governor has created a State GIS Council to make recommendations for Alabama's development and use of GIS technologies by September 2002. Efforts to develop a new water quality database, which will allow more efficient use of data for analysis and reporting purposes as well as uploading to the new version of EPA's national water quality database, STORET X, are nearing completion. The Department has also implemented and recently upgraded ADEM's lab information management system (LIMS) used by the Department's three laboratories.

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. Development of EPA-mandated nutrient criteria for State waters will also require additional monitoring. Based on EPA's comparison with other Region 4 states and an evaluation of Alabama's current surface water monitoring program, a significant increase in resources is needed for surface water monitoring. Unfortunately, increases in funding from State and federal sources are unlikely at this time.

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

Table 10-1

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
AFC	Alabama Forestry Commission
	Alabama's Public Universities
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
Alabama 2002 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

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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)

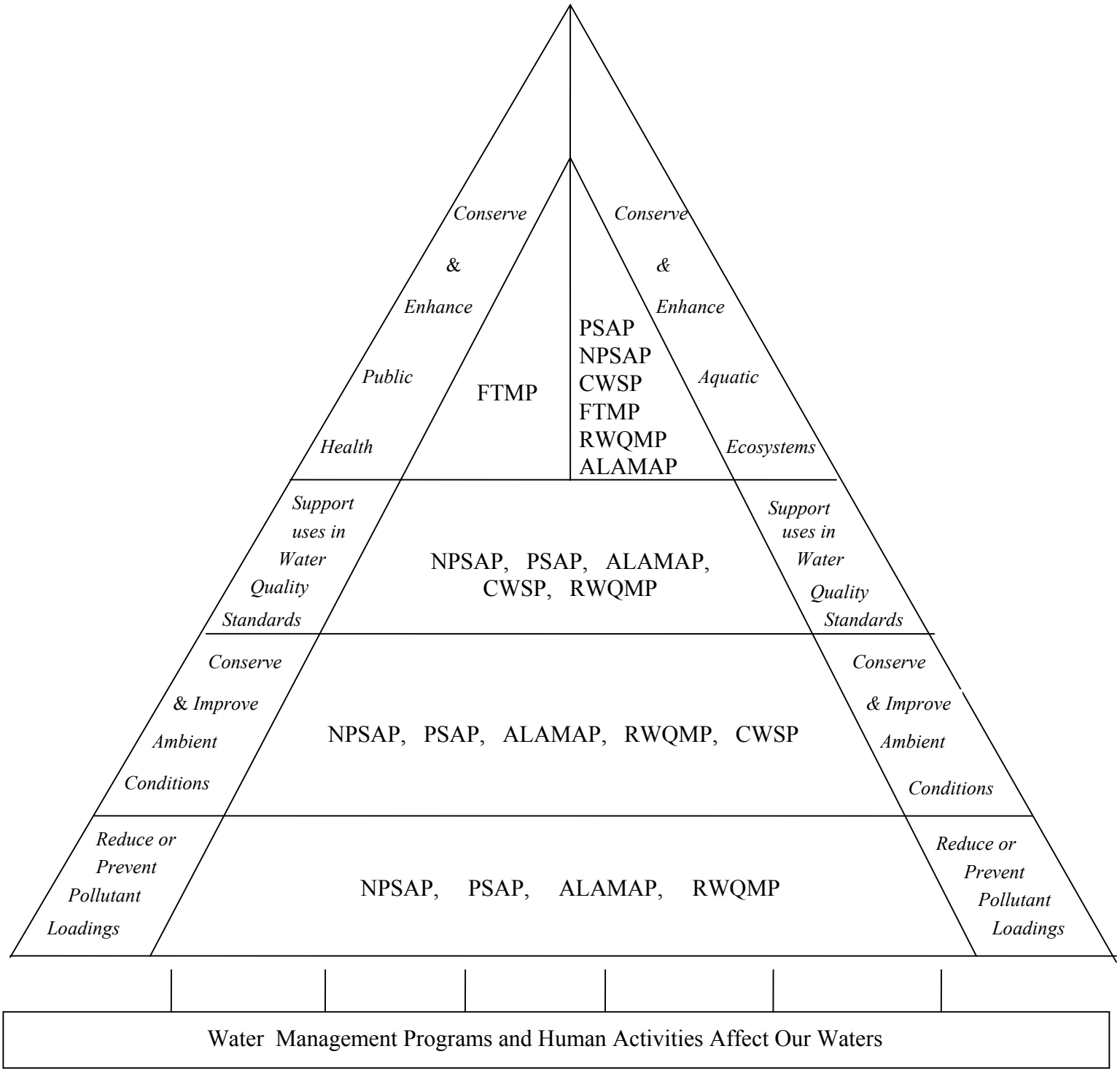
Table 3. Reports Generated by Field Operations Division Since 1990

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 Dog River Watershed: 2nd Year's Study. Ongoing Development and Assessment of the Effects of Urban Nonpoint Sources on the Aquatic Resources of the Basin. Macroinvertebrate Community and Sediments.	Coastal
1995	Alabama/Mississippi Pilot Reference Site Project: 1990-1994	

Table 3 (cont.)

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 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.