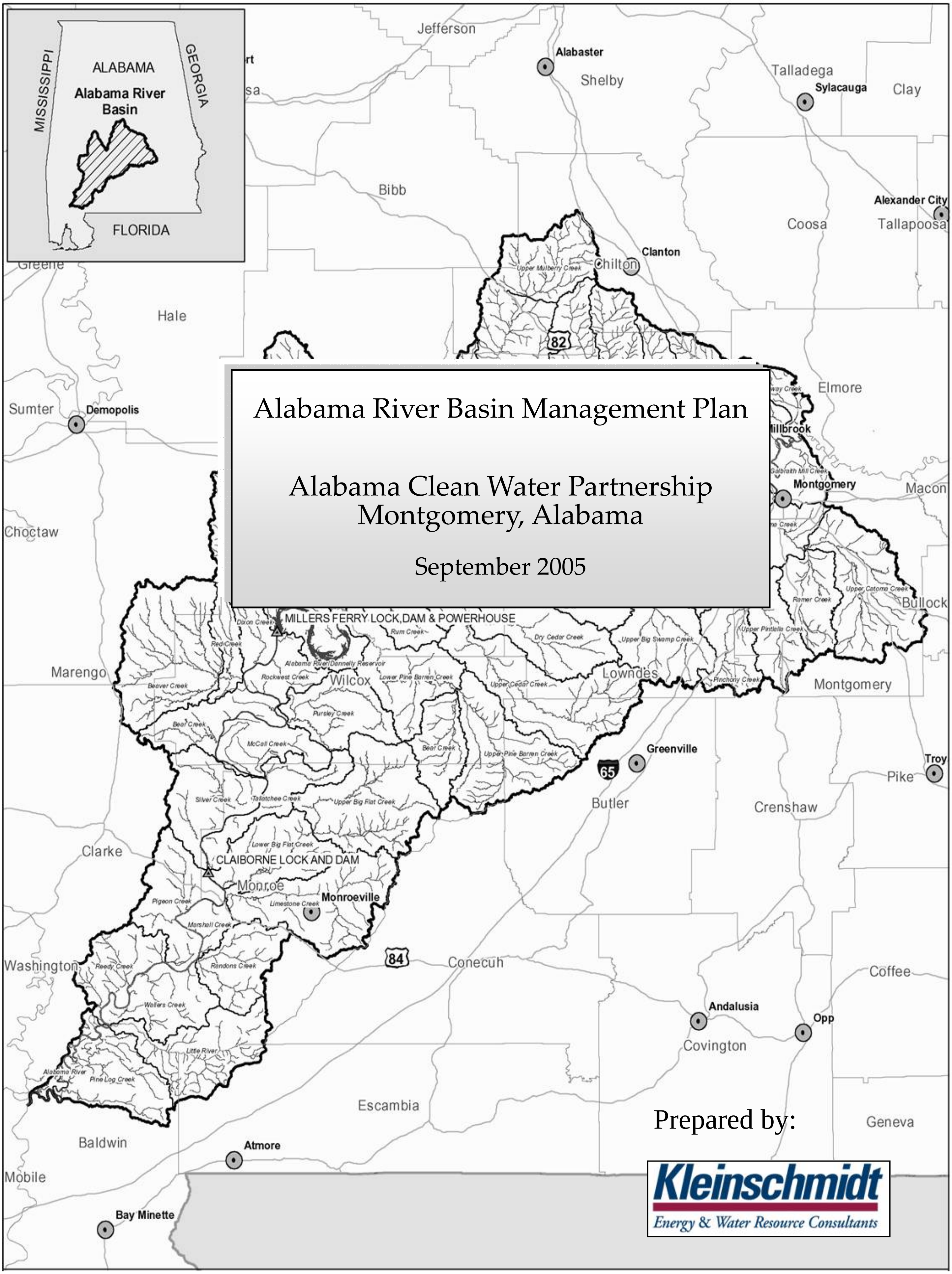

Alabama River Basin Management Plan

Alabama Clean Water Partnership
Montgomery, Alabama

September 2005

Prepared by:

Kleinschmidt

Energy & Water Resource Consultants

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*This project was funded or partially funded by the
Alabama Department of Environmental Management through a
Clean Water Act Section 319(h) nonpoint source grant provided
by the U.S. Environmental Protection Agency – Region IV*

ALABAMA RIVER BASIN MANAGEMENT PLAN

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ACKNOWLEDGEMENTS

On behalf of the Alabama Clean Water Partnership and the Alabama/Tombigbee Steering Committee, Kleinschmidt Associates would like to thank all the organizations and individuals that participated in the process to develop this basin management plan. Their participation at stakeholder and steering committee meetings, input at various points during the planning process, and comments on draft versions of the plan were essential to the successful development of this plan. Moreover, the interest and enthusiasm in the sustainable management of Alabama's waters shown by these participants gives promise to the future implementation of the recommendations in this plan and the long-term protection of water quality in the river basins of the State. A list of many of the dedicated stakeholders is provided below:

Alabama Clean Water Partnership
Alabama Coastal Foundation
Alabama Department of Environmental Management
Alabama Department of Economic Affairs – Office of Water Resources
Alabama Department of Public Health
Alabama Farmers Federation
Alabama Forestry Commission
Alabama Power Corporation
Alabama Pulp and Paper Council
Alabama River Pulp
Alabama Rivers Alliance
Alabama Soil and Water Conservation Committee
Alabama Water Watch
Alabama-Tombigbee Regional Commission
Auburn University
Boise Cascade
Business Council of Alabama
Capital Ideas
Central Alabama Regional
CH2M Hill
City of Montgomery
Coosa Alabama River Improvement Association
Dee River Ranch
Georgia-Pacific
Gulf States Paper
Hand Arendall/Alabama Coastal Foundation
Home Builders Association of Alabama
Legacy Partners in Environmental Education
MS Department of Environmental Quality
Natural Resource Conservation Service
Olin
Planning and Development Council
Plum Creek Watershed Association
Rayonier, Inc
Tenn-Tom Water Development Authority
The Nature Conservancy
The Water Works and Sanitary Sewer Board of the City of Montgomery
Tombigbee Resource Conservation & Development Council
United States Army Corps of Engineers
United States Department of Agriculture
United States Geological Survey
University of South Alabama Foundation
University of West Alabama

PLACEHOLDER

COMMONLY USED ACRONYMS AND ABBREVIATIONS

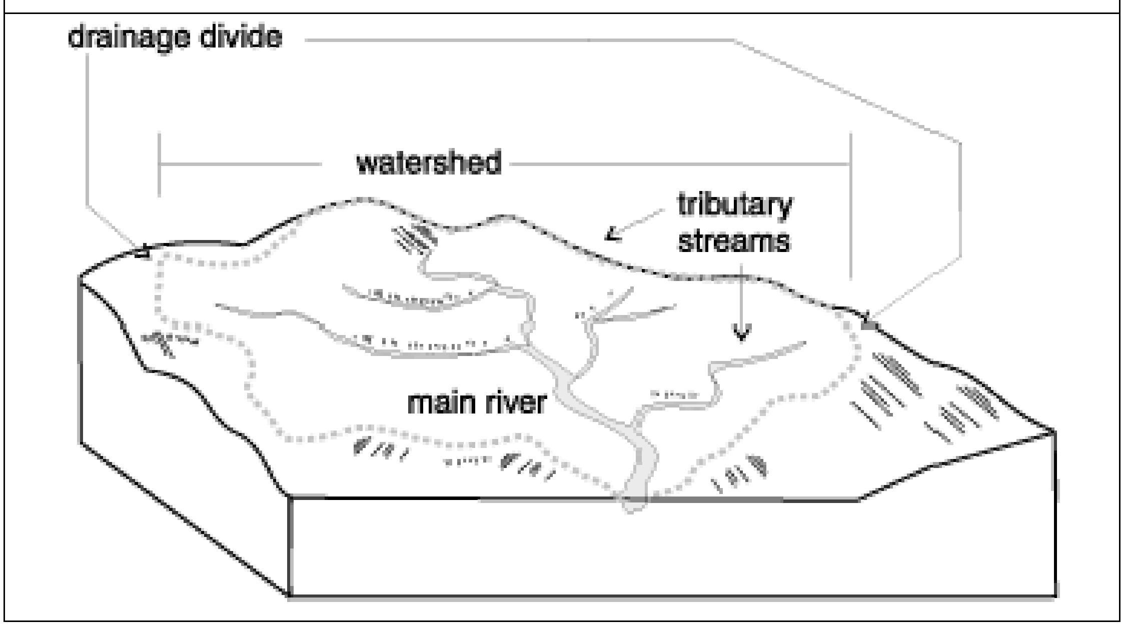
AAGC	Alabama Association of General Contractors
ACES	Alabama Cooperative Extension System
ACOE	United States Army Corps of Engineers
ACWP	Alabama Clean Water Partnership
ADCNR	Alabama Department of Conservation and Natural Resources
ADAI	Alabama Department of Agriculture and Industry
ADECA	Alabama Department of Economic and Community Affairs
ADEM	Alabama Department of Environmental Management
ADIR	Alabama Department of Industrial Relations
ADOT	Alabama Department of Transportation
ADPH	Alabama Department of Public Health
AEC	Alabama Environment Council
AEMC	Alabama Environmental Management Commission
AFA	Alabama Forestry Association
AFC	Alabama Forestry Commission
AFO	Animal Feeding Operation
AHBA	Alabama Home Builders Association
ALFA	Alabama Farmers Federation
ANHP	Alabama Natural Heritage Program
APC	Alabama Power Company
APPCO	Alabama Pulp and Paper Council
ARA	Alabama Rivers Alliance
ASG	Alabama Sea Grant Extension Program
ASMC	Alabama Surface Mining Commission
AU	Auburn University
AWF	Alabama Wildlife Federation
AWPCA	Alabama Water Pollution Control Act
AWRI	Alabama Water Resources Institute
AWW	Alabama Water Watch
AWWA	Alabama Water Watch Association
BCA	Business Council of Alabama
BMP	Best Management Practices
CAFO	Concentrated Animal Feeding Operation
CBEP	Community Based Environmental Protection
CRP	Conservation Reserve Program (USDA NRCS)
CVA	Clean Vessel Act
CWA	Clean Water Act
CWAP	Clean Water Action Plan
DO	Dissolved Oxygen
DC	District Conservationist
EMAP	Environmental Monitoring Assessment Program
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program (USDA NRCS)
EWP	Emergency Watershed Protection Program
FIP	Forestry Incentives Program
FSA	Farm Services Agency
FWPCA	Federal Water Pollution Control Act
GIS	Geographical Information System
GSA	Geological Survey of Alabama
ICFAA	International Center for Fisheries and Allied Aquaculture – Auburn University
IPM	Integrated Pest Management
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory of the USFWS
OSDS	Onsite Sewage Disposal System
OSM	United States Bureau of Mines – Office of Surface Mining
RC&D	Resource Conservation and Development
SMZ	Streamside Management Zone
SWCC	Soil and Water Conservation Committee
SWCD	Soil and Water Conservation District
SWCS	Soil and Water Conservation Society
SWCP	State Wetland Conservation Plan
SWCS	Soil and Water Conservation Society
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy of Alabama
TSI	Trophic State Index
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers (a.k.a. ACOE)
USDA	United States Department of Agriculture
USDA -FS	United States Department of Agriculture – Forest Service
USDA -NRCS	Natural Resources Conservation Service
USDI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UWA	University of West Alabama
WHIP	Wildlife Habitat incentives Program
WMA	Watershed Management Authority
WRP	Wetlands Reserve Program
WWTP	Waste Water Treatment Plant

1.0 INTRODUCTION

The value of water is no secret to Alabama. In fact, Alabama ranks seventh in the United States for its number of stream miles, with 77,274 miles. It also boasts 337 miles of coastline and approximately 610 miles of estuarine shoreline along the Gulf of Mexico. Alabama has over 3.5 *million* acres of wetlands, both freshwater and tidal. There are also 490,472 acres of lakes, reservoirs and ponds; some of which are associated with 16 hydroelectric dams and 16 navigational dams (5 of which are also power-generating).

Whether it is the Mobile Bay, the Alabama River or Catoma Creek, many Alabamians live, play and work on the water. We are all dependent on water for food and energy. And, because of our reliance on this resource, we all have a vested interest in protecting it for ourselves and our grandchildren and their grandchildren. The basin management planning process is a very important step to protect Alabama waters. It is an all-inclusive process that encourages all interested parties to participate. It consists of people working together to create guidelines for the management of the State's water resources based on their beliefs and the best scientific information available. The ultimate result of this process is a basin management plan that guides the activities of individuals and organizations to protect and restore Alabama's creeks, rivers, ponds, lakes, estuaries, and bays.

Graphical illustration of a watershed



A basin or watershed is made up of all of the land that drains into a particular body of water like a stream, river or lake. Any body of water and its drainage area make up a distinct hydrologic unit (the "watershed") in which all living things are interconnected by a basic and dynamic element: *water*. All waterbodies, large and small, have distinct watersheds. For the sake of classification, watersheds for large rivers are actually referred to as *river basins* or simply, *basins*. Basins are made up of *sub-basins*. Sub-basins are made up of *watersheds.* And, watersheds are made up of *sub-watersheds* (tributaries).

What we do on the land where we live has a direct effect on the quality of water in our local streams. Rain carries soil from erosion along with other pollutants over the land and into our creeks, rivers and lakes. We commonly refer to this volume of water as **stormwater** and we refer to this type of pollution as **polluted runoff** or **nonpoint source pollution** because it does not come from any one **point source** or an end of a sewer or discharge pipe. Land uses including forest operations, mining, road construction, urban development, and certain farming practices increase soil erosion, can cause nonpoint source pollution, and negatively impact water quality. Common homeowner practices like, washing the car, applying fertilizers and pesticides, and improperly disposing of pet and households wastes, can also lead to nonpoint source pollution. When unchecked or mismanaged, these activities can lead to serious water quality problems. However, when practicing sound and careful management, plus a little common sense and courtesy for others, we can minimize and control the impact we have on the land and the water.

The prevention of water pollution by managing activities that impact the land and water occurs by regulatory and non-regulatory means. In the United States, the Clean Water Act[1] (CWA) mandates the designation of water quality standards and addresses activities that lead to water pollution. Water quality standards are determined by factoring in the known uses[2] of the water (e.g. swimming, fishing), chemical and biological criteria (e.g. lead, arsenic, bacteria) and a quality protection clause known as, the "anti-degradation policy." Using the standards as benchmarks, the CWA calls for the management of a wide range of water quality issues either by regulation, as is the case with wetland impacts, dredging, and point source pollution (e.g. end-of-

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[1] 33 U.S.C. 1251 - 1376

[2] Alabama's use classification system contains the following use classifications: Public Water Supply (PWS), Swimming and Other Whole Body Water Contact (S), Shellfish Harvesting (SH), Fish and Wildlife (F&W), Limited Warmwater Fishery, Outstanding Alabama Water (OAW), and Agricultural and Industrial Water Supply (A&I).

pipe discharges), or voluntary strategies such as, providing technical and financial assistance to industry, farmers, and municipalities. Section 319 of the CWA calls for a voluntary approach to protecting and restoring water quality and it is the main body of the CWA that authorizes programs and strategies such as this basin management plan to manage nonpoint source pollution and to protect watersheds. Table 1 below summarizes the primary regulatory programs and governmental mechanisms that protect water quality.

Table 1. Summary of Water Quality Regulations and Management Authorities

Program	Authorized Agency	Description
Water Quality Inventory – State of the State's Waters - 305(b)	ADEM - Water	Documents the quality of all of Alabama's waters
List of Impaired Waters - 303(d)	ADEM - Water	Information on waters that are polluted or degraded and do not meet their designated and existing uses.
Water Quality Restoration Planning (TMDL)	ADEM - Water	Developed for the waters listed under 303(d), these plans limit the amount of a pollutant(s) into impaired waters
Point Source Discharges	ADEM – Water	Individual and group permits to discharge pollutants into surface waters from municipal wastewater treatment plants, large storm sewer outfalls, construction sites over 5 acres, utilities, industrial discharges, aquaculture operations, certain animal feeding operations (AFO) and surface mining operations.
Stormwater Phase I & Phase II	ADEM – Water	Permits to limit runoff and pollution from municipal separate storm sewer systems and construction sites
Concentrated Animal Feeding Operations (CAFO)/Animal Feeding Operations(AFO)	ADEM – Field Operations	AFO that qualify as CAFOs must obtain a NPDES permit from ADEM. Also, AFO in certain, priority watersheds must register with ADEM too.
State Indirect Discharge Permits	ADEM – Water	Permits for industrial discharges into a publicly-owned wastewater treatment system.
Surface Mining Rules	ADEM-Field Operations	In addition to NPDES permits, surface mines must submit pollution prevention plans to ADEM.
Freshwater Wetlands	USACOE & ADEM	Authorized through Section 404 of the Clean Water Act, certain activities that may impact to waterways and wetlands must be permitted.
Ground Water Protection	ADEM - Water	Regulations for underground storage tanks (UST) and underground injection (UIC)
Water Withdrawals	ADECA – OWR	ADECA issues 5 to 10 year "Certificates of Use" for water withdrawals/diversions No permits; a "Declaration of Beneficial Use" must be filed with ADECA
Drought Management	ADECA-OWR	The state maintains the Alabama Drought Management Plan which contains the State's strategies for handling a drought.
Onsite Sewage Disposal Systems	AL Department of Public Health	Property owners must obtain a permit from the county health agency before they install an onsite sewage disposal system or septic tank.
Local land use controls	County, city and town governments	The use of zoning, easements and building codes to minimize the impact of development on water quality. Few municipalities have zoning authority in Alabama.
Water Quality Trading	USEPA & ADEM	EPA has issued the Water Quality Trading Assessment Handbook as guidance to explore this market-based approach
Watershed-based Permitting	USEAP & ADEM	An extension of the NPDES program to cover multiple sources within a watershed under one permit.

Implementation of the provisions of the CWA, including Section 319, fall into the hands of federal and state environmental agencies. The United States Environmental Protection Agency (EPA) is the federal agency charged with issuing and enforcing rules and regulations under the Clean Water Act. To accomplish this mandate, EPA works with, and in many cases, delegates authority to, state environmental agencies to conduct implementation activities.

EPA Region 4 covers the southeastern United States, including Alabama. It coordinates with the Alabama Department of Environmental Management (ADEM), which is the primary agency responsible for executing the water protection mandates of the CWA for the State of Alabama. These responsibilities include, but are not limited to, the development of water quality standards;[3] monitoring and reporting the state and condition of Alabama's waters[4]; creating a list of impaired waters[5]; regulating point sources of pollution (*i.e.,* Section 402 - National Pollution Discharge Elimination System (NPDES)); setting limits to concentrations and volumes of pollutant inputs (Total Maximum Daily Loads (TMDLs)); and providing technical and financial assistance to landowners, municipalities and business to reduce nonpoint source pollution (Section 319). An excellent summary of these authorities can be found in the State's Nonpoint Source Management Program (NSMP)..[6]

Alabama's Nonpoint Source Management Program sets forth ADEM's vision, goals, objectives and strategies to protect and restore the waters of the State by effectively managing nonpoint source pollution through a community-based, watershed-specific and cooperative approach (ADEM, 2003). The ADEM Office of Communication, Planning, and Outreach is charged with updating and coordinating the implementation of the NSMP. The Program is periodically updated and was last updated in August of 2003. This latest Program update spells out the directive for a watershed approach to nonpoint source pollution management.

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[3] Alabama's surface water quality standards are found in Chapters 335-6-10 and 335-6-11 of the ADEM Administrative Code. The ***Antidegradation Policy*** of the ADEM Water Quality Program is found in the ADEM Administrative Code Rule 335-6-10-04(3) is perhaps the most comprehensive enforcement mechanism because it requires management measures to prevent the decrease (degradation) of the State's waters.

[4] ADEM completed the *Integrated Water Quality Monitoring and Assessment Report* in 2004, also commonly known as the 'State of the State's Waters Report, which is a biannual report to Congress mandated by Section 305(b) of the CWA.

[5] Section 303(d) of the CWA mandates that the states must develop a list of impaired (not attaining water quality standards) waters every even-numbered year.

[6] *See* 'Chapter 4 - Management Program Implementation Mechanisms and Authorities' for a summary of the regulatory and non-regulatory mechanisms and legal foundation on many water quality related programs.

Alabama's NSMP sets forth ADEM's vision, goals, objectives and strategies to protect and restore the waters of the State by effectively managing nonpoint source pollution through a community-based, watershed-specific and cooperative approach (ADEM, 2003). The ADEM Office of Communication, Planning, and Outreach is charged with updating and coordinating the implementation of the NSMP. The Program is periodically updated and was last updated in August of 2003. This latest Program update highlights the important elements of a watershed approach to nonpoint source pollution management in Alabama:

> *"In 1997, Alabama began implementation of a watershed management approach as a tool for assessment and prioritization of water quality issues, development of strategies and solutions, and opportunities for targeted, cooperative actions to achieve water quality goals. Among the key elements of the watershed management approach are: stakeholder involvement; watershed monitoring; watershed assessment; prioritization and targeting development of management strategies; development of watershed management plans; and, plan implementation."*
>
> \- ADEM Nonpoint Source Management Program, 2004

More specifically, basin management plans for Alabama's river basins are explicitly stated in the NSMP's Goals:

> *"Goal 4. Develop 10 river basin management plans (8-digit Hydrologic Unit Code Cataloging Unit) that present practical "big-picture" goals, objectives, and milestones to protect impaired or threatened waters. Goal 5. Develop 10 sub-watershed protection plans (11-14 digit Hydrologic Unit Code subwatershed number) to provide reasonable assurance that load allocations for targeted sources and causes of NPS pollution are being addressed and water use classifications and standards can be restored as expeditiously as possible. Goal 6. Support the efforts of the Alabama Clean Water Partnership (CWP) Program."*
>
> - Chapter 1 of the Alabama Nonpoint Source Management Program August 2003, ADEM Nonpoint Source Unit. Pages 1-5.

Development of this basin management plan for the Alabama River Basin constitutes another successful step for the State of Alabama to meet its nonpoint source pollution management goals. The next section will explain the origin of this basin management plan and how it was created. It will also discuss the many people involved in the planning process.

2.0 BASIN MANAGEMENT PLAN FOR THE ALABAMA RIVER

This basin management plan for the Alabama River Basin has been developed to advance the mission of the Alabama Clean Water Partnership whose members are committed to *restoring, maintaining, and protecting the waterways of the State of Alabama*. It is the first plan of its kind for this basin, paralleling previous basin planning efforts completed and underway for other basins of the state. Two basic goals have guided its development:

1. ***Educate readers about nonpoint source pollution in the Alabama River Basin and how it can be effectively managed and,***

2. ***Assist individuals and organizations working on the management of the Alabama River Basin with the coordination of their activities.***

This document is one piece of a very large and complex puzzle consisting of related studies and plans that have focused on the management of the Alabama River Basin. And, like all puzzle pieces, this piece (the "plan") should tell us enough about the rest of the pieces so that we can fit it into place. The plan was developed to meet the following objectives:

- identify and characterize pollution sources
- describe nonpoint source pollution control measures
- estimate technical and financial assistance needs to implement recommendations
- increase public awareness of watershed issues
- schedule pollution control management measures
- describe plan milestones
- identify monitoring strategies
- estimate pollutant load reductions

The development of this basin management plan was highlighted by a process where people met and discussed issues about Alabama's waters and their watersheds. The discussions focused on how to better understand how we impact our waters and to develop guidelines for ourselves to decrease the impacts we have on them by 1) encouraging the positive, responsible things we are already doing to protect Alabama's waters and 2) informing each other and promoting change of the behaviors and actions that have a negative impact on our environment, especially water quality. In this regard, the basin management plan reflects our knowledge about the waters and state how we might manage them in the future.

This basin management plan contains information and data that describes the river and its basin, explains water quality issues in the watershed, and proposes recommendations for managing these issues. This written document becomes a central source of information about the basin that educates people and enables them to make informed choices about their activities as they relate to impacts in the Alabama River Basin. The plan strives to influence the way people act in a way that promotes the stewardship of Alabama's waters.

2.1 Alabama Clean Water Partnership (ACWP)

The ACWP is a statewide nonprofit organization that incorporated in 2001. Guided by a Board of Directors and a Statewide Coordinator, it is a coalition of public and private individuals, companies, organizations and governing bodies that work together to manage water resources and aquatic ecosystems for Alabama. The purpose of the ACWP is to bring together many diverse groups in order to coordinate their efforts, to share information, to plan management activities and to allocate resources. The ACWP was organized to allow these diverse interests to develop, support, and coordinate efforts that aim to restore, maintain, and protect the waterways of Alabama. ACWP Partners enjoy, 1) improved communication, 2) data and information sharing and consolidation, 3) opportunities for improved coordination, and 4) opportunities for enhanced collaboration.

Major River Basins Represented in the Alabama Clean Water Partnership	
Alabama - Tombigbee	Conecuh-Sepulga
Black Warrior	Coosa
Cahaba	Coastal
Chattahoochee-Chipola	Tallapoosa
Choctawhatchee-Pea-Yellow	Tennessee

Under the auspices of the Alabama Department of Environmental Management, USEPA, and private interests, the ACWP has successfully spearheaded the basin management planning effort for the rivers of Alabama. By adopting the "basin" or "watershed" approach to the management of water quality issues, constituencies are invited to participate on behalf of their respective basins and sub-basins. The goal of this process is to address water quality issues at the smallest scale possible because water quality problems – especially nonpoint source pollution problems – are the culmination of innumerable small pollution inputs and, therefore, require a widespread educational response to produce cumulative and positive results.

2.2 Alabama-Tombigbee CWP Steering Committee

The ACWP is made up of 10 basin groups representing 11 major river basins of the State. For each basin, a Steering Committee has been formed consisting of representatives from the general public, agricultural business, major industries, governmental agencies, private organizations and universities. The Alabama/Tombigbee Clean Water Partnership Steering Committee (a.k.a. AlaTom Steering Committee) is one of these committees.[7] Over 70 people representing counties throughout the two basins make up this committee. Its primary purpose is to serve as a coordinating body for stakeholders from the Alabama and Tombigbee River basins. The Committee meets on a quarterly basis in Montgomery. The membership of the Steering Committee is summarized in Table 2 below.

Table 2. Membership of the Alabama – Tombigbee Steering Committee

Alabama Department of Environmental Management	Central Alabama Regional Planning and Development Council
Alabama Clean Water Partnership	CH2M Hill
Alabama Coastal Foundation	City of Montgomery
Alabama Department of Economic Affairs – Office of Water Resources	Coosa Alabama River Improvement Association
Alabama Department of Public Health	Dee River Ranch
Alabama Farmers Federation	Georgia-Pacific
Alabama Forestry Association	Gulf States Paper
Alabama Forestry Commission	Hand Arendall/Alabama Coastal Foundation
Alabama Home Builders Association	MS Department of Environmental Quality
Legacy Partners in Environmental Education	Olin
Alabama Power Corporation	Plum Creek Watershed Association
Alabama Pulp and Paper Council	Rayonier, Inc
Alabama River Pulp	Tenn-Tom Waterway Development Authority
Alabama Rivers Alliance	The Nature Conservancy
Alabama Soil and Water Conservation Committee	The Water Works and Sanitary Sewer Board of the City of Montgomery
Alabama Water Watch	Tombigbee Resource Conservation & Development Council
Alabama-Tombigbee Regional Commission	University of South Alabama Foundation
Auburn University	University of West Alabama
Boise Cascade	United States Army Corps of Engineers
Business Council of Alabama	United States Department of Agriculture – Natural Resource Conservation Service
Capital Ideas	United States Geological Survey

[7] There is currently one steering committee for both the Alabama River and Tombigbee River basins because of limited funding to the ACWP. Each basin would have its own steering committee if funding were available.

2.3 Sub-basin Stakeholder Groups in the Alabama River Basins

In addition to the overarching support of the ACWP and the AlaTom Steering Committee, this basin management planning process heavily relies on input from a wide array of local stakeholders with various perspectives on water resource management issues. Local knowledge of the watershed, feasibility of management recommendations (ground-truthing) and community "buy in" were key elements of the planning process and should come through local input. These local stakeholders are typically the individuals and organizations with perspectives related to the basin from a smaller, more intimate, or grassroots scale, which means they are property owners, local resource managers and/or representatives of local businesses, industry, municipal government, and civic organizations. Some stakeholders were already involved in the process; other stakeholders were invited to participate.

In the Alabama Basin, the core group of local or sub-basin stakeholders were recruited from organizations participating in the ACWP and the AlaTom Steering Committee. Local organizations and watershed groups were also invited to attend. In the Alabama River Basin, several such watershed-based grassroots organizations exist: Catoma Creek Watershed Association, Rambranch Creek Association, Save and Preserve Swift Creek and the Wilcox Friends of the River.

Local citizen activists, such as water quality monitors, are an important source of local input and volunteer resources. For instance, in the Alabama River Basin, volunteers play an active role in water quality monitoring. These citizen monitors are made up Boy Scouts, high school students, retirees and working parents. Such volunteers are coordinated by Alabama Water Watch and the Alabama Cooperative Extension System. They will be discussed in more detail later on in the plan.

An information and education component beyond the quarterly meetings of the AlaTom Steering Committee involving local stakeholders was a crucial element to this basin management planning effort. This component provided the opportunity for stakeholders to participate in the planning process and to contribute to the basin management plan(s). It is common that stakeholders like governmental agencies and private interest groups have staff or representatives assigned to the planning process. On the contrary, the "working public" are more difficult to engage because of a lack of access to meetings (*i.e.*, working people are not afforded the time to attend daytime agency meetings) or the lack of awareness (*i.e.*, citizens typically do not monitor the daily functions of a governmental agency unless those functions are highlighted in the popular press). Therefore, the Alabama Clean Water Partnership (ACWP) and its consultant team provided opportunities for stakeholder identification, attendance and participation in the process.

Promoting attendance to a stakeholder participation program in support basin management efforts in both the Alabama and Tombigbee Basin was challenged by the great size of the two basins. Combined, the two basins encompass almost a quarter of the area of the entire State of Alabama: A total of 19,779 square miles (Area of Alabama = 52,423 sq. miles) and 54 counties (including over 6,000 sq. miles and 22 counties in Mississippi). Long travel distances within these basins were a practical hurdle for stakeholders to attend stakeholder meetings and demonstrated to that opportunities should be created on a smaller, more convenient scale. Stakeholder group organization on a smaller geographic scale would also promote water quality management at the watershed and sub-watershed scale. At this smaller scale, planning targets a smaller number of people and activities compared to a multi-county or multi-state level where the target population and area increases to an impractical scale.

With a limited number of existing stakeholder groups to call on as well as financial constraints, the AlaTom Steering Committee targeted this basin management plan and its ongoing public information efforts at the *sub-basin* level. Five sub-basins, three in the Alabama River Basin (Upper, Middle and Lower Alabama), and two in the Tombigbee River Basin (Upper and Lower Tombigbee), were designated to be the scope of the management plans. The supporting stakeholder outreach component of the plans were designed in accordance with this approach.

At the onset of the Alabama – Tombigbee Basin Management Planning Process in the fall of 2003, APPCO, AlaTom Steering Committee, and Kleinschmidt Associates agreed to implement a collaborative stakeholder process that built off current efforts. This process was strategically designed so that the basin management planning process would be used as a beacon to attract participants and local sponsors to form sub-basin groups. The hope was to “jump start” the public participation program for the Alabama and Tombigbee River Basins plans and to draw people to the statewide ACWP program.

The Ala-Tom Steering Committee and the Basin Facilitator organized several meetings over the course of the planning process. These meetings are listed in Table 3. Participants at these subbasin meetings received presentations on current water quality issues in their basin, subbasin and watersheds and they were asked to respond with questions and to engage in facilitated discussions. In some instances, “around the room” discussions were staged so that everyone in the audience was given an opportunity to introduce themselves, speak about where they live, their interest in participating in the group and most importantly, what concerns they had about the rivers and tributaries of their community. Participants were encouraged to elaborate on problems they perceived in the watershed and to suggest possible remedies for these issues. These sessions allowed for direct input from watershed stakeholders that wished to be a part of the basin management planning process. This stakeholder input is presented in Section 6.2 of this plan.

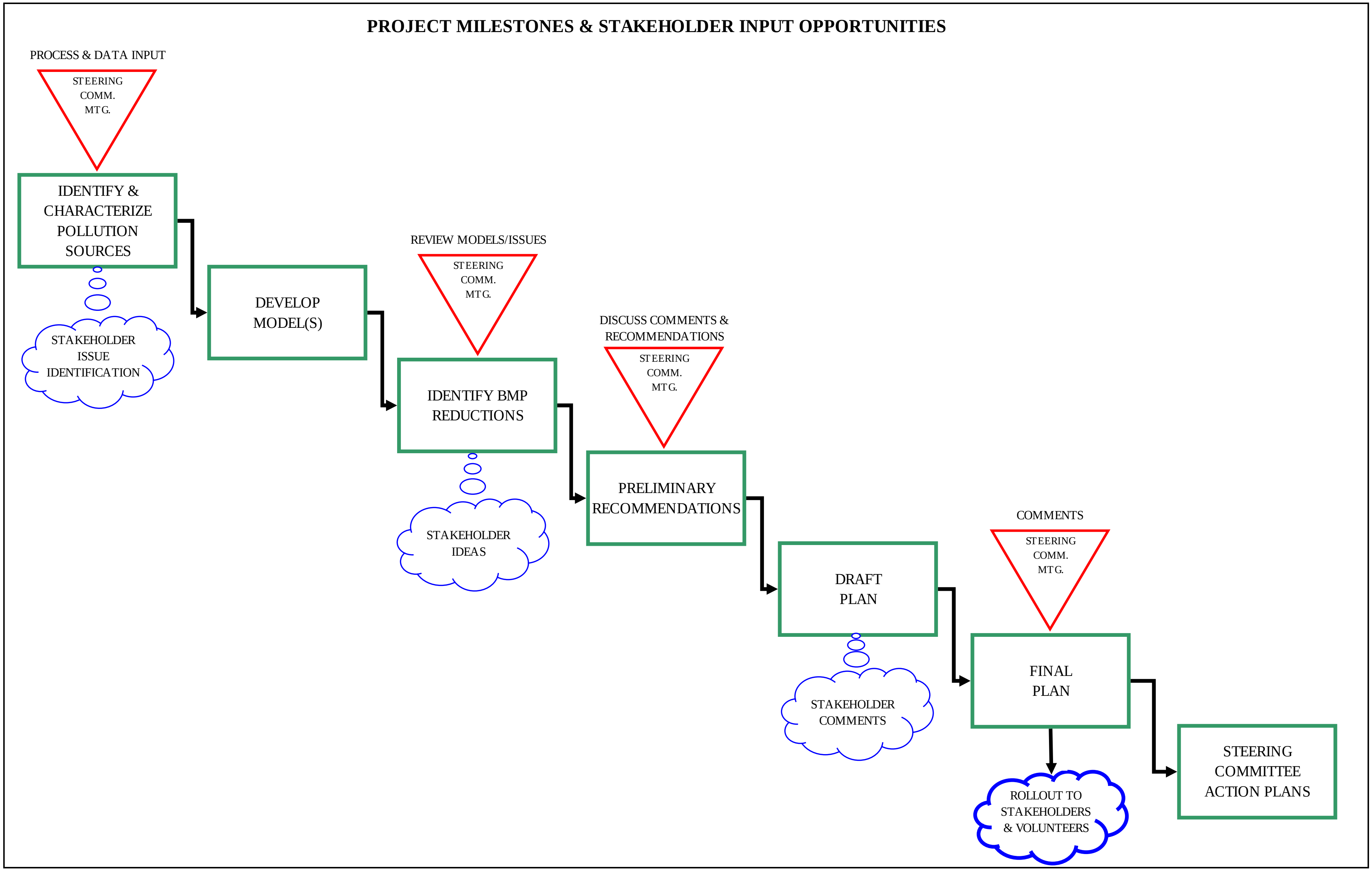
Table 3. Alabama River Subbasin Stakeholder Meetings

Lower Alabama/Lower Tombigbee Thursday, January 29, 2004 at 6:00 p.m., ALFA Building, Grove Hill, AL
Nonpoint Source Conference/WATERQUEST **Alabama/Tombigbee Stakeholders Meeting** February 10, 2004, Birmingham, AL
Upper Alabama – Catoma Creek Watershed Wednesday, March 17, 2004 at 12:00 p.m. at the Montgomery County, Department of Health Auditorium
Lower Alabama/Lower Tombigbee Thursday, March 18, 2004 at 6:00 p.m., ALFA Building, Grove Hill, AL

An illustration of the stakeholder input process fits into the process for developing the Alabama River Basin Management Plans is provided as Figure 1 on the next page. At defined stages in the plan development timeline (blue-colored symbols), stakeholders are given the opportunity to participate in the basin management planning process. Particular attention and energy is focused on stakeholder comments related to known water quality issues (*i.e.*, water quality issues as defined by the State's 305(b), 303(d) and/or TMDL Process) and any other water quality concerns or issues they have. In terms of scale, basin management issues are discussed from a basin level down to the associated watersheds and sub-watersheds, where applicable.

Stakeholder input is the cornerstone to successful basin management plans for the Alabama and Tombigbee River Basins. Participants at the sub-basin meetings received presentations on current water quality issues in their basin, sub-basin and watersheds and they were asked to respond with questions and engage in facilitated discussions. In some instances, "around the room" discussions were staged so that everyone in the audience was given an opportunity to introduce themselves, speak about where they live, their interest in participating in the group and most importantly, what concerns they had about the rivers and tributaries of their community. Participants were encouraged to elaborate on problems they perceived in the watershed and suggest possible remedies for these issues. These sessions allowed for direct input from watershed stakeholders that wished to be a part of the basin management planning process. This stakeholder input is presented in Section 6.2 of this plan.

Figure 1. Stakeholder Input Opportunities for the Basin Management Plans



2.3.1 Catoma Watershed Advisory Committee

Catoma Creek is a tributary of the Alabama River that runs northwesterly from its headwaters in southern Montgomery County to its confluence with the Alabama River approximately ten miles west of the City of Montgomery. ADEM categorizes the Catoma Creek with a 'Fish and Wildlife' classification meaning that the water quality in this creek should support aquatic fish and wildlife. Approximately 23 miles of the lower Catoma Creek from Ramer Creek to the confluence with the Alabama River have been included on the State's *303d List of Impaired Waters* for excessive organic enrichment and low dissolved oxygen since 1996. More recently, Catoma Creek was also "listed" because of the presence of high levels of pathogenic bacteria in water quality samples.

Great attention to Catoma Creek's and its water quality emerged in the late 1980s and continues today. Sanitary sewer overflows (SSOs) from the Catoma Water Pollution Control Plant (WPCP), resulting from rain events, were suspected to be negatively impacting the aquatic ecology of the creek and causing fish kills. Through an Administrative Order, ADEM directed the Water Works and Sanitary Sewer Board of the City of Montgomery to assess water quality issues associated with the WPCP and other possible pollution sources in the Catoma Creek Watershed. As a result, the *Catoma Creek Watershed Management Study* was begun.

The *Catoma Creek Watershed Management Study* concluded that the source of the creek's water quality problems were the SSOs associated with the WPCP. The study found that nonpoint source pollution and storm water discharges were the primary causes of water quality impairments to Catoma Creek in both wet and dry weather. The watershed study led to the development of the *Catoma Creek Watershed Management Plan*, taking an integrated and holistic approach to solving the creek's water quality problems. In October 1998, the *Plan* was completed by the consulting firm CH2M Hill for the Water Works and Sanitary Sewer Board of Montgomery.

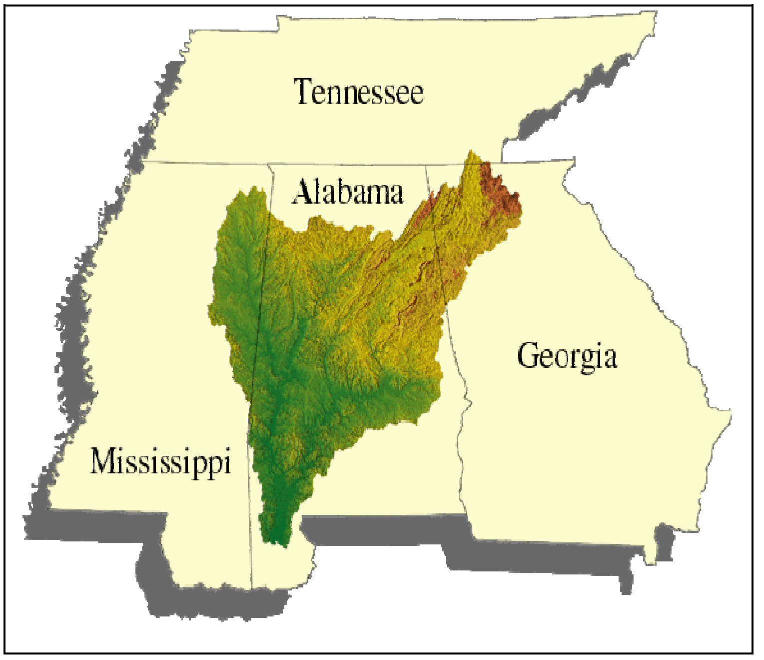
The Catoma Creek plan established management goals and strategies to restore and protect the water quality of Catoma Creek. Much like this basin management plan, it was developed with input from stakeholders representing various interests who worked together to identify problem and issues, define and rank objectives, develop management or control alternatives, implement the plan, and monitor the performance of implementation steps. The development of the plan relied on three committees and their collective efforts: Steering Committee, Technical Committee, and Education/Outreach Committee. Since the completion of the Plan, a standing committee called the Catoma Watershed Advisory Committee (CWAC) has been working under the auspices of the Board and CH2MHill to implement the watershed management plan.

The efforts to create and implement the *Catoma Creek Watershed Management Plan* represent a good working model for watershed management in Alabama. In fact, the activities in the Catoma Watershed provide evidence in support of the importance of working on the sub-watershed scale, which is a key recommendation of this plan.

The CCAC meets on a quarterly basis in Montgomery. During the development of this basin management plan, stakeholders from the Upper Alabama Sub-basin Stakeholders Group were invited to attend and participate in discussions regarding the Catoma Creek and the Alabama River. Although the Catoma Creek Plan exists as a separate document, its objectives run parallel with the management objectives of this basin management plan. This basin management plan recommends working with the Catoma Watershed stakeholders to further their goals as well as those for the sub-basin as whole.

3.0 PHYSICAL GEOGRAPHY OF THE ALABAMA RIVER BASIN

The Alabama River occupies the southeastern ridge of the Mobile River Basin, which is the sixth largest river basin in the United States, encompassing 44,000 square miles in portions of Alabama, Georgia, Mississippi and Tennessee. Seven major rivers and their subbasins make up the Mobile River Basin: Alabama, Black Warrior, Cahaba, Coosa, Mobile, Tallapoosa and Tombigbee. According to the United States Geological Survey (USGS), the mean annual flow of the Mobile River is approximately 62,100 cubic feet per second. Of this volume, the Alabama River makes up 52 percent of the flow contribution while the Tombigbee River contributes the other 48 percent (Atkins, et al, 2004). Nearly 4 million people live and work in the Mobile River Basin, mostly in the largest cities in Alabama: Birmingham, Mobile, Montgomery and Tuscaloosa (Johnson, et al, 2002). The rivers of the Basin generate most of the power consumed by this population.

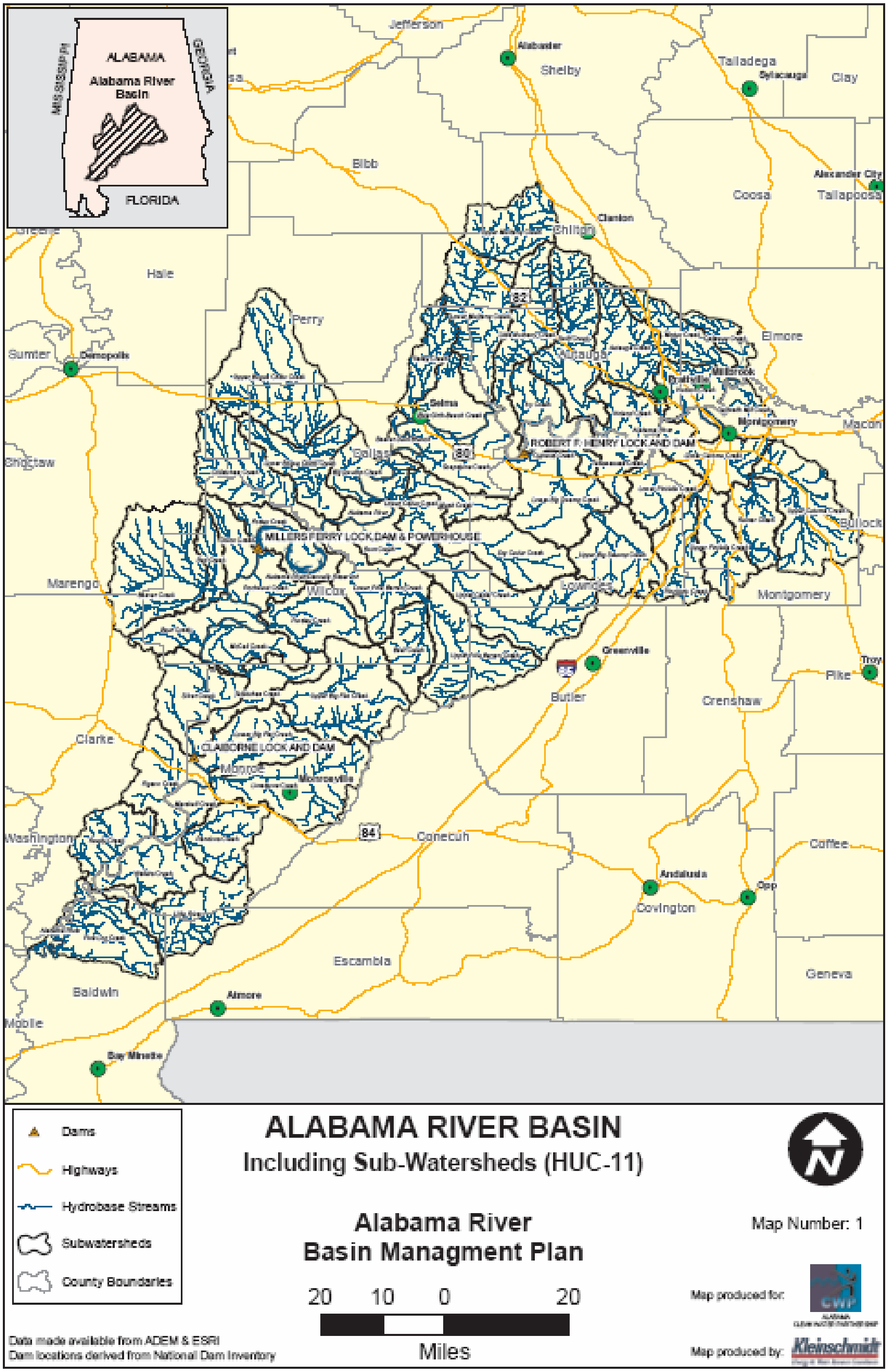


Location of the Mobile River Basin

- Map source: USGS (WRIR 02-4162), 2002

The Alabama River basin is located in southwestern Alabama. Its headwaters descend the Piedmont region of lower Appalachia beginning at the confluence of the Tallapoosa and Coosa Rivers. The Cahaba River flows into the Alabama north of Montgomery. Generally flowing in a northeast to southwest direction through the State’s capitol, Montgomery, the Alabama River joins the Tombigbee south of Jackson, Alabama, forming the Mobile River, which drains southward into the Gulf of Mexico.

Figure 2. Map of the Alabama River Basin



3.1 Basins and Watersheds of the Alabama River

The USGS National Water-Quality Assessment (NAWQA) Program uses hydrologic unit codes (HUC) to categorize the watershed lands of the United States.[8] Watersheds are typically divided into units containing one major river basin. There are two hydrologic regions in the state of Alabama, six sub-regions corresponding to the drainage areas of the major river basins, and eleven hydrologic accounting codes (six-digit or HUC 6) corresponding to drainage areas of the major tributaries to these rivers. There are eighteen (18) watersheds in the state, which are further broken down into 8-digit hydrologic cataloging units (HUC 8 = 52 watersheds) and 11-digit cataloging sub-units (HUC 11 = 629 sub-watersheds).

Over the course of this plan's development a new generation of hydrologic codes (HUC 12) was introduced. These new watershed delineations led to the modification of the HUC 11 boundaries so that they are replaced by HUC 10 boundaries. In the original hydrologic unit dataset, there were 654 eleven digit hydrologic units for Alabama. The new HUC 10 dataset contains 317 and the HUC 12 contains 1,426. Hydrologic units were delineated using both paper and digital 7.5 minute topographic quadrangle maps. For modeling purposes, this plan relied on the HUC 11 delineations because the new HUC 12 delineations were not yet adopted. However, a map of the newly adopted HUC 12 watersheds is provided in the map section of this document for educational purposes.

Sub-basins of the Alabama River Basin	8-digit Hydrologic Unit Code (HUC 8)
Upper Alabama	03150201
Middle Alabama	03150203
Lower Alabama	03150204

Map 1 on the previous page and attached depicts the location of these sub-basins with respect to associated counties. There are 61 sub-watersheds (11-digit cataloging sub-units) in the Alabama River Basin associated with its major tributaries. Major tributaries include Autauga Creek, Catoma Creek, Swift Creek, Woodruff Reservoir, Pintala Creek, Mulberry Creek, Swamp Creek,

[8] *See* Seaber, P.R., Kapinos, F.P., and Knapp, G.L., 1987, Hydrologic Unit Maps: U.S. Geological Survey Water-Supply Paper 2294, 63 p. "The United States is divided and sub-divided into successively smaller hydrologic units which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system."

Cedar Creek, Barren Creek, Chilatchee Creek, Pursley Creek, Big Flat Creek, and Little River. A complete list of tributaries and their watersheds is provided in Appendix A.

3.2 Dams and their Impoundments in the Alabama River Basin

There are three dams along the Alabama River: the Robert F. Henry lock and dam near Benton, the Millers Ferry lock and dam near Camden, and the Claiborne lock and dam near Monroeville (*see* Map 1). Information about these dams and their associated impoundments is summarized in Table 4 below.

Table 4. U.S. Army Corps of Engineers Dams in the Alabama River Basin

Name	Impoundment	Date	Use	Location	River Mile	Total Drainage Area (acres)	Surface Area (acres)	Storage Capacity (acre-feet)
Robert F. Henry Lock and Dam	R.E. “Bob” Woodruff	1971	Power, navigation, recreation	Lowndes County	245.4	16,300	12,510	234,200
Millers Ferry Lock, Dam and Powerhouse	William “Bill” Dannelly Lake	1970	Power, navigation, recreation	Wilcox County	142.3	20,700	17,200	331,800
Claiborne Lock and Dam	Claiborne Lake	1969	Navigation, recreation	Monroe County	81.8	21,473	5,930	96,360
Sources: Ruddy and Hitt, 1990; USACOE, 1985.								

3.3 Climate

The state of Alabama has a humid, subtropical climate, with mild winters and hot summers (GSA, 2002). The average annual temperature in the Alabama River Basin ranges from 62˚F at the northern end to 66˚F towards the southern end. No climatic data station in the state has an average monthly temperature below freezing (GSA, 2002). The average annual rainfall for the Alabama River Basin ranges from 50 to 56 inches per year (UAB, 2004). The southern portions of the watershed are wetter than the northern portions; 62 inches of rainfall per year occurs in the south, which is the highest recording for the entire basin.

3.4 Geology

The State of Alabama rises from the Gulf of Mexico coastline, exposing deeper and older formations all the way back through the Mesozoic rocks of the Tuscaloosa Group in mid-state. The more resistant layers in this sequence crop out as long low ridges, steep on the north and gentle on the south, called *cuestas*.[9] The Alabama River basin is located within the geologic region known as the Coastal Plain, which formed in the shallow waters that covered most of the central continent throughout geologic history. Generally, the geology of the Alabama River basin consists of two types: Cretaceous chalk, and Oligocene, Eocene, Paleocene clastic[10] sediments with porous limestone (Robinson, 2003). A listing of the types of rocks and their formation of origin can be found on Table 5 (GSA, 2002).

Table 5. The geology of the Alabama River basin.

Rock Type	Formation
Sand, Clay, Silt, Mud	Alluvial, coastal, low terrace deposits
Sand, Clay	Providence sand
Sand, Clay	Coker Formation
Sand, Gravel, Clay	Gordo Formation
Sand, Clay	Eutaw Formation
Chalk, Marl, Clay	Demopolis chalk
Limestone, Silt, Sand	Clayton Formation
Clay, Claystone, Sand	Nanafalia Formation
Silt, Clay, Sand	Tuscahoma Formation
Clay, Limestone, Sand	Jackson Group undifferentiated
Sand, Limestone, Marl, Clay	Oligocene Series undifferentiated
Gravelly, Sand, Clay	Miocene Series undifferentiated

From this rich geology, raw materials for construction and other industrial applications are mined throughout the Basin. In fact, the Alabama River basin contains a share of the state's major producing areas for minerals. An outline of the counties in the Alabama River basin and the minerals produced there is found on Table 6.

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[9] A cuesta is a ridge with a gentle slope on one side and a cliff on the other. *Source:* The American Heritage® Dictionary of the English Language, Fourth Edition. Copyright © 2000 by Houghton Mifflin Company.

[10] Clastic is a geological term that describes rock made up of fragments of preexisting rock; fragmental. *Source:* The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company.

Table 6. Major production of minerals by county in the Alabama River basin (GSA, 2002; USGS, 2002).

County	Minerals
Autauga	Construction sand and gravel
Bibb	Iron oxide pigment plant, crushed stone, common clay
Chilton	Common clay, industrial sand and gravel
Clarke	Construction sand and gravel
Conecuh	Construction sand and gravel
Crenshaw	Construction sand and gravel
Dallas	Ferroalloys plant, industrial sand and gravel, common clay
Elmore	Common clay, industrial sand and gravel
Escambia	Construction sand and gravel, sulfur-natural gas
Lowndes	Bentonite, construction sand and gravel
Marengo	Cement plant, crushed stone
Monroe	Construction sand and gravel, crushed stone
Montgomery	Common clay, industrial sand and gravel, ferroalloys plant
Wilcox	Common clay
NA = not available	

3.5 Soils

The official soil of the state of Alabama is the *Bama* soil series. A typical Bama soil profile consists of a five inch topsoil of dark brown fine, sandy loam; a six inch subsurface of fine sandy loam; and a red clay loam and sandy clay loam subsoil to sixty inches or more. The Bama soil series is in the Ultisols soil order and is classified as fine-loamy, siliceous, subactive, thermic Typic Paleudults. *Ultisols* are old, highly weathered soils developed under woodland vegetation and are generally low in natural fertility. The classification of “fine-loamy” means that the subsoil has between 18-35 percent clay with more than 15 percent sand. The descriptor “siliceous” indicates that the sand and silt-size particles in the upper part of the subsoil is more than 90 percent (by weight) silica minerals or other extremely durable minerals that are resistant to weathering. “Subactive” implies that the clay fraction in the upper part of the subsoil is dominantly low activity clays, and “thermic” refers to an average annual soil temperature of between 59˚ and 72˚F.

Bama soils are found in every county of the Alabama River basin except Crenshaw, Butler, and Conecuh. They generally parallel major river systems, forming in thick deposits of loamy fluvial or marine sediments. Bama soils are found on high positions of the landscape and are well drained, making them desirable for most agricultural and urban uses. More specifically, the Alabama River Basin is dominated by soils typical of the Coastal Plain, which consists of five varieties of soils—three in the Upper Coastal Plains and two in the Lower Coastal Plains. Most of the soils in this area are derived from marine and fluvial sediments eroded from the Appalachian and Piedmont plateaus (Mitchell, 1999).[11] Detailed manuscripts and soil maps for every county in Alabama are available online through the USDA NRCS (http://soils.usda.gov/survey/online_surveys/alabama/).

3.6 Hydrogeology

Most of the Alabama River Basin is underlain by varying ages of alluvial and terrace deposits of gravel, sand, and clay that make up the Southeastern Coastal Plain aquifer system (Johnson, et al, 2002; Robinson, 2003). The Southeastern Coastal Plain aquifer system is made up of two subcomponents: the Cretaceous and the Tertiary aquifer systems. The older Cretaceous system is the basal aquifer system and the most widespread (Johnson, et al., 2002). This water-bearing system consists of sand beds in the Providence Sand, Ripley and Eutaw Formations and, in part, the Tuscaloosa Group, confined by chalk and/or clay impermeable layers. Locally, these aquifers are referred to as the Chattahoochee River and Black Warrior aquifers. The Black Warrior River aquifer has deposits ranging from about 5 feet to more than 100 feet in depth and is typically shallow.

The Tertiary sedimentary aquifer system is made up of a thick sequence of sand with sandstone and gravel, as well as limestone beds (Johnson, et al., 2002). These sediments range in age from Paleocene to late Eocene and were deposited in marine environments. The upper part of this aquifer system is locally known as the Lisbon aquifer and the lower part is called the Nanafalia-Clayton aquifer.

3.7 Ground Water Resources

In the Mobile River Basin, more than 300 million gallons of groundwater are withdrawn per day (Atkins, et al., 2004). Most of this water is used for domestic uses - roughly 50% of Alabama's population relies on groundwater for domestic supplies (*e.g.*, drinking water). In the

[11] For current soil survey information for the State of Alabama, please visit the USDA NRCS' Alabama Soil Survey Website (http://www.al.nrcs.usda.gov/programs/soilsurv.html).

Coastal Plain of the Mobile River Basin, in which the Alabama River Basin falls, nearly 60 percent of the water consumed comes from ground water, predominately from the Black Warrior River aquifer (Atkins, et al., 2004). The quality of this ground water used for domestic supply is generally very good and meets Federal and State standards for drinking water, according to the USGS's sampling of shallow and deep monitoring wells. Isolated areas within the basin have revealed that increase land use intensity has a detrimental effect on water supplies (Atkins, et al., 2004).

Urban and agricultural land uses in the Mobile River Basin are known to negatively impact groundwater quality. Water samples from urban and agricultural areas within the flood plains of the Alabama, Tallapoosa and Black Warrior Rivers and their tributaries revealed the presence of pesticides and nutrients. Levels of these constituents were significantly different between agricultural and urban areas with the urban area samples showing higher levels of pollutants (Robinson 2003). Other studies have also shown elevated levels of nutrients, pesticides and volatile organic compounds (VOCs) in samples from shallow wells and low concentrations of several synthetic chemical compounds have been found in deeper domestic wells in the Mobile River Basin (Atkins, et al., 2004).

For the State of Alabama, three agencies, two state and one federal serve as the primary managers of its groundwater resources. The USGS is the principal scientific agency that studies subsurface resources under the mandate of several federal programs. The Alabama Department of Economic and Community Affairs is the principal state agency that, "plans, coordinates, develops and manages Alabama's water resources," including ground and surface water.[12] Along with ADEM, which plays a major role in regulating activities that affect groundwater (e.g. underground storage tanks, underground discharge), these agencies play the central role in monitoring the state of groundwater resources in terms of quantity and quality for all of Alabama.

[12] ADECA, 2004. Agency Website (http://www.adeca.state.al.us/Office%20of%20Water%20Resources/default.aspx). Accessed December 30, 2004.

3.8 Ecological Components of the Alabama River Basins

The ecological components of the Alabama River Basin consist of a wide range of upland and aquatic habitats utilized by a diversity of plants and animals. This fact is especially true of the aquatic ecosystems found within the Basin and the greater region. The Alabama River Basin, and the greater Mobile River Basin, are well-noted for the presence of unique aquatic habitats and plant and animal species. In fact, these basins are home to dozens of threatened and endangered species. Some of which, are endemic to the area.

The Alabama River and Mobile River Basin have been the subject of recent and considerable management activities due to the presence of diverse flora and fauna. Two federal protection actions and several non-governmental conservation activities have occurred in recent years emphasizing the value and importance of the ecosystems of this area. In the fall of 2000, the United States Fish and Wildlife Service approved the *'Mobile River Basin Aquatic Ecosystem Recovery Plan'*, which lays out the agency's strategic plans for recovering 22 species throughout the Mobile River Basin. More recently, in July of 2004, USFWS finalized its designation of critical habitat for three threatened and eight endangered mussels in the basin.[13] Also, The Nature Conservancy has targeted the Mobile River Basin as one of their priority conservation areas in the Southeastern United States (Smith, 2002).

The purpose of these planning efforts parallel the purpose of this basin management plan. Common to all of these recent planning efforts is the goal of protecting and restoring aquatic ecosystems, which is a goal compatible with the water quality protection goals of this basin management plan. This section of the plan will provide a brief description of the ecological components of the basin. It will also summarize the recent ecological management activities and their significance in light of this basin management plan.

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[13] The Mobile *River Basin Aquatic Ecosystem Recovery Plan* was approved by Sam D. Hamilton, Regional Director, USFWS, on November 17, 2000. This Plan sets forth the USFWS' intent to act on the behalf of the species in question to promote their recovery. The final designation of the critical habitat appeared in the Federal Register (50 CFR Part 17), July 1, 2004.

3.8.1 Habitats of the Alabama River Basin

The Alabama River Basin is a unique mosaic of different ecosystem types. EPA categorizes areas of ecological resources throughout the United States into “ecoregions.” ***Ecoregions***, as defined by the EPA, “denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources” (EPA, 2001). EPA recommends the development of ‘ecoregional reference conditions’ as a scientifically defensible method of defining expected habitat, biotic, and chemical conditions within streams, rivers, reservoirs, and wetlands. Ecoregions are described using hierarchal classification system that correspond to the spatial scale of the ecoregion (*i.e.*, I being the coarsest and IV more refined). Level IV ecoregions have been developed or are under development in 37 states nationwide. Six Level III ecoregions cover Alabama: Piedmont, Southeastern Plains, Ridge and Valley, Southwestern Appalachians, Interior Plateau, and the Southern Coastal Plain (Griffith, et al, 2001). Within these six regions are delineated 27 Level IV ecoregions (*see* Map 2).

USEPA places the Alabama River basin in the ‘Southeastern Plains’ Ecoregion (Ecoregion Number 65). These ecosystems consist of irregular plains with broad inter-stream areas made up of a mixture of cropland, pasture, woodland, oak-hickory-pine forests and Southern mixed forests. The Southeastern Plains are broken down into nine sub-categories, all but two of which are part of the Alabama River Basin. The physical characteristics of these ecoregions are summarized in Table 7, according to sub-category.

Figure 3. Ecoregions of Alabama

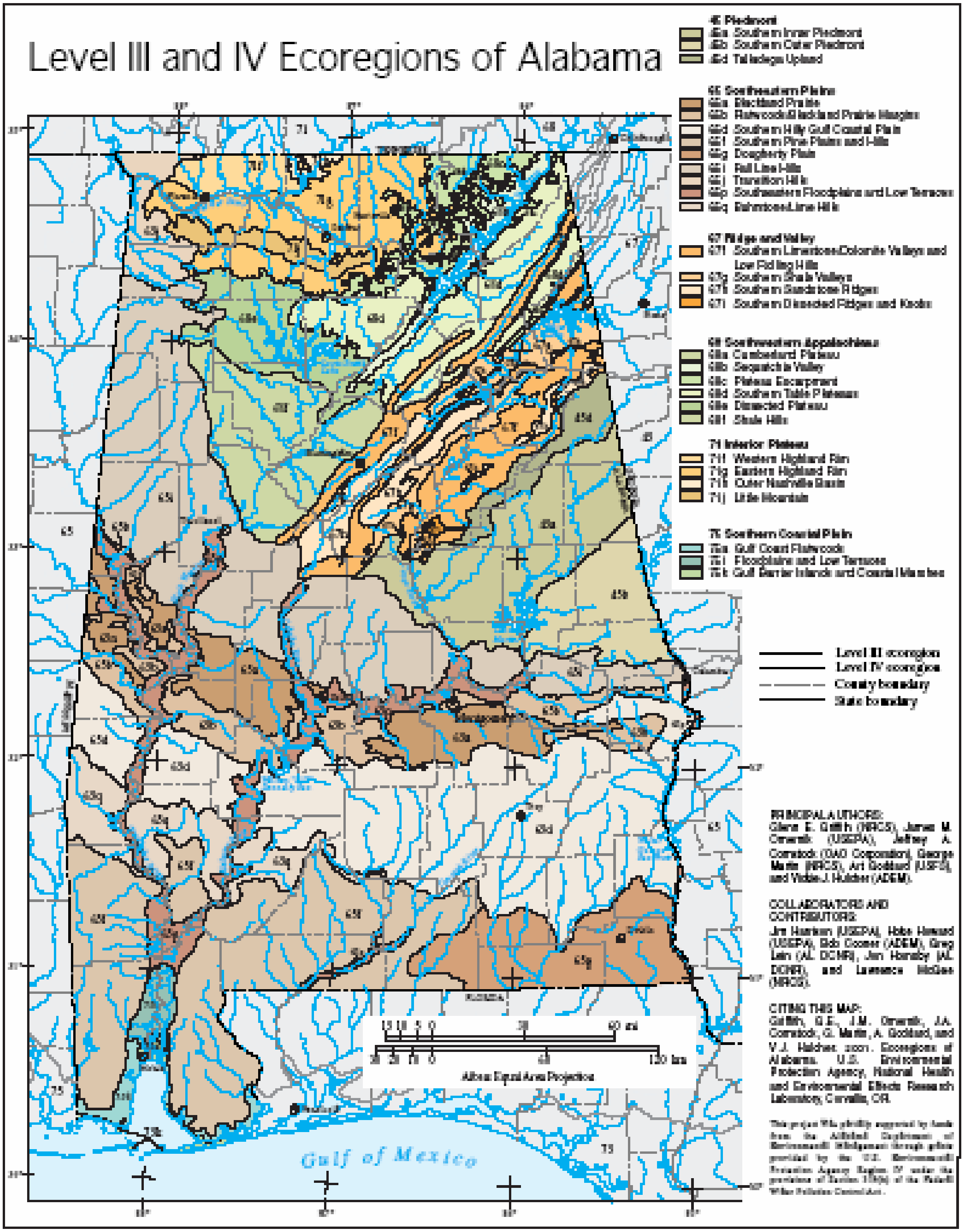

Table 7. Physical Characteristics of the Level IV Ecoregions of the Alabama River Basin—Southeastern Plains Level III Ecoregion (EPA, 2001).

Code	Level IV Ecoregion	Elevation (ft)	Physical Characteristic
65a	Blackland Prairie	120-360	Undulating irregular plains, nearly level to strongly sloping; low gradient streams with chalk, clay, sand, and silt substrates
65b	Flatwoods/Blackland Prairie Margins	100-520	Smooth lowland plains and undulating irregular plains; sluggish, low gradient, clay and sand bottomed streams
65d	Southern Hilly Gulf Coastal Plain	100-780	Dissected irregular plains, northward facing cuestas, low hills with broad tops; some wide floodplains and broad, level to undulating terraces; low to moderate gradient mostly sandy bottomed streams
65f	Southern Pine Plains and Hills	40-520	Southward sloping, dissected irregular plains, some open low hills, mostly broad gently sloping ridgetops with steeper side slopes near drainages; low to moderate gradient sand and clay bottomed streams; some sinkholes in eastern area
65i	Fall Line Hills	200-1000	Dissected open hills with rounded tops; gently sloping to strongly sloping side-slopes; low to moderate gradient streams with sandy and gravelly substrates
65p	Southeastern Floodplains and Low Terraces	10-330	Major river floodplains and associated low terraces; low gradient streams with sandy and silty substrates, oxbow lakes, ponds, swamps
65q	Buhrstone/Lime Hills	65-550	Rolling to strongly dissected open hills and open low hills, cuestas with a north-facing steep slope; gravel, cobble, and bedrock substrates

One ecoregion of particular interest in the context of this basin management plan is the Blackland Prairie region, also known as the "Alabama Black Belt". This region is characterized ecologically by its gently rolling hills which are well dissected providing rapid surface drainage. Soils in the Blackland Prairie are fairly uniform dark-colored alkaline clays, often referred to as "black gumbo," interspersed with some gray acid sandy loam[14]. This area once supported a tall-grass prairie dominated by bluestems, side oats, and switchgrass. Although it is considered a very fertile region of the basin, the "Black Belt" is often referenced in terms of its poor socioeconomic conditions, which will be mentioned later on in the context of water quality and future basin management efforts.

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[14] Texas Parks and Wildlife Department: Water Resources Team. Evaluation of Natural Resources in Bastrop, Burleson, Lee, and Milam Counties. March 2000. 55 pp.

3.8.2 Biodiversity in the Alabama River Basin

The Mobile River Basin is considered one of the most ecologically significant basins in North America because of its wide variety of aquatic and terrestrial ecosystems which support a diversity of associated organisms. In fact, the basin contains some of the most unique assemblages of aquatic organisms in North America. It contains 40 percent of North America's aquatic turtle species (17 species); ranks third in the nation for its variety of fishes (160 species); provides habitat for the richest aquatic snail fauna in the world (120 species) and ranks in the top ten river basins in the world in terms of diversity of freshwater mussels (75 mussels). Of these, 3 species of turtles, 40 species of fish, 33 species of mussels and 110 species of aquatic snails are endemic[15] to the Mobile River Basin (Abell, et. al., 2000; USFWS, 2000).

Like the other major rivers of the Mobile River Basin, the Alabama River has undergone significant physical changes from centuries of human settlement that have negatively impacted these ecological components of the system. It is believed that over half of all known, or presumed, aquatic animal extinctions in the United States have been freshwater mussels and snails indigenous to the Mobile River Basin (USFWS, 2000). Throughout the State of Alabama, there are 18 plant and 97 animal species listed as threatened or endangered under the Endangered Species Act of 1973 (ESA). As of 2000, 100 imperiled[16] species were found in the Mobile River Basin alone. Of these, 39 aquatic species were federally listed under the ESA. Most of which survive as isolated populations in *refugia* of limited reaches of streams and rivers (USFWS, 2000). Only a small number of these species can be found in the Alabama River Basin.

3.8.3 Threatened and Endangered Aquatic Species in the Alabama River Basin

Nine aquatic species have been identified in the Recovery Plan with known populations or potential habitat in the Alabama River basin.

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[15] *Endemic* species are native to a region and are found no other place on Earth.
[16] 'Imperiled' signifies that the species is endangered, threatened, a species of concern or a candidate for the ESA list.

Table 8. Threatened and Endangered Aquatic Species in the Alabama River Basin (U.S. Fish and Wildlife Service 2000)

Fish	
Alabama Sturgeon	*Scaphirhynchus suttkusi*
Gulf Sturgeon	*Acipenser oxyrhynchus desotoi*
Freshwater Mussels	
Orange-nacre Mucket	*Lampsilis perovalis*
Alabama Mocassinshell	*Medionidus acutissimus*
Southern Clubshell	*Pleurobema decisum*
Dark Pigtoe	*Pleurobema furvum*
Ovate Clubshell	*Pleurobema perovatum*
Heavy Pigtoe (Judge Tait's Mussel)	*Pleurobema taitianum*
Inflated Heelsplitter	*Potamilus inflatus*

The following species profiles have been adapted from the Recovery Plan. The entire Mobile River Basin Aquatic Ecosystem Recovery Plan and its recommendations may be accessed online through the USFWS' Ecological Services Division or directly at the following URL: http://ecos.fws.gov/docs/recovery_plans/2000/001117.pdf.[17]

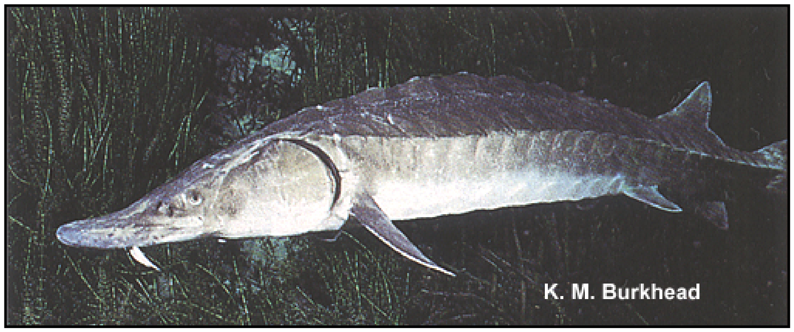
ALABAMA STURGEON *Scaphirhynchus suttkusi* (Acipenseridae)

The Alabama sturgeon is an elongate, slender fish which can reach a length of about 31 inches and ranges from 2-4 pounds. The fish has an orange coloration with a broad head and flattened snout. The body narrows abruptly to the rear, with bony plates covering the head, back and sides. This species was historically found in large and small rivers of the Mobile River Basin.

Population numbers of Alabama sturgeon appear to be very low, based on recent collection efforts. The decline of this species is attributed to over-fishing, loss and fragmentation of habitat as a result of historical navigation development, and historical episodes of water quality degradation. Current threats primarily result from its reduced range and small population numbers, which are compounded by a lack of information on habitat and life history requirements. Conservation efforts for this species were implemented in 1997, which include broodstock collections, an attempt to spawn captive broodstock at a State hatchery, and habitat studies. A detailed recovery plan has yet to be developed.

[17] URL for the Mobile Recovery Plan was active and functioning on February 2, 2005.

GULF STURGEON ***Acipenser oxyrhynchus desotoi (*****Acipenseridae)**



The gulf sturgeon is an anadromous fish with a sub-cylindrical body imbedded with bony plates. The snout is greatly extended and blade like with four fleshy chin barbels in front of the mouth, which is oriented on the lower surface of the head. Gulf sturgeon historically occurred in most major river systems from the Mississippi River to the Suwannee River, Florida, and marine waters of the Central and Eastern Gulf of Mexico, south to Florida Bay. In recent years, Gulf sturgeon have been caught or reported in the Alabama River, however, population estimates are unknown throughout its range.

Sturgeon continue to be caught incidental to other fisheries, habitat continues to be affected by dredging and water quality degradation and, migration and reproduction are impeded by impoundments. The primary recovery objectives are to prevent further reduction of existing wild stock; establish population levels that would allow delisting of the Gulf sturgeon in discrete management units; and establish population levels that could withstand directed fishing pressure within discrete management units.

ORANGE-NACRE MUCKET ***Lampsilis perovalis*** **(Unionidae)**

The orange-nacre mucket is a medium-sized mussel, between 2-3.5 inches in length, with a moderately thick oval shell. Several known populations are locally abundant while others are small and localized. Surviving populations are threatened by urban and agricultural runoff, surface mine drainage, small stream impoundment projects, industrial and sewage treatment plant discharges, and channel degradation caused by sand and gravel mining.

The current distribution indicates that historic and gradual increases in chronic turbidity levels may be an important factor in the decline of the orange-nacre mucket. The U.S. Forest Service has funded mussel surveys in streams under its jurisdiction, and has strengthened stream management zone guidelines on National Forest lands in Alabama. The immediate recovery objective is to prevent the continued decline of this species by locating, protecting, and restoring stream drainages with extant populations (see critical habitat units 14 and 15).

ALABAMA MOCCASINSHELL *Medionidus acutissimus* (Unionidae)

The Alabama moccasin shell is a small, delicate species, approximately 1 inch in length. The shell is narrowly elliptical and terminates in a sharp point. The periostracum (shell) is yellow to brownish yellow, with broken green rays across the entire surface of the shell. Habitat modification, sedimentation, eutrophication, and water quality degradation are the primary causes associated with the decline of the Alabama moccasinshell. This species is very sensitive to and it is believed that surviving populations are threatened by activities that contribute to increased rates of sedimentation and erosion.

The U.S. Forest Service has funded mussel surveys in streams under its jurisdiction, and has implemented improved stream management zone guidelines on National Forests in Alabama. Surveys of potential habitat are being conducted to locate extant populations. The immediate recovery objective is to prevent the continued decline of this species by locating, protecting, and restoring stream drainages with extant populations. There are no known populations of this species in the Alabama River basin, however a 32 mile reach of Bogue Chitton Creek has been designated as critical habitat for the southern clubshell and the orange-nacre mucket. These conservation efforts may prove to benefit the Alabama mocassinshell as this reach is coincident with historic occurrences of this species (see critical habitat unit 15).

SOUTHERN CLUBSHELL *Pleurobema decisum* (Unionidae)

The southern clubshell is a medium sized mussel just under 3 inches long, with a thick shell, and heavy hinge plate and teeth. The periostracum (shell) color ranges from yellow to yellow-brown. Except for the Mobile Delta, this species was formerly known from every major stream system in the Mobile River basin, including the Alabama River and tributaries. Known populations in the Alabama River basin occur in the mainstem of the Alabama River and Bogue Chitto Creek where it is a rare to uncommon occurrence.

Surviving populations are threatened by impoundment and channelization projects, household and agricultural runoff, and channel degradation caused by sand and gravel mining and/or channel maintenance projects. Current conservation actions include conducting surveys of potential habitat throughout the historic range of the southern clubshell in efforts to locate extant populations. Recovery to the point of down listing to threatened is unlikely and the immediate recovery objective is to prevent the extinction of this species by locating, protecting, and restoring stream drainages with extant populations (see critical habitat units 14 and 15).

DARK PIGTOE *Pleurobema furvum* (Unionidae)

The dark pigtoe is a small to medium-sized mussel, occasionally reaching 2.4 inches in length, and is oval with a reddish-brown coloration. Populations are localized, and numbers of individuals are very low in all known occupied streams. Surviving populations are threatened by impoundment projects, surface mine runoff, and household and agricultural runoff. Surveys of potential habitat throughout the historic range of the dark pigtoe are being conducted and the U.S. Forest Service has implemented improved stream management zone guidelines in the Sipsey Fork and its headwaters in Bankhead National Forest. The immediate recovery objective is to prevent the extinction of this species by locating, protecting, and restoring stream drainages with extant populations.

OVATE CLUB SHELL *Pleurobema perovatum* (Unionidae)

The ovate club shell is a small to medium-sized mussel that rarely exceeds 2 inches in length. The oval shell is yellow to dark brown. Known populations are small and localized and are threatened by channelization, household and agricultural runoff, and channel erosion. Surveys of potential habitat throughout the historic range of the ovate clubshell are being conducted by Federal, State and private biologists in efforts to locate unknown extant populations. The immediate recovery objective is to prevent the extinction of this species by locating, protecting, and restoring stream drainages with extant populations.

HEAVY PIGTOE (JUDGE TAIT'S MUSSEL) *Pleurobema taitianum* (Unionidae)

The shell of the heavy pigtoe is obliquely triangular with an average shell size of about 2 inches in length and is usually brown to brownish-black in color. There is a small known population of this species in the Alabama River near Selma, Alabama. Habitat modification for navigation is the primary cause of the decline of the heavy pigtoe as this species cannot tolerate impoundment. Agricultural runoff, sand and gravel mining within and adjacent to the river channel, and low population levels also threaten the species. The State of Alabama conducts annual survey of mussel beds in the Alabama River. The immediate recovery objective is to prevent the extinction of this species by locating surviving populations and protecting its remaining habitat.

INFLATED HEELSPLITTER *Potamilus inflatus* (Unionidae)

The inflated heelsplitter has an oval, compressed to moderately inflated, thin brown to black shell which may be *5* inches in length. Extensive surveys of the Alabama River have located only a single fresh dead shell of the species. Historic habitat has been impacted by channel modification for navigation and flood control, impoundment, pollution, navigation dredging, and gravel dredging and mining. Several surveys have been conducted throughout its known current range including studies on life history and genetics. The recovery objective is to delist the inflated heelsplitter.

3.8.4 Conservation Efforts

In 2000, the USFWS approved the *Recovery Plan of the Mobile River Basin Aquatic Ecosystem* ("Recovery Plan") to address the recovery objectives of 22 endemic aquatic species of the Mobile River Basin (USFWS, 2000). The Plan describes the status of the 22 species, characterizes the risks of their imperilment and provides recommendations to recover these populations. It is meant to, "provide(s) a basic foundation for discussions and negotiations that must occur at both ecosystem and watershed levels if listed aquatic species are to be protected and recovered." (USFWS, 2000). Several of the major issues discussed in the Recovery Plan are summarized below.

The degree of uniqueness of these aquatic species makes them inherently vulnerable to extinction. According to the USFWS, the endangered and threatened aquatic species in the Mobile River Basin are all extremely vulnerable to similar, basic impacts to the rivers and streams they inhabit. Decreases in the flow and quality of water and alterations to the structure of the streams, are the primary factors that disrupt the habitats of these species. In this regard, sedimentation is considered the greatest factor threatening the aquatic ecosystems across the basin. Sedimentation refers to deposition of particles of inorganic and organic matter from the water column. Increased sedimentation is caused primarily by disturbances to river bottoms and streambeds and by soil erosion. Deposition of these materials alters streambeds, transports pollutants, smothers and kills benthic organisms, and eliminates suitable breeding and foraging habitat for mobile species (e.g. fish, turtles, snails). Furthermore, sediments carried by water, transport pollutants, particular nutrients, which degrade water quality and contribute to accelerated rates of eutrophication of water bodies.

Historically, the construction of dams and locks is recognized as the major contributing factor to the extinction and imperilment of the aquatic species in the Basin (USFWS, 2000). Impoundments fragment habitats, change flow regimes, increase sedimentation and limit the movement of species within the ecosystem. Other activities that permanently alter or degrade habitat quality include, channelization of streams, in-stream mining, dredging, point source wastewater discharges and nonpoint or diffuse pollution. Lastly, any increases in intensive land-based activities that promote erosion can exacerbate sedimentation in streams and rivers and lead to habitat degradation, if best management practices are not implemented.

Beyond the physical, chemical and biological impacts to the habitats and species, the USFWS recognized several major obstacles to reaching the species' recovery objectives. These obstacles are listed here: 1) public perception that listed species diminishes property values; 2) a lack of consensus for stream management strategies within the Basin; 3) depressed population numbers equate to high risks for species transplants and near impossibility for population enhancements; 4) technological barriers to artificial propagation and population augmentation (USFWS, 2000). In the Plan, the USFWS sets forth three 'Basic Tenants' to frame its recommendations for recovery of the 22 target species:

1. enforce existing laws and use established mechanisms to protect, restore and manipulate the future management of the ecosystem,

2. focus soil and water stewardship activities on the watershed level and,

3. increase research efforts that focus attention on the imperil aquatic species. These three tenants frame thirty-six recommendations (10 major and 26 minor) that promote activities that will increase the likelihood of protection and recovery of 22 aquatic species covered in the Recovery Plan.

Effective August 02, 2004, the USFWS designated critical habitat for 11 species of freshwater mussels (3 threatened; 8 endangered) in the Mobile River Basin.[18] Table 9 lists these species and their listing status. 'Critical habitat' has a specific definition within the Endangered Species Act[19] and refers to the geographic area occupied by the species at the time of the listing where the physical and biological features necessary for the conservation of the species exist and there is a need for special management to protect the

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[18] 50 CRF Part 17. Federal Register, Volume 69, No. 126, Thursday, July 1, 2004. pp. 40084 – 40171. In 1993, the USFWS listed 11 species of freshwater mussels and declared that the assignment of critical habitat was "prudent but not determinable" and therefore, did not complete the designation. A lawsuit in 2000, led to a 2001 court order that mandated the USFWS to complete the critical habitat designation.
[19] Section 3 (Paragraph 5A-C)

listed species. The purpose of the designation is to ensure that federal agencies consult with the USFWS prior to conducting any activities that may impact the listed species, *i.e.*, activities within the critical habitat. It does not add an extra regulatory layer to private landowners that play a part in managing listed species found on their property. In the context of this basin management planning effort, the critical habitat highlights segments or reaches of rivers and streams that deserve special management consideration due to their designation as critical habitat areas.

Table 9. Eleven Species of Imperiled Freshwater Mussels (Family: *Unionidae*) with Designated Critical Habitat in the Mobile River Basin

Common Name	Scientific Name	Threatened (T) /Endangered (E)
Southern acornshell	*Epioblasma othcaloogensis*	T
Southern clubshell	*Pleurobem decisum*	E
Ovate clubshell	*Pleurobema perovatum*	E
Upland combshell	*Epioblasma metastriata*	E
Triangular kidneyshell	*Ptychobranchus greeni*	E
Coosa moccasinshell	*Medionidus parvulus*	E
Alabama moccasinshell	*Medionidus acutissimus*	T
Orange-nacre mucket	*Lampsilis perovalis*	T
Dark pigtoe	*Pleurobema furvum*	E
Southern pigtoe	*Pleurobema georgianum*	E
Fine-lined pocketbook	*Lampsilis altilis*	T

The designated critical habitat in the Mobile River Basin amounts to 26 river and stream segments ("units") constituting 1,093 miles of river and stream channels. According to the USFWS, these reaches contain the habitat needs of the species of concern. To meet the criteria for the designation, each segment or unit must have the "primary constituent elements."[20] For the 11 mussels species, these elements are the following: 1) geomorphically stable stream and river channels and banks; 2) a flow regime necessary for normal behavior, growth, and survival of all life stages of mussels and their fish hosts in the river environment; 3) water quality, including temperature, pH, hardness, turbidity, oxygen content and other chemical characteristics necessary for normal behavior, growth and viability of all life stages; 4) sand, gravel, and or cobble substrates with low to moderate amounts of attached filamentous algae, and other physical and chemical characteristics necessary for normal behavior, growth, and viability of all

[20] 50 CRF Part 17. Federal Register, Volume 69, No. 126, Thursday, July 1, 2004. pp. 40097

life stages; 5) fish hosts with adequate living, foraging, and spawning areas for them; and, 6) few or no competitive or predacious nonnative species present.[21]

Table 10. Summary of Critical Habitats for 11 Threatened and Endangered Species of Freshwater Mussels within the Alabama River Basin

Critical Habitat Unit Number	River/Stream Name	Basin Name	County Name(s)	Reach Length (miles)	Species Present	Species with Historic Range
14	Alabama River	AL	Autauga, Lowndes, Dallas, AL	45	Southern clubshell	Orange-nacre mucket
15	Bogue Chitto Creek	AL	Dallas, AL	32	Southern clubshell Orange-nacre mucket	Alabama moccasinshell

In the Alabama River Basin, a total of 77 miles of stream are considered to have the primary constituent elements that justify critical habitat designation. A summary of these critical habitat units can be found in Table 10 above. The designation of these stream reaches as critical habitat will not impact private landowner activities unless they require Federal funding or permits.[22] In fact, the only current [Federal] economic activity along the Alabama River impacted by the critical habitat designation is the maintenance dredging of the Federal Navigation Channel.

[21] Ibid.
[22] Ibid.

4.0 PEOPLE AND THE ALABAMA RIVER BASIN

4.1 Population in the Basin

The estimated population within the Alabama River basin based on 2000 U.S. Census data is 350,211 people. Major population centers like Montgomery, Selma and Monroeville are located in the basin. Table 11 exhibits the population in each county, along with median household income. On average, the median household income in the Alabama River Basin was $28,452.

Table 11. Population Data and Median Income for the Alabama River Basin

County	Total Population	Estimated Population within Watershed	Percent Change since 1990	Median Household Income
Autauga	43,671	42,702	27.61%	$42,013
Butler	21,399	4,232	-2.25%	$24,791
Chilton	39,593	14,950	21.98%	$32,588
Clarke	27,867	6,912	2.30%	$27,388
Dallas	46,365	41,379	-3.67%	$23,370
Elmore	65,874	11,776	33.86%	$41,243
Escambia	38,440	1,938	8.23%	$28,319
Lowndes	13,473	13,056	6.44%	$23,050
Marengo	22,539	3,141	-2.36%	$27,025
Monroe	24,324	21,989	1.49%	$29,093
Montgomery	223,510	157,265	6.90%	$35,962
Perry	11,861	3,251	-7.04%	$20,200
Wilcox	13,183	13,173	-2.84%	$16,646

1 Population estimates were made by calculating the percentage of each county falling within the watershed boundary. The percentage area was used to estimate the proportion of the population within the watershed. These estimates assume an even distribution of people across each county and do not take into consideration population centers. Bullock and Conecuh counties were removed because they represent a very small portion of the watershed.

U.S. Census population projections for Alabama show that the state's population will steadily increase from 4.47 million in 2000 to over 5.2 million in 2025. The greater proportion of this population increase will occur in the proximity of the major population centers, including Montgomery and Tuscaloosa as people move to these cities from out of state and other parts of Alabama. Whereas, the rural areas of Alabama are experiencing losses in population, many of these urban centers, and particularly their suburbs, are witnessing significant population increases.[23] As a result, urban sprawl is a phenomenon now in effect as population growth spurns residential growth outside of historic city centers.

- *Montgomery and the Alabama River*

An indicator of this growth and sprawl - home sales and home construction data - suggests that residential development continues to boom in these areas. In fact, Montgomery, Autauga County ranks the highest in terms of the number of homes listed, sold and constructed (U.S. Census, 2004; AREREC, 2004). New homes equate to more land utilized for development and less for agricultural and other productive uses. Map 3 – Land Use - provides a graphical representation of the population centers and other land uses in the Alabama River Basin in 1990. Unfortunately, no current land use information is available for the entire basin to make a comparison.

4.2 The Economy of the Alabama River Basin

This section will discuss some of the primary economic characteristics and statistics for the Alabama River Basin. Employment figures from the U.S. Census are presented below and in Appendix B. An overview of major natural resource-based industries is also provided. A brief description of the Black Belt Region is given due to the fact that this area of the basin is the focal point of recent concern.

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[23] *See* 'Metro areas see growth at edges' by Haya El Nasser and Paul Overberg. USA TODAY, Posted 4/14/2005 6:18 PM, Updated 4/15/2005 10:50 AM (http://www.usatoday.com/news/nation/2005-04-14-fastest-growing-county_x.htm)

4.2.1 Employment

The 2000 U.S. Census reported that an estimated 141,295 out of 350,211 (40%) people living in the Alabama River basin described themselves as employed. A breakdown of the industries employing these people by county is provided in Appendix B. The category with the largest number of employees in the basin is ‘education, health, and social services followed by ‘manufacturing and construction.’ The category with the least amount of employees, out of thirteen, is the category including agriculture, forestry, fishing, hunting, and mining. It is worth noting that, although the number of people employed by these industrial sectors may be less than others, the gross land area supporting forestry and agriculture, in particular, far exceeds other industrial sectors.

4.2.2 Major Natural-Resource-based Industries

Forestry

- A Pulp and Paper Plant rises over the Alabama River

Forestry is by far Alabama’s largest industry. Compared to the rest of the Nation, Alabama boasts the second largest commercial forest with over two-thirds of the state (22.9 million acres) forested. In fact, Alabama’s forestland covers more acres than the size of Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, and Rhode Island combined. It is estimated that 71% of these forested lands are owned by private, non-industrial land owners. Forestry generates approximately $13 billion for Alabama each year and employs approximately 10% of the State’s total work force.

The Alabama River Basin is approximately 67% percent forested with over 2.5 million acres of forestland. Many of these acres are privately owned (71%) and actively managed for a variety of uses. Statistics from the Alabama Forestry Commission provide a more detailed understanding on how much forest is being harvested, for which purpose and in which counties. Clarke, Butler and Escambia Counties are the top three in terms of the average volume of trees removed per year. Refer to Table 12 below for more detail.

Table 12. Summary Forest Statistics for the Alabama River Basin

Average Annual Removals of Live Trees for Selected Counties within the Alabama River Basin

County	Million Cubic Feet
Autauga	21.1
Butler	54.3
Chilton	23.6
Clarke	60.4
Conecuh	38.1
Crenshaw	26.9
Dallas	24.5
Elmore	11.1
Escambia	37.2
Lowndes	19.8
Marengo	24.9
Monroe	36.4
Montgomery	11.9
Perry	25.6
Wilcox	35.4

Note: Data obtained from the 2000 Forest Inventory and Analysis (FIA) statistics.

Wood Use Percentages for Selected Counties within the Alabama River Basin

County	Lumber	Pulp	Poles & Pilings
Autauga	19%	81%	0%
Butler	37%	63%	0%
Chilton	38%	62%	0%
Clarke	46%	51%	3%
Conecuh	29%	70%	1%
Crenshaw	35%	64%	1%
Dallas	36%	64%	0%
Elmore	28%	72%	0%
Escambia	25%	71%	4%
Lowndes	27%	73%	0%
Marengo	53%	46%	1%
Monroe	37%	62%	1%
Montgomery	17%	83%	0%
Perry	38%	62%	0%
Wilcox	41%	57%	2%

Note: Data derived from the 2002 Forest Resource Report compiled by the Alabama Forestry Commission. Statistics are for the year 2002 only.

Agriculture

Between the years 2003-2004, the total statewide farm and forestry receipts were over $4.54 billion. The top five farm commodities for cash receipts according to the Alabama Agricultural Statistics Service in 2004 were:

(1) poultry
(2) cattle and calves
(3) greenhouse, sod, and nursery products
(4) cotton
(5) peanuts

Together, these five commodities comprise 90% of the total commodity receipts. Within the Alabama River Basin several counties are within the top ten leading producers of these commodities: 1) Lowndes (peanuts) 2) Monroe (peanuts and cotton) 3) Montgomery (cattle).

Table 13. Summary Agricultural Statistics for Selected Counties within the Alabama River Basin

County	Population*	Land Area within watershed (sq.mi)	Number of Farms (1997)	Average Farm Size (Acres)
Autauga	44,876	591.03	348	301
Butler	21,147	153.86	440	221
Chilton	39,995	264.61	663	149
Clarke	27,776	310.68	248	248
Dallas	46,029	886.56	435	572
Elmore	67,461	117.48	560	222
Escambia	38,181	48.04	380	229
Lowndes	13,418	702.59	330	524
Marengo	22,367	934.81	464	428
Monroe	24,177	562.73	422	319
Montgomery	221,973	562.73	654	368
Perry	11,676	198.45	340	425
Wilcox	13,130	906.77	248	621

*U.S. Census Bureau, 2000

Aquaculture - Catfish

Catfish farming is a major source of income in Central Alabama. Several of the top ranking counties in terms of annual production are located the Alabama River Basin: Dallas (#2), Perry (#4), Montgomery (#8), and Wilcox (#13). [24] Total annual sales reached a peak for the entire state in 2003, at $85.2 million with 200 operations with a total of 25,400 acres dedicated to the crop. Water

- Catfish farm ponds

[24] Number indicates state ranking.

surface area increased from 22,100 acres with 260 operations in 2000, to 25,400 acres with 200 operations in 2004. Despite the decrease in total catfish farming operations the total annual sales have increased by over 1,174% between 2000-2003 (Alabama Agricultural Statistics Service, 2004).

4.2.3 The "Black Belt" Region

As described earlier in Section 3.8.1 of this plan, there exists a large swath of Central Alabama known for its dark rich soils and primarily agricultural economy and communities. Alabama's Black Belt consists of the counties of Pickens, Sumter, Choctaw, Greene, Hale, Marengo, Perry, Dallas, Wilcox, Lowndes, Macon, and Bullock. This region is characterized sociologically as experiencing severe social and economic hardships. According to the 2000 U.S. Census, the counties contain some of the lowest scoring school systems and highest rates of poverty, illiteracy and infant mortality. In addition, the communities in these areas are among the 100 poorest counties in the United States, with poverty rates ranking in the poorest 13 percent of counties nationally.[25] A combination of these factors has resulted in the general opinion that this region is the most economically depressed area in Alabama, a situation that is thought to be attributable to poorly developed infrastructure and sparse economic opportunities.

A report issued by Governor Bob Riley's Black Belt Action Commission states: "Often called the state's "Third World," the problems of the Black Belt impacts all of our citizens. If Alabama is to reach its full potential, the challenges of this region must be addressed."[26] The Governor's Commission is focusing on improving the socioeconomic conditions of the Black Belt.

The state of water resources in the Black Belt is generally not well-understood. Other than the State's 303d List of Impaired Waters, there is very little information regarding water quality of this region. Some information on the state of water supply and wastewater management is available through the West Alabama Regional Commission in

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[25] Executive Order Number 22, August 11, 2004. Governor of the State of Alabama Bob Riley. Governor's Commission for Action in Alabama's Black Belt. http://64.124.237.54/EO.asp

[26] Governor Bob Riley's Black Belt Commission, *Overview of Black Belt Action Commssion, Commission charge, Polling, Statistics and members (pdf file)*. Accessed September 1, 2005 at 3:30 p.m. at http://64.124.237.54/publications.asp

its *Comprehensive Economic Development Strategy*. Regional planning documents for the basin did not contain water quality-related information. However, the information from the West Alabama plan would suggest that similar conditions would be found in other parts of the Black Belt and should be investigated.

Table 14. Proportion of the Alabama River Basin in each County

County	% of Watershed in County		County	% of Watershed in County
Autauga	9.83%		Escambia	0.80%
Butler	2.56%		Marengo	2.28%
Chilton	4.40%		Monroe	15.55%
Clarke	5.17%		Montgomery	9.36%
Dallas	14.75%		Wilcox	15.08%
Elmore	1.95%			

4.3 Political jurisdictions and Governmental Agencies in the Alabama River Basin

The Alabama River flows through 18 counties in the state. These counties are listed in Table 14. The percent area of the Alabama River Basin within each county was calculated for illustrative purposes.

4.3.1 Regional Authorities

Alabama is divided into twelve regions that have a planning commission or council established to coordinate region-wide projects, promote cooperation among local governments and to carry out state and federal programs on a regional basis. Each of the regions produces a strategic plan for economic and community development that serves to guide certain activities in these regions.[27] The Alabama Association of Regional Councils (AARC) is the umbrella group that coordinates its twelve members and promotes cooperation among them. The greater proportion of the Alabama River Basin includes the following commissions: Alabama-Tombigbee Regional Commission (Region 6), the South Central Alabama Development Commission (Region 5), and the Central Alabama Regional Planning and Development Commission (Region 9).

[27] A review of the plans for the regional planning councils corresponding to the Alabama River Basin found that they do not focus on environmental issues to any extent. The websites for each region and their plans can be readily accessed through the AARC website (http://www.alarc.org/).

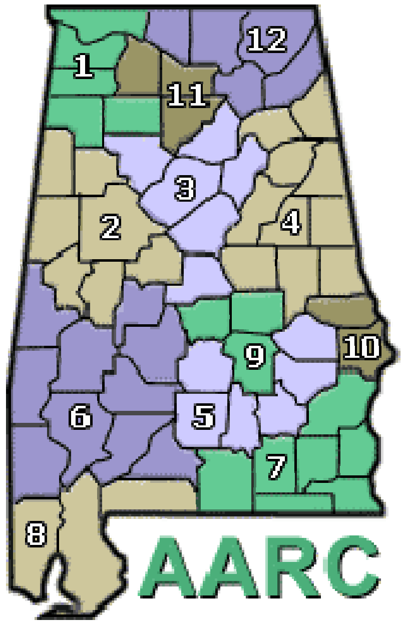

Figure 4.Regional Planning Councils of Alabama (Image credit to AARC, 2005)

4.3.2 State and Federal Organizations

Numerous federal and state agencies have jurisdiction over natural resources within the Alabama River Basin. Many, if not all, of them are involved in the Alabama Clean Water Partnership in some way. Some of the primary state and federal agencies are mentioned here. On the federal level there are, U.S. Environmental Protection Agency; several arms of the U.S. Department of Agriculture, including the Natural Resource Conservation Service; U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and the U.S. Geological Survey. Of the state agencies, the following are of major importance to this planning effort: Alabama Department of Environmental Management, Alabama Department of Conservation and Natural Resources, Alabama Department of Economic and Community Affairs, Alabama Forestry Commission, Geological Survey of Alabama, Alabama Soil and Water Conservation Committee, and the Alabama Department of Transportation.

5.0 WATER QUALITY IN THE ALABAMA RIVER BASIN

One of the key objectives of this basin management plan is to identify water quality concerns in the basin and to develop strategies for managing these concerns. *What is the current state of water quality in the creeks, rivers, lakes, and ponds of the Alabama River Basin?* The answer to this question is told by the data that is collected over the years by government agencies, private industry, and citizen volunteers. This section looks at the current understanding of water quality in the Alabama River Basin.

Authorized by the Clean Water Act (CWA), the U.S. Environmental Protection Agency Region 4 requires ADEM to complete two periodic water quality inventories and assessments: 1) Section 305(b) of the CWA calls for a bi-annual inventory of the quality of Alabama's waters and, 2) Section 303(d) of the CWA requires Alabama to list, in even-numbered years, all of its polluted and degraded waters that are not achieving their designated uses. The 2004 reporting year marked an evolution of water quality reporting for USEPA and Alabama integrating these two water quality reports into one report entitled, *Alabama's 2004 Integrated Water Quality and Assessment Report*.[28] This *Integrated Report* is the most current and comprehensive inventory and evaluation of water quality data for the waters of Alabama, including the Alabama River Bain, and it is vital to the basin management planning effort because it contains data and information that serve as a baseline of our understanding of the conditions of the waters in the Basin.

5.1 Water Quality Monitoring and Data Sources

Over a dozen water quality studies and monitoring programs generate data in support of the *Integrated Report* and inform our overall understanding of water quality in the Alabama River Basin. Table 15 on the next page lists these water quality monitoring and data collection efforts as well as the type of data they collect. The majority of these efforts are the responsibility of ADEM and constitute the agency's comprehensive approach to monitoring called, ASSESS.[29]

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[28] The 2004 Integrated Report is available through ADEM's website: http://www.adem.state.al.us/WaterDivision/WQuality/305b/WQ305bReport.htm.

[29] ASSESS is an acronym for **A**labama's **S**trategy for **S**ampling **E**nvironmental indicators of **S**urface water quality **S**tatus. The agency strives to maximize resources by prioritizing monitoring needs according to certain objectives and reporting needs, such as those mandated for the 305(b) and 303(d) requirements.

Other efforts, such as ADPH's fish consumption advisories, SWCC's watershed assessments, and the Alabama Water Watch (AWW)'s citizen water quality monitoring data, support ADEM's efforts to evaluate the waters of the State. In addition, agencies such as USGS and the USACOE, perform targeted water quality studies that inform the overall state of knowledge regarding water quality in the basin. The *Integrated Report* contains a more detailed description of each of these programs and how they factor into the overall assessment picture. Several of these efforts are displayed on Map 4 and discussed below.

Table 15. Important Sources of Water Quality Data for the Alabama River Basin

Agency	Period of Record	Report or Program Title	Information Type
ADEM	2002 – 2003	Alabama's 2004 Integrated Water Quality and Assessment Report (305b & 303d)	Chemical, physical, habitat, biological
ADEM	2003	Nonpoint Source Assessment Program	Chemical, biological, physical
ADEM	2003	Point Source Assessment Program	Chemical, biological, physical
ADEM	2003	Ecoregion Reference Assessment Program	Chemical, physical, habitat, biological
ADEM	2003	Clean Water Act §303(d) Support Assessments	Chemical, physical
ADEM	2003	Fixed Ambient Trend Monitoring Program	Chemical, physical, habitat, biological
ADEM	1997 – 2003	Alabama Monitoring and Assessment Program (ALAMAP)	Chemical, physical, habitat
ADEM	2000	Surface Water Quality Screening Assessment of the Alabama River	Chemical, habitat, biological
ADEM	2002	Alabama's 2002 305 (b) Water Quality Report to Congress	Chemical, physical, habitat, biological
ADPH	2004	Fish Advisories	Fish consumption, toxics
AWW	1999 – 2003	Alabama Water Watch - Citizen Volunteer WQ Monitoring	Chemical and bacteria
GSA	1960s to present	Various studies and reports pertaining to water quality, aquatic fauna, and groundwater.	Chemical, physical, biological
SWCC	1998	Statewide Watershed Assessments (by County)	Sediment loading
USGS	1997 – 2001	Flow and water quality data	Chemical, physical
USGS NAWQA	1997 – 2003	National Water-Quality Assessment Program	Chemical, physical, habitat, biological

5.1.1 Nonpoint Source Pollution Assessments

This basin management plan primarily focuses on nonpoint source pollution and how to manage activities in the watersheds of the Alabama Basin to minimize its effects. As mentioned above, the plan is an integral step in implementing the Alabama Nonpoint

Source (NPS) Management Program, which focuses on preventing or eliminating water quality impairments related to NPS runoff pollutants and protecting unimpaired waters.[30] Through the use of its Section 319 funds, the NPS Program supports county-by-county, citizen-based nonpoint source screening assessments under the administration of the Soil and Water Conservation Committee. These assessments occur on a 5-year rotational basis. The first assessment for the Alabama River Basin was completed in 1999-2000; the second rotational assessment is scheduled for 2005.[31]

5.1.2 Authorized Point Source Discharges – NPDES Permits in the Basin

ADEM manages Alabama's National Pollutant Discharge Elimination System (NPDES) permitting and compliance regulatory programs. In Alabama, no person shall discharge pollutants into waters of the state without first having obtained a valid NPDES permit or coverage under a valid General NPDES Permit. Furthermore, no person, required to apply for a storm water discharge permit by 40 CFR 122.26 (1994), shall discharge pollutants into waters of the state without first having applied for a valid NPDES permit or coverage under a valid General NPDES Permit. New dischargers shall obtain a valid NPDES permit or coverage under a valid General Permit prior to conducting any activity for which application for a storm water discharge permit is required by 40 CFR 122.26 (1994). NPDES permits are issued for mining, industry, construction stormwater and Animal Feeding Operations/Concentrated Animal Feeding Operations.

In the Alabama River Basin, as of August 2005, there were several reported NPDES permits. These are summarized by watershed in Table 16.

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[30] ADEM, 2004. *Alabama's 2004 Integrated Water Quality and Assessment Report.* Page 129.
[31] Ibid, Page 132.

Table 16. NPDES Permits issued in the Alabama River Basin as of August 2005

	Number of Permits Issued as of August 2005 within the Alabama River Basins				
	CAFO	**Industrial**	**Mining**	**Municipal**	**Construction**
Upper Alabama HUC03150201	8	380	NR	35	306
Middle Alabama HUC03150203	4	54	2	9	38
Lower Alabama HUC03150204	NR	72	9	3	22

NR = None reported

Source: ADEM, 2005

5.1.3 Alabama Water Watch

An integral part of Alabama's approach to the management of nonpoint source pollution is the reliance on citizen volunteers to monitor water quality in its basins. Alabama Water Watch (AWW) is a statewide program coordinated out of the Department of Fisheries and Allied Aquacultures and the International Center for Aquaculture and Aquatic Environments at Auburn University. It is dedicated to developing citizen volunteer monitoring of Alabama's surface waters. According to ADEM, 75 citizen groups submitted data during the report period for the 2004 Report and one of those groups was new to AWW. Most AWW groups monitored in the Tennessee, Coastal Plains and Mobile River watersheds. Of the 3,930 chemistry data records received from October 2001 through September 2002, monitors in the Coosa, Mobile and Tennessee watersheds submitted 68% of the data (26%, 23% and 19%, respectively). Monitors also submitted a total of 893 bacteriological data records during the report period. Since the inception of the AWW program in late 1992, monitors have sampled 1,400 sites on 575 water bodies and submitted over 21,000 chemistry and over 4,000 data forms.[32] AWW is

[32] Ibid, Page 132.

funded by the USEPA, ADEM, Alabama Cooperative Extension System, and Alabama Agricultural Experiment Station.

Table 17. Summary of Alabama Water Watch Monitoring Activity in the Alabama River Basin, 1998 – 2005.

Group Name	County	Last Date Sampled	Active Sites	Inactive Sites	# Chemical Samples	# Bacteria Samples	# Biological Samples	Status
Bridge Creek Scouts	Autauga	26-Aug-04	2	3	41	15	0	Active
Camp Creek Water Watcher	Montgomery	15-Jan-05	1	0	8	9	0	Active
Isabella Water Watchers	Chilton	1-Aug-00	0	3	4	1	0	Inactive
Lanier High School	Montgomery	8-May-98	0	2	18	0	0	Inactive
Perry County	Perry	19-Feb-04	4	0	4	0	0	Active
Selma High School	Dallas	29-Apr-02	0	1	6	0	0	Inactive
Tri-River Region Water Watch	Autauga Dallas Elmore Lowndes Montgomery	5-Jan-05	8	51	843	31	1	Active

In the Alabama River Basin, seven citizen monitoring groups have sampled 64 sites. Currently, four of those seven groups are actively monitoring 15 sites. The majority of the sampling conducted is chemical although there are data collections for biological and bacteriological indicators. Samples and field data are collected and submitted to AWW by volunteers, which is then made available on-line through Auburn University (http://frontpage.auburn.edu/icaae/index.aspx.).

5.1.4 National Water-Quality Assessment Program (NAWQA)

NAWQA is implemented by the United States Geological Survey to assess water quality status and trends of the Nations' ground and surface waters on a regional and national scale (USGS, 2003).[33] Physical, chemical, and biological data are collected from a wide range of environmental settings to assess overall water quality within a study unit.

[33] United States Geological Survey, 2003. *Occurrence and Distribution of Nutrients, Suspended Sediment, and Pesticides in the Mobile River Basin, Alabama, Georgia, Mississippi, and Tennessee, 1999-2001, as amended.* By Ann K. McPherson, Richard S. Moreland, and J. Brian Atkins. USGS NAWQA Water-Resources Investigations Report 03-4203. Montgomery, Alabama.

The Mobile River Basin is one of the study units that NAWQA has assessed since 1997. Several recent reports contain data and analyses pertinent to the management of the Alabama River Basin. A list of the most pertinent USGS publications and their area of relevance to the Basin is provided below.

Table 18. Major USGS Publications pertinent to the Alabama River Basin

Title	Principal Author	Relevance to Alabama River Basin Management Plan
Water Resources Data, Alabama, Water Year 2003 (AL-03-1)	W.L. Psinakis	Contains data for records of stage, discharge, and water quality of streams; stages and contents of lakes and reservoirs; and water levels in wells, includes 11 surface water stations in the Alabama River Basin.
Occurrence and distribution of nutrients, suspended sediment, and pesticides in the Mobile River Basin, Alabama, Georgia, Mississippi, and Tennessee, 1999-2001 (WRIR 03-4203)	A.K. McPherson	Targeted water quality analysis (January 1999 to December 2001) to measure levels of nitrogen, phosphorus and pesticides at nine sites. Three sites in the Alabama River Basin: Threemile Branch, Pintlalla Creek and Alabama River.
Environmental setting and water-quality issues of the Mobile River Basin, Alabama, Georgia, Mississippi, and Tennessee (WRIR 02-4162)	G.C. Johnson	Overview of the physiographic and hydrologic features of the Mobile River Basin. Characterization of water quality issues throughout the study area including the Alabama River Basin.
Water Quality in the Mobile River Basin, Alabama, Georgia, Mississippi, and Tennessee, 1999-2001 (USGS Circular 1231)	J. Brian Atkins	Summary of other water quality reports completed for the Mobile River Basin. Contains study highlights that are important for local, state and federal water resource managers and stakeholders (*see discussion below*).

NAWQA's publication, *Water Quality in the Mobile River Basin, Alabama, Georgia, Mississippi, and Tennessee, 1999-2001*, contains important observations about the effects of land use on water quality in the Mobile River Basin, and more specifically, the Alabama River Basin. The report looks at levels of nutrients, pesticides, organochlorine compounds, volatile organic compounds (VOCs), biological communities and radon. Furthermore, it provides a valuable comparison about the impacts of urban versus rural (agricultural) land uses. Study segments within the Alabama River Basin (*e.g.*, Pintlalla Creek, Catoma Creek and Threemile Branch) produced data results that suggest that the prevalent land use dictates the dominant pollutant(s) found in the water, *i.e.*, higher levels of herbicides in urban versus rural streams (Atkins, et al, 2003). Overall, the study provides a national perspective on water quality issues in the Mobile River Basin. It may be access online, free-of-charge from USGS Alabama at the following URL: http://al.water.usgs.gov/publications/onlineALpubs.html.

5.1.5 United States Army Corps of Engineers

The ACOE collects water resource data at its three locks and dams on the Alabama River. Flow and stage data on available on a regular basis for all three projects. However, only at the R.F. Henry Dam in Lowndes County does the Army Corps collect water quality data using one automatic water quality monitor. This monitor collects temperature, pH, conductivity, and dissolved oxygen data on an hourly basis.[34] In addition, the ACOE has been involved in numerous studies pertaining to the water resources of the Alabama River Basin. In particular, there are studies that provide historical data for the rivers and impoundments associated with the three ACOE projects on the Alabama River. One large-scale effort worth mentioning began in the early 1990s in support of the Alabama-Coosa-Tallapoosa Compact. This research is discussed in more detail below.

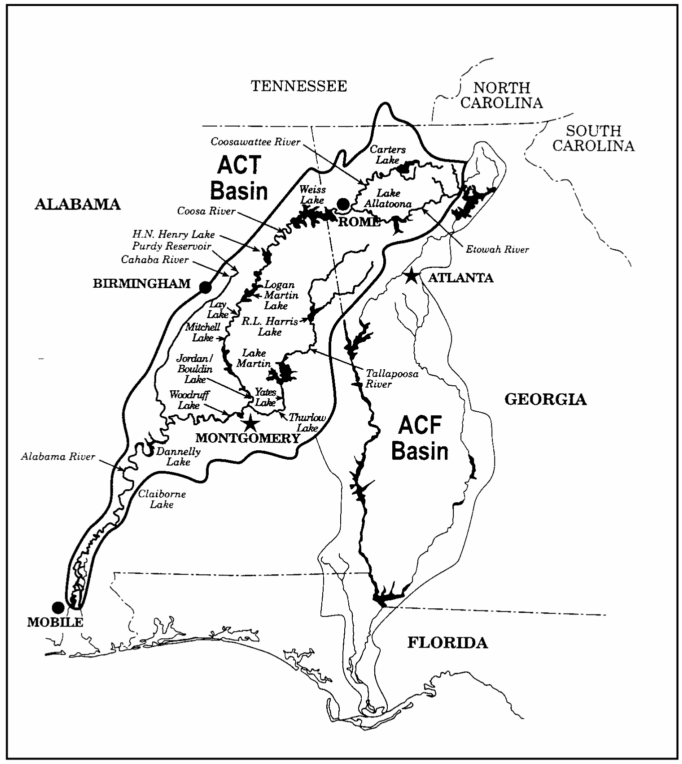
5.1.6 Draft Environmental Impact Statement (EIS) - Water Allocation for the Alabama-Coosa-Tallapoosa River Basin

In September 1998, the ACOE – Mobile District published the *Draft Environmental Impact Statement for Water Allocation for the Alabama-Coosa-Tallapoosa River Basin* in Alabama and Georgia. The EIS was triggered by the signing into law of the *ACT River Basin Compact* on November 20, 1997. The Compact formed an interstate administrative agency, the ACT Basin Commission, comprised of the Governors of Alabama and Georgia and a Federal Commissioner appointed by the President of the United States. The primary mission of the Commission and the Compact was to "develop an allocation formula for equitably apportioning the surface waters of

[34] Diane I. Findley. RE: WQ Data for Alabama and Tombigbee. Diane.I.Findley@sam.usace.army.mil (January 31, 2005)

the ACT Basin among the States while protecting the water quality, ecology, and biodiversity of the ACT…"[35] These efforts directly emerged out of an earlier (1992) interstate Memoranda of Agreement that the States of Alabama, Florida, and Georgia agreed to, along with agency support from the ACOE, to conduct a 'Comprehensive Study' of the ACT and Apalachicola-Chattahoochee-Flint (ACF) River Basins.

The ACOE took a broad-view or 'programmatic' approach to the Draft EIS because of the large geographic extent of the ACT Basin. This approach was also used because no water allocation formula had been settled upon by the Commission and without a preferred allocation formula it was only possible to examine the impacts of several hypothetical alternatives, or allocation scenarios, including a "no action" scenario. Nonetheless, the Draft EIS contains a wealth of research and data pertinent to the environmental and socioeconomic resources of the ACT Basin and the potential impacts to them given various water use scenarios.



-Illustration of the Alabama-Coosa-Tallapoosa and Apalachicola-Chattahoochee-Flint River Basins (ACOE, 1988).

For the purposes of this Alabama River Basin Management Plan, only the sections of the Draft EIS addressing water quality within the Alabama River Basin are referenced. This plan relied on more recent assessments and reports (*e.g.*, 2004 Integrated Report/303d List of Impaired Waters, 2000 Surface Water Quality Screening Assessment for the Alabama River) for water quality information rather than the Draft EIS due to the fact that the greater proportion of the EIS assessments were completed seven or more years ago. It is worth mentioning, however, that the Draft EIS did address nonpoint

[35] Public Law [PL]105-105

source pollution. The ACOE used several models to understand the hydrological features of the basin, and most notably, the BASINS[36] Model to assess nonpoint source pollution throughout the ACT Basin. It also used BASINS and HEC-5Q to predict the environmental consequences to rivers and reservoirs based on the water allocation alternatives.

The scale of the nonpoint source pollution modeling effort for the ACT study included the Alabama, Coosa, and Tallapoosa river basins and groups of subwatersheds. The modeling effort designated 200 subwatersheds within the ACT, grouping these into seven separate groups. ACT Subwatershed Group #7 represents the Alabama River Basin in the model outputs. The BASINS nonpoint source pollution model (NPSM) estimated nonpoint source pollutant loadings for three different scenarios equating to three different land use distributions for the years 1995, 2020, and 2050. Model outputs were in 5-year daily times series for five key parameters: flow, biological oxygen demand (BOD_5), total nitrogen, total phosphorus, and fecal coliform bacteria colonies.

Generally speaking, the model predicted pollutant loads to increase from 1995 to 2020 and from 2020 to 2050 in the ACT Basin. BOD_5 showed the greatest increase of the four pollutants measured from 1995 to 2050. Whereas, total nitrogen showed the smallest rate of increase of the four pollutants from 1995 to 2050. Flows were predicted to increase over time throughout the basin.[37]

For Subwatershed Group #7 (Alabama River Basin) of the ACT Study flow and the four pollutants were predicted to increase from 1995 to 2050. Flow would increase by 1.58% overall. For BOD-5, an increase of 24.80% would occur in the basin while total nitrogen, total phosphorus, and fecal coliform would increase by 11.81%, 17.57%, and 17.24%, respectively. Compared to the other ACT subwatershed groups, these increases were not considered the highest.[38]

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[36] Better Assessment Science Integrating Nonpoint and Point Source Pollution
[37] U.S. Army Corps of Engineers, 1998. *Draft EIS – Water Allocation for the Alabama-Coosa-Tallapoosa River Basin Main Report.* Mobile, AL. Appendix D, Section 8, pages 49 & 50.
[38] Ibid.

5.2 The Status of Monitoring in the Alabama River Basin

ADEM categorizes each waterbody based on the level of available information and its assessment status. This categorization identifies future monitoring needs as well as priorities for pollution management. The table below provides a brief description of each category.

Table 19. Water Quality Categorization for the State of Alabama

Category	Description
Category 1	Waterbody attains all designated uses. There is data (e.g. chemical, biological and physical) and information that are consistent with the State's 303(d) listing and assessment methodology to support a determination that all water quality standards are attained.
Category 2	There are some data and information available for the waterbody but the information is insufficient to make a determination that the water does or does not support all of its designated uses.
Category 3	No data and information to determine if any designated use is attained. Monitoring on a priority basis needed to obtain data
Category 4	Waterbodies belong in Category 4 if one or more designated uses are impaired or threatened but establishment of a TMDL is not required. Contains three subcategories: **Category 4a -** A TMDL has been completed for the water-pollutant combination **Category 4b** - Other required control measures are expected to result in the attainment of water quality standards in a reasonable period of time **Category 4c –** The impairment is not caused by a pollutant.
Category 5	Category 5 waterbodies constitute those waters in the Section 303(d) list that, “EPA will approve or disapprove under the CWA. Waters should be placed in Category 5 when it is determined, in accordance with the State's assessment and listing methodology, that a pollutant has caused, is suspected of causing, or is projected to cause an impairment or threat.” (ADEM, 2003).
Source: *Alabama’s 2004 Integrated Water Quality and Assessment Report*, Appendix C-2	

Table 20 provides a summary of the categorization for the waters of the Alabama River Basin while a complete table from the *2004 Integrated Report* of the categorized waters in the basin is presented in Appendix C. This list shows that while twelve stream segments meet their designated uses (Category 1), several streams within the Alabama River Basin have not been monitored or evaluated. Fourteen stream segments are Category 2 or, lack sufficient data to determine if it meets water quality standards. Twenty-six (26) segments are in Category 3 or, waters where no data and information exists to determine if they meet water quality standards. Waters in these categories represent monitoring needs; these are waters where governmental and volunteer resources have not been mustered to collect the necessary data to assess the waterbody.

There are no Category 4 waters listed for the Alabama River Basin. However, there are several Category 5 waters and these, by definition, are listed on the State’s ‘303(d) List of Impaired Waters,’ which is a major component of its *2004 Integrated Report*. EPA and ADEM have scheduled these waters for the development of a TMDL, or Total Maximum Daily Load, which require ADEM to set limits to the amount of pollutants impacting that water. The TMDL is the prerequisite water quality restoration component that addresses nonpoint sources of pollution within a watershed and is discussed more thoroughly in the next section

Table 20. Summary of Categorized Waters in the Alabama River Basin

Category 1 Waters
Autauga Creek, Pintlalla Creek, Mulberry Creek, Buck Creek, Valley Creek, Soapstone Creek, Pine Barren Creek, Cub Creek, Gravel Creek, Pursley Creek, Silver Creek
Category 2 Waters
Mortar Creek, Pierce Creek, Autauga Creek, Catoma Creek, Swift Creek,, Alabama River, Morgan Creek, Mulberry Creek, Bogue Chitto Creek, Chilatchee Creek, Beaver Creek, Randons Creek, Bear Creek, Little River
Category 3 Waters
Callaway Creek, Hurricane Branch, South Mortar Creek, Cottonford Creek, Middle Creek, Kenner Creek, Pine Level Branch, Galbraith Mill Creek, Sevenmile Creek, Three Mile Branch, Mill Creek, Still Creek, Grandview Branch, Alabama River, Sand Creek, Turkey Creek, Rockwest Creek, Big Flat Creek, Limestone Creek
Category 4 Waters
No Category 4 Waters in the Alabama River Basin
Category 5 Waters
Three Mile Branch, Catoma Creek, Alabama River downstream of Rockwest Creek and upstream of Bear Creek
Source: *Alabama's 2004 Integrated Water Quality and Assessment Report*, Appendix D

5.3 Setting Limits to Nonpoint Source Pollution – TMDLs

ADEM is required to plan for the restoration of all the [Category 5] waters listed on the 303(d) list. Each impaired waterbody is subject to further investigation and analysis to determine the amount of a pollution that would be allowed to enter it and still meet water quality standards. The process of setting these allowable pollutant limits or, Total Maximum Daily Loads (TMDLs), follows a basic formula that considers the allowable load of a particular pollutant from point sources and nonpoint sources, plus a margin of safety to help ensure environmental protection.[39] TMDLs are developed for an individual waterbody or, a segment of stream or river, as well as on a watershed basis where technological solutions (e.g. wastewater treatment) would not result in the achievement of water quality standards. A map of the Alabama River Basin Classified Waters is provided on the next page and as Map 5 in the map section.

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[39] The amount of pollution that a water body can assimilate considers waste load allocation (WLA) for point sources, the load allocation (LA) for nonpoint sources, and a margin of safety (MOS). The formula for a TMDL is as follows: TMDL = WLA + LA + MOS.

Table 21. Waterbodies in the Alabama River Basin listed on the 2004 303(d) List

Waterbody Name	Support Status	Rank	County	Uses	Causes	Sources	Size	Downstream/Upstream	1996 303(d)?	Draft TMDL Date
Three Mile Branch	Non	M	Montgomery	F&W	Pesticides (Dieldrin)	Unknown	7.6 miles	Lower Wetumpka Rd/Its source	No	2007
Catoma Creek	Partial	M	Montgomery	F&W	Organic Enrichment/ DO	Pasture grazing Urban runoff /storm sewers	23.2 miles	Alabama River/Ramer Creek	Yes	2002
Catoma Creek	Partial	M	Montgomery	F&W	Pathogens	Urban runoff /storm sewers Agriculture	23.2 miles	Alabama River/Ramer Creek	No	2007
Alabama River	Partial	L	Wilcox	PWS	Organic Enrichment/ DO	Dam construction Flow regulation /modification	5.0 miles	Beaver Creek/Rockwest Creek	Yes	2003
Alabama River	Partial	L	Wilcox	S F&W	Organic Enrichment/ DO	Industrial	7.6 miles	Bear Creek/Frisco Railroad Crossing	Yes	2003
Alabama River	Partial	L	Wilcox	F&W	Organic Enrichment/ DO	Industrial	5.0 miles	Frisco Railroad Crossing/Pursley Creek	Yes	2003
Alabama River	Partial	L	Wilcox	F&W	Organic Enrichment/ DO	Dam construction Flow regulation /modification	8.7 miles	Pursley Creek/River Mile 131	No	2003
Alabama River	Partial	L	Wilcox	PWS	Organic Enrichment/ DO	Dam construction Flow regulation /modification	1.5 miles	River Mile 131/Beaver Creek	No	2003

The 2004 303(d) List contains eight segments of impaired streams within the Alabama River Basin. Table 21 above is adapted from the Final 2004 list and provides detail about these segments.[40] Map 6 illustrates these stream segments within the context of the Basin and its subwatersheds. Five segments totaling 27.8 miles of the main stem of the Alabama River in Wilcox County are impaired and partially supporting classified uses due to enrichment by organic matter, which leads to below-standard levels of dissolved oxygen in the water. One segment of the Catoma Creek in Montgomery County measuring 23.2 miles is listed for two different causes: organic enrichment/dissolved oxygen and pathogens. Finally, 7.6 miles of the Three Mile Branch in Montgomery County has been listed due to high levels of pesticides found by monitoring.

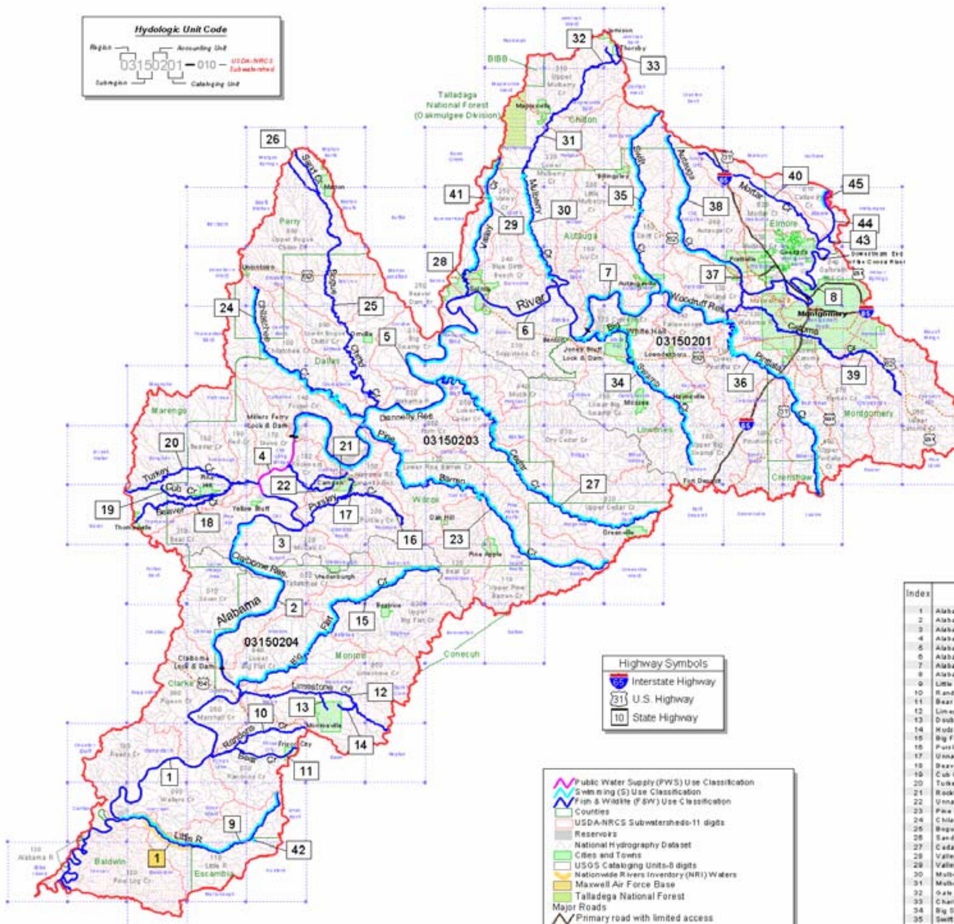
[40] ADEM, 2004. *Alabama's 2004 Integrated Water Quality and Assessment Report, Appendix F.*

USGS Catalog No.	Quad Name	ADEM Map No.
32086-D6	Autaugaville	105NW
31087-H7	Bashi	80NE
31087-F2	Beatrice	63NW
32086-C7	Benton	106SE
31086-F8	Bethel	62NW
31087-B8	Bibb Island	38NW
32086-F6	Billingsley	120NW
31087-B6	Blacksher	37NW
32087-C1	Blackwell Bend	107SE
32086-A7	Braggs	91SE
32087-D3	Browns	108NE
32087-F1	Buck Creek	122NE
32086-D8	Burnsville	106NW
31087-E2	Burnt Corn	63SW
32086-A6	Calhoun	39NE
32087-A3	Camden North	78NE
31087-H3	Camden South	130SW
32086-C4	Cantelous	234SE
32087-A1	Carlowville	82SE
31087-C7	Carlton	33NE
32087-B4	Catherine	105NE
32087-C4	Central Mills	105NW
31087-F5	Chance	65NE
32085-A8	China Grove	97SW
31087-D7	Choctaw Bluff	52NE
31087-C6	Chrysler	51SW
31087-E5	Claiborne	65SE
32086-G5	Clanton East	134SE
32086-G6	Clanton West	134SW
32086-B7	Collirene	91NE
31087-H4	Coy	78NW
32087-B3	Crumptonia	93NE
31086-H4	Danielsville	74NW
32086-B2	Davis Crossroads	88NW
32086-E4	Deatsville	119SW
32086-D7	Durant Bend	106NE
32087-B1	Elm Bluff	92NE
32086-E3	Elmore	119SE
31087-D3	Excel	60NE
32086-B8	Fitzpatrick	87NW
32087-B5	Flatwood	94NE
31087-D5	Flynns Lake	51NE
31086-G7	Forest Home	76SE
32086-D5	Forester	105NE
31086-H6	Fort Dale	75NW
31086-H5	Fort Deposit	75NE
31087-F4	Franklin	64NW
31087-D4	Frisco City	50NW
31087-G6	Fulton East	79SW
31087-D6	Gainestown	51NW
32086-B6	Gordonsville	90NW
31086-G6	Greenville West	75SW
32086-B5	Hayneville	90NE
32086-F3	Holtville	119NE
31087-B4	Huxford	36NW
31087-G4	Hybart	78SW
32086-H6	Jamison East	134NW
32086-H7	Jamison West	135NE
32086-E8	Jones	121SW
32087-A5	Kimbrough	94SE
31086-H3	Lapine	74NE
32087-A4	Lee Long Bridge	93SW
32086-B4	Letohatchee	89NW
31087-G5	Lower Peach Tree	79SE
32086-C6	Lowndesboro	105SE
32087-B6	Magnolia	94NW
32086-G7	Maplesville East	135SE
32086-G8	Maplesville West	135SW
32086-F4	Marbury	119NW
32087-D2	Marion Junction	107NW
32087-F3	Marion North	123NE
32087-E3	Marion South	123SE
31087-B5	McCullough	37NE
31087-G1	McWilliams	77SE
31087-E4	Mexia	64SW
32086-E7	Milton	121SE
32086-A8	Minter	91SW
31087-E3	Monroeville	64SE
32086-D3	Montgomery North	104NE
32086-C3	Montgomery South	104SE
32087-F4	Morgan Springs	123NW
32086-C1	Mount Meigs	103SE
32086-A6	Mount Willing	90SW
31087-G2	Nadawah	77SW
31087-F3	Natchez	64NE
32087-E5	Newbern	124SE
31087-H1	Oak Hill	77NE
32086-E5	Old Kingston	120SE
32087-C2	Orrville	107SW
31087-A6	Perdido	37SW
31086-H8	Pine Apple North	76NW
31086-G8	Pine Apple South	76SW
31087-H5	Pine Hill	79NE
32086-A1	Pine Level	88SE
32086-F8	Plantersville	121NW
32086-B9	Pleasant Hill	91NW
32086-F7	Pletcher	121NE
32086-D4	Prattville	104NW
32086-A2	Ramer	88SW
32086-H8	Randolph	135NW
31087-D2	Repton	40NW
31086-H7	Ridgeville	76NE
31087-H2	Rosebud	77NW
32087-C3	Safford	108SE
32086-A4	Sandy Ridge	89SW
32086-C8	Sardis	106SW
32087-E4	Scott Station	123SW
32086-A3	Sellers	89SE
32087-D1	Selma	107NE
31087-F1	Skinnerton	63NE
32086-B3	Snowdoun	89NE
31087-E6	Suggsville	65SW
32087-E1	Summerfield	122SE
32087-A6	Surginer	94SW
32087-E2	Suttle	122SW
32087-A7	Sweet Water	95SE
32087-B2	Tasso	92NW
32086-B1	Tealeys Mill	88NE
31087-B7	Tensaw	38NE
32087-C5	Thomaston East	109SE
31087-H6	Thomasville	79NW
32087-A2	Tilden	92SW
32087-D5	Uniontown West	109NW
31087-C4	Uriah East	50SW
31087-C5	Uriah West	51SE
32086-E6	Vida	120SW
31087-G3	Vredenburgh	78SE
32086-E2	Wetumpka	118SW
31087-F6	Whatley	65NW
32086-F5	White City	120NE
32086-C5	White Hall	105SW
32086-D2	Willow Springs	103NW

FINAL

Alabama River Basin Classified Waters

ADEM Water Division - Water Quality Program
Chapter 335-6-11
Water Use Classifications For Interstate and Intrastate Waters
Effective Date: 01/12/2001



Index	Waterbody	Location	ORVs[1]	Comments
1	Little River	From AL 59 To Co. Rd. 1	Scenic Recreation Fish Wildlife	Outstanding State coastal canoe stream with numerous sand bars.

1 Nationwide Rivers Inventory (NRI)

1 Outstandingly Remarkable Values: S=Scenery, R=Recreation, G=Geology, F=Fish, W=Wildlife, H=History, C=Cultural
The NRI can be obtained from http://www.nps.gov/rivers/

1-45 Alabama River Basin Classified Waters

Index	Stream	From	To	Classification
1	Alabama River	MOBILE RIVER		F&W
2	Alabama River	Claiborne Lock and Dam		S/F&W
3	Alabama River	Frisco Railroad Crossing	Claiborne Lock and Dam	F&W
4	Alabama River	River Mile 131	Frisco Railroad Crossing	PWS
5	Alabama River	Millers Ferry Lock and Dam	River Mile 131	S/F&W
6	Alabama River	Blackwell Bend (Six Mile Creek)	Millers Ferry Lock and Dam	F&W
7	Alabama River	Jones Bluff Lock and Dam	Blackwell Bend (Six Mile Creek)	S/F&W
8	Alabama River	Pintlala Creek	Jones Bluff Lock and Dam	F&W
9	Little River	ALABAMA RIVER	Pintlala Creek	S/F&W
10	Randons Creek	ALABAMA RIVER	Its source	F&W
11	Bear Creek	Randons Creek	Its source	F&W
12	Limestone Creek	ALABAMA RIVER	Its source	F&W
13	Double Bridges Creek	Limestone Creek	Its source	F&W
14	Hudson Branch	Limestone Creek	Its source	F&W
15	Big Flat Creek	ALABAMA RIVER	Its source	S/F&W
16	Pursley Creek	ALABAMA RIVER	Its source	F&W
17	Unnamed tributary south of Camden	Pursley Creek	Its source	F&W
18	Beaver Creek	ALABAMA RIVER	Its source	F&W
19	Cub Creek	Beaver Creek	Its source	F&W
20	Turkey Creek	Beaver Creek	Its source	F&W
21	Rockwest Creek	ALABAMA RIVER	Its source	F&W
22	Unnamed tributary west of Camden	Rockwest Creek	Its source	F&W
23	Pine Barren Creek	ALABAMA RIVER	Its source	S/F&W
24	Chilatchee Creek	ALABAMA RIVER	Its source	S/F&W
25	Bogue Chitto Creek	ALABAMA RIVER	Its source	F&W
26	Sand Creek	Bogue Chitto Creek	Its source	F&W
27	Cedar Creek	ALABAMA RIVER	Its source	S/F&W
28	Valley Creek	ALABAMA RIVER	Its source	F&W
29	Valley Creek	Selma-Summerfield Rd.	Its source	S/F&W
30	Mulberry Creek	ALABAMA RIVER	Selma-Summerfield Rd.	S/F&W
31	Mulberry Creek	Plantersville	Its source	F&W
32	Gale Creek	Mulberry Creek	Plantersville	F&W
33	Charlotte Creek	Gale Creek	Its source	F&W
34	Big Swamp Creek	ALABAMA RIVER	Its source	S/F&W
35	Swift Creek	ALABAMA RIVER	Its source	S/F&W
36	Pintlala Creek	ALABAMA RIVER	Its source	S/F&W
37	Autauga Creek	ALABAMA RIVER	Its source	F&W
38	Autauga Creek	Western boundary of Prattville	Its source	S/F&W
39	Catoma Creek	ALABAMA RIVER	Western boundary of Prattville	F&W
40	Mortar Creek	COOSA RIVER	Its source	F&W
41	Valley Creek Lake	Within Valley Creek State Park	Its source	S/F&W
42	Little River Lake	Within Little River State Park	Its source	S/F&W
43	Coosa River*	ALABAMA RIVER	Jordan Dam	F&W
44	Bouldin Canal (Callaway Creek)*	COOSA RIVER	Bouldin Dam	F&W
45	Coosa River (Lake Jordan)*	Bouldin Dam	Alabama Highway 111	PWS/S/F&W

* In Chapter §335-6-11 these classifications are listed under the Coosa River Basin section

Highway Symbols
Interstate Highway
U.S. Highway
State Highway

Public Water Supply (PWS) Use Classification
Swimming (S) Use Classification
Fish & Wildlife (F&W) Use Classification
Counties
USDA-NRCS Subwatersheds-11 digits
Reservoirs
National Hydrography Dataset
Cities and Towns
USGS Cataloging Units-8 digits
Nationwide Rivers Inventory (NRI) Waters
Maxwell Air Force Base
Talladega National Forest
Major Roads
Primary road with limited access
Primary road
USGS 7.5 Minute Series Quadrangles (1:24,000)

10 0 10 Miles
10 0 10 Kilometers
Scale 1:600,000

Software: ESRI's Arcview 3.2
Extension: RTI's NHD-RIT
Avenue Script: R. Bourman's Graphtab.ave
Projection: Geographic/Unprojected
Datum: NAD83
Date: 12/14/2001
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ADEM Water Quality Branch

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5.3.1 TMDLs in the Alabama River Basin

Several waterbodies within the Alabama River Basin have been subject to or are scheduled for TMDL development. All of the listed segments of the Alabama River currently have a draft TMDL. (Refer to inset text box below for a summary of the Claiborne Pool TMDL.) Catoma Creek, which is listed for two impairments – organic enrichment (OE)/dissolved oxygen (DO) and pathogens - has been scheduled for two TMDLs in 2005 and 2006, respectively.[41] The Three Mile Branch TMDL for pesticides (dieldrin) is scheduled for completion in 2007.

It is worth noting that since the last posting of the 303(d) list in 2002, the list changed because of textual corrections, additional listed water bodies and segments, and removal of waterbodies from the list. In the Alabama River Basin, no new segments were added. Three sections of Claiborne Pool were delisted (*i.e.*, removed from the 303d list) due to improvements in nutrient levels in the lake.[42] Therefore, ADEM was no longer required to complete a nutrient TMDL for this waterbody.

[41] The draft OE/DO TMDL for Catoma Creek was drafted in 2002 and will finalized and submitted to EPA in 2004.
[42] Table E-2 Alabama's Final 2004 §303(d) List, Waterbody/Pollutants Removed from the 2002 List

Summary of Delisting Decision for the Claiborne Pool of the Alabama River—Nutrients

Three segments of the Alabama River comprising Claiborne Pool were listed for nutrient enrichment/eutrophication. The segments run from Rockwest Creek to Bear Creek along the Alabama mainstem. Two segments from Beaver Creek to Rockwest Creek and Bear Creek to Pursley Creek were listed in 1996 as impaired by nutrients and organic enrichment (OE)/dissolved oxygen (DO). The section from Pursley Creek to Beaver Creek was added in 2000.

ADEM water quality standards state that minimum DO concentration in a waterbody classified under swimming and fish/wildlife is 5.0 mg/L except under extreme natural conditions, when 4.0 mg/L is allowed. Sampling in 2002 confirmed that DO concentrations below 5 mg/L (but above 4 mg/L) occur within listed segments more than 10 percent of the time during the summer growing season. Modeling revealed that DO excursions are indeed associated with OE and flow modifications, but nutrients and the impacts of nutrients on algal growth were determined not to be contributors to depleted DO in the listed segments. The TMDL for OE/DO was drafted in October 2003 but a TMDL for nutrients was not required.

Based on detailed sampling conducted during 2000 and 2002, ADEM has also determined that chlorophyll a concentrations present in the entire Claiborne Pool of the Alabama River are "fully consistent with support of all designated beneficial uses." There is no need to develop a nutrient TMDL to address eutrophication within the Claiborne Pool. Delisting for nutrients is justified because there exists "more recent or accurate data" to assess the role of nutrients in the impairment.

A second indicator that supports removal of nutrients from the list of potential impairment sources is the ***average trophic state index*** (TSI), observed over the last 15 years. The lake has an average TSI of 53, which indicates the presence of nutrients and biological activity, but does not suggest an imminent nutrient or algal problem. However, it is important to maintain nutrient loads at present levels to prevent algal blooms and additional DO problems.

- ADEM, 2003. *Draft Delisting Decision for the Claiborne Pool of the Alabama River, Waterbody ID# AL/Alabama R_01, AL/Alabama R_02, and AL/Alabama R_03, Nutrients.* Alabama Department of Environmental Management – Water Quality Branch, Water Division. October 2003. Montgomery, AL

The stretch of the Alabama River referred to as Claiborne Pool is also subject to a TMDL because of impairments due to organic enrichment (OE) and low dissolved oxygen (DO). Claiborne Pool begins at the tail waters of Millers Ferry Lock & Dam and is impounded by Claiborne Lock & Dam. In October 2003, ADEM released the *Draft Total Maximum Daily Load (TMDL) for OE/DO* for three segments of the Alabama River (Waterbody ID# AL/Alabama R_01, AL/Alabama R_02, and AL/Alabama R_03). This TMDL is scheduled to be finalized in Fiscal Year 2005 for EPA review and approval (ADEM, 2004). OE includes sources of carbonaceous biochemical oxygen demand (CBOD) that consume dissolved oxygen (ADEM, 2003).

The major point source contributor of OE loads to the listed segments is the Weyerhaeuser Pine Hill Mill, a container board pulp mill with an industrial discharge that enters the system at River Mile 121.2 and has a reported flow rate of 12.4 million gallons per day (MGD). Weyerhaeuser's NPDES permit imposes the following additional requirements: "Stream monitoring shall be performed daily between June 1 and October 31 at river mile 121.8 (Station C). If any DO values at Station C are found to be less than 5.4 mg/L, the permittee shall either immediately initiate daily river monitoring or immediately cease discharge until DO values at Station C are found to be equal to or greater than 5.4 mg/L."(ADEM, 2004).

ADEM and Tetra Tech conducted modeling to better understand the role of the mill in the Claiborne Pool water quality issues. The model scenarios indicated that the existing Weyerhaeuser discharge contributes a small portion of the oxygen deficit resulting in excursion of DO criterions in the Claiborne Pool. Proposed modifications to decrease the loading from Pine Hill, which Weyerhaeuser has reportedly already begun to implement, should reduce the impact of the Pine Hill Mill effluent to low levels—assuming the effluent quality, particularly the BOD, improves to the extent indicated by Weyerhaeuser. Fully achieving water quality standards within the listed segments would appear to require an improvement in the upstream water quality leaving Millers Ferry Lock and Dam (ADEM, 2004).

6.0 BASIN MANAGEMENT CONCERNS AND ISSUES

The basin management concerns and issues for the Alabama River Basin, and the recommendations for addressing these needs, are the primary components of this basin management plan. These needs and recommendations provide a road map for future action in the river basin, with the ultimate goal of natural resource enhancement and protection.

A multi-faceted approach was taken to identify the water quality concerns and issues in the basin. A major element of this approach included the issues and concerns identified by the river basin stakeholders. Stakeholder input collected at several meetings regarding needs and concerns was complemented by an analysis of existing information summarized by ADEM in the 2000 *Surface Water Quality Screening Assessment of the Alabama River Basin*. This comprehensive report contains analyses of 1998 Soil and Water Conservation District (SWCD) data, which relied on field surveys to ***estimate*** watershed attributes (*e.g.*, land use, use density) and nonpoint source pollution potential. This 1998 SWCD data is the most recent data available that describes the basin with regard to land uses and potential nonpoint source pollution. The SWCD data has three components that were used to help identify basin concerns for the purposes of developing this plan:

- *Nonpoint source pollution impairment potential for subwatersheds*, as determined by the SWCDs (1998).
- *Resource concerns in the subwatersheds*, as determined by the local Soil and Water Conservation Districts (1998).
- *Sediment loading estimates for the subwatersheds*, as provided by the local Soil and Water Conservation Districts (1998) and published by the Alabama Soil and Water Conservation Committee (www.swcc.state.al.us/watershedmenu.htm).

Information from the *Screening Assessment* was utilized to establish what the basin management concerns and issues are for the Alabama River Basin. It is very important to note that the 1998 is older data and does not reflect current conditions in the basin.

In light of the fact that there is limited empirical and GIS data available to estimate land use and water quality in the Alabama River Basin, an analysis of land use and nonpoint source pollution is also limited. It should be understood that these data were utilized to guide the basin management planning process and they are not meant to quantify pollution loads throughout the basin. In other words, these data and the watershed modeling conducted for this plan represent **potential impacts** and not **measured impacts.**

6.1 Stakeholder Concerns.

During the week of March 15, 2004, four sub-basin stakeholder meetings were organized by the Basin Facilitator and her sponsoring organization, the Alabama Pulp and Paper Council. Following an introductory and educational component to familiarize participants to the basin management planning process, a facilitated discussion of water quality issues was held to gather direct input from participants about local watershed issues and concerns.

Summaries from these stakeholder meetings are presented below as *Concerns and Issues.* The summaries consist of the problems and concerns stated by the participants as well as stakeholder input regarding remedies they suggest to address the issue or problem, or alternatively, what information they felt was needed to better understand their concerns.

Upper Alabama – Catoma Creek Watershed, Wednesday, March 17, 2004 at 12:00 p.m. at the Montgomery County, Department of Health Auditorium, Montgomery, Alabama
Concerns and Issues: • There are two creeks that are called, "Cypress Creek" – one flowing through Downtown Montgomery and one flowing through Lowndes County. Information regarding Brownsfield and groundwater issues of this downtown creek can be discovered at ADEM. • Wetlands banking is an increasingly popular management strategy to protect water resources in Alabama. For more information about the Alabama Wetlands Mitigation Bank at the McLemore Family property *see* www.gmcnetwork.com. • Catoma Creek information and its *Lessons Learned* will be mentioned in the Alabama River Basin Management Plan and joint Upper Alabama Sub-basin and Catoma Watershed stakeholder meetings will be held. • ACOE water quality data is available and should be included in the Plan. • Soil erosion and runoff from municipal roads and new road construction • Severe soil erosion and sedimentation • Water pollution by pathogenic bacteria • Wetland and aquatic habitat destruction • Polluted stormwater runoff with toxics, pathogenic bacteria • Rapid urban development, increased impervious surfaces, and polluted runoff • Lack of understanding and awareness of nonpoint source pollution issues • Difficult access to builders, contractors, developers, and municipal officials to discuss nonpoint source pollution issues.

Lower Alabama/Lower Tombigbee Meeting, Thursday, March 18, 2004 at 6:00 p.m., ALFA Building, Grove Hill, AL

Concerns and Issues:

- Forestry and Nonpoint Source Pollution
  - Explore ways to enhance outreach efforts to non-company/“mom and pop” logging operations to increase knowledge and understanding of sustainable forestry practices.
    - For example, a stakeholder pointed out that Alabama River Woodland does not own woodlands; they pay logging companies and forest land owners for timber. They follow the SFI management principles and practices. They also follow a “3-strikes-and-you-are-out” Policy for timber harvesters whose practices are not consistent with SFI.

- Road construction and maintenance in the watershed is an issue. Specific items or areas of concern were mentioned and are listed below:
    - County and State Road Crews should be trained and supervised. Perhaps County Engineers could be trained in modern water quality BMPs for road work. As an incentive they may receive continuing education credits (CEUs).
    - Currently, it appears that the road crews do not adhere to BMPs for road work.
    - There is a need for BMP enforcement – is there a mechanism that could be used and improved?
    - Any system needs incentives for compliance.

- Mining and excavation operation impact water bodies.
    - It is perceived that the contractors (the people that dig) are the source of the problem.
    - Need for BMP training, implementation and monitoring/enforcement for this industry.

- *Water Fests* have been and are a great educational outlet and activity for local students and teachers.

- Illegal dumping of solid waste from watercraft on the Alabama and Tombigbee Rivers is a huge problem.

- Road crossings and boat ramps lead to stream and rive bank erosion and they also tend to be areas where litter is dumped or left.

- Investigate technology transfer of BMP technology from one industry (forestry) to another (transportation).

- Road construction BMPs are needed – What program can be implemented?

- Who has jurisdiction over dumping of trash and waste from watercraft? *Answer:* U.S. Coast Guard, ADEM, state and municipal law enforcement authorities.

- Who has jurisdiction over river traffic? *Answer:* U.S. Coast Guard, ACOE, ADEM, state and municipal law enforcement authorities.

6.2 Nonpoint Source Pollution Impairment Potential for Subwatersheds.

Subwatershed impairment potential was determined by the local Soil and Water Conservation Districts (1998) and augmented with current construction stormwater authorizations by ADEM (2003). Impairment potential is a rating that provides an estimation of the potential for current and future nonpoint pollution from various sources *without proper management*. **This estimation of pollution potential is an approximation made by the Soil and Water Conservation Districts in order to assess each watershed.**[43] Proper management, in this context, means that appropriate best management practices (BMPs) are implemented and maintained. The nonpoint source pollution impairment potential for each subwatershed in the Alabama River Basin is provided in **Appendix D**.

NPS pollution impairment potential was determined for seven potential rural sources (ADEM, 2002):

- Row crops (rated by percent of land use devoted to cropland and the percent of cropland acres where pesticides are applied)
- Pasture runoff (rated by percent of land use devoted to pasture land)
- Animal husbandry (rated by the number of animal units per acre)
- Aquaculture (rated by the percent of land use devoted to aquaculture)
- Forestry practices (rated by the sum of the percent of forestry acres that are clear cut, the percent of forestry acres that are selectively harvested annually, and the percent of forestry acres that need remediation and management)
- Mining (rated by the percent of land use devoted to mining)
- Sedimentation (rated by the tons per acre per year of sedimentation in the subwatershed).

[43] The SWCD attempted to collect data from many industries and user associations working in the basin. In 1998, the Alabama Forestry Commission input regarding forestry in the Tombigbee River Basin was not included. Therefore, a considerable amount of data regarding forestry in the basin was never included, limiting the accuracy of the data overall.

- *A New Road near Montgomery* (Credit: City of Montgomery)

- *A Newly installed Stormdrain* (Credit: City of Montgomery)

The findings for the Alabama River Basin, shown in **Figure 5**, show potential pollution impairments from forestry practices as the most common source in the Alabama River Basin. The impairment scores shown in **Figures 5 - 8** were derived by weighting the impairment potential ratings reported in ADEM (2002) by 3 for “high” (H) ratings and by 2 for “medium” (M) ratings for the subwatersheds.

Figure 5. Nonpoint source pollution potential in the Alabama River Basin. Percentages reflect the proportion of the total impairment score for the Alabama River Basin that is attributed to each rural land use impairment source.

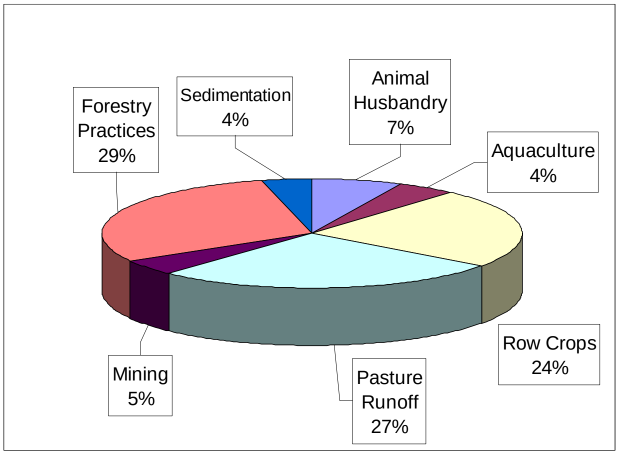


Figure 7. Nonpoint source pollution potential in the Middle Alabama River Basin. Percentages reflect the proportion of the total impairment score for the Middle Basin that is attributed to each rural land use impairment source.

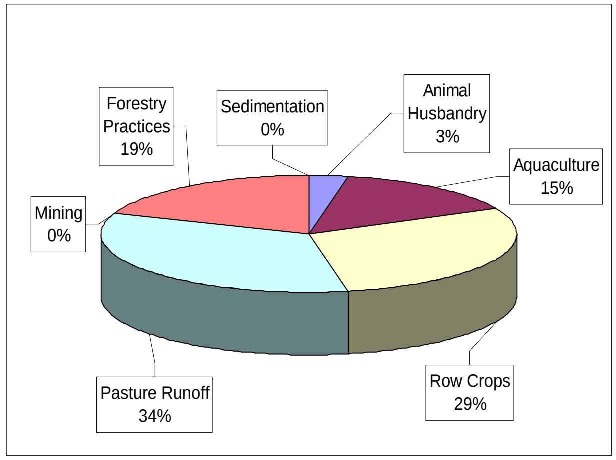


Figure 6. Nonpoint source pollution potential in the Upper Alabama River Basin. Percentages reflect the proportion of the total impairment score for the Upper Basin that is attributed to each rural land use impairment source.

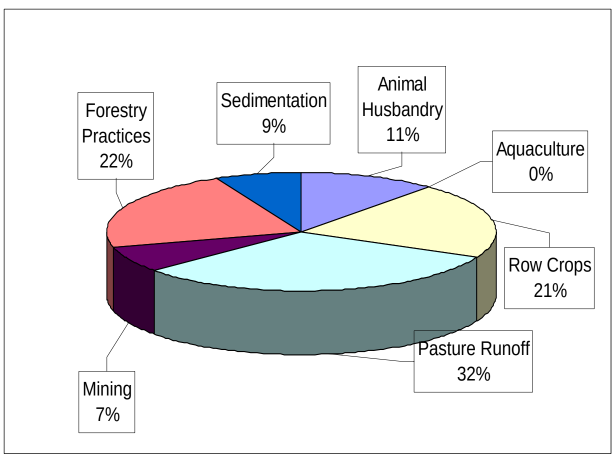
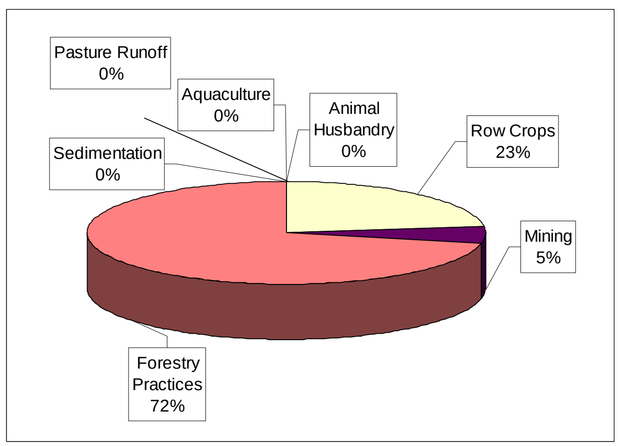


Figure 8. Nonpoint source pollution potential in the Lower Alabama River Basin. Percentages reflect the proportion of the total impairment score for the Lower Basin that is attributed to each rural land use impairment source.



Twenty-nine percent of the total potential impairment in the Alabama River Basin was attributed to forestry practices, with pasture runoff and row crops a close second and third as sources of nonpoint impairment. Land use in the basin is largely forested land (67%), with pastureland at 17% and cropland at 9%. This indicates that, on a per acre basis, impairment potential from forested land is far less than from either pastureland or cropland.

In the Upper and Middle Alabama River basins, pasture runoff and row crops, along with forestry practices, were the primary sources of nonpoint pollution impairment (**Figure 6 and 7**). Forestry practices were the dominant source of impairment (72%) in the Lower Alabama River Basin (**Figure 8)**, with row crops a distant second source.

The five subwatersheds with the greatest NPS pollution impairment potential for each of the seven rural land use sources are shown on the following page in **Table 22**. The subwatersheds listed below were among the top five for multiple NPS impairment sources:

- Lower Boguechitto Creek (4 NPS impairment sources)
- Upper Boguechitto Creek (3 NPS impairment sources)
- Upper Catoma Creek (2 NPS impairment sources)
- Galbraith Mill Creek (2 NPS impairment sources)
- Mill Creek & Pine Creek (2 NPS impairment sources)
- Lower Big Swamp Creek (2 NPS impairment sources)
- Lower Pintlalla Creek (2 NPS impairment sources)

Table 22. Nonpoint source pollution potential in the Alabama River Basin and its three sub-basins. Percentages reflect the proportion of the total NPS impairment score for the basin attributable to each of the seven rural land use impairment sources. The top five subwatersheds were ordered within similar rating groups by subwatershed size.[1]

ANIMAL HUSBANDRY	***Percent***
Alabama River Basin	7%
Upper Alabama River Basin	11%
Middle Alabama River Basin	3%
Lower Alabama River Basin	0%
Top 5 Subwatersheds:	***Rating:***
Upper Catoma Creek	M
Lower Big Swamp Creek	M
Little Mulberry Creek	M
Lower Boguechitto Creek	M
Lower Pintlalla Creek	M

AQUACULTURE	***Percent***
Alabama River Basin	4%
Upper Alabama River Basin	0%
Middle Alabama River Basin	15%
Lower Alabama River Basin	0%
Top 5 Subwatersheds:	***Rating:***
Upper Boguechitto Creek	H
Chilatchee Creek	H
Lower Boguechitto Creek	M
Mush Creek	M
Beaver Creek	L

ROW CROPS	***Percent***
Alabama River Basin	24%
Upper Alabama River Basin	21%
Middle Alabama River Basin	29%
Lower Alabama River Basin	23%
Top 5 Subwatersheds:	***Rating:***
Upper Boguechitto Creek	H
Soapstone Creek	H
Lower Boguechitto Creek	H
Randons Creek	H
Lower Cedar Creek	H

PASTURE RUNOFF	***Percent***
Alabama River Basin	27%
Upper Alabama River Basin	31%
Middle Alabama River Basin	34%
Lower Alabama River Basin	0%
Top 5 Subwatersheds:	***Rating:***
Upper Catoma Creek	H
Lower Big Swamp Creek	H
Lower Boguechitto Creek	H
Lower Pintlalla Creek	H
Upper Pintlalla Creek	H

MINING	***Percent***
Alabama River Basin	5%
Upper Alabama River Basin	7%
Middle Alabama River Basin	0%
Lower Alabama River Basin	5%
Top 5 Subwatersheds:	***Rating:***
Galbraith Mill Creek[2]	H
Lower Catoma Creek	M
Bluegirth Beech Creek	M
Mill Creek/Pine Creek	M
Marshall Creek	M

FORESTRY PRACTICES	***Percent***
Alabama River Basin	29%
Upper Alabama River Basin	22%
Middle Alabama River Basin	19%
Lower Alabama River Basin	72%
Top 5 Subwatersheds:	***Rating:***
Upper Big Swamp Creek	H
Dry Cedar Creek	H
Pine Log Creek	H
Reedy Creek	H
Upper Cedar Creek	M

SEDIMENTATION	***Percent***
Alabama River Basin	4%
Upper Alabama River Basin	7%
Middle Alabama River Basin	0%
Lower Alabama River Basin	0%
Top 5 Subwatersheds:	***Rating:***
Hudson Creek	H
Galbraith Mill Creek[2]	M
Tallawassee Creek	M
Beaver Dam Branch	M
Upper Boguechitto Creek	L

Both an ADEM Priority and a High NPS Potential Subwatershed
ADEM Priority Subwatershed
High NPS Potential Subwatershed
2004 303(d) Subwatershed

[1] Source of data: SWCC (1998). NPS impairment ratings of "H" were weighted by a factor of 3, while "M" ratings were a factor of 2. Ratings of "L" were not included in the score.

[2] Both a 303(d) impaired waters designation and a High NPS Potential subwatershed.

6.3 Resource Concerns for Subwatersheds:

The local Soil and Water Conservation Districts provided data to ADEM (2002) regarding resource concerns in the subwatersheds of the Alabama River Basin. These resource concerns, identified by District staff with stakeholder input, fell into 16 categories that are summarized in **Table 23**. The most common resource concern across the subwatersheds of the Alabama River Basin was livestock access to streams, where it was cited as a significant concern in 80 percent of the subwatersheds. Road and roadbank erosion, along with excessive sediment from unpaved roads and roadbanks, were the second and third most frequent resource concerns, being cited in 75 percent and 66 percent of the subwatersheds respectively. Livestock overgrazing of pastures was also cited as a resource concern in the majority (over 50 percent) of the subwatersheds.

- *Improper Disposal of Solid Waste* (Credit: City of Montgomery)

Livestock access to streams, and road/roadbank erosion were the most common resource concerns in each of the three basin segments of the Alabama River Basin. Detailed resource concerns in each of the subwatersheds are provided in **Appendix E.**

Table 23. Resource concerns in the Alabama River Basin and its three basin segments. Percentages reflect the number of subwatersheds in the basin in which the resource concern was considered significant. Source of data: SWCC (1998).

Resource Concerns in the Subwatershed	Alabama River Basin	Upper Alabama River Basin	Middle Alabama River Basin	Lower Alabama River Basin
Livestock Commonly have access to streams	80%	77%	91%	69%
Road and roadbank erosion	75%	62%	95%	69%
Excessive sediment from roads/road banks	66%	50%	77%	77%
Livestock are overgrazing pastures	57%	54%	77%	31%
Bacteria and other organisms in surface waters	41%	50%	50%	8%
Gully erosion on agricultural land	31%	38%	27%	23%
Poor soil condition (cropland)	26%	50%	14%	
Nutrients in surface waters	20%	27%	9%	23%
Excessive erosion on cropland	18%	23%	18%	8%
Excessive sediment from cropland	15%	19%	9%	15%
Nonpoint source pollution from urban development	13%	23%	5%	8%
Inadequate management of animal wastes	5%	4%	9%	
Excessive animal waste applied to land	3%		9%	
Excessive pesticides applied to land	3%		5%	8%
Pesticides in surface waters	3%		5%	8%
Low dissolved oxygen in surface waters	2%	4%		

6.4 Sediment Loading Estimates

Wind and water drive the erosion of soil from the land. The amount of soil loss, or sediment load, varies according to the land uses within a watershed. Once in a river or stream, the sediment load remains suspended in the water and is deposited in the channel or a river delta. Deposition of the sediments, or sedimentation, can alter a river or stream over time. Changes in configuration of stream can than impact how much and in what way future sedimentation occurs. That is the primary way in which stream change course over time and can change their banks. In certain streams during certain periods, the sediment load can be attributed to these natural, instream processes. However, these are natural processes of sedimentation are heavily influenced by land use, climate, slope of the surrounding land, and management activities targeted to decrease erosion.

Data on sediment loading estimates (in units of tons per year) were taken from the Alabama Soil and Water Conservation Committee database that is published on the web. This information was provided by the local Soil and Water Conservation Districts. Estimates were provided for 9 sediment erosion sources:

- Cropland
- Mined land
- Critical areas
- Stream banks
- Sand and gravel pits
- Developing urban land[44]
- Gullies
- Dirt roads and road banks
- Woodlands

Sediment loading in the Alabama River Basin is estimated to come from developing urban land (20 percent), followed by sand and gravel pits (14 percent), dirt roads and roadbanks (13 percent), degraded streams (13 percent), croplands (12 percent), and woodlands (assumed to be harvested) (11 percent). Sediment loading percentages for the Alabama River Basin and each of its three basin segments are shown in **Figure 9** through **12**.

- *A Block Culvert near Montgomery* (Credit: City of Montgomery)

[44] Developing urban land is rural land that is being converted through development to concentrated residential or urban land.

Figure 9. Sediment loading estimates for the Alabama River Basin. Percentages reflect the proportion of the total sediment loading for the Alabama River Basin that is attributed to each source of sediment erosion.

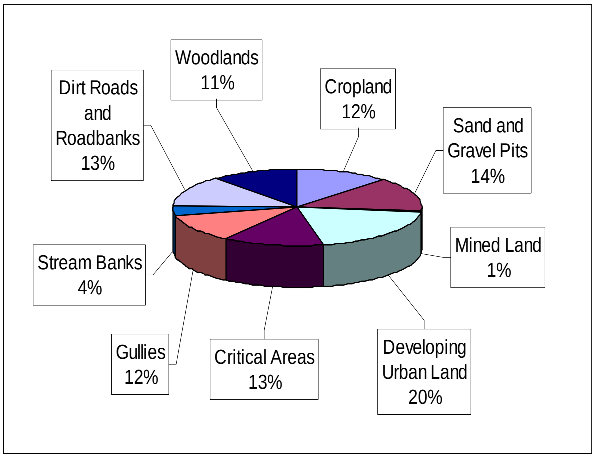


Figure 10. Sediment loading estimates for the Upper Alabama River Basin. Percentages reflect the proportion of the total sediment loading for the Upper Alabama River Basin that is attributed to each source of sediment erosion.

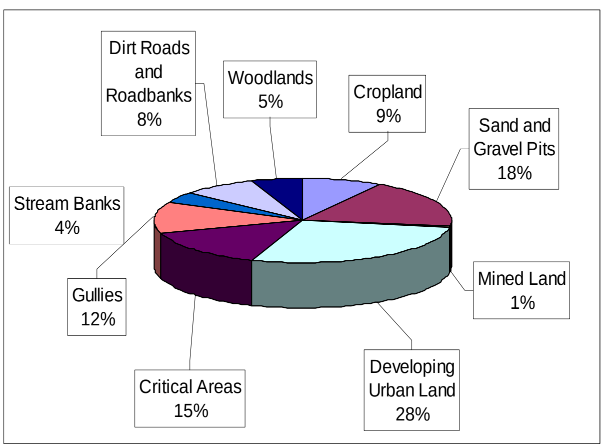


Figure 11. Sediment loading estimates for the Middle Alabama River Basin. Percentages reflect the proportion of the total sediment loading for the Middle Alabama River Basin that is attributed to each source of sediment erosion.

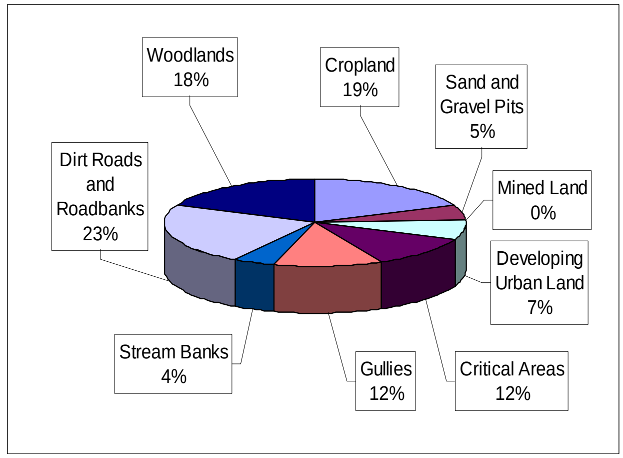
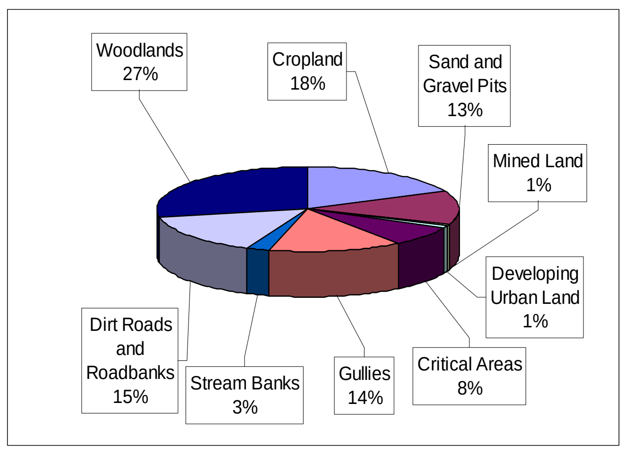


Figure 12. Sediment loading estimates for the Lower Alabama River Basin. Percentages reflect the proportion of the total sediment loading for the Lower Alabama River Basin that is attributed to each source of sediment erosion.



The five subwatersheds in the Alabama River Basin with the highest sediment loading for each of the nine sediment erosion sources are shown in **Table 24**. Six of the subwatersheds stand out as having significant annual sediment loading from specific erosion sources:

- Upper Boguechitto Creek subwatershed - has the highest annual sediment loading from cropland, and is at least 184 percent higher than all other subwatersheds.
- Galbraith Mill Creek subwatershed - has the highest annual sediment loading from sand and gravel pits, and is at least 50 percent higher than all other subwatersheds.
- Mill Creek / Pine Creek subwatersheds - have the highest annual sediment loading from developing urban land, and is at least 1,191 percent higher than all other subwatersheds.
- Lower Big Swamp Creek subwatershed - has the highest annual sediment loading from critical areas, and is at least 65 percent higher than all other subwatersheds.
- Lower Big Swamp Creek subwatershed - has the highest annual sediment loading from gullies, and is at least 65 percent higher than all other subwatersheds.
- Beaver Creek subwatershed - has the highest annual sediment loading from dirt roads and roadbanks, and is at least 96 percent higher than all other subwatersheds.

The subwatersheds with the highest total sediment loading estimates from all sources are shown in **Table 25**. The Mill Creek/Pine Creek subwatershed has the highest annual sediment loading from all erosion sources, but 91 percent of that sediment load comes from developing urban land. Lower Big Swamp Creek has the second highest total annual sediment loading from all erosion sources, with 77 percent of that total coming from the critical areas and gullies source areas. Further breakdowns can be derived from the sediment loading estimates for each of the subwatersheds, provided in **Appendix F.**

Table 24. Sediment loading from various sources in the Alabama River Basin and its three sub-basins[1].

CROPLAND	Load (tons/yr)
Alabama River Basin	819,718
Upper Alabama River Basin	358,783
Middle Alabama River Basin	325,447
Lower Alabama River Basin	135,488
Top 5 Subwatersheds:	
Upper Boguechitto Creek	156,765
Soapstone Creek	55,190
Lower Boguechitto Creek	48,552
Little Mulberry Creek	36,453
Randons Creek	35,237

SAND AND GRAVEL PITS	Load (tons/yr)
Alabama River Basin	965,995
Upper Alabama River Basin	776,370
Middle Alabama River Basin	93,557
Lower Alabama River Basin	96,067
Top 5 Subwatersheds:	
Galbraith Mill Creek[2]	210,000
Tallawassee Creek	140,000
Lower Catoma Creek	98,000
Bluegirth Beech Creek	70,000
Mortar Creek	43,750

MINED LAND	Load (tons/yr)
Alabama River Basin	34,320
Upper Alabama River Basin	30,000
Middle Alabama River Basin	0
Lower Alabama River Basin	4,320
Top 5 Subwatersheds:	
Pinchony Creek	30,000
Marshall Creek	4,320

DEVELOPING URBAN LAND	Load (tons/yr)
Alabama River Basin	1,303,741
Upper Alabama River Basin	1,171,839
Middle Alabama River Basin	125,227
Lower Alabama River Basin	6,675
Top 5 Subwatersheds:	
Mill Creek/Pine Creek	938,160
Beaver Creek	72,660
Galbraith Mill Creek[2]	40,000
Upper Boguechitto Creek	38,977
Mortar Creek	36,861

CRITICAL AREAS	Load (tons/yr)
Alabama River Basin	879,478
Upper Alabama River Basin	617,738
Middle Alabama River Basin	204,885
Lower Alabama River Basin	56,855
Top 5 Subwatersheds:	
Lower Big Swamp Creek	151,575
Upper Big Swamp Creek	91,800
Lower Pintlalla Creek	87,500
Dry Cedar Creek	73,225
Pinchony Creek	70,275

GULLIES	Load (tons/yr)
Alabama River Basin	807,037
Upper Alabama River Basin	491,512
Middle Alabama River Basin	207,332
Lower Alabama River Basin	108,193
Top 5 Subwatersheds:	
Lower Big Swamp Creek	98,980
Upper Big Swamp Creek	59,780
Bluegirth Beech Creek	49,000
Dry Cedar Creek	48,685
Lower Pintlalla Creek	44,100

STREAM BANKS	Load (tons/yr)
Alabama River Basin	277,932
Upper Alabama River Basin	181,102
Middle Alabama River Basin	77,892
Lower Alabama River Basin	18,938
Top 5 Subwatersheds:	
Upper Big Swamp Creek	21,750
Lower Big Swamp Creek	21,750
Upper Cedar Creek	21,316
Lower Pintlalla Creek	18,400
Beaver Dam Branch	15,440

DIRT ROADS AND ROADBANKS	Load (tons/yr)
Alabama River Basin	855,193
Upper Alabama River Basin	341,195
Middle Alabama River Basin	399,064
Lower Alabama River Basin	114,934
Top 5 Subwatersheds:	
Beaver Creek	117,900
Tallawassee Creek	60,000
Pine Log Creek	41,250
Upper Cedar Creek	35,670
Lower Mulberry Creek	34,980

WOODLANDS	Load (tons/yr)
Alabama River Basin	762,225
Upper Alabama River Basin	229,527
Middle Alabama River Basin	321,452
Lower Alabama River Basin	211,246
Top 5 Subwatersheds:	
Beaver Creek	47,524
Upper Cedar Creek	46,772
Pine Log Creek	46,346
Silver Creek	31,856
Little Mulberry Creek	27,900

Both an ADEM Priority and a High NPS Potential Subwatershed

ADEM Priority Subwatershed

High NPS Potential Subwatershed

2004 303(d) Subwatershed

[1] Source of data: ADEM (2002). NPS impairment ratings of "H" were weighted by a factor of 3, while "M" ratings were weighted by a factor of 2. Ratings of "L" were not included in the score.

[2] Both a 303(d) impaired waters designation and a High NPS Potential subwatershed.

Table 25. Subwatersheds in the Alabama River Basin with the highest total sediment loading estimates from all erosion sources. Sediment loading estimates are in tons per year. Source of data: Alabama Soil and Water Conservation Districts, published by the SWCC.

Subwatershed	*Tons/year*		*Subwatershed*	*Tons/year*
Mill Creek/Pine Creek	1,029,966		Upper Big Swamp Creek	210,832
Lower Big Swamp Creek	323,912		Lower Pintlalla Creek	181,617
Tallawassee Creek	293,056		Dry Cedar Creek	170,052
Beaver Creek	283,790		Bluegirth Beech Creek	164,270
Upper Boguechitto Creek	266,787		Mortar Creek	159,335
Galbraith Mill Creek	257,900		Upper Cedar Creek	157,028

6.5 Summary of Management Needs.

A listing of the primary resource concerns and management needs and issues is provided on the next page. This list is based on the previous summaries of stakeholder concerns derived from public meetings, the impairment potential for subwatersheds as determined by the local Soil and Water Conservation Districts, resource concerns for subwatersheds as developed by the local Soil and Water Conservation Districts, and sediment loading rates as provided by the Alabama Soil and Water Conservation Committee on the web. Many of the concerns or issues were cited from several of these information sources.

Other concerns discussed in earlier sections of this plan may be significant on a local or subwatershed scale, but are not widespread concerns across the river basin. More localized concerns should not be ignored at the subwatershed management scale, and management efforts toward those concerns should be pursued as opportunities arise. These primary resource management issues and concerns are the central focus for developing basin management recommendations. The assessments for all subwatersheds in the river basin in terms of nonpoint source impairment, resource concerns, and sediment loading are provided in **Appendices D through F**. Information on a subwatershed scale can also be found in the Surface Water Quality Screening Assessment of the Alabama River Basin, published by ADEM (2000).

Primary Resource Management Concerns

• sediment and nutrient loading from forestry practices	• wetland and aquatic habitat destruction
• sediment and nutrient loading from pastureland	• nonpoint pollution from urban land development
• sediment, nutrient, and pesticide loading from cropland	• sediment loading from sand and gravel pits
• sediment and nutrient loading from aquaculture	• sediment loading from critical areas
• nonpoint source impairment from sedimentation	• gully erosion
• soil erosion from roads, roadbanks and new road construction	• road crossings and boat ramp litter problems
• animal husbandry / waste management impacts	• septic tank nutrient and pathogen loading
• livestock access to streams	• river traffic management
• livestock overgrazing of pastureland	• dumping garbage from boats
• pesticides, bacteria and other organisms in surface waters	• integrating management lessons from other watersheds
• stormwater runoff with toxics and pathogenic bacteria	• outreach and education on watershed protection and restoration
• mining and excavation impacts on surface waters	• technology transfer for BMPs across industries
• failing septic systems in the Black Belt Region	• invasive species (e.g., water hyacinth in Dannelly Reservoir)
• improper disposal of deer carcasses	

6.6 Targeted Subwatersheds

The central themes of this river basin management plan are (1) to identify the primary resource management needs of the basin, (2) to identify the areas in the basin where priority action is are most needed, (3) to develop management recommendations that address those needs, and (4) to identify implementation opportunities and mechanisms for those recommendations. The highest priority areas in the Alabama River Basin, where management efforts are most needed, are identified below. These subwatersheds are illustrated in **Map 7**.

These priority areas, referred to as Targeted Subwatersheds in this plan, are those subwatersheds identified by ADEM as priority subwatersheds in their Surface Water Quality Screening Assessment of the Alabama River Basin, published by ADEM (2000); those subwatersheds with a "high" potential for nonpoint source pollution impairment, as determined by the Soil and Water Conservation Districts and published by ADEM (2000), see **Appendix D**; or those subwatersheds with segments identified by ADEM as impaired on their 303(d) surface water impairment list. These targeted subwatersheds are shown in **Table 26**.

It should be emphasized that additional subwatersheds not included in **Table 26** may become Targeted Subwatersheds after additional assessment efforts. Possible subwatersheds requiring additional assessment include Lower Pintlalla Creek, Beaver Creek, and Upper Big Swamp Creek subwatersheds. These three subwatersheds all had high estimated sediment loading from nonpoint sources. The primary nonpoint pollution causes and sources identified for the Targeted Subwatersheds are identified in **Table 26**. These sources and causes were captured in the bulleted list of "Primary Resource Management Concerns" on page 6-14.

- *A Silt Fence (Soil Erosion BMP) at a Road Construction Site near Montgomery* (Credit: City of Montgomery)

Table 26. Target subwatersheds in the Alabama River Basin. These subwatersheds were identified as either having a high NPS Impairment Potential, being an ADEM Priority Subwatershed, or having a 303(d) impaired water in the subwatershed. Source of data: ADEM (2002).

HUC Code	Subwatershed	Criteria	Modeled	Primary Causes and Sources
Upper Alabama River Basin (0201):				
030	Mill Creek/Pine Creek	High NPS Potential	yes	Runoff and sedimentation primarily from urban development, roads and road banks; nutrients and bacteria in surface waters; livestock access to streams
040	Galbraith Mill Creek	High NPS Potential	yes	Sedimentation from sand and gravel pits and urban development; livestock overgrazing, access to streams; bacteria in surface waters
140	Tallawassee Creek	High NPS Potential	yes	Sedimentation from sand and gravel pits, dirt roads and roadbanks; erosion from agricultural lands; livestock overgrazing, access to streams
170	Cypress Creek	High NPS Potential	yes	Sedimentation from agricultural lands, critical areas, gullies, roads and road banks; livestock overgrazing and stream access
190	Lower Big Swamp Creek	High NPS Potential	yes	Sedimentation from critical areas, gullies, stream banks; pasture runoff, and livestock overgrazing; septic tank failures
060	Upper Catoma Creek	ADEM Priority SW	yes	Nutrients from pasture runoff; livestock overgrazing and stream access; bacteria in surface waters
070	Ramer Creek	ADEM Priority SW	yes	Stream impacts from pasture runoff and animal husbandry practices; livestock overgrazing and access to streams; bacteria in surface waters
220	Lower Mulberry Creek	ADEM Priority SW	yes	Sedimentation from dirt roads and roadbanks, agricultural lands, sand and gravel pits; livestock overgrazing; animal waste management
230	Soapstone Creek	ADEM Priority SW	yes	Sedimentation from agricultural lands, sand and gravel pits; livestock access to streams; bacteria in surface waters
250	Valley Creek	ADEM Priority SW	yes	Sedimentation from dirt roads and road banks and forestry practices; livestock access to streams; bacteria in surface waters
040	Galbraith Mill Creek	303(d)	no	Impairment due to pesticides (dieldrin); source is unknown
080	Lower Catoma Creek	303(d)	yes	Organic enrichment and low dissolved oxygen due to urban runoff and pasture runoff; sedimentation from sand and gravel pits; livestock overgrazing, access to streams; nutrients and bacteria in surface waters
Middle Alabama River Basin (0203):				
040	Mush Creek	High NPS Potential	yes	Sedimentation from sand and gravel pits, critical areas, gullies; nutrient impacts from aquaculture; livestock overgrazing, access to streams; bacteria, nutrients and pesticides in surface waters
080	Upper Boguechitto Creek	High NPS Potential; ADEM Priority SW	yes	Sedimentation from cropland and developing urban land; nutrients from aquaculture; livestock overgrazing, access to streams; erosion from roads and roadbanks; bacteria in surface waters
090	Lower Boguechitto Creek	High NPS Potential; ADEM Priority SW	yes	Sedimentation from cropland, gullies, dirt roads and roadbanks; nonpoint pollution from animal husbandry, aquaculture, row crops, pasture runoff; livestock have access to streams; nutrients and bacteria in surface waters
100	Chilatchee Creek	High NPS Potential; ADEM Priority SW	yes	Sedimentation from croplands, dirt roads and roadbanks, critical areas, woodlands; livestock overgrazing, access to streams; bacteria in surface waters
Lower Alabama River Basin (0204):				
070	Randons Creek	ADEM Priority SW	yes	Sedimentation from croplands, woodlands, dirt roads and roadbanks; livestock have access to streams
090	Wallers Creek	ADEM Priority SW	yes	Sedimentation from croplands, woodlands; livestock have access to streams

6.7 Sediment Load Modeling of Targeted Subwatersheds

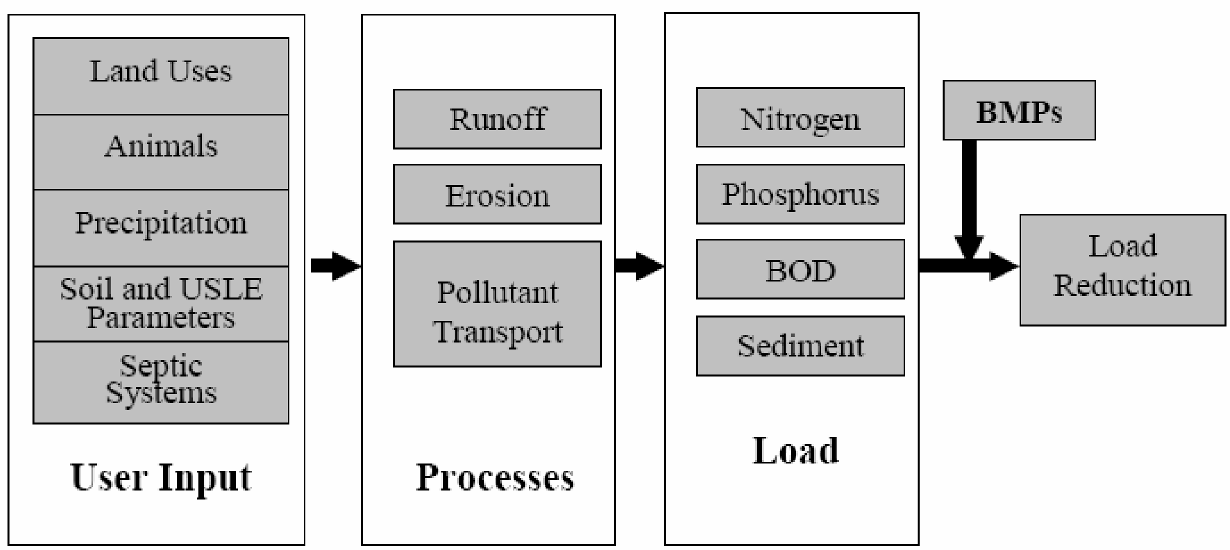
Some of the best management tools we have for addressing nonpoint source pollution problems are the implementation of land use specific Best Management Practices (BMPs). Over 93 percent of the land use in the Alabama River Basin is in forestry, pastureland, or cropland, with approximately 80 percent of the potential for nonpoint source pollution (without proper management) in the Alabama River Basin coming from these three land uses). It is well recognized that there are important benefits from implementing BMPs for these three land uses, particularly in reducing the loading of sediment, nitrogen, and phosphorus to surface waters.

A publicly-available watershed model was used for the targeted subwatersheds in order to illustrate the benefits from implementing several BMPs for each land use. The Environmental Protection Agency (EPA) STEPL (Spreadsheet Tool for the Estimation of Pollutant Load) watershed model was utilized for each targeted subwatershed for estimating the loading of sediments, nitrogen, and phosphorus to surface waters from forested land, cropland, and pastureland. The model includes a small selection of best management practices and their load reduction efficiencies for each land use that can selected by the user. For the illustrative purposes of this modeling in the plan, the installed best management practices were utilized; no other best management practices were used in the model.

STEPL (Spreadsheet Tool for the Estimation of Pollutant Load) is an EPA-approved modeling approach to calculate sediment and nutrient loads from different land uses and the load reductions that would result from the implementation of various best management practices (BMPs). It computes surface runoff; nutrient loads, including nitrogen, phosphorus, and 5-day biological oxygen demand (BOD_5); and sediment delivery based on various land uses and management practices.

Land uses considered in the model are urban land, cropland, pastureland, feedlots, forested land, and a user-defined type. The pollutant sources include potential nonpoint sources such as cropland, pastureland, farm animals, feedlots, urban runoff, and failing septic systems. The types of animals considered in the calculations are beef cattle, dairy cattle, swine, horses, sheep, chickens, turkeys, and ducks. For each watershed, the annual nutrient loading is calculated based on the runoff volume and the pollutant concentrations in the runoff water as influenced by factors such as the land use distribution and management practices.

The annual sediment load, from sheet and rill erosion only, is calculated based on the Universal Soil Loss Equation (USLE) and the sediment delivery ratio. The sediment and nutrient load reductions that result from the implementation of BMPs are computed using known BMP reduction efficiencies. The user has the capacity to incorporate additional BMPs and to modify the reduction efficiencies of BMPs. The general framework of STEPL is shown below:



The quality of the model outputs are very dependent on the accuracy of its inputs. Data sources utilized to run STEPL included land use, animal density, and septic system statistics as published by the Soil and Water Conservation Districts on the SWCC web site. **For this reason, the modeling conducted for forested land in the Alabama River Basin is not representative of accurate statistics do to the incompleteness of the 1998 survey of forested land.** STEPL provides rainfall, runoff curves, and nutrient concentrations in runoff for each county in the state. While STEPL also provides USLE factors for each county, we utilized input from the NRCS for USLE factors for each county and subwatershed in the model.[45]

STEPL runs on a watershed and county basis, so watersheds that encompass several counties have to be run individually by each county segment of the watershed. Each

[45] These factors consider the **Sediment Delivery Ratio,** which stands for the percentage or proportion that estimates the amount of the sediment load that ultimately reaches the water via precipitation from the land.

subwatershed model using STEPL was calibrated for sediment loads from cropland and forested land to the estimates made by the Soil and Water Conservation Districts in 1998. Model calibration was made first for cropland sediment loads by adjusting the sediment delivery ratio[46] as needed to meet the 1998 sediment load estimate for cropland. Model calibration was deemed successful for a subwatershed if the sediment delivery ratio used to match the 1998 load estimate was less than 0.48. There were 4 of the 17 modeled subwatersheds where calibration to the 1998 sediment load estimates was unsuccessful (*i.e.*, sediment delivery ratios above 0.48 were required in order to calibrate). In these cases, a sediment delivery ratio of 0.48 was utilized in STEPL and the resulting sediment load estimate was utilized for subsequent BMP load reduction modeling.

The sediment delivery ratio utilized for cropland load calibration was incorporated in the calibration of sediment loads from forested lands. Calibration for forested land sediment loads was accomplished by adjusting the C-factor[47] in the USLE equation in order to match the 1998 sediment load estimates from forested land. Model calibration was deemed successful for a subwatershed if the C-factor used to match the 1998 load estimate was less than 0.06. In all but one case, the STEPL sediment load estimates for forested land were successfully calibrated to the 1998 SWCD load estimates.[48]

STEPL provides estimates of sediment and nutrient load reductions with the incorporation of BMPs for cropland, forested land, and pastureland. Once the model is calibrated for a subwatershed, as described above, a BMP can be added to the model to predict the load reductions attributable to that BMP. <u>An assumption that has been made with the modeling for this basin management plan is that any BMPs already implemented in the basin have been accounted for in the 1998 sediment load estimates made by the Soil and Water Conservation Districts.</u> In other words, the effectiveness of BMPs, other than the ones included in the model estimates, were assumed to be estimated as a part of the 1998 SWCD data. Therefore, estimates for subwatersheds where forested land is the predominant land use,

[46] The sediment delivery ratio is a percentage that reflects the proportion of the soil eroded from the land surface that ultimately reaches (delivered to) the stream or river.
[47] The C-factor in the USLE equation is the cropping management factor, which for forested land is influenced by canopy cover, the type of soil cover, and the percent of ground cover.
[48] A sediment load estimate for the Galbraith Mill Creek subwatershed for forested land (3,000 acres) was not made by the SWCD in 1998, while the STEPL model predicted 37 tons/year in sediment from forested land in the subwatershed.

underestimate or **overlook** the effectiveness of best management practices implemented by forest land owners and managers. The SWCDs are presently updating their sediment load estimates for the subwatersheds, with new data expected to be available in 2006. The STEPL models developed as part of this basin management plan can be updated at that time to incorporate the newer information.

Nine BMPs were modeled as part of this basin management plan. These BMPs were modeled at five implementation levels (0%, 25%, 50%, 75%, and 100%) for the land use acreage applicable to the BMP. The BMPs, and their sediment and nutrient load reduction efficiencies, are shown in **Table 27**. Descriptions of the BMPs are provided in Section 7.0.

Table 27. Load reduction efficiencies for the nine BMPs utilized in STEPL for this basin management plan.

	Load Reduction Efficiencies (%)		
	Sediment Loads	**Nitrogen Loads**	**Phosphorus Loads**
Agricultural Land Use			
Filter Strips	65%	70%	75%
Reduced Tillage	75%	55%	45%
Streambank Stabilization and Fencing	75%	75%	75%
Terraces	85%	20%	70%
Pastureland Land Use			
Streambank Protection and Fencing	75%	60%	60%
Terraces	42%	24%	26%
Forested Land Use			
Site Preparation / Steep Slope Seeder / Transplant	81%	ND	ND
Site Preparation / Straw / Crimp Seed / Fertilizer / Transplant	95%	ND	ND
Site Preparation / Straw / Net / Seed / Fertilizer / Transplant	83%	ND	ND
ND *denotes not determined; nutrient load reductions based on nutrient content in the runoff.*			

In all but 3 of the 19 subwatersheds modeled, the STEPL sediment loads for cropland were successfully calibrated to the 1998 SWCD load estimates. <u>Sediment loads from forested land were successfully calibrated to the 1998 SWCD load estimates for only 7 of the 19 targeted subwatersheds.</u>[49] The STEPL sediment load estimates were all lower than the 1998 SWCD load estimates for the targeted subwatersheds that were not successfully calibrated for cropland, and substantially lower for the subwatersheds not successfully calibrated for forested land. STEPL sediment load estimates were utilized as the baseline for subsequent modeling of sediment and nutrient load reductions with BMP implementation.

Modeling results for sediment loading using STEPL are shown in **Table 28**. The predicted sediment loads are compared to the 1998 estimated sediment loads made by the Soil and Water Conservation Districts (SWCD). Sediment loading from cropland, pastureland, and forested land was estimated using STEPL, while SWCD sediment load estimates were made in 1998 for cropland and forested land. In all but one case, the STEPL sediment loads for forested land were successfully calibrated to the 1998 SWCD load estimates[50]. Sediment loads from cropland were successfully calibrated to the 1998 SWCD load estimates for 13 of the 17 targeted subwatersheds. The STEPL sediment load estimates were all lower than the 1998 SWCD load estimates for the four targeted subwatersheds that were not successfully calibrated for cropland. STEPL sediment load estimates were utilized as the baseline for subsequent modeling of sediment and nutrient load reductions with BMP implementation.

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[49] This outcome could be an indicator that the 1998 SWCD data does not accurately account for the forestland in the basin.

[50] A sediment load estimate for the Galbraith Mill Creek subwatershed for forested land (3,000 acres) was not made by the SWCD in 1998, while the 2005 STEPL model predicted 37 tons/year in sediment from forested land in this subwatershed.

Table 28. Sediment load estimates for targeted subwatersheds in the Alabama River Basin for cropland, pastureland, and forested land Comparison of load estimates are made between those made by the Soil and Water Conservation Districts in 1998 and those derived from STEPL modeling as part of this plan.

SubWatershed	*County*	CROPLAND SEDIMENT LOADING (tons/year)		FORESTRY SEDIMENT LOADING (tons/year)		*2005 MODELED PASTURELAND SEDIMENT LOADING (tons/year)*
		1998 Soil and Water Conservation Districts Estimate	*2005 Modeled Estimate[1]*	*1998 Soil and Water Conservation Districts Estimate*	*2005 Modeled Estimate[2]*	
Mill Creek/Pine Creek	Autauga	**11,772**	**7,116**	1,350	1,353	642
Mill Creek/Pine Creek	Elmore	5,428	5,426	4,982	4,941	2,642
Lower Mulberry Creek	Autauga	**9,909**	**8,913**	4,500	4,479	630
Lower Mulberry Creek	Chilton	**10,500**	**6,746**	11,250	11,138	4,626
Lower Mulberry Creek	Dallas	1,207	1,207	6,486	6,403	451
Chilatchee Creek	Dallas	2,608	2,608	7,829	7,788	1,990
Chilatchee Creek	Marengo	0	0	3,070	3,055	1,600
Chilatchee Creek	Perry	31,069	31,058	1,165	1,152	4,389
Chilatchee Creek	Wilcox	84	84	6,248	6,297	243
Lower Boguechitto Creek	Dallas	48,552	48,564	5,232	5,208	6,944
Mush Creek	Dallas	**18,734**	**15,795**	2,888	2,914	2,100
Mush Creek	Lowndes	**600**	**303**	3,088	3,136	1,280
Upper Boguechitto Creek	Dallas	64,682	64,698	3,515	3,499	4,374
Upper Boguechitto Creek	Perry	92,083	92,106	5,847	5,785	13,558
Soapstone Creek	Dallas	55,190	55,096	8,968	8,942	4,266
Valley Creek	Dallas	3,809	3,814	8,379	8,455	610
Cypress Creek	Lowndes	**28,050**	**26,838**	2,630	2,684	6,302
Tallawessee Creek	Lowndes	9,816	9,826	5,377	5,226	7,075
Lower Big Swamp Creek	Lowndes	18,000	18,019	13,522	13,664	15,648
Randons Creek	Monroe	35,237	35,208	5,864	6,025	210

Table 29. Sediment load estimates for targeted subwatersheds in the Alabama River Basin for cropland, pastureland, and forested land Comparison of load estimates are made between those made by the Soil and Water Conservation Districts in 1998 and those derived from STEPL modeling as part of this plan (cont'd).

SubWatershed	*County*	CROPLAND SEDIMENT LOADING (tons/year)		FORESTRY SEDIMENT LOADING (tons/year)		*2005 MODELED PASTURELAND SEDIMENT LOADING (tons/year)*
		1998 Soil and Water Conservation Districts Estimate	*2005 Modeled Estimate [1]*	*1998 Soil and Water Conservation Districts Estimate*	*2005 Modeled Estimate [2]*	
Wallers Creek	Monroe	9,070	9,088	7,831	7,752	371
Galbraith Mill Creek	Montgomery	3,600	3,604	**0**	**37**	419
Lower Catoma Creek	Montgomery	1,800	1,802	2,805	2,810	2,591
Ramer Creek	Montgomery	1,269	1,265	2,457	2,459	3,526
Upper Catoma Creek	Montgomery	9,000	9,022	5,621	5,631	13,064

[1] For those subwatersheds where calibration to the SWCD sediment load value required an unrealistic sediment delivery ratio above 0.480, a sediment delivery ratio of 0.480 was used. Successful STEPL model calibration was deemed to have occurred if the sediment delivery ratio entered in the model was less than 0.480.

[2] For those subwatersheds where calibration to the SWCD sediment load value required an unrealistic USLE forestry C Factor above 0.060, a USLE forestry C Factor of 0.030 was used, which is the mean forestry C Factor of all subwatersheds successfully calibrated to SWCD forestry sediment load estimates. Successful STEPL model calibration was deemed to have occurred if the USLE forestry C Factor entered in the model was less than 0.060.

Bold entries in shaded boxes denote subwatersheds where the 2005 model could not be calibrated to the 1998 Soil and Water Conservation Districts' loading estimates.

6.8 BMP Load Reductions for Targeted Subwatersheds

The predicted reductions in sediment, nitrogen, and phosphorus loading through BMP implementation are discussed in the "Recommendations" section of this plan, where it is recommended that BMPs be implemented to address specific management concerns. It should be understood that the nine BMPs that were modeled here for each targeted subwatershed using STEPL were chosen as example BMPs for forestry, cropland, and pastureland. More detailed modeling, done at a smaller spatial scale and with additional BMPs, should be undertaken as needed in the process of future implementation of this plan.

For each of the nine BMPs that were modeled, we incorporated five different levels of BMP implementation in the subwatershed being modeled. These were 0 % (no additional BMP implementation), and 25%, 50%, 75%, and 100% implementation of the BMP. These percentages relate to the proportion of the total acreage of that particular land use (e.g. cropland) in the subwatershed in which the BMP would be implemented. BMPs that have already been implemented in the Alabama River Basin are assumed to have been accounted for as part of the calibration of the STEPL model to the 1998 SWCD sediment load data for each targeted subwatershed.

The BMP modeling is a useful component of this plan because it provides a set of expected benefits from the implementation of specific plan recommendations. It also provides a sense of the level of effort needed in implementing specific BMPs to get particular sediment, nitrogen, and phosphorus load reductions. Ultimately this enhances the ability to make important management decisions regarding where to expend effort and funds, which management approaches to take, and the level of effort that should be targeted in order to achieve desired benefits. The modeling approach used here is not intended as a means for predicting sediment and nutrient concentrations in surface waters. The STEPL modeling results presented in this plan should be utilized as a planning tool for guiding management decisions.

7.0 RIVER BASIN MANAGEMENT RECOMMENDATIONS

The primary resource concerns and issues expressed by watershed stakeholders, and those derived from existing subwatershed and river basin studies and data, were outlined in the previous section of the plan. The remainder of this river basin management plan is devoted to identifying goals and strategies that address those concerns and issues so that they are corrected. These strategies will involve restoration, protection, and education projects or tasks focused on attaining a specific goal. In the list below, 8 basin goals have been developed that address these basin resource concerns and issues.

7.1 Basin Management Goals and the Concerns / Issues they Address

GOAL 1: *Reduce nonpoint source pollution from agricultural activities - cropland, pastureland, and animal husbandry*

- livestock access to streams
- nutrient runoff from pasture & cropland
- sediments from pasture and cropland
- gully erosion and erosion from critical areas
- animal waste management impacts
- livestock overgrazing of pastureland
- pesticides and pathogens in surface waters

GOAL 2: *Reduce nonpoint source pollution from forestry*

- sediment loading from land
- nutrient runoff from land
- erosion and sediment from logging roads
- thermal stress in streams from riparian canopy cover
- gully erosion on hillsides

GOAL 3: *Reduce nonpoint source pollution from aquaculture operations*

- nutrient loading from ponds
- bacteria loading from ponds

GOAL 4: *Reduce nonpoint source pollution from roads, roadbanks, and new road construction*

- soil erosion from roads and roadbanks
- gully erosion

GOAL 5: *Reduce pollution from urban and residential areas*

- septic tank and sewage treatment nutrient loading and pathogens
- soil erosion from new road construction
- soil erosion from land clearing and construction activities
- sediment loading from urban land development
- stormwater runoff - pathogens and toxics

GOAL 6: *Reduce nonpoint source pollution from mining activities*

- sediment loading from sand and gravel pits
- mining and excavation impacts on surface waters

GOAL 7: *Protect and restore wetlands and fish and wildlife habitat*

- wetland and aquatic habitat destruction

GOAL 8: *Improve river recreation management*

- river traffic management
- dumping from boats
- boat ramp problems

Several additional goals are included in this plan that are not directly related to specific resource issues. These goals are:

GOAL 9: Promote resource education and outreach, and watershed awareness of issues in the river basin. Promote volunteer activities throughout the watershed. Promote watershed management technology transfer.

GOAL 10: Continue to track resource trends in the river basin to measure progress in restoration and protection efforts, and identify new resource concerns and issues.

GOAL 11: Develop a framework in the river basin to implement the projects and tasks in this plan at the subwatershed level.

These latter goals are critical to the implementation and success of this river basin plan. In the following pages, each goal will be addressed individually, and strategies will be established to achieve the goal. For each strategy, specifics are provided regarding:

- the agencies or groups that are integral to implementing the strategy,
- the timeframe or priority of the strategy,
- a qualitative assessment of the level of funding needed for the strategy,
- monitoring needs,
- and performance indicators by which to gauge the success of implementing the strategy.

A discussion will then follow which describes how these strategies will fit together to achieve the goal. For the first two goals related to reducing nonpoint source pollution from agricultural and forestry land uses, the results from the BMP load reduction modeling will be provided and discussed as well.

While targeted subwatersheds should be prioritized for action, management efforts should not be neglected in other subwatersheds. Available funding should be directed to the subwatersheds most in need, as appropriate, based on requirements and restrictions dictated by the funding source. At the same time, additional monitoring data from streams with unknown status should also be considered.

Key Participatory Groups for Implementation of the River Basin Management Plan

AAGC	Alabama Association of General Contractors
ACES	Alabama Cooperative Extension System
ACOE	United States Army Corps of Engineers
ACP	Alabama Catfish Producers
ACWP	Alabama Clean Water Partnership
ADCNR	Alabama Department of Conservation and Natural Resources
ADAI	Alabama Department of Agriculture and Industry
ADECA	Alabama Department of Economic and Community Affairs
ADEM	Alabama Department of Environmental Management
ADOT	Alabama Department of Transportation
ADPH	Alabama Department of Public Health
AFA	Alabama Forestry Association
AFC	Alabama Forestry Commission
AFF	Alabama Farmers Association
AFS	American Fisheries Society
AFPA	American Forest and Paper Association
ALC	Alabama Loggers Council
ALFA	Alabama Farmers Federation
AMI	Alabama Mining Institute
ANEMO	AlabamaNonpoint Education for Municipal Officials
ANHP	Alabama Natural Heritage Program
ANLA	Alabama Nursery and Landscape Association
AOWA	Alabama Onsite Wastewater Association
AOWB	Alabama Onsite Wastewater Board
APPC	Alabama Pulp and Paper Council
ARA	Alabama Rivers Alliance
ASMC	Alabama Surface Mining Commission
ASTA	Alabama Septic Tank Association
ATA	Alabama Turfgrass Association
AU	Auburn University
AWF	Alabama Wildlife Federation
AWWA	Alabama Water Watch Association
CG	United States Coast Guard
DU	Ducks Unlimited
FFA	Future Farmers of America
FSA	Farm Services Agency
GSA	Geological Survey of Alabama
FS	United States Forest Service
HBAA	Home Builders Association of Alabama
HOBOs	Home Owners and Boat Owners Associations
MPD	Marine Police Division
NRCS	Natural Resources Conservation Service
RC&D	Resource Conservation and Development
SWCC	Soil and Water Conservation Committee
SWCD	Soil and Water Conservation District
SWCS	Soil and Water Conservation Society
SWS	Society of Wetland Scientists
TNC	The Nature Conservancy of Alabama
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

GOAL 1: *Reduce nonpoint source pollution from agricultural activities – cropland, pastureland, and animal husbandry*
<u>Issues and Concerns in the Basin</u>: • livestock access to streams • nutrient runoff from pasture & cropland • sediments from pasture and cropland • gully erosion and erosion from critical areas • animal waste management impacts • livestock overgrazing of pastureland • pesticides and pathogens in surface waters

Recommended Strategies to Achieve the Goal:

Lead Agency or Group[1]	Timeframe[2]	Level of Funding[3]	Monitoring Need[4]	Performance Indicator[5]
Implement streambank fencing and streambank buffer restoration projects.				
Landowners; NRCS, SWCD, SWCC, AWF	High priority, continuous, long term	Medium; private /public	quarterly for fence/buffer condition	Stream miles for buffers and fences
Implement cropland BMPs to reduce sediment and nutrient loading to surface waters.				
Landowners; NRCS, SWCD, SWCC, ACES	High priority, continuous, long term	Medium to high; private /public	quarterly for BMP condition	Units of implemented BMPs
Implement pastureland BMPs to reduce sediment and nutrient loading to surface waters.				
Landowners; NRCS, SWCD, SWCC, ACES	High priority, continuous, long term	Medium to high; private /public	quarterly for BMP condition	Units of implemented BMPs
Implement effective agricultural waste management systems.				
Landowners; NRCS, SWCD, SWCC, ACES	High priority, continuous, long term	Medium to high; private /public	quarterly for system effectiveness	Number of systems implemented
Implement BMPs to reduce sediment erosion from gullies and critical areas.				
Landowners; NRCS, SWCD, SWCC, ACES	High priority, continuous, long term	Medium; private /public	quarterly for erosion effectiveness	Number of acres in which BMP has been implemented

Lead Agency or Group[1]	Timeframe[2]	Level of Funding[3]	Monitoring Need[4]	Performance Indicator[5]
Establish goals in each subwatershed, where needed, for the voluntary implementation of agricultural BMPs.				
Farming Community, FSA, NRCS, SWCD, SWCC	High priority, periodic revisions	Low; private /public	Biennial revisions	New program of goals established every 2 years
Coordinate BMP demonstration projects on local farms in selected subwatersheds spread across the river basin.				
Landowners; NRCS, SWCD, SWCC, ACES	Middle priority, periodic, long term	Medium; private /public	quarterly for condition of BMPs	Number of BMP demonstration projects implemented
Work with the agricultural community via outreach to identify funding sources for BMP implementations, to promote the implementation of BMPs, and to recognize those who implement them.				
Landowners; NRCS, SWCD, SWCC, ACES, ADEM, ACWP, ADAI	High priority, continuous, long term	Low to Medium; private /public	Annual progress reports	Number of outreach efforts or projects completed; number of funding sources identified; number of farmers recognized
Initiate educational outreach activities with youth involved in agriculture to promote the use of BMPs.				
NRCS, SWCD, SWCC, ACES, FFA, 4H, schools, SWCS	Medium priority, continuous, long term	Low to Medium; private /public	Annual progress reports	Number of outreach events and number of groups and youth engaged
Promote the retirement of highly erosive farmland to conservation use through NRCS programs.				
NRCS, SWCD, SWCC, AWF, land trusts	High priority, continuous, long term	High; public	Annual progress reports for the watershed	Acres of highly erosive land retired
Coordinate a program for the agriculture community to gather and properly dispose of pesticides and herbicides where necessary.				
Landowners; ADEM, ADAI, SWCD, ACES, County Waste Mgmt., chemicals companies	Medium priority, continuous, long term	Low; private /public	Annual progress reports	Number of collection events; amount of material disposed of; types of materials disposed of

1 Lists responsible parties/primary actors; acronyms are defined on page xvii, and on the following page.
2 Quantifies the start time of the measure suggesting priority, as well as stating the duration of the implementation of the measure in the following terms: *short-term* (6 – 12 months), *mid-range* (6 – 18 months), *long-term* (18 months and greater), and/or *continuous* (ongoing, regular measure).
3 Estimates funding in terms of *low* (volunteer support through $25K), *medium* ($25K - $100K), and *high* ($100K ->). *May also state "source" of funding by program or simply, "private/public" to indicate sector of investment.
4 Captures the monitoring need and sets a frequency.
5 Performance indicator(s) are those measures that will indicate the degree of success in implementing the strategy.

How the Strategies Will Achieve the Goal.

The solutions to the concerns and issues identified in this plan related to agricultural land use lie primarily in the implementation of BMPs. These BMP implementation strategies are focused on cropland, pastureland, streambank fencing and streambank buffers, animal waste management systems, and erosion control for gullies and critical areas. Additional strategies identified here are in direct support for promoting the implementation of these BMPs, through education, outreach, and recognition. The reduction of pesticides and herbicides will be accomplished through the collection of leftover amounts of these chemicals, and through the BMPs as they reduce surface runoff. The retirement of highly erosive land to conservation purposes is a key strategy as well, with the benefits of both soil erosion and wildlife enhancement. Several of the key BMPs are described below.

Vegetative Filter Strips
Strips of vegetation, which may include grass, shrubs, or trees that filter runoff and retain contaminants before they reach surface waters. The filter strip vegetation slows or intercepts surface runoff from cropland, capturing or providing temporary retention of pollutants like sediment, pesticides, and nutrients. Vegetative uptake of nutrients or retention of other pollutants protects adjacent surface waters.

No-Till Farming
A method of farming where the soil is not tilled between each year's crops. This method of farming includes no seedbed preparation other than opening a small slit for the purpose of placing the seed at the intended depth. The continuous ground cover prevents soil erosion and surface runoff into adjacent surface waters. No till residue also improves soil tilth and adds organic matter to the soil as it decomposes, and reduces soil compaction.

Terraces

Terraces are earthen embankments around a hillside that stops water flow and stores it or guides it safely off a field.

Terraces break long slopes into shorter ones, and usually follow the contour. As surface runoff makes its way down a hillside, through cropland, terraces serve as small dams to intercept water and guide it to an outlet or allow it to evaporate or infiltrate. Water quality in adjacent streams is improved by this interception of surface runoff.

Riparian Buffers and Stream Fencing

Riparian buffer restoration is the replanting of trees along streambanks to restore the canopy cover over streams, reduce streambank erosion, and improve water quality.

Streambank fencing controls livestock access to streams, which decreases streambank erosion and improves water quality.

Streambank fencing and riparian buffer restoration are best undertaken simultaneously.

Pastureland Management

Some of the same BMPs used for cropland can be utilized in pastureland. These include riparian buffers and streambank fencing, terraces, critical areas planting, and pasture or paddock rotation with fencing.

These BMPs increase vegetative cover in the pasture areas and in riparian areas, thereby reducing erosion and protecting water quality. Forage production is increased as well.

The benefits expected from implementation of agricultural BMPs are significant in this river basin. STEPL watershed modeling was utilized to estimate the reductions in sediment, nitrogen, and phosphorus loading from cropland and pastureland gained by the implementation of six different BMPs. There are many other BMPs that can be utilized and should be considered. The six modeled here were chosen as example BMPs that could play a significant role in achieving this plan goal. Five different levels of BMP implantation were considered: 0, 25, 50, 75, and 100 percent implementation to the number of acres devoted to either cropland or pastureland. The six BMPs that were modeled were:

- Cropland - Filter Strips
- Cropland - Streambank Stabilization and Fencing
- Cropland - Terraces
- Cropland - Reduced Tillage
- Pastureland - Streambank Stabilization and Fencing
- Pastureland - Terraces

The potential benefits from implementation of these BMPs are shown in **Tables 30** through **35** for the targeted subwatersheds with the highest sediment loading from cropland. The Upper Boguechitto Creek subwatershed in Perry County is the targeted subwatershed with the highest estimated sediment loading from cropland. With the implementation of filter strip BMPs on half the cropland acreage in the Perry County portion of this subwatershed, for instance, sediment loading is expected to be reduced from 92,000 tons per year to 62,000 tons per year (**Tables 30**). Similar significant benefits in sediment, nitrogen, and phosphorus load reductions in other subwatersheds are shown in these tables. The BMP load reduction modeling results for all targeted subwatersheds are in **Appendix G**.

It should be pointed out that this modeling was done at a subwatershed scale, and the BMP being modeled is assumed to be implemented on a given percentage of the total acreage of that land use. When implemented, however, some BMPs have a positive impact only on a portion of a farm and not the entire acreage of that farm. These modeled BMP load reductions are therefore intended to serve as a management guide for strategic planning at the watershed scale. They provide guidance on the comparative benefits of implementing BMPs on different subwatersheds, and the relative load reduction benefits from different BMPs.

There are numerous additional agricultural BMPs that can be implemented, including BMPs that address agricultural waste management and BMPs for reducing erosion from gullies and critical areas. The NRCS and SWCD offices provide outstanding assistance to farmers in identifying and implementing appropriate BMPs. Several documents provide good reviews of agricultural BMPs, including the SWCC's "*Protecting Water Quality on Alabama's Farms*"; the ACES's and NRCS's "*Nutrient Management Planning for Animal Feeding Operations*"; and an overview of agricultural BMPs, with pictures, on the web at:
http://faculty.msmary.edu/envirothon/current/guide/ag_urban_bmp.htm

Some of these additional agricultural BMPs include grassed waterways, diversions, critical areas planting, sediment control ponds and detention basins, contour farming, crop rotation, cover crops, nutrient management, manure storage and management, grazing land management, pasture renovation and planting, integrated pest management, wetland creation, roof runoff management, composting, livestock watering facilities, and pesticide management.

Critical Areas Planting

Critical areas planting is the planting of grass or other vegetation to protect a badly eroding area in an agricultural area.

These areas typically have a significant erosion problem. The planting of vegetation provides a surface cover that reduces erosional processes and also traps surface runoff.

Sediment, nutrient, and pesticide runoff to adjacent streams is reduced by critical areas planting.

Manure Management

Manure management involves several BMPs, including the storage of animal manure, the proper use of animal manure as field fertilizer, and improved collection methods from barnyard to storage area.

The proper storage of animal manure is a critical BMP step, with numerous options tailored to the farm operation characteristics. These BMPs all benefit by reducing the surface runoff and ground water infiltration of nutrients and organic matter.

Table 30. **Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Filter Strips" agricultural BMPs for cropland. The subwatersheds with the highest sediment loading from cropland are listed below. Other subwatershed load reduction modeling results are provided in Appendix G.**

			BMP - Filter Strips for Cropland					
SubWatershed	***Acres of Cropland***	***Percent of Acres Put in BMP***	***Nitrogen Load from Cropland- With Percent Reductions (lbs/year)***		***Phosphorus Load from Cropland- With Percent Reductions (lbs/year)***		***Sediment Load from Cropland- With Percent Reductions (tons/year)***	
Upper Boguechitto Creek - Perry County	34,105	0%	746,465	0%	212,171	0%	92,106	0%
	8,526	25%	619,516	17%	175,225	17%	77,138	16%
	17,053	50%	492,574	34%	138,281	35%	62,172	32%
	25,579	75%	365,625	51%	101,336	52%	47,205	49%
	34,105	100%	238,676	68%	64,390	70%	32,237	65%
Upper Boguechitto Creek - Dallas County	26,951	0%	564,278	0%	157,761	0%	64,698	0%
	6,738	25%	468,119	17%	130,174	17%	54,185	16%
	13,476	50%	371,960	34%	102,587	35%	43,672	32%
	20,213	75%	275,794	51%	74,998	52%	33,158	49%
	26,951	100%	179,635	68%	47,411	70%	22,644	65%
Soapstone Creek - Dallas County	22,996	0%	481,128	0%	134,478	0%	55,096	0%
	5,749	25%	399,134	17%	110,960	17%	46,143	16%
	11,498	50%	317,141	34%	87,443	35%	37,190	33%
	17,247	75%	235,147	51%	63,925	52%	28,237	49%
	22,996	100%	153,154	68%	40,407	70%	19,284	65%
Lower Boguechitto Creek - Dallas County	20,230	0%	423,560	0%	118,419	0%	48,564	0%
	5,058	25%	361,693	15%	99,402	16%	40,673	16%
	10,115	50%	279,199	34%	77,004	35%	32,781	33%
	15,173	75%	207,022	51%	56,297	52%	24,889	49%
	20,230	100%	134,838	68%	35,588	70%	16,997	65%
Randons Creek - Monroe County	19,576	0%	380,809	0%	101,962	0%	35,208	0%
	4,894	25%	315,576	17%	83,929	18%	29,487	16%
	9,788	50%	250,343	34%	65,895	35%	23,765	33%
	14,682	75%	185,109	51%	47,862	53%	18,044	49%
	19,576	100%	119,876	69%	29,828	71%	12,323	65%

Table 31. Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Reduced Tillage" agricultural BMPs for cropland. The subwatersheds with the highest sediment loading from cropland are listed below. Other subwatershed load reduction modeling results are provided in Appendix G.

			BMP - Reduced Tillage Systems for Cropland					
SubWatershed	*Acres of Cropland*	*Percent of Acres Put in BMP*	*Nitrogen Load from Cropland- With Percent Reductions (lbs/year)*		*Phosphorus Load from Cropland- With Percent Reductions (lbs/year)*		*Sediment Load from Cropland- With Percent Reductions (tons/year)*	
Upper Boguechitto Creek - Perry County	34,105	0%	746,465	0%	212,171	0%	92,106	0%
	8,526	25%	629,087	16%	179,790	15%	74,836	19%
	17,053	50%	511,717	31%	147,412	31%	57,567	37%
	25,579	75%	394,339	47%	115,032	46%	40,296	56%
	34,105	100%	276,961	63%	82,652	61%	23,026	75%
Upper Boguechitto Creek - Dallas County	26,951	0%	564,278	0%	157,761	0%	64,698	0%
	6,738	25%	476,340	16%	134,036	15%	52,567	19%
	13,476	50%	388,402	31%	110,310	30%	40,437	37%
	20,213	75%	300,457	47%	86,582	45%	28,305	56%
	26,951	100%	212,518	62%	62,856	60%	16,175	75%
Soapstone Creek - Dallas County	22,996	0%	481,128	0%	134,478	0%	55,096	0%
	5,749	25%	406,157	16%	114,258	15%	44,766	19%
	11,498	50%	331,187	31%	94,039	30%	34,435	38%
	17,247	75%	256,216	47%	73,819	45%	24,105	56%
	22,996	100%	181,246	62%	53,599	60%	13,774	75%
Lower Boguechitto Creek - Dallas County	20,230	0%	423,560	0%	118,419	0%	48,564	0%
	5,058	25%	373,019	12%	104,329	12%	39,458	19%
	10,115	50%	291,540	31%	82,800	30%	30,352	38%
	15,173	75%	225,535	47%	64,992	45%	21,247	56%
	20,230	100%	159,521	62%	47,181	60%	12,141	75%
Randons Creek - Monroe County	19,576	0%	380,809	0%	101,962	0%	35,208	0%
	4,894	25%	322,815	15%	87,238	14%	28,606	19%
	9,788	50%	264,820	30%	72,514	29%	22,005	38%
	14,682	75%	206,826	46%	57,790	43%	15,403	56%
	19,576	100%	148,831	61%	43,066	58%	8,802	75%

Table 32. **Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Streambank Stabilization and Fencing" agricultural BMPs for cropland. The subwatersheds with the highest sediment loading from cropland are listed below. Other subwatershed load reduction modeling results are provided in** Appendix G**.**

SubWatershed	*Acres of Cropland*	*Percent of Acres Put in BMP*	BMP - Streambank Stabilization and Fencing for Cropland					
			Nitrogen Load from Cropland- With Percent Reductions (lbs/year)		*Phosphorus Load from Cropland- With Percent Reductions (lbs/year)*		*Sediment Load from Cropland- With Percent Reductions (tons/year)*	
Upper Boguechitto Creek - Perry County	34,105	0%	746,465	0%	212,171	0%	92,106	0%
	8,526	25%	606,501	19%	172,388	19%	74,836	19%
	17,053	50%	466,543	37%	132,608	37%	57,567	37%
	25,579	75%	326,580	56%	92,825	56%	40,296	56%
	34,105	100%	186,616	75%	53,043	75%	23,026	75%
Upper Boguechitto Creek - Dallas County	26,951	0%	564,278	0%	157,761	0%	64,698	0%
	6,738	25%	458,478	19%	128,182	19%	52,567	19%
	13,476	50%	352,677	37%	98,602	37%	40,437	37%
	20,213	75%	246,871	56%	69,020	56%	28,305	56%
	26,951	100%	141,070	75%	39,440	75%	16,175	75%
Soapstone Creek - Dallas County	22,996	0%	481,128	0%	134,478	0%	55,096	0%
	5,749	25%	390,916	19%	109,263	19%	44,766	19%
	11,498	50%	300,705	38%	84,049	38%	34,435	38%
	17,247	75%	210,493	56%	58,834	56%	24,105	56%
	22,996	100%	120,282	75%	33,619	75%	13,774	75%
Lower Boguechitto Creek - Dallas County	20,230	0%	423,560	0%	118,419	0%	48,564	0%
	5,058	25%	352,737	17%	97,907	17%	39,458	19%
	10,115	50%	264,725	38%	74,012	38%	30,352	38%
	15,173	75%	185,310	56%	51,809	56%	21,247	56%
	20,230	100%	105,890	75%	29,605	75%	12,141	75%
Randons Creek - Monroe County	19,576	0%	380,809	0%	101,962	0%	35,208	0%
	4,894	25%	309,408	19%	82,844	19%	28,606	19%
	9,788	50%	238,006	38%	63,726	38%	22,005	38%
	14,682	75%	166,604	56%	44,608	56%	15,403	56%
	19,576	100%	95,202	75%	25,491	75%	8,802	75%

Table 33. **Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Terraces" agricultural BMPs for cropland. The subwatersheds with the highest sediment loading from cropland are listed below. Other subwatershed load reduction modeling results are provided in** Appendix G**.**

SubWatershed	Acres of Cropland	Percent of Acres Put in BMP	BMP - Terraces for Cropland: Nitrogen Load from Cropland- With Percent Reductions (lbs/year)		Phosphorus Load from Cropland- With Percent Reductions (lbs/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Upper Boguechitto Creek - Perry County	34,105	0%	746,465	0%	212,171	0%	92,106	0%
	8,526	25%	661,243	11%	170,785	20%	72,533	21%
	17,053	50%	576,034	23%	129,401	39%	52,961	42%
	25,579	75%	490,813	34%	88,016	59%	33,388	64%
	34,105	100%	405,591	46%	46,630	78%	13,816	85%
Upper Boguechitto Creek - Dallas County	26,951	0%	564,278	0%	157,761	0%	64,698	0%
	6,738	25%	502,424	11%	127,165	19%	50,950	21%
	13,476	50%	440,570	22%	96,568	39%	37,202	42%
	20,213	75%	378,705	33%	65,969	58%	23,453	64%
	26,951	100%	316,851	44%	35,372	78%	9,705	85%
Soapstone Creek - Dallas County	22,996	0%	481,128	0%	134,478	0%	55,096	0%
	5,749	25%	428,421	11%	108,399	19%	43,388	21%
	11,498	50%	375,715	22%	82,320	39%	31,680	43%
	17,247	75%	323,008	33%	56,241	58%	19,972	64%
	22,996	100%	270,302	44%	30,162	78%	8,264	85%
Lower Boguechitto Creek - Dallas County	20,230	0%	423,560	0%	118,419	0%	48,564	0%
	5,058	25%	404,629	4%	97,481	18%	38,244	21%
	10,115	50%	330,697	22%	72,485	39%	27,924	43%
	15,173	75%	284,272	33%	49,519	58%	17,605	64%
	20,230	100%	237,835	44%	26,551	78%	7,285	85%
Randons Creek - Monroe County	19,576	0%	380,809	0%	101,962	0%	35,208	0%
	4,894	25%	343,461	10%	82,492	19%	27,726	21%
	9,788	50%	306,112	20%	63,022	38%	20,245	43%
	14,682	75%	268,764	29%	43,552	57%	12,763	64%
	19,576	100%	231,415	39%	24,082	76%	5,281	85%

Table 34. Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Streambank Stabilization and Fencing" agricultural BMPs for pastureland. The subwatersheds with the highest sediment loading from pastureland are listed below. Other subwatershed load reduction modeling results are provided in Appendix G**.**

SubWatershed	Acres of Pasture-land	Percent of Acres Put in BMP	BMP - Streambank Protection and Fencing for Pastureland					
			Nitrogen Load from Pastureland - With Percent Reductions (lbs/year)		Phosphorus Load from Pastureland - With Percent Reductions (lbs/year)		Sediment Load from Pastureland - With Percent Reductions (tons/year)	
Lower Big Swamp	50,327	0%	518,631	0%	54,420	0%	15,648	0%
Lowndes County	12,582	25%	438,959	15%	45,534	16%	12,714	19%
	25,164	50%	359,288	31%	36,648	33%	9,780	37%
	37,745	75%	279,613	46%	27,762	49%	6,846	56%
	50,327	100%	199,941	61%	18,876	65%	3,912	75%
Upper Boguechitto	34,105	0%	359,834	0%	40,438	0%	13,558	0%
Creek -	8,526	25%	304,231	15%	33,745	17%	11,016	19%
Perry County	17,053	50%	248,632	31%	27,054	33%	8,474	37%
	25,579	75%	193,029	46%	20,362	50%	5,932	56%
	34,105	100%	137,426	62%	13,669	66%	3,390	75%
Upper Catoma	63,030	0%	620,245	0%	59,478	0%	13,064	0%
Creek -	15,758	25%	525,643	15%	49,953	16%	10,615	19%
Montgomery County	31,515	50%	431,036	31%	40,428	32%	8,165	38%
	47,273	75%	336,434	46%	30,903	48%	5,716	56%
	63,030	100%	241,827	61%	21,377	64%	3,266	75%
Tallawessee Creek	11,525	0%	129,940	0%	16,764	0%	7,075	0%
Lowndes County	2,881	25%	109,599	16%	13,922	17%	5,748	19%
	5,763	50%	89,262	31%	11,081	34%	4,422	37%
	8,644	75%	68,921	47%	8,240	51%	3,095	56%
	11,525	100%	48,580	63%	5,398	68%	1,769	75%
Lower Boguechitto	27,904	0%	281,350	0%	27,989	0%	6,944	0%
Creek -	6,976	25%	238,314	15%	23,470	16%	5,642	19%
Dallas County	13,952	50%	195,278	31%	18,951	32%	4,340	38%
	20,928	75%	152,243	46%	14,432	48%	3,038	56%
	27,904	100%	109,207	61%	9,913	65%	1,736	75%

Table 35. Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Terraces" agricultural BMPs for pastureland. The subwatersheds with the highest sediment loading from pastureland are listed below. Other subwatershed load reduction modeling results are provided in Appendix G**.**

SubWatershed	*Acres of Pasture-land*	*Percent of Acres Put in BMP*	BMP - Terraces for Pastureland					
			Nitrogen Load from Pastureland - With Percent Reductions (lbs/year)		*Phosphorus Load from Pastureland - With Percent Reductions (lbs/year)*		*Sediment Load from Pastureland - With Percent Reductions (tons/year)*	
Lower Big Swamp Lowndes County	50,327	0%	518,631	0%	54,420	0%	15,648	0%
	12,582	25%	485,261	6%	50,112	8%	14,005	10%
	25,164	50%	451,892	13%	45,803	16%	12,362	21%
	37,745	75%	418,515	19%	41,494	24%	10,719	32%
	50,327	100%	385,146	26%	37,186	32%	9,076	42%
Upper Boguechitto Creek - Perry County	34,105	0%	359,834	0%	40,438	0%	13,558	0%
	8,526	25%	336,290	7%	37,141	8%	12,135	11%
	17,053	50%	312,753	13%	33,845	16%	10,711	21%
	25,579	75%	289,209	20%	30,548	24%	9,288	31%
	34,105	100%	265,664	26%	27,251	33%	7,864	42%
Upper Catoma Creek - Montgomery County	63,030	0%	620,245	0%	59,478	0%	13,064	0%
	15,758	25%	581,153	6%	54,969	8%	11,693	10%
	31,515	50%	542,053	13%	50,459	15%	10,321	21%
	47,273	75%	502,961	19%	45,949	23%	8,949	31%
	63,030	100%	463,861	25%	41,439	30%	7,577	42%
Tallawessee Creek Lowndes County	11,525	0%	129,940	0%	16,764	0%	7,075	0%
	2,881	25%	121,123	7%	15,325	9%	6,332	11%
	5,763	50%	112,314	14%	13,888	17%	5,589	21%
	8,644	75%	103,497	20%	12,449	26%	4,846	31%
	11,525	100%	94,680	27%	11,011	34%	4,103	42%
Lower Boguechitto Creek - Dallas County	27,904	0%	281,350	0%	27,989	0%	6,944	0%
	6,976	25%	263,469	6%	25,828	8%	6,214	11%
	13,952	50%	245,588	13%	23,666	15%	5,485	21%
	20,928	75%	227,707	19%	21,505	23%	4,756	32%
	27,904	100%	209,826	25%	19,343	31%	4,027	42%

GOAL 2: *Reduce nonpoint source pollution from forestry activities -*
Issues and Concerns in the Basin: • industry is doing an excellent job of implementing BMPs • sediment loading from land • streambank erosion from riparian buffer loss • nutrient runoff from land • loss of streamside canopy cover; increasing water temperatures • erosion and sediment from logging roads • gully erosion on hillsides

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Implement forestry management BMPs to reduce sediment and nutrient loading to surface waters. Identify those tracts in greatest need of BMP enhancement.				
Landowners; AFA, AFC, APPC, ALC, SWCD, ACES	High priority, continuous, long term	Medium to high; private /public	quarterly for BMP condition	Acres of forested land where BMPs are implemented
Implement BMPs on new, in-use, and abandoned logging roads and roadbanks to reduce sediment and nutrient loading to surface waters.				
Landowners; AFA, AFC, APPC, ALC, SWCD, ACES, county engineers, stakeholders	High priority, continuous, long term	Medium to high; private /public	quarterly for BMP condition	Miles of roads where BMPs have been implemented
Implement BMPs to reduce sediment erosion from gullies and critical areas on forested lands.				
Landowners; AFA, AFC, APPC, ALC, SWCD, ACES	Medium priority, continuous, long term	Medium to high; private /public	quarterly for erosion effectiveness	Number of acres in which BMP has been implemented
Promote BMPs for stream buffers and wetlands in commercially forested areas.				
Landowners; NRCS, SWCD, SWCC, AFA, AFC, ALC, ACES, ACWP	High priority, continuous, long term	Medium; private /public	quarterly for buffer and wetlands condition	Stream miles for buffers and acres for wetlands that are restored or protected
Educate forest landowners concerning the importance of BMPs in reducing nonpoint source pollution associated with timber management.				
Landowners; AFC, AFA, APPC, ALC, ACES, ACWP	High priority, continuous, long term	Low to medium; private /public	Annual progress reports	Number of outreach efforts or educational projects completed; number of landowners engaged

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Initiate education and outreach programs with students involved in forestry activities.				
AFC, AFA, APPC, FFA, 4H, schools, SWCS, SWCD, NRCS, ACWP	Medium priority, continuous, long term	Low to Medium; private /public	Annual progress reports	Number of outreach events and number of groups and youth engaged
Utilize the Alabama Forestry Commission's TREASURE Forest program to recognize forest landowners with a proven record of Best Management Practices, and to recognize and reward good forest management stewardship. Promote participation in the American Tree Farm System and the programs of the Sustainable Forestry Initiative for environmental and forestry benefits.				
Landowners, AFC, AFA, AFPA, ACWP	Medium priority, continuous, long term	Low; private /public	Annual progress reports	Number of landowners recognized
Work with the forestry community via outreach to identify funding sources for BMP implementations, to promote the implementation of BMPs, and to recognize those who implement them.				
Landowners; AFC, AFA, APPC, ALC, ACES, ACWP	Medium priority, continuous, long term	Low; private /public	Annual progress reports	Number of outreach efforts or events completed; number of funding sources identified

<u>How the Strategies Will Achieve the Goal.</u>

The continued implementation of forestry BMPs in the river basin is key to mitigating sediment and nutrient loading from forested land. These BMP implementation strategies are focused on actively managed forested land, in-use and abandoned logging roads, and areas of gully and critical area sediment erosion. The protection of streams and streambanks, and riparian wetlands, is also crucial to enhancing aquatic systems health in the basin. The restoration and maintenance of degraded stream buffers and wetlands in forested areas can also enhance the integrity of streams and could be accomplished by incorporating riparian restoration into the suite of available forestry BMPs.

Currently, the Alabama Forestry Commission reports BMP implementation rates across the state at 96.5% compliance rate. This report highlights the forest industry's vigilance in implementing BMPs. Education, outreach, and recognition are strategies supportive of and critical to BMP implementation efforts because they promote their implementation. The TREASURE Forest program provides a significant mechanism for BMP promotion and stewardship recognition. The promotion of participation in the American Tree Farm System and the programs of the Sustainable Forestry Initiative (SFI®) Program and Alabama Loggers Council will further enhance both environmental and forestry benefits. Workshops and the distribution of educational materials are key efforts. Educational efforts with youth involved or interested in forestry are key steps for stewardship in the future. The SFI Program submitted the following program description in order to highlight the forest industry's efforts to sustainably manage land and water resources:

"The Sustainable Forestry Initiative (SFI®) Program was initiated in 1994 by the American Forest and Paper Association (AF&PA). There are nine principles that guide this program. The first of these defines "sustainable forestry" as practicing a land stewardship ethic which provides for the needs of the present without compromising the ability of future generations to meet their own needs. Managed forests make a vital contribution to the quality of life by providing economic, environmental and social benefits. The SFI Program is a partnership among landowners, wood producers, contractors, and the companies that purchase wood.

The SFI Program in Alabama began with the establishment of the Alabama SFI Implementation Committee (SFI-IC). This organization is comprised of the AF&PA member companies with operations and/or forest land located in Alabama plus interested non-member companies and organizations. New SFI-IC members have been added through an AF&PA licensing program or as "supporting members", such as the Alabama Forestry Commission, The Department of Conservation, the Auburn School of Forestry and Wildlife Sciences, the Alabama Tree Farm Committee, the Alabama Forestry Association, the Alabama Wildlife Federation, the Alabama Loggers Council, etc.

The Alabama SFI-IC has four operating groups, Logger Education, Landowner Education, Public Outreach, and Inconsistent Practices to implement the SFI Program. The first three groups developed and implemented programs to educate loggers, wood dealers, wood procurement employees, landowners, and the general public as to what constitutes sustainable forestry. These efforts combined existing programs and resources and added new initiatives as needed. The Inconsistent Practices group implemented a "1-800" number. Anyone can call and get information about sustainable forestry practices or report what appears to be an inconsistent practice by a member company. Every reported inconsistent practice is investigated and the result reported back to the caller. In recent years, a website (www.alaforestry.org/sfi) alternative to the 1-800 # has been added where the same thing can be accomplished.

Logger Education in cooperation with the Alabama Loggers Council (ALC) adapted and expanded the existing Professional Logging Manager (PLM) course of instruction to meet the requirements of the SFI Program. This is a five day course of instruction, usually taken one day per week for five weeks at various locations around the State. To date, over 3000 loggers and other wood supply individuals have completed the PLM course. Once successfully completed, a logging contractor is listed on the Alabama Forestry Association website, www.alaforestry.org/frameset_plm.html. Annually, the logging contractor must complete six hours of appropriate continuing education to remain on the PLM list. AF&PA member companies have individually established wood purchasing guidelines which encourage their wood suppliers to have a current PLM designation. In 2005, There are approximately 2200 individuals on the PLM list. Logger Education and the ALC have also sponsored a series of Driver Education courses around Alabama, which are attended by Contractors and Drivers. These are taught by highway safety experts to raise the awareness of participants about defensive driving habits, as well as, the financial and emotional cost of accidents.

Landowner Education developed an excellent handbook on sustainable forestry. The member companies attempt to distribute these to all landowners from whom their wood originates. Through Forestry Extension at Auburn and Dr. Glenn Glover, the SFI Program supported the development of the Private Forest Management Team website (PFMT.org) which became an award winning and nationally recognized website for forestry information. This was primarily designed with private landowners in mind, but is packed with scientific and other information about forest and the practice of Forestry. Landowner Education is currently sponsoring the development of a "Forest Management" text similar to the "Wildlife Management" text published about five years ago. A diverse group of forest scientist is writing the chapters. Publication is anticipated in early 2006. Landowner Education also works with the Alabama Tree Farm Committee, the Alabama TREASURE Forest program, and other forest landowner initiatives to increase the knowledge base about sustainable forestry. The SFI-IC and Alabama Forestry Extension in Auburn also sponsor the Master Tree Farmer continuing education program in Alabama. This 21 hour program is offered annually in February and March by live satellite feed from Clemson University through Extension offices all over the Southeast. More than 200 landowners have participated in this program each year. A sister program, Master Wildlife Management, is offered one out of every three years from the same source and sponsored by the Alabama Wildlife Federation.

Public Outreach has been responsible for informing the general public about the SFI Program and more specifically opinion leaders such as State Legislators and other public officials. For two years, the SFI Program ran sponsorship ads on Alabama Public Radio during the "Morning Edition" and "All Things Considered" news programs. For several years, State legislators who deal with forestry issues and appropriate State Agency leaders have been provided a dinner program about SFI and sustainable forestry in Alabama.

Another component of the SFI Program is the Sustainable Forestry Initiative Standard (SFIS). AF&PA sponsored the development of this performance standard with the combined efforts of the member companies, forest scientists, public forestry leaders, and environmental organizations. The SFIS is managed by the Sustainable Forestry Board (SFB). The SFB is an independent multi-stakeholder body comprised of one-third AF&PA member companies, one-third national environmental organizations, and one third forest scientists and/or public agency leaders. Since its implementation in 1995, the SFIS evolved annually until the 2000-04 Standard was published. Now the 2005-09 revised Standard has just been released. The SFIS is a means by which member companies and licensees can measure and certify their performance in meeting the Principles of Sustainable Forestry. While voluntary conformance is an option, most member companies and licensees go through a third party audit of their operations to gain the most objective review of their performance. These audits are conducted by organizations that must be environmental management system (EMS) registrars and accredited by the American National Standards Institute (ANSI). To achieve certification the auditor must find the Company and each facility to be in full conformance with the SFI Standard. Third party certified facilities will go through a full re-certification audit every five years with periodic third party surveillance audits in the interim. Once third party certified, member company and licensees may apply to use the

SFI on product label as a visible sign the product was produced through a sustainable managed system. Today there are over 120,000,000 acres of forest land in North America that are third party certified to the Sustainable Forestry Initiative Standard. For more information visit the following websites: http://www.afandpa.org/ and http://www.aboutsfb.org/."

There are numerous forestry BMPs being implemented throughout the Alabama River basin, including BMPs for abandoned logging road and in-use roads (and associated road banks), BMPs for reducing erosion from gullies and critical areas, and BMPs for protecting streams, streambanks, and wetlands in forested areas. Two excellent references for forestry BMPs are the AFC's[51] "*Alabama's Best Management Practices for Forestry*" and the GEPD's[52] "*Georgia's Best Management Practices for Forestry*". These forestry BMPs focus on (1) streamside management zones, (2) stream crossings, (3) forest roads, (4) timber harvesting, (5) reforestation and stand management, (6) forested wetland management, and (7) revegetation and stabilization. Brief descriptions of several examples of BMPs from these forestry manuals are provided to illustrate the common methods used to decrease erosion and nonpoint source pollution from forestry activities.

Seeding and Mulching
Seeding can be done in a number of ways. The most common method is with a farm tractor and a broadcast seeder. On steep or severely erosive sites, a hydroseeder can be used. Seed should be covered by pulling a section harrow, cultipacker, or brush. Mulch should be used on slopes over 5%, on sites where vegetation will establish slowly, or on deep sands or heavy clay soils. Mulch helps prevent erosion and allows vegetation to become established. Where there is a danger of mulch being blown or washed off-site, anchor it by running over the mulched area with a disk harrow. On steep slopes, anchor mulch with netting and tack-down staples or spray it with a tackifier.
Gully Stabilization
Gully stabilization should receive high priority during all land management activities. Actively eroding gully systems should be stabilized. The most effective way to reduce increases in sediment production and/or reduce the chance of reactivating the erosion process in healed gully systems is to avoid operating in them and maintain all existing vegetation. Site preparation, including herbicide and burning, should be avoided.

[51] Alabama Forestry Commission, published in January 1993.
[52] Georgia Environmental Protection Department, published in January 1999.

Roadside Erosion Control
Access roads are an essential part of any forest management operation and provide access for other activities on forestland. With proper planning, location, construction, and maintenance techniques, well-constructed access roads allow for productive operations and cause minimal soil and water quality impacts. However, poorly located, poorly constructed, or poorly maintained access roads, especially at stream crossings, can result in sediment reaching streams; changing stream flow patterns, degrading fish and aquatic organism habitat, and adversely affecting aesthetics.

<table>
<tr><th colspan="2">Streambank Stabilization</th></tr>
<tr><td colspan="2">Streambank erosion is a wearing-away of soil and rock that form streambanks. This process is accelerated by activities that increase stream flow and velocity, including stream channelization and straightening, the removal of streamside vegetation, and the construction of impervious surfaces.

Streambank stabilization and restoration utilizes inexpensive vegetative and bioengineering techniques to limit streambank erosion. The re-establishment of a functional floodplain by removal of accumulated streambank sediments will decrease streambank erosion and enhance the nutrient uptake capacity of the floodplain.

Photos courtesy of the Adams County Soil and Water Conservation District, Quincy, Illinois.</td></tr>
<tr><td>Before
</td><td>After
</td></tr>
</table>

The expected benefits from implementation of forestry BMPs are significant in this river basin. Without extensive water quality monitoring to measure the positive impacts of forestry BMPs on water quality, a model can be a useful tool. To illustrate this point, STEPL watershed modeling was utilized to estimate the reductions in sediment, nitrogen, and phosphorus loading from forested lands gained by the implementation of three *example* BMPs provided within the STEPL model. *There are many other BMPs that are currently utilized in Alabama and could be* *incorporated into the model in the future to estimate their effectiveness to reduce sediment loads.* The three BMPs modeled here were chosen as example BMPs to demonstrate the use of the STEPL model as a way to quantify the potential to protect water quality. The economics of these modeled BMPs was not considered by the model or the plan. Therefore, these BMPs may not be the most economically feasible solution but they are actual BMPs that are used throughout the region. Five different levels of BMP implantation were considered: 0, 25, 50, 75, and 100 percent implementation to the number of acres of forested lands. The three BMPs that were modeled were selected from the "BMP Menu" within the STEPL software and are presented in here:

	Best Management Practices Load Reduction Efficiencies (%)		
	Sediment Loads	**Nitrogen Loads**	**Phosphorus Loads**
BMP Combination			
Site Preparation / Steep Slope Seeder / Transplant	81%	ND	ND
Site Preparation / Straw / Crimp Seed / Fertilizer / Transplant	95%	ND	ND
Site Preparation / Straw / Net / Seed / Fertilizer / Transplant	83%	ND	ND
ND *denotes not determined; nutrient load reductions based on nutrient content in the runoff.*			

These BMPs are combinations of different practices that can be employed during the site preparation phase of timber management, after harvest and before planting, or for road construction. The individual practices are listed in the box on the next page.[53] For example, **'Site Preparation / Straw / Net / Seed / Fertilizer / Transplant'** refers to any combination of site preparation practices where straw, jute net(s), and/or native plants are placed on areas to be seeded, especially steep slops, to reduce surface erosion from wind and rain. 'Fertilizer' characterizes the practice of fertilizing the area-of-concern to encourage rapid plant growth (ensuring soil stabilization in the root zone).

[53] STEPL Models and Documentation are available online through EPA Region 5 at: http://it.tetratech-ffx.com/stepl/

Soil Stabilization Measures (Forests Site Preparation)

The following measures can be used to stabilize soils for forest site preparation and road construction:

Measure	Description
Hydromulch	Mix of cellulose fiber and water sprayed on slope
Straw	Straw hand-placed evenly on slope
Crimping	Rolling the placed straw with a sheepfoot roller
Seeding	Spreading grasses, alfalfa, or other legumes using a hand spreader or water mix
Fertilizer	Application of nitrogen, phosphorus, and potassium by hand spreader or water mix
Transplanting	Hand transplantation of locally grown plant species
Net	Jute netting hand-placed on slope and pinned in place

The potential benefits from implementation of these BMPs are shown in - **Table 36** through **Table 38** for the targeted subwatersheds with the highest sediment loading from forested lands. The Lower Big Swamp Creek subwatershed in Lowndes County is the targeted subwatershed with the highest estimated sediment loading from forested lands. With the implementation of the site preparation BMP of "Straw/Crimp Seed/ Fertilizer/Transplant" on half the forestland acreage in the Lowndes County portion of this subwatershed, for instance, sediment loading is expected to be reduced from 13,700 tons per year to 7,200 tons per year (**Table 36**). Similar significant benefits in sediment, nitrogen, and phosphorus load reductions in other subwatersheds are shown in these tables. The BMP load reduction modeling results for all targeted subwatersheds are in **Appendix G**.

It should be pointed out that this modeling was done at a subwatershed scale, and the BMP being modeled is assumed to be implemented on a given percentage of the total acreage of that land use. An important consideration with this modeling is that not all forested land in the Alabama River Basin is commercially planted and harvested. These three site preparation BMPs are not applicable to non-commercially managed forests. As discussed previously, these modeled BMP load reductions are intended to illustrate how STEPL may be used to estimate load reductions from BMP implementation. They also provide guidance on the comparative benefits of implementing BMPs on different subwatersheds, and the relative load reduction benefits from different BMPs in different subwatersheds. ***The load reductions from forestry BMPs in this plan do not reflect actual situations in Alabama.*** However, future modeling could be adapted to estimate (quantify) the load reductions that the most popular BMPs used in Alabama.

There are numerous additional forestry BMPs that can be implemented, including BMPs for abandoned logging road and in-use roads (and associated roadbanks), BMPs for reducing erosion from gullies and critical areas, and BMPs for protecting streams, streambanks, and wetlands in forested areas. Two excellent references for forestry BMPs are the AFC's[54] "*Alabama's Best Management Practices for Forestry*" and the GEPD's[55] "*Georgia's Best Management Practices for Forestry*". These forestry BMPs focus on (1) streamside management zones, (2) stream crossings, (3) forest roads, (4) timber harvesting, (5) reforestation and stand management, (6) forested wetland management, and (7) revegetation and stabilization.

[54] Alabama Forestry Commission, published in January 1993.
[55] Georgia Environmental Protection Department, published in January 1999.

Table 36. **Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Site Preparation/Steep Slope Seeder/Transplant" forestry BMPs for forested land. The subwatersheds with the highest sediment loading from forested land are listed below. Other subwatershed load reduction modeling results are provided in** Appendix G.

SubWatershed	*Acres of Forest Land*	*Percent of Acres Put in BMP*	BMP - Forestry: Site Preparation/Steep Slope Seeder/Transplant					
			Nitrogen Load from Forest Land - With Percent Reductions (lbs/year)		*Phosphorus Load from Forest Land - With Percent Reductions (lbs/year)*		*Sediment Load from Forest Land - With Percent Reductions (tons/year)*	
Lower Big Swamp Creek - Lowndes County	45,073	0%	58,748	0%	24,346	0%	13,664	0%
	11,268	25%	49,894	15%	20,937	14%	10,897	20%
	22,537	50%	41,040	30%	17,528	28%	8,130	40%
	33,805	75%	32,186	45%	14,119	42%	5,363	61%
	45,073	100%	23,331	60%	10,710	56%	2,596	81%
Lower Mulberry Creek - Chilton County	41,272	0%	50,148	0%	20,975	0%	11,138	0%
	10,318	25%	42,931	14%	18,197	13%	8,883	20%
	20,636	50%	35,713	29%	15,418	26%	6,627	41%
	30,954	75%	28,496	43%	12,639	40%	4,372	61%
	41,272	100%	21,278	58%	9,860	53%	2,116	81%
Soapstone Creek - Dallas County	29,894	0%	38,552	0%	15,985	0%	8,942	0%
	7,474	25%	32,758	15%	13,755	14%	7,131	20%
	14,947	50%	26,963	30%	11,524	28%	5,321	41%
	22,421	75%	21,169	45%	9,293	42%	3,510	61%
	29,894	100%	15,374	60%	7,062	56%	1,699	81%
Valley Creek - Dallas County	27,929	0%	36,225	0%	15,001	0%	8,455	0%
	6,982	25%	30,746	15%	12,892	14%	6,743	20%
	13,965	50%	25,267	30%	10,782	28%	5,031	40%
	20,947	75%	19,788	45%	8,673	42%	3,319	61%
	27,929	100%	14,309	61%	6,563	56%	1,607	81%
Chilatchee Creek - Dallas County	26,096	0%	33,596	0%	13,932	0%	7,788	0%
	6,524	25%	28,549	15%	11,989	14%	6,211	20%
	13,048	50%	23,503	30%	10,046	28%	4,634	41%
	19,572	75%	18,456	45%	8,103	42%	3,057	61%
	26,096	100%	13,410	60%	6,160	56%	1,480	81%

Table 37. Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Site Preparation/Straw/Crimp Seed/ Fertilizer/Transplant" forestry BMPs for forested land. The subwatersheds with the highest sediment loading from forested land are listed below. Other subwatershed load reduction modeling results are provided in Appendix G**.**

SubWatershed	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/Straw/Crimp Seed/ Fertilizer/Transplant					
			Nitrogen Load from Forest Land - With Percent Reductions (lbs/year)		Phosphorus Load from Forest Land - With Percent Reductions (lbs/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Lower Big Swamp Creek - Lowndes County	45,073	0%	58,748	0%	24,346	0%	13,664	0%
	11,268	25%	48,363	18%	20,348	16%	10,419	24%
	22,537	50%	37,979	35%	16,350	33%	7,174	47%
	33,805	75%	27,594	53%	12,352	49%	3,928	71%
	45,073	100%	17,210	71%	8,354	66%	683	95%
Lower Mulberry Creek - Chilton County	41,272	0%	50,148	0%	20,975	0%	11,138	0%
	10,318	25%	41,683	17%	17,716	16%	8,493	24%
	20,636	50%	33,218	34%	14,457	31%	5,848	48%
	30,954	75%	24,753	51%	11,198	47%	3,202	71%
	41,272	100%	16,288	68%	7,939	62%	557	95%
Soapstone Creek - Dallas County	29,894	0%	38,552	0%	15,985	0%	8,942	0%
	7,474	25%	31,756	18%	13,369	16%	6,818	24%
	14,947	50%	24,960	35%	10,752	33%	4,695	48%
	22,421	75%	18,164	53%	8,136	49%	2,571	71%
	29,894	100%	11,368	71%	5,519	65%	447	95%
Valley Creek - Dallas County	27,929	0%	36,225	0%	15,001	0%	8,455	0%
	6,982	25%	29,799	18%	12,527	16%	6,447	24%
	13,965	50%	23,373	35%	10,053	33%	4,439	47%
	20,947	75%	16,947	53%	7,579	49%	2,431	71%
	27,929	100%	10,521	71%	5,105	66%	423	95%
Chilatchee Creek - Dallas County	26,096	0%	33,596	0%	13,932	0%	7,788	0%
	6,524	25%	27,677	18%	11,653	16%	5,938	24%
	13,048	50%	21,758	35%	9,375	33%	4,089	48%
	19,572	75%	15,840	53%	7,096	49%	2,239	71%
	26,096	100%	9,921	70%	4,817	65%	389	95%

Table 38. **Expected reductions in sediment, nitrogen, and phosphorus loading with implementation of "Site Preparation/Straw/ Net/Seed/Fertilizer/Transplant" forestry BMPs for forested land. The subwatersheds with the highest sediment loading from forested land are listed below. Other subwatershed load reduction modeling results are provided in Appendix G.**

SubWatershed	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/ Straw/Net/Seed/Fertilizer/Transplant					
			Nitrogen Load from Forest Land - With Percent Reductions (lbs/year)		Phosphorus Load from Forest Land - With Percent Reductions (lbs/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Lower Big Swamp Creek - Lowndes County	45,073	0%	58,748	0%	24,346	0%	13,664	0%
	11,268	25%	49,675	15%	20,853	14%	10,829	21%
	22,537	50%	40,603	31%	17,360	29%	7,993	41%
	33,805	75%	31,530	46%	13,867	43%	5,158	62%
	45,073	100%	22,457	62%	10,374	57%	2,323	83%
Lower Mulberry Creek - Chilton County	41,272	0%	50,148	0%	20,975	0%	11,138	0%
	10,318	25%	42,752	15%	18,128	14%	8,827	21%
	20,636	50%	35,357	29%	15,281	27%	6,516	42%
	30,954	75%	27,961	44%	12,433	41%	4,205	62%
	41,272	100%	20,565	59%	9,586	54%	1,893	83%
Soapstone Creek - Dallas County	29,894	0%	38,552	0%	15,985	0%	8,942	0%
	7,474	25%	32,615	15%	13,699	14%	7,087	21%
	14,947	50%	26,677	31%	11,413	29%	5,231	42%
	22,421	75%	20,740	46%	9,128	43%	3,376	62%
	29,894	100%	14,802	62%	6,841	57%	1,520	83%
Valley Creek - Dallas County	27,929	0%	36,225	0%	15,001	0%	8,455	0%
	6,982	25%	30,611	15%	12,839	14%	6,701	21%
	13,965	50%	24,997	31%	10,678	29%	4,946	41%
	20,947	75%	19,382	46%	8,517	43%	3,192	62%
	27,929	100%	13,768	62%	6,355	58%	1,437	83%
Chilatchee Creek - Dallas County	26,096	0%	33,596	0%	13,932	0%	7,788	0%
	6,524	25%	28,425	15%	11,941	14%	6,172	21%
	13,048	50%	23,254	31%	9,950	29%	4,556	42%
	19,572	75%	18,083	46%	7,959	43%	2,940	62%
	26,096	100%	12,911	62%	5,968	57%	1,324	83%

GOAL 3: *Reduce nonpoint source pollution from aquaculture operations***.**
<u>Issues and Concerns in the Basin</u>: • management of effluent quality from ponds

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Continued implementation of aquaculture BMPs to reduce sediments in effluents from aquaculture ponds. Identify those ponds in greatest need of BMP enhancement.				
Aquaculture operators; AU, ACP, AFF, NRCS, SWCD, ACES	High priority, continuous, long term	Medium; private /public	quarterly for BMP condition	Acres of aquaculture ponds where BMPs are implemented
Continued implementation of aquaculture BMPs to improve water quality in aquaculture ponds and reduce the export of nutrients, organic matter, and low dissolved oxygen water from ponds.				
Aquaculture operators; AU, ACP, AFF, NRCS, SWCD, ACES	High priority, continuous, long term	Medium; private /public	quarterly for BMP condition	Acres of aquaculture ponds where BMPs are implemented
Educate aquaculture operators and owners concerning the importance of BMPs in reducing nonpoint source pollution associated with aquaculture operations.				
Aquaculture operators; AU, ACP, AFF, NRCS, SWCD, ACES	Medium priority, continuous, long term	Low; private /public	Annual progress reports	Number of outreach efforts or educational projects completed; number of operators engaged
Develop a program to recognize aquaculture operations that have exemplary management protocols and implemented BMPs, for their environmental stewardship.				
Aquaculture operators; AU, ACP, AFF, AFS, SWCD, ACWP	Medium priority, continuous, long term	Low; private /public	Annual progress reports	Number of operators recognized

How the Strategies Will Achieve the Goal.

Catfish farming in Alabama is concentrated primarily in the Blackland Prairie region. Soils in this region are high in clay content, resulting in runoff after significant storm events. The watersheds for catfish ponds are therefore important to water quality. The continued implementation of BMPs for aquaculture operations in the river basin is important for reducing sediment and nutrient loading in effluent from catfish farming ponds.

Aquaculture BMP implementation strategies are focused on commercial catfish farming operations and the effluent from the ponds. BMPs focus on the pond itself, how it is operated, and the watershed supplying surface water to the pond. Sediment and nutrients are the primary concern, although effluent high in organic matter and low in dissolved oxygen is also an issue. The use of therapeutic agents, water quality enhancers, and methods used for mortality management are also areas that have been examined for possible water quality impacts. The pond operations most in need of BMPs should be identified and targeted for implementation.

Strategies supportive of and critical to BMP implementation efforts are education, outreach, and recognition. Workshops and the distribution of educational materials are key efforts. Methods of recognition, and possible green certification, should be developed for aquaculture operations of outstanding stewardship. These efforts could be led by the Alabama Catfish Producers, a division of the Alabama Farmer's Federation, with input from watershed organizations and the support of the Alabama Clean Water Partnership.

Recognizing the importance of environmental stewardship, the Alabama Catfish Producers (ACP), a division of the Alabama Farmers Federation, contracted with Auburn University (AU) to conduct an environmental assessment of catfish farming in the state in 1997. The environmental assessment was completed in 1999, resulting in the proposed development of Best Management Practices (BMPs) for Alabama Channel Catfish Farming. Several agencies including AU, the Alabama Department of Environmental Management (ADEM), and the Natural Resources Conservation Service (NRCS), worked with the ACP in developing the BMPs. A first draft of the BMPs was completed in the spring of 2000. Several more drafts followed, with EPA recognizing the final version in September of 2002. The final version was published in a manual format in 2003.

The BMPs have been widely implemented by catfish producers in the state in an effort to minimize any potential environmental impacts from catfish production. The BMPs address various aspects catfish production including reducing runoff into ponds, managing ponds to reduce effluent volume, erosion control, feed management, and water quality. A list of aquaculture BMPs that can be implemented are shown below for aquaculture pond operations.

- Reducing storm runoff into ponds
- Managing ponds to reduce effluent volume
- Erosion control on watersheds and pond embankments
- Pond management to minimize erosion
- Control of erosion by effluents
- Settling basins and wetlands
- Feed management
- Pond fertilization
- Managing ponds to improve quality of overflow effluent
- Managing ponds to improve quality of draining effluent

These BMPs are described in 15 documents published by Auburn University and the NRCS titled "*Alabama Aquaculture Best Management Practices*". These BMPs can be found on the web at:
http://efotg.nrcs.usda.gov/toc.aspx?CatID=213

Storm Inflow and Effluent Control

Storm runoff or overland flow enters aquaculture ponds. Excessive flow through ponds and increased discharge from the ponds can cause erosion of pond outlet structures and increases total suspended solids concentration in effluents.

Water flowing through ponds also flushes out products added to ponds to enhance water quality and fish production, e.g. fertilizer, lime, and salt, and lowers alkalinity. If phytoplankton abundance and nutrient concentrations are high in ponds at time of overflow, pollutant loads to streams can increase.

Managing Pond Water Quality

Catfish ponds can release effluents of poor water quality when they are intentionally drained. With proper pond design, most catfish ponds do not need to be drained, as fish can be harvested with seining. Proper pond design and seining should be promoted.

The proper positioning and use of pond aerators can induce water currents that can increase erosion of embankments and the pond bottom. Embankment vegetation should be promoted to reduce erosion.

Settling basins to improve the water quality of effluents should also be considered. This will improve the water quality of receiving streams.

GOAL 4: *Reduce nonpoint source pollution from roads, roadbanks, and new road construction*
<u>Issues and Concerns in the Basin</u>: • Soil erosion from roads and roadbanks • Gully erosion

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Implement recommended repair and maintenance practices for unpaved roads that reduce erosion and protect water quality from roadways and roadbanks[56]. Address gullies that have developed from improper road drainage.				
County engineers, public works departments, local governments, ADOT, SWCD, NRCS	High priority, continuous, long term	Medium; private/ public	Annual report on improvements	Miles of unpaved roads where improvements have been made
Implement repair practices to roadbanks on paved roads to reduce erosion and sediment loading to surface waters. Address gullies that have developed from improper road drainage.				
County engineers, public works departments, local governments, ADOT, SWCD, NRCS	Medium priority, continuous, long term	Medium; public	Annual report on improvements	Miles of paved roads where roadbank improvements have been made
Implement recommended construction practices for new roadways and roadbanks, to reduce erosion and sediment loading to surface waters during construction and from the roads after they are operational.				
County engineers, public works departments, local governments, ADOT, home builders associations, HBAA, SWCD, NRCS	Medium priority, continuous, long term	Medium; private/ public	Annual report on improvements	Miles of new roads where enhanced efforts have been fostered through this program
Identify and rank unpaved roads in the subwatersheds that contribute most to sediment loading to surface waters.				
County engineers, public works departments, local governments, ADOT, SWCD, NRCS	Medium priority, continuous, long term	Low; public	Periodic updates on ranking of needs in subwatersheds	Number of ranking reports over time

[56] The "Recommended Practices Manual - A Guideline for Maintenance and Service of Unpaved Roads" by the Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority (2000) is an excellent guide.

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Provide training workshops and educational programs on sediment and erosion control for county and city public works employees and others involved in building and maintaining roads.				
County engineers, public works departments, local governments, ADOT, SWCD, NRCS	Medium priority, continuous, long term	Low; private /public	Annual progress reports	Number of outreach efforts, workshops, or educational projects completed; number of groups engaged

<u>How the Strategies Will Achieve the Goal.</u>

Improvements to roads and roadbanks, particularly unpaved roads, is both a necessary and important task for reducing sediment loading to surface waters in the river basin. Sediment loading from roads and roadbanks comprised 13 percent of the total sediment loading in the Alabama River Basin. It was the leading source of sediment loading in the Middle Alabama River Basin, accounting for 23 percent of the total load.

The implementation of BMPs and recommended maintenance practices for roads is the solution for reducing this load. The Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority has published an excellent guide for improving unpaved roads and reducing their environmental impacts. This guide is titled "Recommended Practices Manual - A Guideline for Maintenance and Service of Unpaved Roads" and was published in February 2000, and is available at:

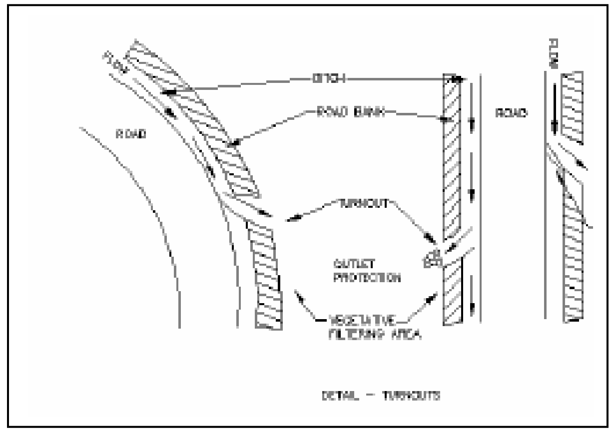
http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/ResourceMat/unpavedtxtonly.pdf

Educational outreach and workshops are a key to promoting the implementation of these BMPs and practices. Coordination with county engineers and governments is an important component of this outreach. As part of this outreach, the unpaved roads most in need of BMPs should be identified and targeted for implementation.

Roadbank Ditch Design and Maintenance

Efficient disposal of runoff from roads helps preserve road bed and banks, and well vegetated ditches slow, control, and filter runoff. This provides an opportunity for sediments to be removed from the runoff water before it enters surface waters.

A stable ditch will not become an erosion problem itself. Ideally, “turn-outs” (intermittent discharge points also called “tail ditches”) will help maintain a stable velocity and the proper flow capacity within the road ditches by timely outleting water from them. This will help distribute roadway runoff and sediments over a larger vegetative filtering area.



Gully Stabilization and Road Drainage

Gullies are a specific form of severe erosion typically caused by concentrated water flow on erosive soils. Once formed, gullies typically grow with time and will continue down-cutting until resistant material is reached. They also expand laterally as they deepen.

Gullies often form at the outlet of culverts or cross-drains at roads, due to the concentrated flows and relatively fast water velocities. Also, gullies can form upslope of culvert pipes if the pipe is set below the meadow elevation.

Stabilization of gullies typically requires removing or reducing the source of water flowing through the gully and refilling the gully with dikes, or small dams, built at specific intervals along the gully.

GOAL 5: *Reduce pollution from urban and residential areas.*
Issues and Concerns in the Basin: • Septic tank and sewage treatment nutrient loading and pathogens • Soil erosion from new road construction • Soil erosion from land clearing and construction activities • Sediment loading from urban land development • Stormwater runoff, and pathogens and toxics

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Implement urban BMPs and environmentally friendly stormwater management policies to reduce stormwater runoff, including wetland treatment approaches. BMPs and management strategies should focus on reducing the quantity and improving the quality of stormwater runoff.				
Municipal and county public works, ADEM, ACWP, local government, HBAA, SWCD, NRCS, ACES	High priority, continuous, long-term	High, public/ private	Annual report on progress	Number of urban BMP projects, number of enhanced policies, number of innovative approaches implemented
Coordinate local urban BMP demonstration projects and promote their environmental enhancements to citizens and the construction industry as appropriate.				
Municipal public works, ACWP, ADEM, HBAA, NRCS, SWCD, ACES, ANEMO, AAGC	Medium priority, continuous, long-term	Medium to high, private/ public	Annual report on progress	Number of urban BMP demonstration projects
Encourage and enforce ordinances that reduce surface runoff and wetlands destruction from land clearing activities during new development construction.				
Local governments, ADEM, ACOE, SWCD, HBAA, SWS	Medium priority, continuous, long-term	Low to medium, public	Annual report on progress	Number and/or location of construction ordinances addressed

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Implement recommended construction practices for new roadways and roadbanks, to reduce erosion and sediment loading to surface waters during construction and from the roads after they are operational.				
County engineers, public works departments, local governments, ADOT, home builders associations, HBAA, SWCD, NRCS, AAGC	Medium priority, continuous, long term	Medium; private/ public	Annual report on improvements	Miles of new roads where enhanced efforts have been fostered through this program
Promote outreach with commercial businesses about ways to reduce nutrient pollution in surface runoff and ground water infiltration from fertilization.				
Commercial landscapers, ANLA, ATA, ACES, ADEM, NRCS, SWCD, ACWP	Medium to low priority, continuous, long-term	Low, private/ public	Annual report on progress	Number of outreach efforts, number of groups engaged
Promote the reduction in impervious cover in residential and commercial development areas.				
Municipal public works, local governments, local regional planning departments, ACWP, ADEM, HBAA, NRCS, SWCD, ACES, ANEMO, AAGC	Medium to low priority, continuous, long-term	Low, private/ public	Annual report on progress	Number of outreach efforts, number of groups engaged, acres of pervious cover installed (new and retrofit)
Conduct nonpoint source pollution and BMP workshops and educational programs for the construction industry.				
Developers, county planners, county engineers, public works departments, local governments, home builders associations, building and industry associations, HBAA, SWCD, NRCS, ACES, AAGC	Medium to high priority, continuous, long term	Low to medium; private/ public	Annual report on progress	Number of workshops and outreach efforts, number of groups engaged
Recognize developers and contractors who are participating in the Clean Water Partnership and have implemented effective BMPs on their sites.				
Developers, county planners, municipalities, stormwater permit holders, home builders associations, building and industry associations, HBAA, SWCD, NRCS, ACWP, AAGC	Medium priority, continuous, long term	Low; private/ public	Annual report on progress	Number of developers and contractors recognized

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Develop and distribute a homeowners' informational packet regarding prevention of residential nonpoint source pollution. Promote the use of stormwater drain stencils in residential and urban areas of the watershed. Coordinate a Watershed-wide Amnesty Day event for residential hazardous waste disposal.				
SWCD, NRCS, ACES, ACWP, ADEM, ADAI, watershed groups, realtors, utility companies, cities, municipalities	Low to medium to high priority, continuous, long term	Low to medium; private/ public	Annual report on progress	Number of workshops and outreach efforts, number of groups engaged
Identify areas with significant impacts such as overflows, failures, and nutrient loading, from onsite sewage disposal systems (OSDSs) and public-owned treatment works (POTWs). Promote improvements through enhanced requirements, monitoring, education and outreach, and incentives.				
Municipal and county public works, county health departments, ADPH, ADEM, AOWA, AOWB, SWCD, NRCS, ACES, ACWP, publicly-owned treatment works	Medium to high priority, continuous, long term	Medium to high; private/ public	Annual report on progress	Number of workshops and outreach efforts, number of groups engaged, number of OSDSs and POTWs inventoried/assessed
Implement advanced onsite sewage treatment system demonstration projects that enhance phosphorus removal and reduce nitrate pollution. Promote education and outreach through these demonstration projects.				
ADPH, AOWA, AOWB, Municipal and county public works, developers, wastewater agencies, ADEM, SWCD, NRCS, ACES	Medium to high priority, continuous, long term	High; private/ public	Annual report on progress	Number of workshops and outreach efforts, number of groups engaged, number of demonstration projects implemented
Educate homeowners and businesses on proper septic tank siting, installation, operation, and maintenance.				
Municipal and county public works, county health departments, ACWP, ASTA, AOWA, AOWB, SWCD, NRCS, ACES, ADPH, homebuilders	Medium to high priority, continuous, long term	Low, private/ public	Annual report on progress	Number of workshops and outreach efforts, number of homeowner and business groups engaged

How the Strategies Will Achieve the Goal.

Urban development can have significant impacts on surface waters in watersheds. According to the 1998 SWCC data and the loading model, sediment loading from urban development is the **largest source in the Upper Alabama River Basin**, comprising 28 percent of the total sediment load in that river basin segment. Most of the sediment load from urban development in the Upper Alabama River Basin (80 percent) comes from the Mill Creek/Pine Creek subwatershed.

Environmentally sensitive or low-impact development (LID) is one means of protecting and enhancing hydrologic systems. LID practices aim to reduce floods in developed areas, to reduce storm water storage requirements, to improve the water quality of runoff, and to help maintain and restore fish habitat. When implemented properly, LID allows for increased growth with minimal environmental effects.

The matrix chart below borrowed from the Upper Tallapoosa Basin Management Plan provides recommended management strategies for dealing with nutrient, bacteria, sedimentation, and solid waste pollution typical of urban areas.[57]

Parameters	Riparian Buffers	Pervious Parking	Surface Sand Filter	Biosolids Reuse	Constructed Wetlands	Storm Drain Stenciling	Illicit Discharge Detection & Elimination
Nutrient enrichment	X		X	X			
Pathogen contamination	X	X	X		X		X
Siltation	X		X		X		X
Illegal Dumping						X	

Reductions in the loading of sediments, nutrients, pathogens, and toxics from developing urban areas should be made on several fronts. Stormwater management BMPs and management

[57] CH2MHILL, 2005. *Tallapoosa River Basin Management Plan*. Prepared for the Alabama Clean Water Partnership, Montgomery, AL. pp. 4-26.

protocols should be pursued to reduce the quantity and improve the quality of stormwater runoff. Innovative stormwater management approaches, including the use of constructed and natural wetlands for treatment, need to be evaluated and implemented where feasible.

The construction and development industry should be diligent in utilizing BMPs in their land clearing, road building, and construction work, with education and enforcement being critical. Wetland impacts from construction activities should be avoided. The incorporation of pervious surfaces with new construction and retrofitting of impervious surfaces should be fostered. Many of these measures are being promoted on an industry-wide basis by the Home Builders Association of Alabama. They offer a ‘Qualified Credentialed Inspection Program Certification (QCIP) to their members demonstrating an obtained level of knowledge about environmental best management practices for the development process. More information on QCIP can be found online at HBAA’s website (http://www.hbaa.org/pdf/qci_brochure.pdf).

Demonstration projects promoting the incorporation of BMPs and green initiatives should promoted through education and outreach and implemented when possible. Builders that incorporate these initiatives should be recognized, perhaps by the Clean Water Partnership and watershed organizations. Similar frameworks exist in several areas nationwide. Workshops educating citizens, landowners, and the building and industry community on urban BMPs and construction BMPs are critical. Educating landscapers on the impacts of improper fertilization resulting in nutrient loading in both surface runoff and ground water infiltration is necessary.

Citizens and homeowners should be involved in promoting environmentally friendly solutions to common problems such as the disposal of hazardous wastes, water conservation, lawn care and fertilization, and septic system maintenance.

Nutrient and pathogen loading from improperly functioning onsite sewage disposal systems (OSDSs) and public-owned treatment works (POTWs) can have severe impacts on surface waters. The OSDSs and POTWs should be reviewed and assessed to identify areas with significant impacts such as overflows, failures, and nutrient loading are occurring. Improvements to these identified OSDSs and POTWs need to be pursued through enhanced requirements, monitoring, education and outreach, and incentives. Alternative onsite sewage treatment system demonstration projects should be pursued.

An example of alternative community-based sewage treatment systems is the decentralized wastewater system. This is a small, community-based system used in rural and developing areas. These systems collect, treat, and reuse wastewater near the point of generation. Advantages include minimizing the collection systems, solids handling, and stream discharge. Most systems utilize an “effluent sewer” concept, which collects wastewater using a septic tank at each home to remove the solids, while the liquid waste is transported through small diameter sewer lines to a local treatment facility. Treatment is typically accomplished by simple and cost-effective attached growth biological processes. The treated effluent is dispersed or reused via in-ground methods. This method of wastewater management is very cost-effective, protects the public health, minimizes or eliminates stream discharges, and provides enhanced property values. Public or private utilities (certified by the ADPH) manage decentralized wastewater infrastructure, while in-ground dispersal or reuse of treated effluents is permitted by ADEM via UIC permits for systems with capacities greater than 10,000 gpd and by ADPH for systems of lesser capacities.

Educational outreach and workshops are a key to promoting the implementation of these BMPs and practices. Coordination with municipal and county engineers, planners, and governments is an important component of this outreach.

Excellent reference materials are available that focus on urban and stormwater BMPs. The 2003 update of the "Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas" is an outstanding compendium of BMPs. Troy State University published a report in May 2000 titled "'How To' Guide for Stormwater and Urban Watershed Management". The City of Knoxville, Tennessee also published an extensive report on "Best Management Practices (BMP) Manual" through their Stormwater Engineering Division. These sources provide excellent background on BMPs and approaches that can be utilized to minimize sediment and water quality impacts from urban development.

GOAL 6: *Reduce nonpoint source pollution from mining activities.*
Issues and Concerns in the Basin: • Sediment loading from sand and gravel pits • Mining and excavation impacts on surface waters

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Promote and enforce BMPs for resource extraction operations, including sand and gravel mining, to reduce sediment runoff and water quality impacts.				
County engineers, ADEM, SWCD, NRCS, GSA, AMI, ACES	Medium priority, continuous, long-term	Medium private	Annual report on progress	Number of resource extraction operations engaged in these efforts, reduction in sediment loading and improvement in water quality
Conduct nonpoint source pollution and BMP workshops and educational programs for the resource extraction industry.				
Resource extraction operators, county engineers, ADEM, SWCD, NRCS, GSA, AMI, ACES	Medium priority, continuous, long term	Low; private/ public	Annual report on progress	Number of workshops and outreach efforts, number of operators engaged
Identify areas with significant sediment and water quality impacts from sand and gravel mining.				
Resource extraction operators, county engineers, ADEM, SWCD, NRCS, GSA, AMI, ACES	Medium priority, continuous, long term	Low; private/ public	Biennial updates of targeted areas	Biennial reports issued; number of targeted areas identified

How the Strategies Will Achieve the Goal.

Mining in Alabama is regulated under NPDES and must obtain a permit to discharge into Alabama's waters from ADEM. At the same time, resource extraction is a nonpoint source category as defined by the EPA, as it can contribute to the degradation of surface waters. Significant to the Alabama River Basin, resource extraction includes sand and gravel mining.

Contamination of streams can occur from sand and gravel mining at times of heavy or sustained rainfall, and from gravel washing processes. Good management practices need to be followed in order to keep nonpoint source pollution at a minimum.

Enforcement of the construction best management practices plan, as part of the permitting for these extraction operations, is critical to reducing surface water impacts. Periodic monitoring of receiving surface waters at these sites is critical to assure the BMPs are effective. Monitoring and enforcement need to be coupled with education and outreach for resource extraction operators for an effective overall approach. Periodic review of surface water quality below all extraction operations needs to be completed, with the intent of identifying operations where further efforts need to be focused for reducing nonpoint source impacts.

GOAL 7: *Protect and restore wetlands and fish and wildlife habitat.*
<u>Issues and Concerns in the Basin</u>: • Wetland and aquatic habitat destruction

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Identify subwatersheds with habitats of exceptional quality or of significant restoration needs, and prioritize parcels for acquisition or restoration projects.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP	High priority, continuous, long term	Low to medium; public	Biennial report of rankings and priorities	Basinwide prioritizations of habitats, supported by participants
Implement projects for habitat restoration and protection, utilizing the prioritized ranking for subwatersheds in the river basin. Identify funding programs and mechanisms that support these projects.				
USFWS, ANHP, ADCNR, SWCD, NRCS, ADEM, AWF, TNC, ACWP, DU	High priority, continuous, long term	High to medium; public/ private	Annual report of restoration and protection progress	Acres of habitat protected; acres of habitat restored
Pursue habitat protection initiatives through acquisition and easement mechanisms, utilizing grant and assistance programs for these purposes. These mechanisms include Environmental Quality Incentives Program (EQUIP), Wetlands Reserve Program (WRP), Conservation Reserve Program (WHIP), Forever Wild and Partners for Wildlife (FWS).				
USFWS, ANHP, ADCNR, SWCD, NRCS, Forever Wild, Landtrusts	High priority, continuous, long term	High to medium; public/ private	Annual report of habitat protection progress	Acres of habitat protected
Review ACOE permit applications for wetland filling & dredging permits in the watershed.				
ACOE, watershed groups, ACWP, ANHP, TNC	Medium priority, continuous, long term	Low; public /private	Biennial report of progress	Number of applications reviewed

How the Strategies Will Achieve the Goal.

Habitat restoration and critical habitat protection are essential to the long term ecological value of the river basin. Knowing what areas are most in need of restoration, and those with the highest ecological value for protection, is the critical first step. These prioritizations will be developed on a subwatershed basis, using the TNC *Biological and Conservation Database* in concert with the *Recovery Plan for the Mobile River Basin Aquatic Ecosystem*. These efforts will be coordinated with the ADCNR's wildlife conservation plan for consistency.

Restoration and protection projects identified within the prioritization plan need to be undertaken, and should utilize the numerous funding mechanisms that exist. Federal and state agencies, NGOs, and private foundations often provide funding for these projects. The NRCS has several funding programs that assist landowners in putting land into conservation easements.

Review of selected COE dredge and fill permit applications in the river basin would serve to provide an extra assessment of potential impacts to habitats. This independent review would function to provide an extra measure of protection to wetlands in the basin.[58] As provided by the ACOE, any person or agency who would like to review ACOE permit applications can call or write the ACOE and request that their name be placed on the ACOE’s mailing list to receive copies of public notices for both private and public actions on wetland filling and dredging permits. The ACOE maintains extensive mailing lists to keep the public and federal and state agencies as well as environmental agencies informed of future actions.

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[58] Any person or agency who would like to review ACOE permit applications can call or write the ACOE and request that their name be placed on the ACOE’s mailing list to receive copies of public notices for both private and public actions on wetland filling and dredging permits.

GOAL 8: *Decrease water quality impacts such as bank erosion, littering, and chemical pollution by increasing boater awareness and improving river recreation management.*
Issues and Concerns in the Basin: • River traffic management • Dumping from boats • Boat ramp abuse and littering

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Work with the ADCNR, ACOE, the Alabama Marine Police Division, and the U.S. Coast Guard to identify ways to better manage river traffic on the Alabama River and at boat ramps.				
ADCNR, ACOE, USCG, MPD, ACWP, HOBOs, and boat ramp operators	Medium priority, continuous, long term	Low; public	Annual progress reports	Reduction in complaints
Work with the ADCNR, the Alabama Marine Police Division, the Coast Guard, and watershed groups to reduce pollution from recreational boaters.				
ADCNR, CG, ACOE, MPD, ACWP, HOBOS, and boat ramp operators	Medium priority, continuous, long term	Low; public	Annual progress reports	Reduction in complaints

How the Strategies Will Achieve the Goal.

Boaters associations, watershed associations, and river recreation users need to work together, and with the Alabama Marine Police, ACOE and the U.S. Coast Guard, to identify problems and problem areas. Stakeholder concerns have centered on boat traffic on the river and at boat ramps. A formalized framework to address these concerns may need to be established via a committee or working group, with representation of those with concerns and those that can do something about them. It is likely that stepped up patrols and enhanced boater education will play key roles as solutions. The use and expansion of pump-out facilities for boaters should be promoted, and can be aided by funding from the Clean Vessels Act.

GOAL 9: *Promote resource education and outreach, and watershed awareness of issues in the river basin. Promote volunteer activities throughout the watershed. Promote watershed management technology transfer.*

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Promote participation and membership in regional watershed groups within the river basin, and establish watershed associations for key subwatersheds.				
ACWP, ADEM, watershed groups, ARA, AWWA	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Promote the implementation of the Alabama River Basin Plan, once approved, through public meetings at key regional locations in the river basin. Use to further participation and membership in watershed groups (strategy listed above). Promote technology transfer for watershed management techniques.				
ACWP, ADEM, watershed groups	High priority, continuous, long term	Low; public	Annual progress reports	Number of meetings and workshops, number of members or participants
Expand educational programs for K-12 students on watershed awareness and environmental concerns.				
ACWP, ADEM, watershed groups, schools	Medium priority, continuous, long term	Low; public	Annual progress reports	Number of educational programs and schools involved
Promote river clean-ups throughout the river basin.				
ACWP, ADEM, watershed groups, ARA, AWWA, SWCD, APPC, ACOE	Medium priority, continuous, long term	Low; public	Annual progress reports	Number of clean-ups held; number of different locations where held
Develop web-based and printed media coverage, and utilize the news media, to promote watershed events and implementation progress.				
ACWP, ADEM, watershed groups, ARA, AWWA, news outlets	High priority, continuous, long term	Low; public	Annual progress reports	Number of events and publicized mechanisms utilized for promotion

How the Strategies Will Achieve the Goal.

The successful implementation of this river basin plan is directly dependent on the involvement and commitment of watershed stakeholders and all the agencies and organizations identified in this plan. The first two strategies listed above are critical for moving this plan forward to implementation. Significant outreach efforts need to be made to get greater involvement of watershed stakeholders in organized watershed associations. Regional and subwatershed organizations that are functionally active are an immediate need.

It is recommended that additional grant monies be secured and utilized to foster the establishment and participation in these regional watershed groups. Strong leadership will need to be identified. All the strategies identified for this goal are important, and efforts need to be focused from the beginning to develop momentum for implementing the plan.

GOAL 10: *Continue to track resource trends in the river basin to measure progress in restoration and protection efforts, and identify new resource concerns and issues.*

Recommended Strategies to Achieve the Goal:

<table>
<tr><th>Lead Agency or Group</th><th>Timeframe</th><th>Level of Funding</th><th>Monitoring Need</th><th>Performance Indicator</th></tr>
<tr><td colspan="5">Support and expand citizen monitoring programs, being sure that targeted subwatersheds are included in monitoring programs.</td></tr>
<tr><td>ACWP, ADEM, watershed groups, schools, ARA, AWWA</td><td>High priority, continuous, long term</td><td>Low; public</td><td>Annual progress reports</td><td>Number of sites monitored; number of citizen participants</td></tr>
<tr><td colspan="5">Support agency, local government, and university efforts for monitoring streams in the river basin, and encourage these monitoring efforts to include post BMP implementation monitoring.</td></tr>
<tr><td>ACWP, ADEM, watershed groups, ARA, AWWA, universities</td><td>High priority, continuous, long term</td><td>Low; public</td><td>Annual progress reports</td><td>Number of sites monitored; number of monitoring programs</td></tr>
<tr><td colspan="5">Incorporate monitoring results and summaries in watershed progress reports as this plan is implemented. Utilize the progress identified with monitoring results to promote the successes of plan implementation.</td></tr>
<tr><td>ACWP, ADEM, watershed groups, ARA</td><td>High priority, continuous, long term</td><td>Low; public</td><td>Annual implementation progress reports</td><td>Number of plan implementation projects supported by monitoring data</td></tr>
</table>

<u>How the Strategies Will Achieve the Goal.</u>

Water quality monitoring is an important component in determining whether goals are being achieved. While the performance measures listed in this plan are important measures for determining implementation success, restoration success is measured in the field with data. Citizen monitoring is an essential component of this monitoring, as there is seldom sufficient funding for state and federal agencies to accomplish all the monitoring that is needed. The river basin watershed groups and associations should work closely with both agencies and citizen monitoring groups to assure that the most important sites are being covered.

As BMPs are being implemented, citizen and agency monitoring should be performed over the long term to gauge the effectiveness of the BMPs at a site or in a subwatershed. Many BMPs require a long time frame to fully realize nutrient and sediment reduction benefits. Further, it may take a critical number of sites in a subwatershed where BMPs are implemented before water quality improvements can be observed in field data. Monitoring commitments need to be established over the long-term. It is therefore important that the targeted watersheds are included in monitoring plans.

Finally, successes in implementing the plan will build upon themselves if those successes are publicized. It is important to demonstrate the successes with documentation of the implementation activities, and with the successes as evidenced with field data.

GOAL 11: *Develop a framework in the river basin to implement the projects and tasks in this plan.*

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Promote the implementation of the Alabama River Basin Plan, once approved, through public meetings at key regional locations in the river basin. Use to further participation and membership in watershed groups.				
ACWP, ADEM, watershed groups, ARA, AWWA	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Promote participation and membership in regional watershed groups within the river basin, and establish watershed associations for key subwatersheds.				
ACWP, ADEM, watershed groups, ARA, AWWA	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Coordinate with federal, state and local agencies to promote the implementation of the plan through education, outreach, and funding opportunities for projects.				
ACWP, ADEM, watershed groups, ARA, AWWA	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups

How the Strategies Will Achieve the Goal.

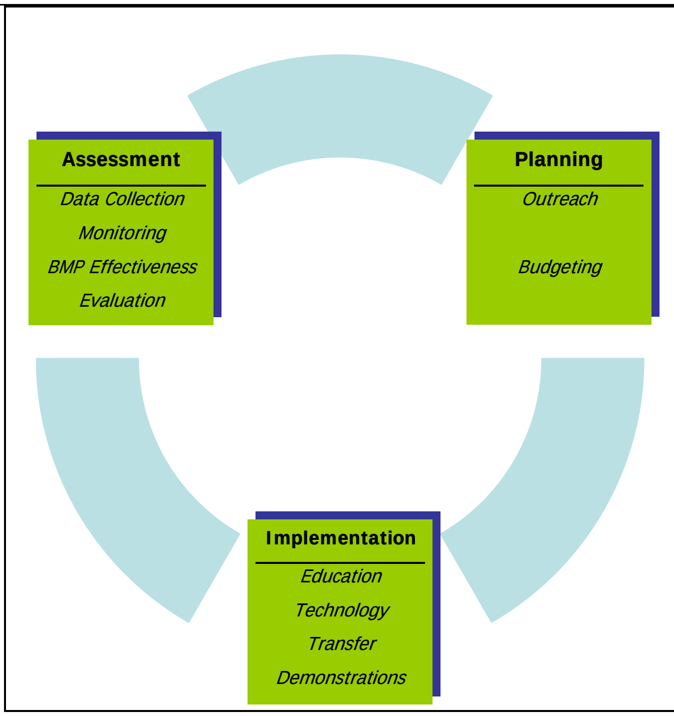
As discussed under the education and outreach goal, the successful implementation of this river basin plan is directly dependent on the involvement and commitment of watershed stakeholders and all the agencies and organizations identified in this plan. The strategies listed above are critical to moving this plan forward to implementation. Significant outreach efforts should be made to get greater involvement of watershed stakeholder in an organized framework. Regional and subwatershed organizations that are functionally active are an immediate need.

As mentioned previously, it is recommended that additional grant monies be secured and utilized to foster the establishment and participation in these regional watershed groups. Strong leadership will need to be identified. All the strategies identified for this goal are important, and efforts need to be focused from the beginning to develop momentum for implementing the plan.

The next section of this river basin plan focuses on implementation opportunities, with particular emphasis on funding sources. As with all plans, it takes committed people and funding for goals to come to fruition.

8.0 *IMPLEMENTATION*

Implementation of this Basin Management Plan for the Alabama River requires funding, time, motivated people, and eventually, a hard look at the plan so that it can be updated and revised. The process of creating this plan began with an assessment of current conditions. Information and data from the assessment phase was used to develop management measures to address key basin issues. Implementation will occur when the appropriate financial and human resources are targeted and specific management actions are taken. After implementation begins, monitoring and evaluation of the outcomes (positive or negative) will mark the beginning of another round of assessment. The assessment leads to plan changes and consequently, changes to implementation, and so on.



Continuing Planning Process for Basin Management

This iterative process of **ASSESSMENT – PLANNING – IMPLEMENTATION** is characteristic of the continuous *planning process* that constitutes basin management planning. This basin management plan is not an end, it is more of a beginning. The plan should be revisited annually to check progress according to the plan's milestones.

The progress of plan implementation is evaluated by monitoring the performance of management measures. Performance is measured by tracking the appropriate indicator or outcome of the specific action. These performance indicators or measures, as set forth in the previous section, are the benchmarks for plan progress. Through regular monitoring a determination can be made if certain plan strategies need to be altered, abandoned, or continued. This dynamic approach is referred to as 'adaptive management' because stakeholders (*i.e.*, agencies, watershed managers, farmers, general public) adapt our management activities based on what we learn from evaluating past actions.

There are several strategies to implement this basin management plan. These ‘next steps’ are discussed below and are followed by references to funding options to support implementation.

8.1 Strategic Next Steps for Basin Management Plan Implementation

- ***Adopt and distribute the Alabama River Basin Management Plan.*** The basin management plan should be used as an outreach and education tool, becoming the central planning and implementation document for the basin.

- ***Expand stakeholder involvement in the sub-basins and Alabama-Tombigbee Steering Committee.*** These steps may help the ACWP and the Alabama-Tombigbee Steering Committee increase the number of its participants over time.
    - Plan stakeholder meetings based on the convenience of the target participants. Consider these following factors: Time of day vs. schedule of target audience; travel time/distance to meeting.
    - Avoid the “just another meeting” syndrome by building meetings around a provocative program including special speakers/presentations, actual work assignments, etc. Always meet with a purpose! Provide refreshments.
    - Work with stakeholders to establish the most effective meeting frequency.
    - Find local sponsorship of the meetings. Are their local businesses or organizations that have a strong and/or influential following in the community that will attract a crowd?
    - Instead of forming a new group, try to fit a watershed sub-group or standing agenda item into an existing business, social or faith-based group. Unless there is a groundswell of activity, then it will be difficult to sustain a group on a singular “watershed” based agenda.
    - Coordinate the distribution of information through the regional or state headquarters of the many organizations that send representatives to the sub-basin meetings. Quarterly meetings focusing on grassroots issues and implementation could occur in Montgomery or other central population centers. Organizational representatives may be charged with the distribution of information, documents, etc.

- ***Focus state and federal grant funding on targeted sub-watersheds.*** This plan sets priorities for action in that the modeling provides a scientific basis to direct management activities.

- ***Increase the number of water quality monitoring sites throughout the Basin.*** The most effective way to get people involved in managing the basin *and* in collecting much-needed water quality data is to encourage involvement inAlabama Water Watch. Additional state and federal governmental resources for staff to expand existing monitoring is also imperative. Lastly, when private landowners can play a role, they, too, should be asked to participate in assessing local waters. The Category 2 and 3 waters shall be the top priority for these efforts.

- ***Teach the Watershed Language***. The value of educating people about water quality issues and watershed protection is beyond limit. At some point in the learning process people realize that they play a part in the management process. Water Festivals, television-based watershed education ("Storm Team Reports"), and classroom programs are necessary parts of a comprehensive watershed education campaign.

- ***Focus conservation and restoration efforts on threatened and endangered aquatic ecosystems.*** This Plan was written to be consistent with the goals and objectives of the *Recovery Plan for the Mobile River Basin Aquatic Ecosystem*. There are several stream segments delineated in the Basin that harbor imperiled species. These segments are priorities for protection.

8.2 Sources of Funding

Without financial resources, many of the recommendations in this plan can not be implemented. On the following pages a summary table (see Table 39) of funding options is provided that will serve as reference to move this plan forward. Many of these sources are already at work in the basin. Several others will require further research and coordination on behalf of the ACWP to obtain these funds and direct them to plan implementation.

Table 39. Watershed Management Funding Organizations and Opportunities; adapted from: CH2MHILL (2005)

Funding Source	Program Description	Match Requirement	Eligibility	Contact Information
Federal				
Section 319	Clean Water Act non-point source implementation competitive grant program funding; education and outreach, technical assistance, BMP demonstration projects, water quality monitoring, and watershed protection projects.	40% non-federal match	Phase I and II permitted areas and confined animal feeding operations generally not eligible.	www.adem.state.al.us
Hazard Mitigation Grant Program	Provides financial assistance to state and local governments for projects that reduce or eliminate the long-term risk to human life and property from the effects of natural hazards.	75% Federal 25% Local	State and Local Governments	Federal Emergency Management Agency (FEMA)
Tea3 Funds - Intermodel Surface Transportation Efficiency Act (ISTEA) and Transportation Equity ACT (TEA)	Provides funding for transportation enhancements including; wetland mitigation, highway runoff pollution control, and roadside landscaping.	80% Federal 20% Local	Local Governments, profit and non-profit entities, and colleges and universities	State DOT
Environmental Quality Incentive Program (EQIP)	Provides technical assistance, cost-sharing, financial incentives, and producer education related to soil, water, air, wildlife and other related natural resource concerns.	40% property owner cost share	Alabama ranchers and farmers	Local NRCS

Table 39 continued - Watershed Management Funding Organizations and Opportunities; adapted from: CH2MHILL (2005)				
Funding Source	Program Description	Match Requirement	Eligibility	Contact Information
Section 206 - Aquatic Ecosystem Restoration	Provides funding to improve, protect, and restore aquatic ecosystems including streambank restoration and planning and construction activities.	35% non-federal match	Local governments	http://www.sam.usace.army.mil
Community Development Block Grant Program (CDBG)	Provides funding to develop viable affordable communities. Eligible activities include; construction or reconstruction of water and sewer facilities, management infrastructure development or improvement, public works improvement, property acquisition, or to support feasibility studies related to development.	Match Required	Local governments in non-entitlement areas	ADECA Office of Community Services 334-242-5100
Direct Federal Funding	Supports projects with national significance.	NA	Open	State Representative or Senator
Direct State Funding	Supports projects with state significance.	NA	Open	Local Representative
Grant Programs				
National Fish and Wildlife Foundation (NFWF)	Awards challenge grants for natural resource conservation projects.			http://www.nfwf.org.
Southern Rivers Conservation Initiative	Provides funding to restore and enhance habitat in southern states, including; stream restoration, freshwater mussel conservation, and management of imperiled fishes. Projects must demonstrate a community-based approach, benefit water quality, and involve specific on-the-ground activities.			http://www.nfwf.org/programs/grant_apply.htm.

Table 39 continued - Watershed Management Funding Organizations and Opportunities; adapted from: CH2MHILL (2005)

Funding Source	Program Description	Match Requirement	Eligibility	Contact Information
Flood Hazard Mitigation and Riverine Ecosystem Restoration Program	Also known as Challenge 21, this program focuses on identifying sustainable solutions to flooding problems.			http://www.hq.usace.army.mil/cepa/pubs/cf-challenge21.htm.
Environmental Education Grants	Supports environmental education projects that enhance the public's awareness, knowledge, and skills to make informed decisions that affect environmental quality.			http://www.epa.gov/enviroed/grants.html
Watershed Protection and Flood Prevention Program	Program provides technical and financial assistance to address resource and related economic problems on a watershed basis.			Local NRCS
Water Quality Cooperative Agreements	Support the creation of unique and new approaches to meeting sanitary sewer, and combined sewer outflows, biosolids, and pretreatment requirements, as well as enhancing state capabilities.			http://www.epa.gov/owm/cwfinance/waterquality.htm.
Watershed Assistance Grants	Supports organizational development and capacity building for watershed partnerships with diverse membership.			http://cfpub.epa.gov/fedfund/program.cfm?prog_num=63.
Five-Star Restoration Program	Competitive projects will have a strong on-the-ground habitat restoration component that provides long-term ecological, educational, and/or socioeconomic benefits to the people and their community.			http://www.epa.gov/owow/wetlands/restore/5star.
U.S. Fish and Wildlife Service Cooperative Endangered Species Conservation Fund	Assists in the development of programs for the conservation of endangered and threatened species. There are four program areas; Conservation Grants, Habitat Conservation Planning Assistance Grants, Habitat Conservation Plan Land Acquisition Grants, and Recovery Land Acquisition Grants.		States and territories that have entered into cooperative agreements with the FWS	http://endangered.fws.gov/grants/section6/index.html.

Table 39 continued - Watershed Management Funding Organizations and Opportunities; adapted from: CH2MHILL (2005)				
Funding Source	Program Description	Match Requirement	Eligibility	Contact Information
Urban and Community Forestry Challenge Cost-share Grant Program	Grant awards are based on recommendations by The National Urban and Community Forestry Advisory Council.			http://www.treelink.org/nucfac/ccs_info.htm
Legacy, Inc., Partners in Environmental Education	Statewide organization that provides grants to support programs that aim to help educate people to become environmentally responsible citizens.	$10,000	No match required	http://www.legacyenved.org.
Private Foundation Grants and Awards	Private foundations are potential sources of funding to support watershed management activities. Many private foundations post grant guidelines on websites. Two online resources for researching sources of potential funding are provided in the contact information.			http://www.fdncenter.org http://www. foundations. org
Other				
Membership Drives	Membership drives can provide a stable source of income to support watershed management programs.			
Donations	Donations can be a major source of revenue for supporting watershed activities, and can be received in a variety of ways including: individual donations, family foundations, community foundations, corporations, federated funds, and church and civic groups.			
User Fees, Taxes, and Assessments	Taxes are used to fund activities that do not provide a specific benefit, but provide a more general benefit to the community; the user may not be able to avoid paying the tax. Assessments must show a benefit to the property owned by the user. There are various forms of taxes and assessments. It is important to note that, while taxes can create a solid funding base that can be used to fund annual capital and operating costs, there is often political pressure to keep taxes low and intensify competition for these resources.			

Table 39 continued – Watershed Management Funding Organizations and Opportunities; adapted from: CH2MHILL (2005)

Funding Source	Program Description	Match Requirement	Eligibility	Contact Information
Rates and Charges	Alabama law authorizes some public utilities to collect rates and charges for the services they provide. Because watershed management programs provide benefits to water and wastewater systems by protecting water supply sources and providing receiving water for wastewater effluent, water and wastewater utility systems often provide funding for watershed management programs.			
Miscellaneous Fees and Incentives	Fees and incentives are used in Alabama. For example, the Water Works and Sewer Board of the City of Gadsden, which is in the Coosa River Basin, charges a sewer surcharge fee for restaurants that do not have a grease trap. For those, that do have a grease trap, it must be pumped monthly or have a system installed that drips a bacteria feed to prevent grease build up. Therefore, to avoid the additional fee, the restaurant operators have an incentive to use BMPs for grease management.			
Impact Fees	Impact fees, which also are known as capital contribution or facilities fees or system development charges, among other names, typically are collected from developers or property owners at the time of building permit issuance to pay for capital improvements that provide capacity to serve new growth.			
Special Assessments	Special assessments are created for the specific purpose of financing capital improvements, such as provisions, to serve a specific area. Once the special assessment has been created, special assessment bonds can be issued, which are secured by liens on the properties benefited by the improvements.			
Sales Tax/Local Option Sales Tax	Local governments, both cities and counties, have the authority to add additional taxes. Local governments can use tax revenues to provide funding for a variety of projects and activities.			
Property Tax	These taxes generally support a significant portion of a county’s or municipality’s non- public enterprise activities. However, the revenues from property taxes also can be used for public enterprise projects, and to pay debt service on general obligation bonds issued to finance system improvements.			
Excise Taxes	These taxes require special legislation, and the funds generated through the tax are limited to specific uses. Examples include the lodging, food, and beverage tax, which generates funds for promotion of tourism; and the gas tax, which generates revenues for transportation–related activities.			

Table 39 continued – Watershed Management Funding Organizations and Opportunities; adapted from: CH2MHILL (2005)

Funding Source	Program Description	Match Requirement	Eligibility	Contact Information
Bonds and Loans	Bonds and loans can be used to finance capital improvements. These programs are appropriate for local governments and utilities that need to make improvements to improve and protect water resources. The cost of the improvements is borrowed through the issuance of bonds or a loan. Associated with the issuance of a bond or loan must be a source of funding for the payment of the resulting debt service on the loan or bonds.			
Investment Income	Some organizations have elected to establish their own foundations or endowment funds to provide long-term funding stability. Endowment funds can be established and managed by a single organization-specific foundation or an organization may elect to have a community foundation to hold and administer its endowment. With an endowment fund, the principal or actual cash raised is invested. The organization may elect to tap into the principal under certain established circumstances.			
Emerging Opportunities for Program Support				
Water Quality Trading	Trading allows regulated entities to purchase credits for pollutant reductions in the watershed or a specified part of the watershed to meet or exceed regulatory or voluntary goals. There are a number of variations for water quality credit trading frameworks. Credits can be traded, or bought and sold, between point sources only, between NPSs only, or between point sources and NPSs.			
PowerTree Carbon Company, LLC	Consortium of conservation groups and electric power generators in the southeast whose goal is to restore strategically located tracts of hardwood forests to increase carbon sequestration and other ecological functions. Power generators are credited for the carbon storage of the restored forests and conservation groups gain large tracts of protected forests which provide additional benefits such as; increased value for passive human use, wildlife habitat, maintenance of native species diversity, soil conservation and water quality buffering functions. Additional program and contact information is available online at: http://www.powertreecarboncompany.com			

Table 39 continued - Watershed Management Funding Organizations and Opportunities; adapted from: CH2MHILL (2005)				
Funding Source	Program Description	Match Requirement	Eligibility	Contact Information
Mitigation and Conservation Banking	Mitigation and Conservation banks are created by property owners who restore and/or preserve their land in its natural condition; such banks have been developed by public, nonprofit, and private entities. In exchange for preserving the land, the "bankers" get permission from ADEM, COE, or other appropriate state and federal agencies to sell mitigation banking credits to developers wanting to mitigate the impacts of proposed development. By purchasing the mitigation bank credits, the developer avoids having to mitigate the impacts of their development on site. Public and nonprofit mitigation banks may use the funds generated from the sale of the credits to fund the purchase of additional land for preservation and/or for the restoration of the lands to a natural state.			
Options Often Overlooked or Unnoticed				
Public and Private Partnerships	Having both public and private stakeholders at the table when pursuing funding for the implementation of management strategies is vital. Public entities have advantages associated with public financing, and the involvement of these entities can bring key decision-makers to the table. Private entities sometimes can contribute significant financial support, needed expertise, and voluntary labor.			
Redirection of Existing Programs and Funding	For priority projects, one way to fund programs is to change the priorities or focus of existing activities to help achieve the objectives of the watershed management plan. This could entail reducing funding for other activities and making such resources available to fund the watershed management program.			

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Appendix A – Sub-Watersheds (HUC 11) of the Alabama River

County	HUC	Sub-Watershed	County	HUC	Sub-Watershed
Autauga	0315-0201-150	Swift Creek	Lowndes	0315-0201-180	Upper Big Swamp Creek
	0315-0201-050	Autauga Creek		0315-0201-110	Lower Pintlalla Creek
	0315-0201-130	Noland Creek		0315-0203-030	Dry Cedar Creek
	0315-0201-160	Ivy Creek		0315-0201-140	Tallawessee Creek
	0315-0201-200	Little Mulberry Creek		0315-0201-170	Cypress Creek
	0315-0201-020	Mortar Creek		0315-0201-100	Upper Pinchoy Creek
	0315-0201-030	Mill Creek/Pine Creek	Marengo	0315-0203-180	Beaver Creek
	0315-0201-010	Calloway Creek	Monroe	0315-0204-070	Randons Creek
Baldwin	0315-0204-120	Pine Log Creek		0315-0204-050	Limestone Creek
Butler	0315-0203-020	Upper Cedar Creek		0315-0204-090	Wallers Creek
Chilton	0315-0201-200	Little Mulberry Creek		0315-0204-110	Little River
	0315-0201-220	Lower Mulberry Creek		0315-0204-060	Marshall Creek
	0315-0201-210	Upper Mulberry Creek		0315-0204-040	Lower Big Flat Creek
Clarke	0315-0204-100	Reedy Creek		0315-0204-020	Tallatchee Creek
	0315-0204-080	Pigeon Creek		0315-0204-030	Upper Big Flat Creek
	0315-0204-010	Silver Creek	Montgomery	0315-0201-080	Lower Catoma Creek
	0316-0203-110	Salt Creek		0315-0201-040	Galbraith Mill Creek
	0316-0203-140	Sand Hill Creek		0315-0201-070	Ramer Creek
Dallas	0315-0203-080	Upper Boguechitto Creek		0315-0201-060	Upper Catoma Creek
	0315-0203-090	Lower Boguechitto Creek		0315-0201-090	Upper Pintlalla Creek
	0315-0201-230	Soapstone Creek	Wilcox	0315-0203-150	Dannelly Reservoir
	0315-0203-100	Chilatchee Creek		0315-0203-180	Beaver Creek
	0315-0203-010	Big Swamp Creek		0315-0203-220	McCall Creek
	0315-0203-060	Rum Creek		0315-0203-110	Upper Pine Barren Creek
	0315-0203-050	Lower Cedar Creek		0315-0203-130	Lower Pine Barren Creek
	0315-0203-040	Mush Creek		0315-0203-190	Red Creek
	0315-0201-240	Bluegirth-Beech Creek		0315-0203-170	Dixon Creek
	0315-0201-250	Valley Creek		0315-0203-140	Foster Creek
	0315-0201-260	Beaver Dam Creek		0315-0203-210	Bear Creek
Escambia	0315-0204-110	Little River		0315-0203-120	Bear Creek
Lowndes	0315-0201-190	Lower Big Swamp Creek		0315-0203-160	Rockwest Creek
				0315-0203-200	Pursley Creek

Appendix B – Employment in the Counties of the Alabama River Basin, 2000 U.S. Census

	Industrial Sector							
County	**Agriculture, forestry, fishing and hunting, and mining**	**Construction**	**Manufacturing**	**Wholesale trade**	**Transportation and warehousing, and utilities**	**Information**	**Finance, insurance, real estate, and rental and leasing**	**Retail trade**
Autauga	441	1,442	3,157	815	920	365	1,251	2,461
Bullock	0	0	1	0	0	0	0	0
Butler	83	113	363	63	75	24	52	230
Chilton	223	860	1,114	248	471	175	429	849
Clarke	119	223	739	56	161	28	96	299
Dallas	290	817	3,375	328	654	171	484	1,616
Elmore	70	496	727	192	259	80	331	599
Escambia	37	56	163	18	44	22	27	97
Lowndes	239	509	861	204	217	63	169	399
Marengo	53	60	324	29	67	10	42	131
Monroe	335	498	2,577	330	582	99	218	1,007
Montgomery	446	3,484	5,526	2,222	2,776	1,895	5,338	7,874
Perry	46	61	269	22	42	3	30	82
Wilcox	262	273	683	143	255	34	121	452
Total	**2,785**	**9,571**	**20,707**	**4,924**	**6,863**	**3,112**	**8,972**	**16,994**

Appendix B – Employment in the Counties of the Alabama River Basin, 2000 U.S. Census (cont'd)

	Industrial Sector				
County	**Educational, health, and social studies**	**Arts, entertainment, recreation, accommodation and food services**	**Other services (except public administration)**	**Public administration**	**Professional, scientific, management, administrative, and waste management services**
Autauga	2,776	1,286	951	1,985	1,309
Bullock	0	0	0	0	0
Butler	253	105	80	98	45
Chilton	968	330	340	226	352
Clarke	467	93	115	82	89
Dallas	2,853	892	779	848	629
Elmore	841	292	274	478	363
Escambia	127	41	38	43	23
Lowndes	747	126	300	354	117
Marengo	218	54	51	41	39
Monroe	1,300	340	353	305	333
Montgomery	14,673	5,015	3,977	8,034	6,155
Perry	237	36	45	42	40
Wilcox	666	170	160	147	73
Total	**27,232**	**9,343**	**7,805**	**12,954**	**10,034**

Appendix C – Categorized Waters in the Alabama River Basin

Assessment Unit number	Name	From	To	Use Classification	Category
AL03150201-0203-102	Autauga Creek	Western boundary of Prattville	Its source	S/F&W	1
AL03150201-0407-100	Pintlalla Creek	Alabama River	Its source	S/F&W	1
AL03150201-1003-100	Mulberry Creek	Plantersville	Its source	F&W	1
AL03150201-1004-100	Buck Creek	Mulberry Creek	Its source	F&W	1
AL03150201-1102-101	Valley Creek	Alabama River	Selma-Summerfield Rd	S/F&W	1
AL03150201-1102-102	Valley Creek	Selma-Summerfield Road	Its source	F&W	1
AL03150201-1203-100	Soapstone Creek	Alabama River	Its source	F&W	1
AL03150203-0506-100	Pine Barren Creek	Alabama River	Its source	S/F&W	1
AL03150203-0604-200	Cub Creek	Beaver Creek	Its source	F&W	1
AL03150203-0801-100	Gravel Creek	Pursley Creek	Its source	F&W	1
AL03150203-0802-100	Pursley Creek	Alabama River	Its source	F&W	1
AL03150204-0104-100	Silver Creek	Alabama River	Its source	F&W	1
AL03150201-0103-100	Mortar Creek	Alabama River	Its source	F&W	2
AL03150201-0105-400	Pierce Creek	Mill Creek	Its source	F&W	2
AL03150201-0203-101	Autauga Creek	Alabama River	West of Prattville	F&W	2
AL03150201-0304-100	Catoma Creek	Ramer Creek	Its source	F&W	2
AL03150201-0603-100	Swift Creek	Alabama River	Its source	S/F&W	2
AL03150201-0706-100	Alabama River	Jones Bluff Lock and Dam	Pintlalla Creek	S/F&W	2
AL03150201-1002-300	Morgan Creek	Little Mulberry Creek	Its source	F&W	2
AL03150201-1005-100	Mulberry Creek	Alabama River	Plantersville	S/F&W	2
AL03150203-0308-100	Bogue Chitto Creek	Alabama River	Its source	F&W	2
AL03150203-0402-200	Chilatchee Creek	Alabama River	Its source	S/F&W	2
AL03150203-0604-100	Beaver Creek	Alabama River	Its source	F&W	2
AL03150204-0404-100	Randons Creek	Alabama River	Its source	F&W	2
AL03150204-0404-300	Bear Creek	Randons Creek	Its source	F&W	2
AL03150204-0603-100	Little River	Alabama River	Its source	S/F&W	2
AL03150201-0101-100	Callaway Creek	Alabama River	Its source	F&W	3
AL03150201-0101-200	Hurricane Branch	Callaway Creek	Its source	F&W	3
AL03150201-0102-200	South Mortar Creek	Mortar Creek	Its source	F&W	3
AL03150201-0103-200	Cottonford Creek	Mortar Creek	Its source	F&W	3
AL03150201-0103-300	Middle Creek	Cottonford Creek	Its source	F&W	3
AL03150201-0103-400	Kenner Creek	Cottonford Creek	Its source	F&W	3
AL03150201-0103-500	Pine Level Branch	Kenner Creek	Its source	F&W	3
AL03150201-0104-100	Galbraith Mill Creek	Alabama River	Its source	F&W	3

Appendix C *continued* – Categorized Waters in the Alabama River Basin

Assessment Unit number	Name	From	To	Use Classification	Category
AL03150201-0104-200	Sevenmile Creek	Galbraith Mill Creek	Its source	F&W	3
AL03150201-0104-301	Three Mile Branch	Galbraith Mill Creek	Lower Wetumpka Road	F&W	3
AL03150201-0105-100	Mill Creek	Crescent Lake	Its source	F&W	3
AL03150201-0105-200	Still Creek	Mill Creek	Its source	F&W	3
AL03150201-0105-300	Mill Creek/Pine Creek	Mill Creek	Its source	F&W	3
AL03150201-0105-500	Grandview Branch	Still Creek	Its source	F&W	3
AL03150201-0501-100	Alabama River	Pintlalla Creek	Its source	F&W	3
AL03150201-1207-101	Alabama River	Cahaba River	Blackwell Bend (Six Mile Creek)	S/F&W	3
AL03150201-1207-102	Alabama River	Blackwell Bend (Six Mile Creek)	Jones Bluff Lock and Dam	F&W	3
AL03150203-0301-200	Sand Creek	Bogue Chitto Creek	Its source	F&W	3
AL03150203-0601-100	Turkey Creek	Beaver Creek	Its source	F&W	3
AL03150203-0701-100	Alabama River	Millers Ferry Lock and Dam	Cahaba River	S/F&W	3
AL03150203-0703-102	Alabama River	Rockwest Creek	Millers Ferry Lock and Dam	PWS	3
AL03150203-0703-200	Rockwest Creek	Alabama River	Its source	F&W	3
AL03150204-0105-100	Alabama River	Claiborne Lock and Dam	Bear Creek	S/F&W	3
AL03150204-0205-200	Big Flat Creek	Alabama River	Its source	S/F&W	3
AL03150204-0303-100	Limestone Creek	Alabama River	Its source	F&W	3
AL03150204-0701-100	Alabama River	Mobile River	Claiborne Lock and Dam	F&W	3
AL03150201-0104-302	Three Mile Branch	Lower Wetumpka Road	Its source	F&W	5
AL03150201-0309-101	Catoma Creek	Alabama River	Ramer Creek	F&W	5
AL03150203-0703-101	Alabama River	Beaver Creek	Rockwest Creek	F&W	5
AL03150203-0805-102	Alabama River	Bear Creek	Frisco Railroad Crossing	S/F&W	5
AL03150203-0805-103	Alabama River	Frisco Railroad Crossing	Pursley Creek	F&W	5
AL03150203-0805-104	Alabama River	Pursley Creek	River Mile 131	F&W	5
AL03150203-0805-105	Alabama River	River Mile 131	Beaver Creek	PWS	5

Appendix D. Potential for nonpoint source pollution impairment of streams in the Alabama River Basin. Only rural land use sources of nonpoint pollution are considered here

			Rural Land Use Impairment Sources						
Subwatershed	**HUC Code**	**Overall Potential NPS Impairment**	**Animal Husbandry**	**Aquaculture**	**Row Crops**	**Pasture Runoff**	**Mining**	**Forestry Practices**	**Sedimentation**
Upper Alabama River Basin:									
Callaway Creek	3150201010	L	L	L	M	M	L	---	L
Mortar Creek	3150201020	M	L	L	M	L	L	M	L
Mill Creek / Pine Creek	3150201030	**H**	L	L	M	M	M	L	**H**
Galbraith Mill Creek	3150201040	**H**	L	L	M	L	H	L	M
Autauga Creek	3150201050	L	L	L	L	L	L	M	L
Upper Catoma Creek	3150201060	M	M	L	L	**H**	L	L	L
Ramer Creek	3150201070	M	M	L	L	**H**	L	L	L
Lower Catoma Creek	3150201080	M	L	L	L	M	M	L	L
Upper Pintlalla Creek	3150201090	M	M	L	L	**H**	L	L	L
Pinchony Creek	3150201100	M	M	L	L	M	L	M	L
Lower Pintlalla Creek	3150201110	M	M	L	L	**H**	L	L	L
Alabama River	3150201120								
Noland Creek	3150201130	M	L	L	M	M	L	M	L
Tallawassee Creek	3150201140	**H**	L	L	M	M	L	M	M
Swift Creek	3150201150	M	L	L	M	L	L	M	L
Ivy Creek	3150201160	M	L	L	M	M	L	M	L
Cypress Creek	3150201170	**H**	L	L	**H**	M	L	M	L
Upper Big Swamp Creek	3150201180	M	L	L	L	M	L	H	L
Lower Big Swamp Creek	3150201190	**H**	M	L	L	**H**	L	M	L
Little Mulberry Creek	3150201200	M	M	L	M	L	L	M	L
Upper Mulberry Creek	3150201210	L	L	L	L	L	L	L	L
Lower Mulberry Creek	3150201220	L	L	L	L	L	L	M	L
Soapstone Creek	3150201230	M	L	L	**H**	M	L	L	L
Bluegirth Beech Creek	3150201240	M	L	L	L	M	M	L	L
Valley Creek	3150201250	L	L	L	L	L	L	M	L
Beaver Dam Branch	3150201260	M	L	L	M	M	L	L	M

Appendix D Potential for nonpoint source pollution impairment of streams in the Alabama River Basin. Only rural land use sources of nonpoint pollution are considered here. (cont'd)

			Rural Land Use Impairment Sources						
Subwatershed	**HUC Code**	**Overall Potential NPS Impairment**	**Animal Husbandry**	**Aquaculture**	**Row Crops**	**Pasture Runoff**	**Mining**	**Forestry Practices**	**Sedimentation**
Middle Alabama River Basin:									
Big Swamp Creek	3150203010	M	L	L	M	L	L	M	L
Upper Cedar Creek	3150203020	L	L	L	L	L	L	M	L
Dry Cedar Creek	3150203030	M	L	L	L	M	L	**H**	L
Mush Creek	3150203040	**H**	L	M	**H**	M	L	M	L
Lower Cedar Creek	3150203050	M	L	L	**H**	M	L	L	L
Rum Creek	3150203060	L	L	L	L	L	L	M	L
Alabama River	3150203070	M	L	L	M	M	L	L	L
Upper Boguechitto Creek	3150203080	**H**	L	**H**	**H**	M	L	L	L
Lower Boguechitto Creek	3150203090	**H**	M	M	**H**	**H**	L	L	L
Chilatchee Creek	3150203100	**H**	L	**H**	M	M	L	L	L
Upper Pine Barren Creek	3150203110	L	L	L	L	L	L	L	L
Bear Creek	3150203120	L	L	L	L	L	L	M	L
Lower Pine Barren Creek	3150203130	L	L	L	L	M	L	L	L
Foster Creek	3150203140	L	L	L	L	M	L	L	L
Alabama River-Dannelly Reservoir	3150203150	L	L	L	L	M	L	L	L
Rockwest Creek	3150203160	L	L	L	L	M	L	L	L
Dixon Creek	3150203170	L	L	L	L	L	L	L	L
Beaver Creek	3150203180	L	L	L	L	L	L	L	L
Red Creek	3150203190	L	L	L	L	L	L	L	L
Pursley Creek	3150203200	L	L	L	L	L	L	L	L
Bear Creek	3150203210	L	L	L	L	L	L	L	L
McCall Creek	3150203220	L	L	L	M	L	L	L	L

Appendix D Potential for nonpoint source pollution impairment of streams in the Alabama River Basin. Only rural land use sources of nonpoint pollution are considered here. (cont'd)

			Rural Land Use Impairment Sources							
Subwatershed	**HUC Code**	**Overall Potential NPS Impairment**	**Animal Husbandry**	**Aquaculture**	**Row Crops**	**Pasture Runoff**	**Mining**	**Forestry Practices**	**Sedimentation**
Lower Alabama River Basin:									
Silver Creek	3150204010	L	L	L	L	L	L	M	L
Tallatchee Creek	3150204020	L	L	L	L	L	L	M	L
Upper Big Flat Creek	3150204030	L	L	L	L	L	L	M	L
Lower Big Flat Creek	3150204040	L	L	L	L	L	L	M	L
Limestone Creek	3150204050	L	L	L	L	L	L	M	L
Marshall Creek	3150204060	M	L	L	L	L	M	M	L
Randons Creek	3150204070	M	L	L	**H**	L	L	M	L
Pigeon Creek	3150204080	M	L	L	M	L	L	M	L
Wallers Creek	3150204090	M	L	L	M	L	L	M	L
Reedy Creek	3150204100	M	L	L	L	L	L	**H**	L
Little River	3150204110	M	L	L	M	L	L	M	L
Pine Log Creek	3150204120	M	L	L	L	L	L	**H**	L
Alabama River	3150204130	L	L	L	L	L	L	M	L

Appendix E. Table 1 - Resource concerns related to agricultural land use practices in the Alabama River Basin.

Subwatershed	Excessive Erosion on Cropland	Gully Erosion on Agricultural Land	Poor Soil Condition on Cropland	Excessive Animal Waste Applied to Land	Excessive Sediment from Cropland	Inadequate Management of Animal Wastes	Livestock are Overgrazing Pastures	Livestock Commonly Have Access to Streams
Upper Alabama River Basin:								
Callaway Creek								X
Mortar Creek			X					X
Mill Creek / Pine Creek			X					X
Galbraith Mill Creek							X	X
Autauga Creek								
Upper Catoma Creek							X	X
Ramer Creek							X	X
Lower Catoma Creek							X	X
Upper Pintlalla Creek	X	X	X				X	X
Pinchony Creek		X	X				X	X
Lower Pintlalla Creek	X	X	X		X		X	X
Alabama River								
Noland Creek								
Tallawassee Creek		X	X				X	X
Swift Creek	X	X	X		X			X
Ivy Creek	X	X	X		X			
Cypress Creek		X	X				X	X
Upper Big Swamp Creek		X	X				X	X
Lower Big Swamp Creek		X	X				X	
Little Mulberry Creek			X		X		X	X
Upper Mulberry Creek	X						X	X
Lower Mulberry Creek	X	X	X		X	X	X	X
Soapstone Creek								X
Bluegirth Beech Creek								X
Valley Creek								X
Beaver Dam Branch								

Appendix E - Table 1 - Resource concerns related to agricultural land use practices in the Alabama River Basin. (cont'd)

Subwatershed	Excessive Erosion on Cropland	Gully Erosion on Agricultural Land	Poor Soil Condition on Cropland	Excessive Animal Waste Applied to Land	Excessive Sediment from Cropland	Inadequate Management of Animal Wastes	Livestock are Overgrazing Pastures	Livestock Commonly Have Access to Streams
Middle Alabama River Basin:								
Big Swamp Creek								X
Upper Cedar Creek	X	X	X	X	X	X	X	X
Dry Cedar Creek		X	X				X	X
Mush Creek		X	X				X	X
Lower Cedar Creek								X
Rum Creek								
Alabama River								
Upper Boguechitto Creek	X	X					X	X
Lower Boguechitto Creek		X						X
Chilatchee Creek	X						X	X
Upper Pine Barren Creek	X	X		X	X	X	X	X
Bear Creek							X	X
Lower Pine Barren Creek							X	X
Foster Creek							X	X
Alabama River-Dannelly Reservoir							X	X
Rockwest Creek							X	X
Dixon Creek							X	X
Beaver Creek							X	X
Red Creek							X	X
Pursley Creek							X	X
Bear Creek							X	X
McCall Creek							X	X

Appendix E - Table 1 - Resource concerns related to agricultural land use practices in the Alabama River Basin. (cont'd)

Subwatershed	Excessive Erosion on Cropland	Gully Erosion on Agricultural Land	Poor Soil Condition on Cropland	Excessive Animal Waste Applied to Land	Excessive Sediment from Cropland	Inadequate Management of Animal Wastes	Livestock are Overgrazing Pastures	Livestock Commonly Have Access to Streams
Lower Alabama River Basin:								
Silver Creek							X	X
Tallatchee Creek							X	X
Upper Big Flat Creek							X	X
Lower Big Flat Creek					X			X
Limestone Creek								
Marshall Creek		X						X
Randons Creek								X
Pigeon Creek							X	X
Wallers Creek								X
Reedy Creek								
Little River	X				X			X
Pine Log Creek		X						
Alabama River		X						

[1] Source of information: ADEM (2002).

Appendix E - Table 2 - Resource concerns related to other land use practices in the Alabama River Basin.

Subwatershed	Road and Roadbank Erosion	Excessive Pesticides Applied to Land	Excessive Sediment from Roads and Roadbanks	Excessive Sediment From Urban Development	Nutrients in Surface Waters	Pesticides in Surface Waters	Bacteria and Other Organisms in Surface Waters	Low Dissolved Oxygen in Surface Waters
Upper Alabama River Basin:								
Callaway Creek				X				
Mortar Creek				X				
Mill Creek / Pine Creek			X	X	X			
Galbraith Mill Creek				X			X	
Autauga Creek				X	X			
Upper Catoma Creek							X	
Ramer Creek							X	
Lower Catoma Creek					X		X	X
Upper Pintlalla Creek	X		X	X			X	
Pinchony Creek	X		X				X	
Lower Pintlalla Creek	X		X					
Alabama River								
Noland Creek	X				X			
Tallawassee Creek	X		X					
Swift Creek	X		X		X		X	
Ivy Creek	X		X					
Cypress Creek	X		X					
Upper Big Swamp Creek	X		X					
Lower Big Swamp Creek	X		X					
Little Mulberry Creek	X		X		X			
Upper Mulberry Creek	X		X				X	
Lower Mulberry Creek	X		X		X		X	
Soapstone Creek	X						X	
Bluegirth Beech Creek	X						X	
Valley Creek	X						X	
Beaver Dam Branch							X	

Appendix E - Table 2 - Resource concerns related to other land use practices in the Alabama River Basin. (cont'd)

Subwatershed	Road and Roadbank Erosion	Excessive Pesticides Applied to Land	Excessive Sediment from Roads and Roadbanks	Excessive Sediment From Urban Development	Nutrients in Surface Waters	Pesticides in Surface Waters	Bacteria and Other Organisms in Surface Waters	Low Dissolved Oxygen in Surface Waters
Middle Alabama River Basin:								
Big Swamp Creek	X						X	
Upper Cedar Creek	X		X	X			X	
Dry Cedar Creek	X		X				X	
Mush Creek	X	X	X		X	X	X	
Lower Cedar Creek	X						X	
Rum Creek	X						X	
Alabama River							X	
Upper Boguechitto Creek	X		X				X	
Lower Boguechitto Creek	X				X		X	
Chilatchee Creek	X		X				X	
Upper Pine Barren Creek	X		X					
Bear Creek	X		X					
Lower Pine Barren Creek	X		X				X	
Foster Creek	X		X					
Alabama River-Dannelly Reservoir	X		X					
Rockwest Creek	X		X					
Dixon Creek	X		X					
Beaver Creek	X		X					
Red Creek	X		X					
Pursley Creek	X		X					
Bear Creek	X		X					
McCall Creek	X		X					

Appendix E - Table 2 - Resource concerns related to other land use practices in the Alabama River Basin. (cont'd)

Subwatershed	Road and Roadbank Erosion	Excessive Pesticides Applied to Land	Excessive Sediment from Roads and Roadbanks	Excessive Sediment From Urban Development	Nutrients in Surface Waters	Pesticides in Surface Waters	Bacteria and Other Organisms in Surface Waters	Low Dissolved Oxygen in Surface Waters
Lower Alabama River Basin:								
Silver Creek	X		X					
Tallatchee Creek	X		X					
Upper Big Flat Creek	X		X					
Lower Big Flat Creek			X					
Limestone Creek	X		X	X				
Marshall Creek			X					
Randons Creek	X	X	X					
Pigeon Creek	X							
Wallers Creek	X		X					
Reedy Creek								
Little River	X		X		X	X		
Pine Log Creek	X		X		X			
Alabama River					X		X	

[1] Source of information: ADEM (2002).

APPENDIX F - Sediment Loading Estimates for Subwatersheds in the Alabama River Basin

Table 1. Sediment loads from subwatersheds in the Alabama River Basin. Percentages reflect the proportion of a particular sediment load source to the total sediment load for a subwatershed. Source of data is ADEM (2002).

Subwatershed	Total Sediment Load	Total Watershed Area	Sediment Loads (tons per year)																	
			Cropland		Sand and Gravel Pits		Mined Land		Developing Urban Land		Critical Areas		Gullies		Stream Banks		Dirt Roads and Roadbanks		Woodlands	
Upper Alabama River Basin:																				
Callaway Creek	58,000	22,539	14,044	24.2%	0	0.0%	0	0.0%	36,000	62.1%	0	0.0%	0	0.0%	118	0.2%	135	0.2%	7,703	13.3%
Mortar Creek	159,335	51,374	26,187	16.4%	43,750	27.5%	0	0.0%	36,861	23.1%	5,250	3.3%	14,700	9.2%	10,072	6.3%	15,051	9.4%	7,464	4.7%
Hudson Creek	1,029,966	46,076	17,200	1.7%	35,000	3.4%	0	0.0%	938,160	91.1%	12,000	1.2%	9,800	1.0%	6,042	0.6%	5,432	0.5%	6,332	0.6%
Galbraith Mill Creek	257,900	45,980	3,600	`	210,000	81.4%	0	0.0%	40,000	15.5%	1,500	0.6%	2,800	1.1%	0	0.0%	0	0.0%	0	0.0%
Autauga Creek	104,256	75,002	16,596	15.9%	17,500	16.8%	0	0.0%	4,800	4.6%	2,250	2.2%	14,700	14.1%	5,000	4.8%	25,410	24.4%	18,000	17.3%
Upper Catoma Creek	74,807	114,605	9,000	12.0%	0	0.0%	0	0.0%	16,000	21.4%	30,000	40.1%	7,000	9.4%	3,094	4.1%	6,790	9.1%	2,922	3.9%
Ramer Creek	6,926	52,868	582	8.4%	0	0.0%	0	0.0%	1,586	22.9%	1,586	22.9%	0	0.0%	1,057	15.3%	1,057	15.3%	1,057	15.3%
Lower Catoma Creek	147,312	62,496	1,562	1.1%	98,000	66.5%	0	0.0%	32,000	21.7%	12,000	8.1%	0	0.0%	1,875	1.3%	0	0.0%	1,875	1.3%
Upper Pintlalla Creek	68,140	55,511	555	0.8%	0	0.0%	0	0.0%	555	0.8%	47,550	69.8%	13,390	19.7%	555	0.8%	4,980	7.3%	555	0.8%
Pinchony Creek	155,142	58,030	1,190	0.8%	870	0.6%	30,000	19.3%	928	0.6%	70,275	45.3%	32,484	20.9%	6,600	4.3%	4,800	3.1%	7,994	5.2%
Lower Pintlalla Creek	181,617	58,456	12,240	6.7%	0	0.0%	0	0.0%	6,820	3.8%	87,500	48.2%	44,100	24.3%	18,400	10.1%	9,030	5.0%	3,527	1.9%
Alabama River																				
Noland Creek	73,809	41,116	15,768	21.4%	3,500	4.7%	0	0.0%	9,000	12.2%	1,974	2.7%	9,800	13.3%	1,974	2.7%	13,794	18.7%	18,000	24.4%
Tallawessee Creek	293,056	34,696	9,816	3.3%	140,000	47.8%	0	0.0%	173	0.1%	41,850	14.3%	27,440	9.4%	8,400	2.9%	60,000	20.5%	5,377	1.8%
Swift Creek	124,237	103,232	33,636	27.1%	17,500	14.1%	0	0.0%	2,890	2.3%	2,890	2.3%	16,170	13.0%	6,000	4.8%	29,850	24.0%	15,300	12.3%
Ivy Creek	62,238	44,448	18,216	29.3%	3,500	5.6%	0	0.0%	0	0.0%	222	0.4%	14,700	23.6%	4,000	6.4%	14,850	23.9%	6,750	10.8%
Cypress Creek	104,101	28,780	28,050	26.9%	7,000	6.7%	0	0.0%	576	0.6%	32,175	30.9%	21,070	20.2%	4,500	4.3%	8,100	7.8%	2,630	2.5%
Upper Big Swamp Creek	210,832	83,174	1,663	0.8%	0	0.0%	0	0.0%	1,663	0.8%	91,800	43.5%	59,780	28.4%	21,750	10.3%	17,100	8.1%	17,075	8.1%
Lower Big Swamp Creek	323,912	107,000	18,000	5.6%	8,750	2.7%	0	0.0%	535	0.2%	151,575	46.8%	98,980	30.6%	21,750	6.7%	10,800	3.3%	13,522	4.2%
Little Mulberry Creek	134,147	88,322	36,453	27.2%	10,500	7.8%	0	0.0%	2,650	2.0%	2,650	2.0%	24,500	18.3%	12,500	9.3%	16,995	12.7%	27,900	20.8%
Upper Mulberry Creek	109,099	69,961	10,652	9.8%	19,500	17.9%	0	0.0%	1,574	1.4%	7,125	6.5%	10,780	9.9%	12,100	11.1%	30,000	27.5%	17,368	15.9%
Lower Mulberry Creek	152,190	107,593	21,616	14.2%	38,500	25.3%	0	0.0%	3,066	2.0%	3,066	2.0%	16,100	10.6%	12,625	8.3%	34,980	23.0%	22,236	14.6%
Soapstone Creek	128,576	76,652	55,190	42.9%	35,000	27.2%	0	0.0%	0	0.0%	10,000	7.8%	1,418	1.1%	6,000	4.7%	12,000	9.3%	8,968	7.0%
Bluegirth Beech Creek	164,270	46,852	890	0.5%	70,000	42.6%	0	0.0%	30,000	18.3%	0	0.0%	49,000	29.8%	890	0.5%	5,760	3.5%	7,730	4.7%
Valley Creek	35,848	42,316	3,809	10.6%	0	0.0%	0	0.0%	6,000	16.7%	2,500	7.0%	2,800	7.8%	360	1.0%	12,000	33.5%	8,379	23.4%
Beaver Dam Branch	38,350	7,562	2,268	5.9%	17,500	45.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	15,440	40.3%	2,280	5.9%	862	2.2%
Middle Alabama River Basin:																				
Big Swamp Creek	40,786	35,624	14,962	36.7%	8,750	21.5%	0	0.0%	0	0.0%	392	1.0%	0	0.0%	427	1.0%	9,309	22.8%	6,946	17.0%
Upper Cedar Creek	157,028	137,596	1,376	0.9%	963	0.6%	0	0.0%	1,376	0.9%	15,850	10.1%	33,705	21.5%	21,316	13.6%	35,670	22.7%	46,772	29.8%
Dry Cedar Creek	170,052	82,221	2,056	1.2%	0	0.0%	0	0.0%	0	0.0%	73,225	43.1%	48,685	28.6%	13,716	8.1%	13,620	8.0%	18,750	11.0%
Mush Creek	87,383	38,563	19,334	`	21,000	24.0%	0	0.0%	0	0.0%	14,125	16.2%	13,475	15.4%	2,613	3.0%	10,860	12.4%	5,976	6.8%
Lower Cedar Creek	59,801	46,844	29,511	49.3%	17,500	29.3%	0	0.0%	0	0.0%	1,921	3.2%	0	0.0%	3,000	5.0%	1,405	2.3%	6,464	10.8%
Rum Creek	63,147	36,574	914	1.4%	35,000	55.4%	0	0.0%	0	0.0%	695	1.1%	4,900	7.8%	622	1.0%	11,580	18.3%	9,436	14.9%
Alabama River	10,987	13,974	1,006	9.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	182	1.7%	7,200	65.5%	2,599	23.7%
Upper Boguechitto Creek	266,787	156,032	156,765	58.8%	0	0.0%	0	0.0%	38,977	14.6%	15,000	5.6%	9,450	3.5%	11,043	4.1%	26,190	9.8%	9,362	3.5%
Lower Boguechitto Creek	88,051	69,759	48,552	55.1%	0	0.0%	0	0.0%	0	0.0%	4,000	4.5%	17,500	19.9%	767	0.9%	12,000	13.6%	5,232	5.9%

Table 1. Sediment loads from subwatersheds in the Alabama River Basin. Percentages reflect the proportion of a particular sediment load source to the total sediment load for a subwatershed. Source of data is ADEM (2002).

Subwatershed	Total Sediment Load	Total Watershed Area	Sediment Loads (tons per year)																	
			Cropland		Sand and Gravel Pits		Mined Land		Developing Urban Land		Critical Areas		Gullies		Stream Banks		Dirt Roads and Roadbanks		Woodlands	
Chilatchee Creek	111,981	98,353	33,761	30.1%	0	0.0%	0	0.0%	6,214	5.5%	17,800	15.9%	8,260	7.4%	3,934	3.5%	23,700	21.2%	18,312	16.4%
Upper Pine Barren Creek	88,612	104,598	7,320	8.3%	418	0.5%	0	0.0%	0	0.0%	6,625	7.5%	20,650	23.3%	7,612	8.6%	22,620	25.5%	23,367	26.4%
Bear Creek	23,600	49,433	494	2.1%	0	0.0%	0	0.0%	0	0.0%	247	1.0%	692	2.9%	395	1.7%	10,350	43.9%	11,421	48.4%
Lower Pine Barren Creek	60,403	82,354	906	1.5%	0	0.0%	0	0.0%	0	0.0%	8,800	14.6%	7,035	11.6%	400	0.7%	22,860	37.8%	20,402	33.8%
Foster Creek	26,369	36,602	293	1.1%	0	0.0%	0	0.0%	0	0.0%	3,660	13.9%	2,590	9.8%	37	0.1%	10,500	39.8%	9,290	35.2%
Alabama River-Dannelly Reservoir	12,581	24,291	170	1.4%	0	0.0%	0	0.0%	0	0.0%	2,430	19.3%	1,680	13.4%	120	1.0%	3,000	23.8%	5,181	41.2%
Rockwest Creek	23,220	35,955	36	0.2%	5,250	22.6%	0	0.0%	0	0.0%	3,600	15.5%	2,520	10.9%	36	0.2%	4,500	19.4%	7,278	31.3%
Dixon Creek	23,345	33,649	673	2.9%	0	0.0%	0	0.0%	0	0.0%	3,360	14.4%	2,380	10.2%	101	0.4%	7,500	32.1%	9,331	40.0%
Beaver Creek	283,790	139,383	669	0.2%	0	0.0%	0	0.0%	72,660	25.6%	13,765	4.9%	20,720	7.3%	10,552	3.7%	117,900	41.5%	47,524	16.7%
Red Creek	19,343	24,747	198	1.0%	0	0.0%	0	0.0%	0	0.0%	2,470	12.8%	1,750	9.0%	131	0.7%	8,250	42.7%	6,544	33.8%
Pursley Creek	43,035	67,866	794	1.8%	475	1.1%	0	0.0%	0	0.0%	6,790	15.8%	4,760	11.1%	679	1.6%	11,250	26.1%	18,287	42.5%
Bear Creek	45,904	54,843	0	0.0%	0	0.0%	0	0.0%	6,000	13.1%	5,700	12.4%	3,500	7.6%	121	0.3%	8,550	18.6%	22,033	48.0%
McCall Creek	48,651	44,251	5,657	11.6%	4,200	8.6%	0	0.0%	0	0.0%	4,430	9.1%	3,080	6.3%	89	0.2%	20,250	41.6%	10,945	22.5%
Lower Alabama River Basin:																				
Silver Creek	68,160	73,731	3,023	4.4%	737	1.1%	0	0.0%	0	0.0%	2,212	3.2%	18,340	26.9%	2,212	3.2%	9,780	14.3%	31,856	46.7%
Tallatchee Creek	18,799	54,261	3,943	21.0%	543	2.9%	0	0.0%	0	0.0%	1,085	5.8%	1,357	7.2%	2,170	11.5%	1,194	6.4%	8,507	45.3%
Upper Big Flat Creek	43,008	120,359	3,009	7.0%	1,204	2.8%	0	0.0%	0	0.0%	2,648	6.2%	3,009	7.0%	3,009	7.0%	10,320	24.0%	19,810	46.1%
Lower Big Flat Creek	22,362	74,253	4,800	21.5%	1,262	5.6%	0	0.0%	0	0.0%	1,522	6.8%	1,485	6.6%	1,485	6.6%	1,485	6.6%	10,322	46.2%
Limestone Creek	43,621	114,325	15,120	34.7%	2,287	5.2%	0	0.0%	2,287	5.2%	2,287	5.2%	2,344	5.4%	2,287	5.2%	2,287	5.2%	14,725	33.8%
Marshall Creek	11,983	20,573	1,099	9.2%	617	5.2%	4,320	36.1%	0	0.0%	617	5.2%	1,400	11.7%	638	5.3%	617	5.2%	2,675	22.3%
Randons Creek	51,109	60,763	35,237	68.9%	4,200	8.2%	0	0.0%	0	0.0%	486	1.0%	486	1.0%	486	1.0%	4,350	8.5%	5,864	11.5%
Pigeon Creek	142,137	71,902	25,325	17.8%	40,600	28.6%	0	0.0%	0	0.0%	19,350	13.6%	22,330	15.7%	144	0.1%	11,820	8.3%	22,568	15.9%
Wallers Creek	19,554	60,285	9,070	46.4%	603	3.1%	0	0.0%	0	0.0%	301	1.5%	603	3.1%	844	4.3%	301	1.5%	7,831	40.0%
Reedy Creek	48,495	56,773	369	0.8%	0	0.0%	0	0.0%	0	0.0%	7,800	16.1%	16,800	34.6%	284	0.6%	7,200	14.8%	16,042	33.1%
Little River	126,178	94,947	29,820	23.6%	42,000	33.3%	0	0.0%	2,374	1.9%	2,421	1.9%	8,750	6.9%	2,469	2.0%	19,290	15.3%	19,055	15.1%
Pine Log Creek	136,196	80,604	4,410	3.2%	2,015	1.5%	0	0.0%	2,015	1.5%	11,250	8.3%	26,250	19.3%	2,660	2.0%	41,250	30.3%	46,346	34.0%
Alabama River	21,114	12,528	263	1.2%	0	0.0%	0	0.0%	0	0.0%	4,875	23.1%	5,040	23.9%	251	1.2%	5,040	23.9%	5,645	26.7%

APPENDIX G - Loading and BMP Load Reduction Modeling Results for the Targeted Subwatersheds

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Filter Strips for Cropland: Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	3,270	0%	69,377	0%	18,950	0%	7,116	0%
		818	25%	57,524	17%	15,617	18%	5,960	16%
		1,635	50%	45,664	34%	12,282	35%	4,803	33%
		2,453	75%	33,811	51%	8,949	53%	3,647	49%
		3,270	100%	21,952	68%	5,614	70%	2,491	65%
Hudson Creek	**Elmore**	2,585	0%	51,264	0%	14,092	0%	5,426	0%
		646	25%	42,508	17%	11,616	18%	4,544	16%
		1,293	50%	33,759	34%	9,142	35%	3,663	32%
		1,939	75%	25,003	51%	6,667	53%	2,781	49%
		2,585	100%	16,247	68%	4,191	70%	1,899	65%
Galbraith Mill Creek	**Montgomery**	3,000	0%	50,874	0%	13,035	0%	3,604	0%
		750	25%	42,115	17%	10,702	18%	3,018	16%
		1,500	50%	33,356	34%	8,369	36%	2,432	33%
		2,250	75%	24,598	52%	6,036	54%	1,847	49%
		3,000	100%	15,839	69%	3,703	72%	1,261	65%
Tallawessee Creek	**Lowndes**	3,272	0%	74,914	0%	21,603	0%	9,826	0%
		818	25%	66,362	11%	18,403	15%	8,229	16%
		1,636	50%	52,823	29%	14,655	32%	6,632	33%
		2,454	75%	36,763	51%	10,359	52%	5,036	49%
		3,272	100%	24,046	68%	6,611	69%	3,439	65%
Cypress Creek	**Lowndes**	9,350	0%	210,106	0%	60,206	0%	26,838	0%
		2,338	25%	174,415	17%	49,745	17%	22,478	16%
		4,675	50%	138,716	34%	39,282	35%	18,116	33%
		7,013	75%	103,025	51%	28,821	52%	13,755	49%
		9,350	100%	67,326	68%	18,358	70%	9,393	65%
Lower Big Swamp Creek	**Lowndes**	6,000	0%	239,198	0%	55,693	0%	18,019	0%
		1,500	25%	198,059	17%	45,806	18%	15,091	16%
		3,000	50%	156,920	34%	35,918	36%	12,163	33%
		4,500	75%	115,781	52%	26,031	53%	9,235	49%
		6,000	100%	74,643	69%	16,143	71%	6,307	65%
Upper Catoma Creek	**Montgomery**	6,000	0%	208,060	0%	44,176	0%	9,022	0%
		1,500	25%	172,010	17%	36,171	18%	7,556	16%
		3,000	50%	135,960	35%	28,165	36%	6,090	33%
		4,500	75%	99,911	52%	20,160	54%	4,624	49%
		6,000	100%	63,861	69%	12,155	72%	3,158	65%
Ramer Creek	**Montgomery**	2,115	0%	67,214	0%	13,213	0%	1,266	0%
		529	25%	55,505	17%	10,775	18%	1,060	16%
		1,058	50%	43,795	35%	8,337	37%	854	32%
		1,586	75%	32,076	52%	5,897	55%	649	49%
		2,115	100%	20,367	70%	3,459	74%	443	65%
Lower Mulberry	**Autauga**	3,303	0%	75,598	0%	21,266	0%	8,913	0%
		826	25%	62,726	17%	17,554	17%	7,465	16%
		1,652	50%	49,855	34%	13,841	35%	6,017	32%
		2,477	75%	36,977	51%	10,127	52%	4,568	49%
		3,303	100%	24,105	68%	6,415	70%	3,120	65%
Lower Mulberry	**Chilton**	2,500	0%	56,329	0%	15,902	0%	6,746	0%
		625	25%	48,077	15%	13,347	16%	5,650	16%
		1,250	50%	37,153	34%	10,354	35%	4,554	33%
		1,875	75%	27,566	51%	7,580	52%	3,457	49%
		2,500	100%	17,978	68%	4,807	70%	2,361	65%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Filter Strips for Cropland: Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Lower Mulberry	Dallas	503	0%	10,531	0%	2,944	0%	1,207	0%
		126	25%	8,738	17%	2,430	17%	1,011	16%
		252	50%	6,945	34%	1,915	35%	815	32%
		377	75%	5,146	51%	1,399	52%	619	49%
		503	100%	3,353	68%	885	70%	423	65%
Soapstone Creek	Dallas	22,996	0%	481,128	0%	134,478	0%	55,096	0%
		5,749	25%	399,134	17%	110,960	17%	46,143	16%
		11,498	50%	317,141	34%	87,443	35%	37,190	33%
		17,247	75%	235,147	51%	63,925	52%	28,237	49%
		22,996	100%	153,154	68%	40,407	70%	19,284	65%
Valley Creek	Dallas	2,116	0%	39,954	0%	10,762	0%	3,814	0%
		529	25%	34,181	14%	9,036	16%	3,194	16%
		1,058	50%	26,275	34%	6,961	35%	2,574	33%
		1,587	75%	19,436	51%	5,061	53%	1,955	49%
		2,116	100%	12,596	68%	3,160	71%	1,335	65%
Lower Catoma Creek	Montgomery	1,500	0%	35,521	0%	8,502	0%	1,802	0%
		375	25%	30,506	14%	7,087	17%	1,509	16%
		750	50%	25,490	28%	5,673	33%	1,216	33%
		1,125	75%	20,474	42%	4,258	50%	924	49%
		1,500	100%	10,945	69%	2,347	72%	631	65%
Middle Alabama									
Mush Creek	Dallas	10,408	0%	188,505	0%	49,602	0%	15,795	0%
		2,602	25%	156,148	17%	40,788	18%	13,228	16%
		5,204	50%	123,792	34%	31,974	36%	10,662	33%
		7,806	75%	91,435	51%	23,160	53%	8,095	49%
		10,408	100%	59,079	69%	14,346	71%	5,528	65%
Mush Creek	Lowndes	200	0%	7,023	0%	1,490	0%	304	0%
		50	25%	5,806	17%	1,220	18%	254	16%
		100	50%	4,589	35%	950	36%	205	33%
		150	75%	3,372	52%	680	54%	156	49%
		200	100%	2,155	69%	410	72%	106	65%
Upper Boguechitto Creek	Dallas	26,951	0%	564,278	0%	157,761	0%	64,698	0%
		6,738	25%	468,119	17%	130,174	17%	54,185	16%
		13,476	50%	371,960	34%	102,587	35%	43,672	32%
		20,213	75%	275,794	51%	74,998	52%	33,158	49%
		26,951	100%	179,635	68%	47,411	70%	22,644	65%
Upper Boguechitto Creek	Perry	34,105	0%	746,465	0%	212,171	0%	92,106	0%
		8,526	25%	619,516	17%	175,225	17%	77,138	16%
		17,053	50%	492,574	34%	138,281	35%	62,172	32%
		25,579	75%	365,625	51%	101,336	52%	47,205	49%
		34,105	100%	238,676	68%	64,390	70%	32,237	65%
Lower Boguechitto Creek	Dallas	20,230	0%	423,560	0%	118,419	0%	48,564	0%
		5,058	25%	361,693	15%	99,402	16%	40,673	16%
		10,115	50%	279,199	34%	77,004	35%	32,781	33%
		15,173	75%	207,022	51%	56,297	52%	24,889	49%
		20,230	100%	134,838	68%	35,588	70%	16,997	65%
Chilatchee Creek	Dallas	1,087	0%	30,140	0%	7,814	0%	2,608	0%
		272	25%	25,799	14%	6,521	17%	2,184	16%
		544	50%	21,458	29%	5,227	33%	1,761	32%
		815	75%	17,106	43%	3,931	50%	1,336	49%
		1,087	100%	9,459	69%	2,275	71%	913	65%
Chilatchee Creek	Marengo	0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Filter Strips for Cropland: Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Chilatchee Creek	Perry	10,356	0%	236,553	0%	68,233	0%	31,058	0%
		2,589	25%	196,398	17%	56,396	17%	26,011	16%
		5,178	50%	156,244	34%	44,559	35%	20,964	33%
		7,767	75%	116,089	51%	32,722	52%	15,917	49%
		10,356	100%	75,935	68%	20,885	69%	10,870	65%
Chilatchee Creek	Wilcox	56	0%	1,005	0%	264	0%	84	0%
		14	25%	832	17%	217	18%	71	16%
		28	50%	660	34%	170	36%	57	33%
		42	75%	487	51%	123	53%	43	49%
		56	100%	315	69%	76	71%	29	65%
Lower Alabama									
Randons Creek	Monroe	19,576	0%	380,809	0%	101,962	0%	35,208	0%
		4,894	25%	315,576	17%	83,929	18%	29,487	16%
		9,788	50%	250,343	34%	65,895	35%	23,765	33%
		14,682	75%	185,109	51%	47,862	53%	18,044	49%
		19,576	100%	119,876	69%	29,828	71%	12,323	65%
Wallers Creek	Monroe	6,047	0%	108,382	0%	28,522	0%	9,088	0%
		1,512	25%	92,829	14%	23,955	16%	7,611	16%
		3,024	50%	71,178	34%	18,387	36%	6,134	32%
		4,535	75%	52,571	51%	13,318	53%	4,657	49%
		6,047	100%	33,969	69%	8,250	71%	3,181	65%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Reduced Tillage Systems for Cropland					
				Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	3,270	0%	69,377	0%	18,950	0%	7,116	0%
		818	25%	58,703	15%	16,162	15%	5,782	19%
		1,635	50%	48,021	31%	13,371	29%	4,448	38%
		2,453	75%	37,347	46%	10,583	44%	3,114	56%
		3,270	100%	26,665	62%	7,792	59%	1,779	75%
Hudson Creek	**Elmore**	2,585	0%	51,264	0%	14,092	0%	5,426	0%
		646	25%	43,345	15%	12,005	15%	4,409	19%
		1,293	50%	35,434	31%	9,920	30%	3,392	37%
		1,939	75%	27,515	46%	7,832	44%	2,374	56%
		2,585	100%	19,596	62%	5,745	59%	1,357	75%
Galbraith Mill Creek	**Montgomery**	3,000	0%	50,874	0%	13,035	0%	3,604	0%
		750	25%	43,302	15%	11,236	14%	2,928	19%
		1,500	50%	35,731	30%	9,437	28%	2,252	38%
		2,250	75%	28,159	45%	7,637	41%	1,577	56%
		3,000	100%	20,587	60%	5,838	55%	901	75%
Tallawessee Creek	**Lowndes**	3,272	0%	74,914	0%	21,603	0%	9,826	0%
		818	25%	69,288	8%	19,471	10%	7,983	19%
		1,636	50%	56,182	25%	16,132	25%	6,141	38%
		2,454	75%	39,296	48%	11,589	46%	4,299	56%
		3,272	100%	27,423	63%	8,250	62%	2,456	75%
Cypress Creek	**Lowndes**	9,350	0%	210,106	0%	60,206	0%	26,838	0%
		2,338	25%	176,927	16%	50,954	15%	21,806	19%
		4,675	50%	143,739	32%	41,700	31%	16,774	38%
		7,013	75%	110,559	47%	32,448	46%	11,742	56%
		9,350	100%	77,371	63%	23,194	61%	6,710	75%
Lower Big Swamp Creek	**Lowndes**	6,000	0%	239,198	0%	55,693	0%	18,019	0%
		1,500	25%	203,426	15%	47,763	14%	14,640	19%
		3,000	50%	167,653	30%	39,832	28%	11,262	38%
		4,500	75%	131,880	45%	31,902	43%	7,883	56%
		6,000	100%	96,107	60%	23,972	57%	4,505	75%
Upper Catoma Creek	**Montgomery**	6,000	0%	208,060	0%	44,176	0%	9,022	0%
		1,500	25%	178,008	14%	38,372	13%	7,330	19%
		3,000	50%	147,956	29%	32,569	26%	5,639	38%
		4,500	75%	117,905	43%	26,766	39%	3,947	56%
		6,000	100%	87,853	58%	20,962	53%	2,255	75%
Ramer Creek	**Montgomery**	2,115	0%	67,214	0%	13,213	0%	1,266	0%
		529	25%	57,773	14%	11,610	12%	1,028	19%
		1,058	50%	48,332	28%	10,008	24%	791	37%
		1,586	75%	38,877	42%	8,402	36%	554	56%
		2,115	100%	29,437	56%	6,799	49%	316	75%
Lower Mulberry	**Autauga**	3,303	0%	75,598	0%	21,266	0%	8,913	0%
		826	25%	63,779	16%	18,051	15%	7,242	19%
		1,652	50%	51,960	31%	14,836	30%	5,571	37%
		2,477	75%	40,133	47%	11,618	45%	3,899	56%
		3,303	100%	28,314	63%	8,402	60%	2,228	75%
Lower Mulberry	**Chilton**	2,500	0%	56,329	0%	15,902	0%	6,746	0%
		625	25%	49,507	12%	13,971	12%	5,481	19%
		1,250	50%	38,679	31%	11,077	30%	4,216	38%
		1,875	75%	29,855	47%	8,665	46%	2,951	56%
		2,500	100%	21,030	63%	6,253	61%	1,687	75%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Reduced Tillage Systems for Cropland					
				Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Lower Mulberry	**Dallas**	503	0%	10,531	0%	2,944	0%	1,207	0%
		126	25%	8,892	16%	2,502	15%	981	19%
		252	50%	7,253	31%	2,060	30%	755	37%
		377	75%	5,606	47%	1,615	45%	528	56%
		503	100%	3,966	62%	1,173	60%	302	75%
Soapstone Creek	**Dallas**	22,996	0%	481,128	0%	134,478	0%	55,096	0%
		5,749	25%	406,157	16%	114,258	15%	44,766	19%
		11,498	50%	331,187	31%	94,039	30%	34,435	38%
		17,247	75%	256,216	47%	73,819	45%	24,105	56%
		22,996	100%	181,246	62%	53,599	60%	13,774	75%
Valley Creek	**Dallas**	2,116	0%	39,954	0%	10,762	0%	3,814	0%
		529	25%	35,450	11%	9,583	11%	3,099	19%
		1,058	50%	27,746	31%	7,635	29%	2,384	38%
		1,587	75%	21,642	46%	6,072	44%	1,669	56%
		2,116	100%	15,538	61%	4,509	58%	953	75%
Lower Catoma Creek	**Montgomery**	1,500	0%	35,521	0%	8,502	0%	1,802	0%
		375	25%	32,041	10%	7,652	10%	1,464	19%
		750	50%	28,561	20%	6,801	20%	1,126	38%
		1,125	75%	25,081	29%	5,951	30%	788	56%
		1,500	100%	14,831	58%	4,010	53%	451	75%
Middle Alabama									
Mush Creek	**Dallas**	10,408	0%	188,505	0%	49,602	0%	15,795	0%
		2,602	25%	160,058	15%	42,562	14%	12,833	19%
		5,204	50%	131,612	30%	35,523	28%	9,872	38%
		7,806	75%	103,165	45%	28,483	43%	6,910	56%
		10,408	100%	74,719	60%	21,443	57%	3,949	75%
Mush Creek	**Lowndes**	200	0%	7,023	0%	1,490	0%	304	0%
		50	25%	6,008	14%	1,295	13%	247	19%
		100	50%	4,994	29%	1,099	26%	190	38%
		150	75%	3,980	43%	903	39%	133	56%
		200	100%	2,966	58%	708	53%	76	75%
Upper Boguechitto Creek	**Dallas**	26,951	0%	564,278	0%	157,761	0%	64,698	0%
		6,738	25%	476,340	16%	134,036	15%	52,567	19%
		13,476	50%	388,402	31%	110,310	30%	40,437	37%
		20,213	75%	300,457	47%	86,582	45%	28,305	56%
		26,951	100%	212,518	62%	62,856	60%	16,175	75%
Upper Boguechitto Creek	**Perry**	34,105	0%	746,465	0%	212,171	0%	92,106	0%
		8,526	25%	629,087	16%	179,790	15%	74,836	19%
		17,053	50%	511,717	31%	147,412	31%	57,567	37%
		25,579	75%	394,339	47%	115,032	46%	40,296	56%
		34,105	100%	276,961	63%	82,652	61%	23,026	75%
Lower Boguechitto Creek	**Dallas**	20,230	0%	423,560	0%	118,419	0%	48,564	0%
		5,058	25%	373,019	12%	104,329	12%	39,458	19%
		10,115	50%	291,540	31%	82,800	30%	30,352	38%
		15,173	75%	225,535	47%	64,992	45%	21,247	56%
		20,230	100%	159,521	62%	47,181	60%	12,141	75%
Chilatchee Creek	**Dallas**	1,087	0%	30,140	0%	7,814	0%	2,608	0%
		272	25%	26,822	11%	6,895	12%	2,119	19%
		544	50%	23,504	22%	5,975	24%	1,630	37%
		815	75%	20,170	33%	5,052	35%	1,141	56%
		1,087	100%	11,894	61%	3,334	57%	652	75%
Chilatchee Creek	**Marengo**	0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Reduced Tillage Systems for Cropland: Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Chilatchee Creek	Perry	10,356	0%	236,553	0%	68,233	0%	31,058	0%
		2,589	25%	199,057	16%	57,687	15%	25,235	19%
		5,178	50%	161,562	32%	47,141	31%	19,411	38%
		7,767	75%	124,067	48%	36,595	46%	13,588	56%
		10,356	100%	86,571	63%	26,049	62%	7,765	75%
Chilatchee Creek	Wilcox	56	0%	1,005	0%	264	0%	84	0%
		14	25%	853	15%	227	14%	68	19%
		28	50%	702	30%	189	28%	53	38%
		42	75%	550	45%	152	43%	37	56%
		56	100%	398	60%	114	57%	21	75%
Lower Alabama									
Randons Creek	Monroe	19,576	0%	380,809	0%	101,962	0%	35,208	0%
		4,894	25%	322,815	15%	87,238	14%	28,606	19%
		9,788	50%	264,820	30%	72,514	29%	22,005	38%
		14,682	75%	206,826	46%	57,790	43%	15,403	56%
		19,576	100%	148,831	61%	43,066	58%	8,802	75%
Wallers Creek	Monroe	6,047	0%	108,382	0%	28,522	0%	9,088	0%
		1,512	25%	96,601	11%	25,574	10%	7,384	19%
		3,024	50%	75,673	30%	20,426	28%	5,680	37%
		4,535	75%	59,311	45%	16,376	43%	3,976	56%
		6,047	100%	42,956	60%	12,329	57%	2,272	75%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Streambank Stabilization and Fencing for Cropland					
				Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	3,270	0%	69,377	0%	18,950	0%	7,116	0%
		818	25%	56,371	19%	15,397	19%	5,782	19%
		1,635	50%	43,361	38%	11,844	38%	4,448	38%
		2,453	75%	30,355	56%	8,291	56%	3,114	56%
		3,270	100%	17,344	75%	4,737	75%	1,779	75%
Hudson Creek	**Elmore**	2,585	0%	51,264	0%	14,092	0%	5,426	0%
		646	25%	41,651	19%	11,449	19%	4,409	19%
		1,293	50%	32,043	37%	8,808	37%	3,392	37%
		1,939	75%	22,429	56%	6,166	56%	2,374	56%
		2,585	100%	12,816	75%	3,523	75%	1,357	75%
Galbraith Mill Creek	**Montgomery**	3,000	0%	50,874	0%	13,035	0%	3,604	0%
		750	25%	41,335	19%	10,591	19%	2,928	19%
		1,500	50%	31,796	38%	8,147	38%	2,252	38%
		2,250	75%	22,257	56%	5,703	56%	1,577	56%
		3,000	100%	12,719	75%	3,259	75%	901	75%
Tallawessee Creek	**Lowndes**	3,272	0%	74,914	0%	21,603	0%	9,826	0%
		818	25%	64,338	14%	18,101	16%	7,983	19%
		1,636	50%	49,607	34%	14,050	35%	6,141	38%
		2,454	75%	32,775	56%	9,451	56%	4,299	56%
		3,272	100%	18,729	75%	5,401	75%	2,456	75%
Cypress Creek	**Lowndes**	9,350	0%	210,106	0%	60,206	0%	26,838	0%
		2,338	25%	170,714	19%	48,918	19%	21,806	19%
		4,675	50%	131,316	38%	37,629	38%	16,774	38%
		7,013	75%	91,924	56%	26,341	56%	11,742	56%
		9,350	100%	52,527	75%	15,052	75%	6,710	75%
Lower Big Swamp Creek	**Lowndes**	6,000	0%	239,198	0%	55,693	0%	18,019	0%
		1,500	25%	194,349	19%	45,251	19%	14,640	19%
		3,000	50%	149,499	38%	34,808	38%	11,262	38%
		4,500	75%	104,649	56%	24,366	56%	7,883	56%
		6,000	100%	59,800	75%	13,923	75%	4,505	75%
Upper Catoma Creek	**Montgomery**	6,000	0%	208,060	0%	44,176	0%	9,022	0%
		1,500	25%	169,048	19%	35,893	19%	7,330	19%
		3,000	50%	130,037	38%	27,610	38%	5,639	38%
		4,500	75%	91,026	56%	19,327	56%	3,947	56%
		6,000	100%	52,015	75%	11,044	75%	2,255	75%
Ramer Creek	**Montgomery**	2,115	0%	67,214	0%	13,213	0%	1,266	0%
		529	25%	54,614	19%	10,736	19%	1,028	19%
		1,058	50%	42,013	37%	8,259	37%	791	37%
		1,586	75%	29,404	56%	5,780	56%	554	56%
		2,115	100%	16,804	75%	3,303	75%	316	75%
Lower Mulberry	**Autauga**	3,303	0%	75,598	0%	21,266	0%	8,913	0%
		826	25%	61,424	19%	17,279	19%	7,242	19%
		1,652	50%	47,251	37%	13,292	37%	5,571	37%
		2,477	75%	33,072	56%	9,304	56%	3,899	56%
		3,303	100%	18,899	75%	5,317	75%	2,228	75%
Lower Mulberry	**Chilton**	2,500	0%	56,329	0%	15,902	0%	6,746	0%
		625	25%	46,880	17%	13,139	17%	5,481	19%
		1,250	50%	35,205	38%	9,939	38%	4,216	38%
		1,875	75%	24,644	56%	6,957	56%	2,951	56%
		2,500	100%	14,082	75%	3,975	75%	1,687	75%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Streambank Stabilization and Fencing for Cropland: Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Lower Mulberry	**Dallas**	503	0%	10,531	0%	2,944	0%	1,207	0%
		126	25%	8,558	19%	2,393	19%	981	19%
		252	50%	6,585	37%	1,841	37%	755	37%
		377	75%	4,606	56%	1,288	56%	528	56%
		503	100%	2,633	75%	736	75%	302	75%
Soapstone Creek	**Dallas**	22,996	0%	481,128	0%	134,478	0%	55,096	0%
		5,749	25%	390,916	19%	109,263	19%	44,766	19%
		11,498	50%	300,705	38%	84,049	38%	34,435	38%
		17,247	75%	210,493	56%	58,834	56%	24,105	56%
		22,996	100%	120,282	75%	33,619	75%	13,774	75%
Valley Creek	**Dallas**	2,116	0%	39,954	0%	10,762	0%	3,814	0%
		529	25%	33,351	17%	8,919	17%	3,099	19%
		1,058	50%	24,971	38%	6,726	38%	2,384	38%
		1,587	75%	17,480	56%	4,708	56%	1,669	56%
		2,116	100%	9,988	75%	2,690	75%	953	75%
Lower Catoma Creek	**Montgomery**	1,500	0%	35,521	0%	8,502	0%	1,802	0%
		375	25%	29,801	16%	7,032	17%	1,464	19%
		750	50%	24,081	32%	5,562	35%	1,126	38%
		1,125	75%	18,361	48%	4,091	52%	788	56%
		1,500	100%	8,880	75%	2,125	75%	451	75%
Middle Alabama									
Mush Creek	**Dallas**	10,408	0%	188,505	0%	49,602	0%	15,795	0%
		2,602	25%	153,160	19%	40,302	19%	12,833	19%
		5,204	50%	117,816	38%	31,001	38%	9,872	38%
		7,806	75%	82,471	56%	21,701	56%	6,910	56%
		10,408	100%	47,126	75%	12,401	75%	3,949	75%
Mush Creek	**Lowndes**	200	0%	7,023	0%	1,490	0%	304	0%
		50	25%	5,706	19%	1,211	19%	247	19%
		100	50%	4,389	38%	931	38%	190	38%
		150	75%	3,072	56%	652	56%	133	56%
		200	100%	1,756	75%	373	75%	76	75%
Upper Boguechitto Creek	**Dallas**	26,951	0%	564,278	0%	157,761	0%	64,698	0%
		6,738	25%	458,478	19%	128,182	19%	52,567	19%
		13,476	50%	352,677	37%	98,602	37%	40,437	37%
		20,213	75%	246,871	56%	69,020	56%	28,305	56%
		26,951	100%	141,070	75%	39,440	75%	16,175	75%
Upper Boguechitto Creek	**Perry**	34,105	0%	746,465	0%	212,171	0%	92,106	0%
		8,526	25%	606,501	19%	172,388	19%	74,836	19%
		17,053	50%	466,543	37%	132,608	37%	57,567	37%
		25,579	75%	326,580	56%	92,825	56%	40,296	56%
		34,105	100%	186,616	75%	53,043	75%	23,026	75%
Lower Boguechitto Creek	**Dallas**	20,230	0%	423,560	0%	118,419	0%	48,564	0%
		5,058	25%	352,737	17%	97,907	17%	39,458	19%
		10,115	50%	264,725	38%	74,012	38%	30,352	38%
		15,173	75%	185,310	56%	51,809	56%	21,247	56%
		20,230	100%	105,890	75%	29,605	75%	12,141	75%
Chilatchee Creek	**Dallas**	1,087	0%	30,140	0%	7,814	0%	2,608	0%
		272	25%	25,180	16%	6,440	18%	2,119	19%
		544	50%	20,219	33%	5,066	35%	1,630	37%
		815	75%	15,250	49%	3,691	53%	1,141	56%
		1,087	100%	7,535	75%	1,954	75%	652	75%
Chilatchee Creek	**Marengo**	0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Streambank Stabilization and Fencing for Cropland					
				Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Chilatchee Creek	**Perry**	10,356	0%	236,553	0%	68,233	0%	31,058	0%
		2,589	25%	192,199	19%	55,439	19%	25,235	19%
		5,178	50%	147,845	38%	42,645	38%	19,411	38%
		7,767	75%	103,492	56%	29,852	56%	13,588	56%
		10,356	100%	59,138	75%	17,058	75%	7,765	75%
Chilatchee Creek	**Wilcox**	56	0%	1,005	0%	264	0%	84	0%
		14	25%	817	19%	215	19%	68	19%
		28	50%	628	38%	165	38%	53	38%
		42	75%	440	56%	116	56%	37	56%
		56	100%	251	75%	66	75%	21	75%
Lower Alabama									
Randons Creek	**Monroe**	19,576	0%	380,809	0%	101,962	0%	35,208	0%
		4,894	25%	309,408	19%	82,844	19%	28,606	19%
		9,788	50%	238,006	38%	63,726	38%	22,005	38%
		14,682	75%	166,604	56%	44,608	56%	15,403	56%
		19,576	100%	95,202	75%	25,491	75%	8,802	75%
Wallers Creek	**Monroe**	6,047	0%	108,382	0%	28,522	0%	9,088	0%
		1,512	25%	90,603	16%	23,675	17%	7,384	19%
		3,024	50%	67,741	37%	17,827	37%	5,680	37%
		4,535	75%	47,416	56%	12,478	56%	3,976	56%
		6,047	100%	27,096	75%	7,131	75%	2,272	75%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Terraces for Cropland: Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	3,270	0%	69,377	0%	18,950	0%	7,116	0%
		818	25%	62,214	10%	15,305	19%	5,604	21%
		1,635	50%	55,038	21%	11,660	38%	4,092	43%
		2,453	75%	47,875	31%	8,016	58%	2,580	64%
		3,270	100%	40,700	41%	4,370	77%	1,067	85%
Hudson Creek	**Elmore**	2,585	0%	51,264	0%	14,092	0%	5,426	0%
		646	25%	45,876	11%	11,375	19%	4,273	21%
		1,293	50%	40,500	21%	8,659	39%	3,120	42%
		1,939	75%	35,112	32%	5,942	58%	1,967	64%
		2,585	100%	29,725	42%	3,225	77%	814	85%
Galbraith Mill Creek	**Montgomery**	3,000	0%	50,874	0%	13,035	0%	3,604	0%
		750	25%	46,457	9%	10,588	19%	2,838	21%
		1,500	50%	42,039	17%	8,140	38%	2,072	43%
		2,250	75%	37,621	26%	5,692	56%	1,306	64%
		3,000	100%	33,204	35%	3,245	75%	541	85%
Tallawessee Creek	**Lowndes**	3,272	0%	74,914	0%	21,603	0%	9,826	0%
		818	25%	77,165	-3%	18,026	17%	7,738	21%
		1,636	50%	66,118	12%	13,792	36%	5,650	43%
		2,454	75%	48,349	35%	8,900	59%	3,562	64%
		3,272	100%	39,494	47%	4,665	78%	1,474	85%
Cypress Creek	**Lowndes**	9,350	0%	210,106	0%	60,206	0%	26,838	0%
		2,338	25%	185,651	12%	48,431	20%	21,135	21%
		4,675	50%	161,184	23%	36,654	39%	15,432	43%
		7,013	75%	136,729	35%	24,879	59%	9,729	64%
		9,350	100%	112,261	47%	13,102	78%	4,026	85%
Lower Big Swamp Creek	**Lowndes**	6,000	0%	239,198	0%	55,693	0%	18,019	0%
		1,500	25%	217,869	9%	45,115	19%	14,190	21%
		3,000	50%	196,539	18%	34,536	38%	10,361	43%
		4,500	75%	175,209	27%	23,957	57%	6,532	64%
		6,000	100%	153,879	36%	13,378	76%	2,703	85%
Upper Catoma Creek	**Montgomery**	6,000	0%	208,060	0%	44,176	0%	9,022	0%
		1,500	25%	192,965	7%	36,028	18%	7,105	21%
		3,000	50%	177,871	15%	27,881	37%	5,187	43%
		4,500	75%	162,777	22%	19,733	55%	3,270	64%
		6,000	100%	147,683	29%	11,585	74%	1,353	85%
Ramer Creek	**Montgomery**	2,115	0%	67,214	0%	13,213	0%	1,266	0%
		529	25%	63,202	6%	10,843	18%	997	21%
		1,058	50%	59,189	12%	8,472	36%	728	42%
		1,586	75%	55,152	18%	6,100	54%	459	64%
		2,115	100%	51,139	24%	3,730	72%	190	85%
Lower Mulberry	**Autauga**	3,303	0%	75,598	0%	21,266	0%	8,913	0%
		826	25%	67,186	11%	17,133	19%	7,019	21%
		1,652	50%	58,774	22%	13,000	39%	5,125	42%
		2,477	75%	50,350	33%	8,866	58%	3,231	64%
		3,303	100%	41,939	45%	4,733	78%	1,337	85%
Lower Mulberry	**Chilton**	2,500	0%	56,329	0%	15,902	0%	6,746	0%
		625	25%	53,566	5%	13,070	18%	5,313	21%
		1,250	50%	43,680	22%	9,713	39%	3,879	43%
		1,875	75%	37,355	34%	6,618	58%	2,446	64%
		2,500	100%	31,031	45%	3,524	78%	1,012	85%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Terraces for Cropland					
				Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Lower Mulberry	**Dallas**	503	0%	10,531	0%	2,944	0%	1,207	0%
		126	25%	9,380	11%	2,374	19%	951	21%
		252	50%	8,228	22%	1,803	39%	694	42%
		377	75%	7,065	33%	1,231	58%	438	64%
		503	100%	5,914	44%	660	78%	181	85%
Soapstone Creek	**Dallas**	22,996	0%	481,128	0%	134,478	0%	55,096	0%
		5,749	25%	428,421	11%	108,399	19%	43,388	21%
		11,498	50%	375,715	22%	82,320	39%	31,680	43%
		17,247	75%	323,008	33%	56,241	58%	19,972	64%
		22,996	100%	270,302	44%	30,162	78%	8,264	85%
Valley Creek	**Dallas**	2,116	0%	39,954	0%	10,762	0%	3,814	0%
		529	25%	38,818	3%	8,912	17%	3,003	21%
		1,058	50%	31,992	20%	6,643	38%	2,193	43%
		1,587	75%	28,011	30%	4,583	57%	1,383	64%
		2,116	100%	24,030	40%	2,524	77%	572	85%
Lower Catoma Creek	**Montgomery**	1,500	0%	35,521	0%	8,502	0%	1,802	0%
		375	25%	35,817	-1%	7,079	17%	1,419	21%
		750	50%	36,112	-2%	5,657	33%	1,036	43%
		1,125	75%	36,408	-2%	4,235	50%	653	64%
		1,500	100%	24,669	31%	2,217	74%	270	85%
Middle Alabama									
Mush Creek	**Dallas**	10,408	0%	188,505	0%	49,602	0%	15,795	0%
		2,602	25%	170,866	9%	40,192	19%	12,438	21%
		5,204	50%	153,228	19%	30,782	38%	9,082	43%
		7,806	75%	135,589	28%	21,372	57%	5,726	64%
		10,408	100%	117,951	37%	11,962	76%	2,369	85%
Mush Creek	**Lowndes**	200	0%	7,023	0%	1,490	0%	304	0%
		50	25%	6,514	7%	1,216	18%	239	21%
		100	50%	6,005	14%	941	37%	175	43%
		150	75%	5,496	22%	666	55%	110	64%
		200	100%	4,987	29%	391	74%	46	85%
Upper Boguechitto Creek	**Dallas**	26,951	0%	564,278	0%	157,761	0%	64,698	0%
		6,738	25%	502,424	11%	127,165	19%	50,950	21%
		13,476	50%	440,570	22%	96,568	39%	37,202	42%
		20,213	75%	378,705	33%	65,969	58%	23,453	64%
		26,951	100%	316,851	44%	35,372	78%	9,705	85%
Upper Boguechitto Creek	**Perry**	34,105	0%	746,465	0%	212,171	0%	92,106	0%
		8,526	25%	661,243	11%	170,785	20%	72,533	21%
		17,053	50%	576,034	23%	129,401	39%	52,961	42%
		25,579	75%	490,813	34%	88,016	59%	33,388	64%
		34,105	100%	405,591	46%	46,630	78%	13,816	85%
Lower Boguechitto Creek	**Dallas**	20,230	0%	423,560	0%	118,419	0%	48,564	0%
		5,058	25%	404,629	4%	97,481	18%	38,244	21%
		10,115	50%	330,697	22%	72,485	39%	27,924	43%
		15,173	75%	284,272	33%	49,519	58%	17,605	64%
		20,230	100%	237,835	44%	26,551	78%	7,285	85%
Chilatchee Creek	**Dallas**	1,087	0%	30,140	0%	7,814	0%	2,608	0%
		272	25%	29,487	2%	6,436	18%	2,054	21%
		544	50%	28,834	4%	5,057	35%	1,500	42%
		815	75%	28,155	7%	3,677	53%	945	64%
		1,087	100%	18,687	38%	1,862	76%	391	85%
Chilatchee Creek	**Marengo**	0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%
		0	0%	0	0%	0	0%	0	0%

SubWatershed	County	Acres of Cropland	Percent of Acres Put in BMP	BMP - Terraces for Cropland					
				Nitrogen Load from Cropland- With Percent Reductions (tons/year)		Phosphorus Load from Cropland- With Percent Reductions (tons/year)		Sediment Load from Cropland- With Percent Reductions (tons/year)	
Chilatchee Creek	Perry	10,356	0%	236,553	0%	68,233	0%	31,058	0%
		2,589	25%	208,575	12%	54,857	20%	24,458	21%
		5,178	50%	180,597	24%	41,482	39%	17,858	43%
		7,767	75%	152,619	35%	28,106	59%	11,259	64%
		10,356	100%	124,641	47%	14,730	78%	4,659	85%
Chilatchee Creek	Wilcox	56	0%	1,005	0%	264	0%	84	0%
		14	25%	911	9%	214	19%	66	21%
		28	50%	817	19%	164	38%	48	43%
		42	75%	723	28%	114	57%	31	64%
		56	100%	629	37%	64	76%	13	85%
Lower Alabama									
Randons Creek	Monroe	19,576	0%	380,809	0%	101,962	0%	35,208	0%
		4,894	25%	343,461	10%	82,492	19%	27,726	21%
		9,788	50%	306,112	20%	63,022	38%	20,245	43%
		14,682	75%	268,764	29%	43,552	57%	12,763	64%
		19,576	100%	231,415	39%	24,082	76%	5,281	85%
Wallers Creek	Monroe	6,047	0%	108,382	0%	28,522	0%	9,088	0%
		1,512	25%	106,372	2%	23,711	17%	7,157	21%
		3,024	50%	88,098	19%	17,700	38%	5,226	42%
		4,535	75%	77,945	28%	12,288	57%	3,294	64%
		6,047	100%	67,803	37%	6,877	76%	1,363	85%

SubWatershed	County	Acres of Pasture-land	Percent of Acres Put in BMP	BMP - Streambank Protection and Fencing for Pastureland: Nitrogen Load from Pastureland - With Percent Reductions (tons/year)		Phosphorus Load from Pastureland - With Percent Reductions (tons/year)		Sediment Load from Pastureland - With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	1,565	0%	17,806	0%	1,972	0%	642	0%
		391	25%	15,057	15%	1,646	17%	521	19%
		783	50%	12,313	31%	1,321	33%	401	37%
		1,174	75%	9,564	46%	996	50%	281	56%
		1,565	100%	6,814	62%	670	66%	160	75%
Hudson Creek	**Elmore**	5,884	0%	62,454	0%	7,305	0%	2,642	0%
		1,471	25%	52,768	16%	6,087	17%	2,147	19%
		2,942	50%	43,083	31%	4,869	33%	1,651	38%
		4,413	75%	33,398	47%	3,652	50%	1,156	56%
		5,884	100%	23,713	62%	2,434	67%	661	75%
Galbraith Mill Creek	**Montgomery**	2,530	0%	24,559	0%	2,258	0%	419	0%
		633	25%	20,827	15%	1,900	16%	340	19%
		1,265	50%	17,091	30%	1,542	32%	262	38%
		1,898	75%	13,358	46%	1,184	48%	183	56%
		2,530	100%	9,622	61%	826	63%	105	75%
Tallawessee Creek	**Lowndes**	11,525	0%	129,940	0%	16,764	0%	7,075	0%
		2,881	25%	109,599	16%	13,922	17%	5,748	19%
		5,763	50%	89,262	31%	11,081	34%	4,422	37%
		8,644	75%	68,921	47%	8,240	51%	3,095	56%
		11,525	100%	48,580	63%	5,398	68%	1,769	75%
Cypress Creek	**Lowndes**	8,234	0%	96,827	0%	13,513	0%	6,302	0%
		2,059	25%	81,549	16%	11,196	17%	5,120	19%
		4,117	50%	66,266	32%	8,877	34%	3,939	38%
		6,176	75%	50,988	47%	6,559	51%	2,757	56%
		8,234	100%	35,706	63%	4,241	69%	1,575	75%
Lower Big Swamp Creek	**Lowndes**	50,327	0%	518,631	0%	54,420	0%	15,648	0%
		12,582	25%	438,959	15%	45,534	16%	12,714	19%
		25,164	50%	359,288	31%	36,648	33%	9,780	37%
		37,745	75%	279,613	46%	27,762	49%	6,846	56%
		50,327	100%	199,941	61%	18,876	65%	3,912	75%
Upper Catoma Creek	**Montgomery**	63,030	0%	620,245	0%	59,478	0%	13,064	0%
		15,758	25%	525,643	15%	49,953	16%	10,615	19%
		31,515	50%	431,036	31%	40,428	32%	8,165	38%
		47,273	75%	336,434	46%	30,903	48%	5,716	56%
		63,030	100%	241,827	61%	21,377	64%	3,266	75%
Ramer Creek	**Montgomery**	31,720	0%	302,384	0%	26,177	0%	3,526	0%
		7,930	25%	256,604	15%	22,087	16%	2,865	19%
		15,860	50%	210,823	30%	17,998	31%	2,204	38%
		23,790	75%	165,042	45%	13,908	47%	1,543	56%
		31,720	100%	119,261	61%	9,819	62%	882	75%
Lower Mulberry	**Autauga**	1,536	0%	17,476	0%	1,935	0%	630	0%
		384	25%	14,779	15%	1,616	17%	512	19%
		768	50%	12,082	31%	1,297	33%	394	38%
		1,152	75%	9,385	46%	977	50%	276	56%
		1,536	100%	6,688	62%	658	66%	157	75%
Lower Mulberry	**Chilton**	6,000	0%	73,521	0%	10,103	0%	4,626	0%
		1,500	25%	61,937	16%	8,374	17%	3,759	19%
		3,000	50%	50,354	32%	6,645	34%	2,892	38%
		4,500	75%	38,771	47%	4,916	51%	2,024	56%
		6,000	100%	27,188	63%	3,186	68%	1,157	75%

SubWatershed	County	Acres of Pasture-land	Percent of Acres Put in BMP	BMP - Streambank Protection and Fencing for Pastureland					
				Nitrogen Load from Pastureland - With Percent Reductions (tons/year)		Phosphorus Load from Pastureland - With Percent Reductions (tons/year)		Sediment Load from Pastureland - With Percent Reductions (tons/year)	
Lower Mulberry	**Dallas**	1,257	0%	13,117	0%	1,431	0%	451	0%
		314	25%	11,094	15%	1,196	16%	367	19%
		629	50%	9,076	31%	960	33%	282	37%
		943	75%	7,053	46%	725	49%	197	56%
		1,257	100%	5,030	62%	489	66%	113	75%
Soapstone Creek	**Dallas**	15,330	0%	156,012	0%	15,932	0%	4,266	0%
		3,833	25%	132,101	15%	13,346	16%	3,466	19%
		7,665	50%	108,185	31%	10,759	32%	2,666	38%
		11,498	75%	84,273	46%	8,172	49%	1,866	56%
		15,330	100%	60,357	61%	5,585	65%	1,066	75%
Valley Creek	**Dallas**	2,116	0%	21,371	0%	2,208	0%	610	0%
		529	25%	18,092	15%	1,849	16%	496	19%
		1,058	50%	14,813	31%	1,489	33%	381	38%
		1,587	75%	11,535	46%	1,130	49%	267	56%
		2,116	100%	8,256	61%	770	65%	153	75%
Lower Catoma Creek	**Montgomery**	12,500	0%	123,006	0%	11,796	0%	2,591	0%
		3,125	25%	104,244	15%	9,907	16%	2,105	19%
		6,250	50%	85,482	31%	8,018	32%	1,619	38%
		9,375	75%	66,721	46%	6,128	48%	1,134	56%
		12,500	100%	47,959	61%	4,239	64%	648	75%
Middle Alabama									
Mush Creek	**Dallas**	5,204	0%	55,047	0%	6,212	0%	2,100	0%
		1,301	25%	46,538	15%	5,183	17%	1,706	19%
		2,602	50%	38,029	31%	4,154	33%	1,312	38%
		3,903	75%	29,520	46%	3,125	50%	919	56%
		5,204	100%	21,011	62%	2,097	66%	525	75%
Mush Creek	**Lowndes**	1,673	0%	19,673	0%	2,746	0%	1,280	0%
		418	25%	16,568	16%	2,275	17%	1,040	19%
		837	50%	13,466	32%	1,804	34%	800	37%
		1,255	75%	10,361	47%	1,333	51%	560	56%
		1,673	100%	7,255	63%	862	69%	320	75%
Upper Boguechitto Creek	**Dallas**	17,577	0%	177,225	0%	17,631	0%	4,374	0%
		4,394	25%	150,115	15%	14,784	16%	3,554	19%
		8,789	50%	123,010	31%	11,938	32%	2,734	37%
		13,183	75%	95,900	46%	9,091	48%	1,914	56%
		17,577	100%	68,791	61%	6,244	65%	1,093	75%
Upper Boguechitto Creek	**Perry**	34,105	0%	359,834	0%	40,438	0%	13,558	0%
		8,526	25%	304,231	15%	33,745	17%	11,016	19%
		17,053	50%	248,632	31%	27,054	33%	8,474	37%
		25,579	75%	193,029	46%	20,362	50%	5,932	56%
		34,105	100%	137,426	62%	13,669	66%	3,390	75%
Lower Boguechitto Creek	**Dallas**	27,904	0%	281,350	0%	27,989	0%	6,944	0%
		6,976	25%	238,314	15%	23,470	16%	5,642	19%
		13,952	50%	195,278	31%	18,951	32%	4,340	38%
		20,928	75%	152,243	46%	14,432	48%	3,038	56%
		27,904	100%	109,207	61%	9,913	65%	1,736	75%
Chilatchee Creek	**Dallas**	8,336	0%	83,781	0%	8,258	0%	1,990	0%
		2,084	25%	70,975	15%	6,927	16%	1,617	19%
		4,168	50%	58,169	31%	5,597	32%	1,244	38%
		6,252	75%	45,363	46%	4,266	48%	871	56%
		8,336	100%	32,557	61%	2,935	64%	498	75%

SubWatershed	County	Acres of Pasture-land	Percent of Acres Put in BMP	BMP - Streambank Protection and Fencing for Pastureland: Nitrogen Load from Pastureland - With Percent Reductions (tons/year)		Phosphorus Load from Pastureland - With Percent Reductions (tons/year)		Sediment Load from Pastureland - With Percent Reductions (tons/year)	
Chilatchee Creek	**Marengo**	3,350	0%	36,231	0%	4,305	0%	1,600	0%
		838	25%	30,607	16%	3,586	17%	1,300	19%
		1,675	50%	24,978	31%	2,866	33%	1,000	38%
		2,513	75%	19,353	47%	2,146	50%	700	56%
		3,350	100%	13,724	62%	1,426	67%	400	75%
Chilatchee Creek	**Perry**	10,356	0%	110,134	0%	12,614	0%	4,389	0%
		2,589	25%	93,087	15%	10,519	17%	3,566	19%
		5,178	50%	76,041	31%	8,424	33%	2,743	38%
		7,767	75%	58,994	46%	6,329	50%	1,920	56%
		10,356	100%	41,947	62%	4,234	66%	1,097	75%
Chilatchee Creek	**Wilcox**	1,184	0%	11,661	0%	1,115	0%	243	0%
		296	25%	9,882	15%	937	16%	197	19%
		592	50%	8,104	30%	758	32%	152	38%
		888	75%	6,326	46%	580	48%	106	56%
		1,184	100%	4,548	61%	401	64%	61	75%
Lower Alabama									
Randons Creek	**Monroe**	580	0%	6,259	0%	678	0%	210	0%
		145	25%	5,295	15%	567	16%	171	19%
		290	50%	4,331	31%	455	33%	131	38%
		435	75%	3,367	46%	344	49%	92	56%
		580	100%	2,403	62%	232	66%	53	75%
Wallers Creek	**Monroe**	1,437	0%	14,375	0%	1,446	0%	371	0%
		359	25%	12,173	15%	1,212	16%	301	19%
		719	50%	9,975	31%	978	32%	232	37%
		1,078	75%	7,774	46%	744	49%	162	56%
		1,437	100%	5,572	61%	510	65%	93	75%

SubWatershed	County	Acres of Pasture-land	Percent of Acres Put in BMP	BMP - Terraces for Pastureland					
				Nitrogen Load from Pastureland - With Percent Reductions (tons/year)		Phosphorus Load from Pastureland - With Percent Reductions (tons/year)		Sediment Load from Pastureland - With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	1,565	0%	17,806	0%	1,972	0%	642	0%
		391	25%	16,643	7%	1,812	8%	574	11%
		783	50%	15,489	13%	1,653	16%	507	21%
		1,174	75%	14,326	20%	1,493	24%	440	31%
		1,565	100%	13,163	26%	1,333	32%	372	42%
Hudson Creek	**Elmore**	5,884	0%	62,454	0%	7,305	0%	2,642	0%
		1,471	25%	58,326	7%	6,700	8%	2,365	11%
		2,942	50%	54,198	13%	6,095	17%	2,087	21%
		4,413	75%	50,071	20%	5,490	25%	1,810	32%
		5,884	100%	45,943	26%	4,885	33%	1,532	42%
Galbraith Mill Creek	**Montgomery**	2,530	0%	24,559	0%	2,258	0%	419	0%
		633	25%	23,029	6%	2,090	7%	375	10%
		1,265	50%	21,491	12%	1,923	15%	331	21%
		1,898	75%	19,961	19%	1,756	22%	287	31%
		2,530	100%	18,423	25%	1,588	30%	243	42%
Tallawessee Creek	**Lowndes**	11,525	0%	129,940	0%	16,764	0%	7,075	0%
		2,881	25%	121,123	7%	15,325	9%	6,332	11%
		5,763	50%	112,314	14%	13,888	17%	5,589	21%
		8,644	75%	103,497	20%	12,449	26%	4,846	31%
		11,525	100%	94,680	27%	11,011	34%	4,103	42%
Cypress Creek	**Lowndes**	8,234	0%	96,827	0%	13,513	0%	6,302	0%
		2,059	25%	90,114	7%	12,325	9%	5,640	10%
		4,117	50%	83,393	14%	11,136	18%	4,978	21%
		6,176	75%	76,680	21%	9,947	26%	4,317	31%
		8,234	100%	69,958	28%	8,758	35%	3,655	42%
Lower Big Swamp Creek	**Lowndes**	50,327	0%	518,631	0%	54,420	0%	15,648	0%
		12,582	25%	485,261	6%	50,112	8%	14,005	10%
		25,164	50%	451,892	13%	45,803	16%	12,362	21%
		37,745	75%	418,515	19%	41,494	24%	10,719	32%
		50,327	100%	385,146	26%	37,186	32%	9,076	42%
Upper Catoma Creek	**Montgomery**	63,030	0%	620,245	0%	59,478	0%	13,064	0%
		15,758	25%	581,153	6%	54,969	8%	11,693	10%
		31,515	50%	542,053	13%	50,459	15%	10,321	21%
		47,273	75%	502,961	19%	45,949	23%	8,949	31%
		63,030	100%	463,861	25%	41,439	30%	7,577	42%
Ramer Creek	**Montgomery**	31,720	0%	302,384	0%	26,177	0%	3,526	0%
		7,930	25%	283,733	6%	24,301	7%	3,156	11%
		15,860	50%	265,083	12%	22,426	14%	2,786	21%
		23,790	75%	246,432	19%	20,551	21%	2,415	32%
		31,720	100%	227,781	25%	18,676	29%	2,045	42%
Lower Mulberry	**Autauga**	1,536	0%	17,476	0%	1,935	0%	630	0%
		384	25%	16,337	7%	1,779	8%	564	11%
		768	50%	15,198	13%	1,622	16%	498	21%
		1,152	75%	14,058	20%	1,465	24%	431	32%
		1,536	100%	12,919	26%	1,308	32%	365	42%
Lower Mulberry	**Chilton**	6,000	0%	73,521	0%	10,103	0%	4,626	0%
		1,500	25%	68,443	7%	9,219	9%	4,141	11%
		3,000	50%	63,366	14%	8,334	18%	3,655	21%
		4,500	75%	58,288	21%	7,449	26%	3,169	32%
		6,000	100%	53,211	28%	6,565	35%	2,683	42%

SubWatershed	County	Acres of Pasture-land	Percent of Acres Put in BMP	BMP - Terraces for Pastureland: Nitrogen Load from Pastureland - With Percent Reductions (tons/year)		Phosphorus Load from Pastureland - With Percent Reductions (tons/year)		Sediment Load from Pastureland - With Percent Reductions (tons/year)	
Lower Mulberry	**Dallas**	1,257	0%	13,117	0%	1,431	0%	451	0%
		314	25%	12,263	7%	1,316	8%	404	11%
		629	50%	11,417	13%	1,201	16%	357	21%
		943	75%	10,563	19%	1,086	24%	309	31%
		1,257	100%	9,709	26%	970	32%	262	42%
Soapstone Creek	**Dallas**	15,330	0%	156,012	0%	15,932	0%	4,266	0%
		3,833	25%	146,041	6%	14,687	8%	3,818	10%
		7,665	50%	136,062	13%	13,441	16%	3,370	21%
		11,498	75%	126,091	19%	12,195	23%	2,922	31%
		15,330	100%	116,112	26%	10,949	31%	2,474	42%
Valley Creek	**Dallas**	2,116	0%	21,371	0%	2,208	0%	610	0%
		529	25%	20,001	6%	2,034	8%	546	11%
		1,058	50%	18,631	13%	1,861	16%	482	21%
		1,587	75%	17,261	19%	1,687	24%	418	32%
		2,116	100%	15,891	26%	1,514	31%	354	42%
Lower Catoma Creek	**Montgomery**	12,500	0%	123,006	0%	11,796	0%	2,591	0%
		3,125	25%	115,252	6%	10,901	8%	2,319	11%
		6,250	50%	107,499	13%	10,007	15%	2,047	21%
		9,375	75%	99,746	19%	9,112	23%	1,775	32%
		12,500	100%	91,992	25%	8,218	30%	1,503	42%
Middle Alabama									
Mush Creek	**Dallas**	5,204	0%	55,047	0%	6,212	0%	2,100	0%
		1,301	25%	51,441	7%	5,704	8%	1,879	11%
		2,602	50%	47,836	13%	5,197	16%	1,659	21%
		3,903	75%	44,231	20%	4,690	24%	1,438	32%
		5,204	100%	40,626	26%	4,183	33%	1,218	42%
Mush Creek	**Lowndes**	1,673	0%	19,673	0%	2,746	0%	1,280	0%
		418	25%	18,307	7%	2,504	9%	1,146	11%
		837	50%	16,948	14%	2,263	18%	1,012	21%
		1,255	75%	15,581	21%	2,021	26%	877	31%
		1,673	100%	14,214	28%	1,779	35%	743	42%
Upper Boguechitto Creek	**Dallas**	17,577	0%	177,225	0%	17,631	0%	4,374	0%
		4,394	25%	165,960	6%	16,269	8%	3,914	11%
		8,789	50%	154,702	13%	14,908	15%	3,455	21%
		13,183	75%	143,437	19%	13,546	23%	2,996	31%
		17,577	100%	132,172	25%	12,185	31%	2,537	42%
Upper Boguechitto Creek	**Perry**	34,105	0%	359,834	0%	40,438	0%	13,558	0%
		8,526	25%	336,290	7%	37,141	8%	12,135	11%
		17,053	50%	312,753	13%	33,845	16%	10,711	21%
		25,579	75%	289,209	20%	30,548	24%	9,288	31%
		34,105	100%	265,664	26%	27,251	33%	7,864	42%
Lower Boguechitto Creek	**Dallas**	27,904	0%	281,350	0%	27,989	0%	6,944	0%
		6,976	25%	263,469	6%	25,828	8%	6,214	11%
		13,952	50%	245,588	13%	23,666	15%	5,485	21%
		20,928	75%	227,707	19%	21,505	23%	4,756	32%
		27,904	100%	209,826	25%	19,343	31%	4,027	42%
Chilatchee Creek	**Dallas**	8,336	0%	83,781	0%	8,258	0%	1,990	0%
		2,084	25%	78,467	6%	7,623	8%	1,781	11%
		4,168	50%	73,154	13%	6,988	15%	1,572	21%
		6,252	75%	67,841	19%	6,353	23%	1,363	32%
		8,336	100%	62,527	25%	5,718	31%	1,154	42%

SubWatershed	County	Acres of Pasture-land	Percent of Acres Put in BMP	BMP - Terraces for Pastureland: Nitrogen Load from Pastureland - With Percent Reductions (tons/year)		Phosphorus Load from Pastureland - With Percent Reductions (tons/year)		Sediment Load from Pastureland - With Percent Reductions (tons/year)	
Chilatchee Creek	**Marengo**	3,350	0%	36,231	0%	4,305	0%	1,600	0%
		838	25%	33,831	7%	3,947	8%	1,433	10%
		1,675	50%	31,423	13%	3,588	17%	1,264	21%
		2,513	75%	29,022	20%	3,229	25%	1,096	31%
		3,350	100%	26,614	27%	2,870	33%	928	42%
Chilatchee Creek	**Perry**	10,356	0%	110,134	0%	12,614	0%	4,389	0%
		2,589	25%	102,894	7%	11,578	8%	3,928	11%
		5,178	50%	95,654	13%	10,542	16%	3,467	21%
		7,767	75%	88,414	20%	9,505	25%	3,006	32%
		10,356	100%	81,174	26%	8,469	33%	2,546	42%
Chilatchee Creek	**Wilcox**	1,184	0%	11,661	0%	1,115	0%	243	0%
		296	25%	10,926	6%	1,031	8%	217	11%
		592	50%	10,192	13%	946	15%	192	21%
		888	75%	9,457	19%	862	23%	166	32%
		1,184	100%	8,722	25%	777	30%	141	42%
Lower Alabama									
Randons Creek	**Monroe**	580	0%	6,259	0%	678	0%	210	0%
		145	25%	5,853	6%	624	8%	188	11%
		290	50%	5,447	13%	569	16%	166	21%
		435	75%	5,041	19%	515	24%	144	32%
		580	100%	4,635	26%	460	32%	122	42%
Wallers Creek	**Monroe**	1,437	0%	14,375	0%	1,446	0%	371	0%
		359	25%	13,457	6%	1,334	8%	332	11%
		719	50%	12,547	13%	1,222	16%	293	21%
		1,078	75%	11,629	19%	1,110	23%	254	31%
		1,437	100%	10,711	25%	997	31%	215	42%

SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/Steep Slope Seeder/Transplant					
				Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	2,490	0%	5,231	0%	2,117	0%	1,353	0%
		623	25%	4,354	17%	1,780	16%	1,079	20%
		1,245	50%	3,477	34%	1,443	32%	805	41%
		1,868	75%	2,601	50%	1,105	48%	531	61%
		2,490	100%	1,724	67%	768	64%	257	81%
Hudson Creek	**Elmore**	8,304	0%	18,536	0%	7,450	0%	4,941	0%
		2,076	25%	15,335	17%	6,217	17%	3,940	20%
		4,152	50%	12,133	35%	4,985	33%	2,940	41%
		6,228	75%	8,931	52%	3,752	50%	1,939	61%
		8,304	100%	5,730	69%	2,519	66%	939	81%
Galbraith Mill Creek	**Montgomery**	3,000	0%	2,177	0%	951	0%	373	0%
		750	25%	1,936	11%	858	10%	297	20%
		1,500	50%	1,694	22%	766	20%	222	41%
		2,250	75%	1,453	33%	673	29%	146	61%
		3,000	100%	1,211	44%	580	39%	71	81%
Tallawessee Creek	**Lowndes**	17,923	0%	22,698	0%	9,426	0%	5,226	0%
		4,481	25%	19,311	15%	8,122	14%	4,168	20%
		8,962	50%	15,925	30%	6,818	28%	3,110	40%
		13,442	75%	12,538	45%	5,514	41%	2,051	61%
		17,923	100%	9,152	60%	4,210	55%	993	81%
Cypress Creek	**Lowndes**	8,766	0%	11,509	0%	4,767	0%	2,684	0%
		2,192	25%	9,771	15%	4,098	14%	2,140	20%
		4,383	50%	8,031	30%	3,428	28%	1,597	41%
		6,575	75%	6,293	45%	2,759	42%	1,053	61%
		8,766	100%	4,554	60%	2,089	56%	510	81%
Lower Big Swamp Creek	**Lowndes**	45,073	0%	58,748	0%	24,346	0%	13,664	0%
		11,268	25%	49,894	15%	20,937	14%	10,897	20%
		22,537	50%	41,040	30%	17,528	28%	8,130	40%
		33,805	75%	32,186	45%	14,119	42%	5,363	61%
		45,073	100%	23,331	60%	10,710	56%	2,596	81%
Upper Catoma Creek	**Montgomery**	37,475	0%	30,322	0%	13,089	0%	5,631	0%
		9,369	25%	26,673	12%	11,684	11%	4,491	20%
		18,738	50%	23,024	24%	10,279	21%	3,351	40%
		28,106	75%	19,375	36%	8,874	32%	2,210	61%
		37,475	100%	15,726	48%	7,469	43%	1,070	81%
Ramer Creek	**Montgomery**	16,383	0%	13,245	0%	5,718	0%	2,459	0%
		4,096	25%	11,652	12%	5,105	11%	1,961	20%
		8,192	50%	10,059	24%	4,491	21%	1,463	40%
		12,287	75%	8,466	36%	3,878	32%	965	61%
		16,383	100%	6,873	48%	3,264	43%	467	81%
Lower Mulberry	**Autauga**	23,000	0%	22,665	0%	9,684	0%	4,479	0%
		5,750	25%	19,762	13%	8,566	12%	3,572	20%
		11,500	50%	16,859	26%	7,449	23%	2,665	41%
		17,250	75%	13,957	38%	6,331	35%	1,758	61%
		23,000	100%	11,054	51%	5,214	46%	851	81%
Lower Mulberry	**Chilton**	41,272	0%	50,148	0%	20,975	0%	11,138	0%
		10,318	25%	42,931	14%	18,197	13%	8,883	20%
		20,636	50%	35,713	29%	15,418	26%	6,627	41%
		30,954	75%	28,496	43%	12,639	40%	4,372	61%
		41,272	100%	21,278	58%	9,860	53%	2,116	81%

SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/Steep Slope Seeder/Transplant					
				Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Lower Mulberry	Dallas	21,621	0%	27,676	0%	11,482	0%	6,403	0%
		5,405	25%	23,527	15%	9,884	14%	5,106	20%
		10,811	50%	19,379	30%	8,287	28%	3,810	40%
		16,216	75%	15,229	45%	6,690	42%	2,513	61%
		21,621	100%	11,080	60%	5,092	56%	1,217	81%
Soapstone Creek	Dallas	29,894	0%	38,552	0%	15,985	0%	8,942	0%
		7,474	25%	32,758	15%	13,755	14%	7,131	20%
		14,947	50%	26,963	30%	11,524	28%	5,321	41%
		22,421	75%	21,169	45%	9,293	42%	3,510	61%
		29,894	100%	15,374	60%	7,062	56%	1,699	81%
Valley Creek	Dallas	27,929	0%	36,225	0%	15,001	0%	8,455	0%
		6,982	25%	30,746	15%	12,892	14%	6,743	20%
		13,965	50%	25,267	30%	10,782	28%	5,031	40%
		20,947	75%	19,788	45%	8,673	42%	3,319	61%
		27,929	100%	14,309	61%	6,563	56%	1,607	81%
Lower Catoma Creek	Montgomery	18,700	0%	15,131	0%	6,531	0%	2,810	0%
		4,675	25%	13,310	12%	5,830	11%	2,241	20%
		9,350	50%	11,489	24%	5,129	21%	1,672	41%
		14,025	75%	9,668	36%	4,428	32%	1,103	61%
		18,700	100%	7,847	48%	3,727	43%	534	81%
Middle Alabama									
Mush Creek	Dallas	9,628	0%	12,525	0%	5,190	0%	2,914	0%
		2,407	25%	10,636	15%	4,463	14%	2,324	20%
		4,814	50%	8,748	30%	3,736	28%	1,734	41%
		7,221	75%	6,860	45%	3,009	42%	1,144	61%
		9,628	100%	4,972	60%	2,282	56%	554	81%
Mush Creek	Lowndes	10,243	0%	13,449	0%	5,570	0%	3,136	0%
		2,561	25%	11,417	15%	4,788	14%	2,501	20%
		5,122	50%	9,385	30%	4,006	28%	1,866	40%
		7,682	75%	7,353	45%	3,223	42%	1,231	61%
		10,243	100%	5,321	60%	2,441	56%	596	81%
Upper Boguechitto Creek	Dallas	11,718	0%	15,092	0%	6,258	0%	3,499	0%
		2,930	25%	12,825	15%	5,386	14%	2,790	20%
		5,859	50%	10,557	30%	4,513	28%	2,082	41%
		8,789	75%	8,290	45%	3,640	42%	1,373	61%
		11,718	100%	6,023	60%	2,767	56%	665	81%
Upper Boguechitto Creek	Perry	19,488	0%	24,983	0%	10,363	0%	5,785	0%
		4,872	25%	21,235	15%	8,920	14%	4,613	20%
		9,744	50%	17,486	30%	7,477	28%	3,442	41%
		14,616	75%	13,738	45%	6,033	42%	2,271	61%
		19,488	100%	9,989	60%	4,590	56%	1,099	81%
Lower Boguechitto Creek	Dallas	17,440	0%	22,462	0%	9,314	0%	5,208	0%
		4,360	25%	19,087	15%	8,015	14%	4,153	20%
		8,720	50%	15,713	30%	6,716	28%	3,099	41%
		13,080	75%	12,338	45%	5,417	42%	2,044	61%
		17,440	100%	8,964	60%	4,118	56%	989	81%
Chilatchee Creek	Dallas	26,096	0%	33,596	0%	13,932	0%	7,788	0%
		6,524	25%	28,549	15%	11,989	14%	6,211	20%
		13,048	50%	23,503	30%	10,046	28%	4,634	41%
		19,572	75%	18,456	45%	8,103	42%	3,057	61%
		26,096	100%	13,410	60%	6,160	56%	1,480	81%

SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/Steep Slope Seeder/Transplant					
				Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Chilatchee Creek	**Marengo**	10,232	0%	13,178	0%	5,465	0%	3,055	0%
		2,558	25%	11,198	15%	4,702	14%	2,437	20%
		5,116	50%	9,218	30%	3,940	28%	1,818	41%
		7,674	75%	7,239	45%	3,178	42%	1,199	61%
		10,232	100%	5,259	60%	2,416	56%	580	81%
Chilatchee Creek	**Perry**	3,884	0%	4,977	0%	2,065	0%	1,152	0%
		971	25%	4,231	15%	1,777	14%	919	20%
		1,942	50%	3,484	30%	1,490	28%	686	41%
		2,913	75%	2,737	45%	1,202	42%	452	61%
		3,884	100%	1,991	60%	915	56%	219	81%
Chilatchee Creek	**Wilcox**	20,826	0%	26,998	0%	11,182	0%	6,297	0%
		5,207	25%	22,918	15%	9,611	14%	5,022	20%
		10,413	50%	18,837	30%	8,040	28%	3,746	41%
		15,620	75%	14,757	45%	6,469	42%	2,471	61%
		20,826	100%	10,677	60%	4,898	56%	1,196	81%
Lower Alabama									
Randons Creek	**Monroe**	39,095	0%	32,787	0%	14,177	0%	6,025	0%
		9,774	25%	28,883	12%	12,674	11%	4,805	20%
		19,548	50%	24,980	24%	11,171	21%	3,585	40%
		29,321	75%	21,075	36%	9,667	32%	2,365	61%
		39,095	100%	17,171	48%	8,164	42%	1,145	81%
Wallers Creek	**Monroe**	52,209	0%	41,944	0%	18,119	0%	7,752	0%
		13,052	25%	36,921	12%	16,185	11%	6,182	20%
		26,105	50%	31,898	24%	14,252	21%	4,612	40%
		39,157	75%	26,875	36%	12,318	32%	3,043	61%
		52,209	100%	21,851	48%	10,384	43%	1,473	81%

SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/Straw/Crimp Seed/ Fertilizer/Transplant — Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	2,490	0%	5,231	0%	2,117	0%	1,353	0%
		623	25%	4,203	20%	1,722	19%	1,031	24%
		1,245	50%	3,174	39%	1,326	37%	710	48%
		1,868	75%	2,147	59%	930	56%	389	71%
		2,490	100%	1,118	79%	534	75%	68	95%
Hudson Creek	**Elmore**	8,304	0%	18,536	0%	7,450	0%	4,941	0%
		2,076	25%	14,781	20%	6,004	19%	3,767	24%
		4,152	50%	11,026	41%	4,559	39%	2,594	48%
		6,228	75%	7,271	61%	3,113	58%	1,420	71%
		8,304	100%	3,516	81%	1,667	78%	247	95%
Galbraith Mill Creek	**Montgomery**	3,000	0%	2,177	0%	951	0%	373	0%
		750	25%	1,894	13%	842	11%	284	24%
		1,500	50%	1,611	26%	733	23%	196	48%
		2,250	75%	1,328	39%	624	34%	107	71%
		3,000	100%	1,044	52%	515	46%	19	95%
Tallawessee Creek	**Lowndes**	17,923	0%	22,698	0%	9,426	0%	5,226	0%
		4,481	25%	18,726	17%	7,897	16%	3,985	24%
		8,962	50%	14,754	35%	6,367	32%	2,744	47%
		13,442	75%	10,782	52%	4,838	49%	1,503	71%
		17,923	100%	6,810	70%	3,309	65%	261	95%
Cypress Creek	**Lowndes**	8,766	0%	11,509	0%	4,767	0%	2,684	0%
		2,192	25%	9,470	18%	3,982	16%	2,046	24%
		4,383	50%	7,430	35%	3,197	33%	1,409	48%
		6,575	75%	5,391	53%	2,412	49%	772	71%
		8,766	100%	3,351	71%	1,626	66%	134	95%
Lower Big Swamp Creek	**Lowndes**	45,073	0%	58,748	0%	24,346	0%	13,664	0%
		11,268	25%	48,363	18%	20,348	16%	10,419	24%
		22,537	50%	37,979	35%	16,350	33%	7,174	47%
		33,805	75%	27,594	53%	12,352	49%	3,928	71%
		45,073	100%	17,210	71%	8,354	66%	683	95%
Upper Catoma Creek	**Montgomery**	37,475	0%	30,322	0%	13,089	0%	5,631	0%
		9,369	25%	26,043	14%	11,441	13%	4,294	24%
		18,738	50%	21,763	28%	9,793	25%	2,957	47%
		28,106	75%	17,482	42%	8,145	38%	1,619	71%
		37,475	100%	13,203	56%	6,498	50%	282	95%
Ramer Creek	**Montgomery**	16,383	0%	13,245	0%	5,718	0%	2,459	0%
		4,096	25%	11,377	14%	4,999	13%	1,875	24%
		8,192	50%	9,509	28%	4,279	25%	1,291	47%
		12,287	75%	7,640	42%	3,560	38%	707	71%
		16,383	100%	5,771	56%	2,840	50%	123	95%
Lower Mulberry	**Autauga**	23,000	0%	22,665	0%	9,684	0%	4,479	0%
		5,750	25%	19,260	15%	8,373	14%	3,415	24%
		11,500	50%	15,856	30%	7,063	27%	2,352	48%
		17,250	75%	12,452	45%	5,752	41%	1,288	71%
		23,000	100%	9,047	60%	4,441	54%	224	95%
Lower Mulberry	**Chilton**	41,272	0%	50,148	0%	20,975	0%	11,138	0%
		10,318	25%	41,683	17%	17,716	16%	8,493	24%
		20,636	50%	33,218	34%	14,457	31%	5,848	48%
		30,954	75%	24,753	51%	11,198	47%	3,202	71%
		41,272	100%	16,288	68%	7,939	62%	557	95%

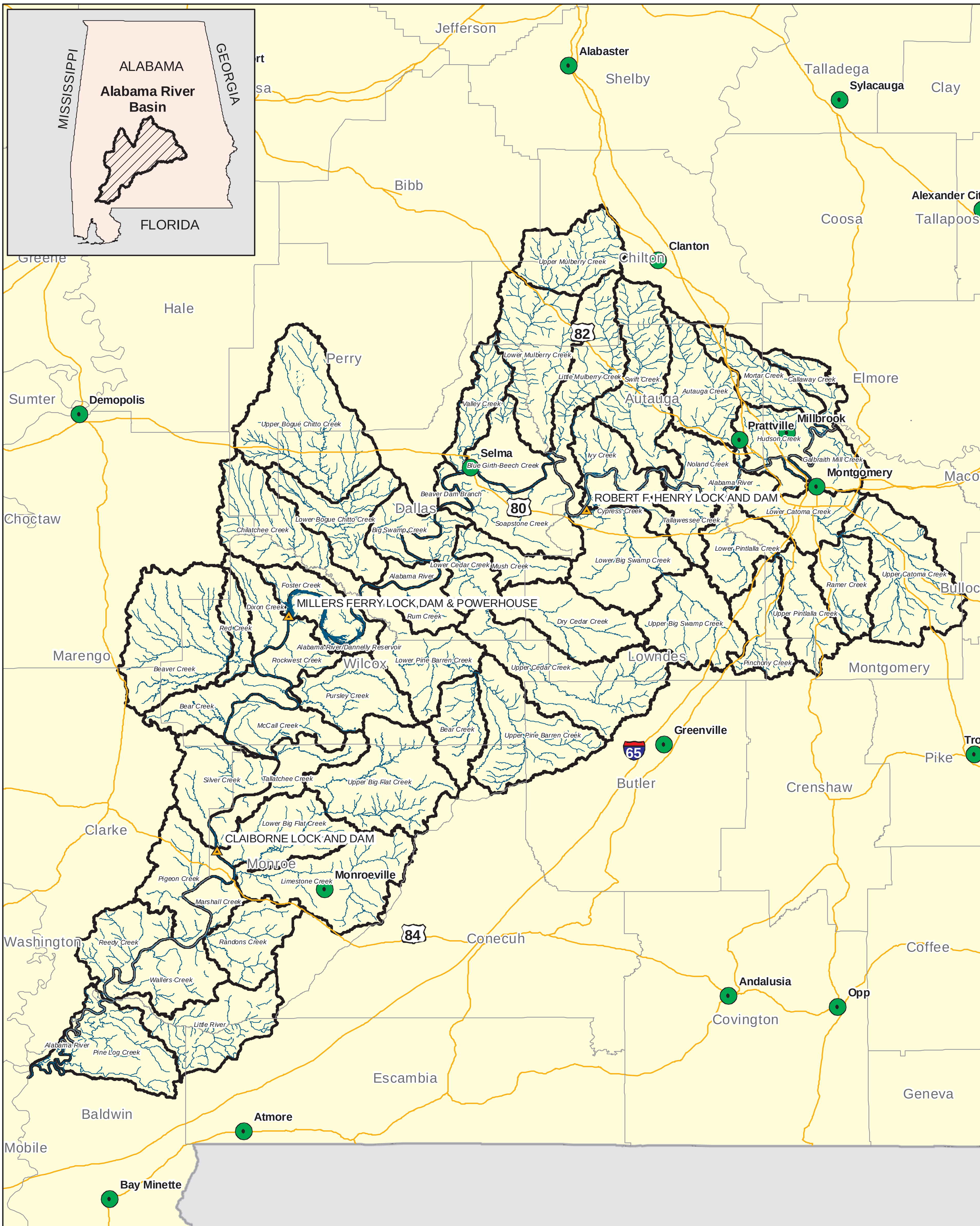
SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/Straw/Crimp Seed/ Fertilizer/Transplant					
				Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Lower Mulberry	**Dallas**	21,621	0%	27,676	0%	11,482	0%	6,403	0%
		5,405	25%	22,810	18%	9,608	16%	4,882	24%
		10,811	50%	17,944	35%	7,735	33%	3,362	47%
		16,216	75%	13,078	53%	5,862	49%	1,841	71%
		21,621	100%	8,212	70%	3,988	65%	320	95%
Soapstone Creek	**Dallas**	29,894	0%	38,552	0%	15,985	0%	8,942	0%
		7,474	25%	31,756	18%	13,369	16%	6,818	24%
		14,947	50%	24,960	35%	10,752	33%	4,695	48%
		22,421	75%	18,164	53%	8,136	49%	2,571	71%
		29,894	100%	11,368	71%	5,519	65%	447	95%
Valley Creek	**Dallas**	27,929	0%	36,225	0%	15,001	0%	8,455	0%
		6,982	25%	29,799	18%	12,527	16%	6,447	24%
		13,965	50%	23,373	35%	10,053	33%	4,439	47%
		20,947	75%	16,947	53%	7,579	49%	2,431	71%
		27,929	100%	10,521	71%	5,105	66%	423	95%
Lower Catoma Creek	**Montgomery**	18,700	0%	15,131	0%	6,531	0%	2,810	0%
		4,675	25%	12,995	14%	5,709	13%	2,143	24%
		9,350	50%	10,859	28%	4,887	25%	1,475	48%
		14,025	75%	8,724	42%	4,065	38%	808	71%
		18,700	100%	6,588	56%	3,242	50%	141	95%
Middle Alabama									
Mush Creek	**Dallas**	9,628	0%	12,525	0%	5,190	0%	2,914	0%
		2,407	25%	10,310	18%	4,337	16%	2,222	24%
		4,814	50%	8,096	35%	3,485	33%	1,530	48%
		7,221	75%	5,881	53%	2,632	49%	838	71%
		9,628	100%	3,667	71%	1,780	66%	146	95%
Mush Creek	**Lowndes**	10,243	0%	13,449	0%	5,570	0%	3,136	0%
		2,561	25%	11,066	18%	4,653	16%	2,391	24%
		5,122	50%	8,682	35%	3,735	33%	1,646	47%
		7,682	75%	6,299	53%	2,818	49%	902	71%
		10,243	100%	3,916	71%	1,900	66%	157	95%
Upper Boguechitto Creek	**Dallas**	11,718	0%	15,092	0%	6,258	0%	3,499	0%
		2,930	25%	12,433	18%	5,235	16%	2,668	24%
		5,859	50%	9,774	35%	4,211	33%	1,837	48%
		8,789	75%	7,115	53%	3,187	49%	1,006	71%
		11,718	100%	4,455	70%	2,163	65%	175	95%
Upper Boguechitto Creek	**Perry**	19,488	0%	24,983	0%	10,363	0%	5,785	0%
		4,872	25%	20,587	18%	8,670	16%	4,411	24%
		9,744	50%	16,191	35%	6,978	33%	3,037	48%
		14,616	75%	11,794	53%	5,285	49%	1,663	71%
		19,488	100%	7,398	70%	3,592	65%	289	95%
Lower Boguechitto Creek	**Dallas**	17,440	0%	22,462	0%	9,314	0%	5,208	0%
		4,360	25%	18,504	18%	7,791	16%	3,971	24%
		8,720	50%	14,546	35%	6,267	33%	2,734	48%
		13,080	75%	10,588	53%	4,743	49%	1,497	71%
		17,440	100%	6,631	70%	3,219	65%	260	95%
Chilatchee Creek	**Dallas**	26,096	0%	33,596	0%	13,932	0%	7,788	0%
		6,524	25%	27,677	18%	11,653	16%	5,938	24%
		13,048	50%	21,758	35%	9,375	33%	4,089	48%
		19,572	75%	15,840	53%	7,096	49%	2,239	71%
		26,096	100%	9,921	70%	4,817	65%	389	95%

SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/Straw/Crimp Seed/ Fertilizer/Transplant					
				Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Chilatchee Creek	Marengo	10,232	0%	13,178	0%	5,465	0%	3,055	0%
		2,558	25%	10,856	18%	4,571	16%	2,330	24%
		5,116	50%	8,534	35%	3,677	33%	1,604	48%
		7,674	75%	6,212	53%	2,783	49%	878	71%
		10,232	100%	3,890	70%	1,889	65%	153	95%
Chilatchee Creek	Perry	3,884	0%	4,977	0%	2,065	0%	1,152	0%
		971	25%	4,101	18%	1,727	16%	879	24%
		1,942	50%	3,226	35%	1,390	33%	605	48%
		2,913	75%	2,350	53%	1,053	49%	331	71%
		3,884	100%	1,474	70%	716	65%	58	95%
Chilatchee Creek	Wilcox	20,826	0%	26,998	0%	11,182	0%	6,297	0%
		5,207	25%	22,212	18%	9,339	16%	4,801	24%
		10,413	50%	17,427	35%	7,497	33%	3,306	48%
		15,620	75%	12,642	53%	5,655	49%	1,810	71%
		20,826	100%	7,856	71%	3,812	66%	315	95%
Lower Alabama									
Randons Creek	Monroe	39,095	0%	32,787	0%	14,177	0%	6,025	0%
		9,774	25%	28,209	14%	12,414	12%	4,594	24%
		19,548	50%	18,367	44%	8,060	43%	3,053	49%
		29,321	75%	19,051	42%	8,888	37%	1,732	71%
		39,095	100%	14,472	56%	7,125	50%	301	95%
Wallers Creek	Monroe	52,209	0%	41,944	0%	18,119	0%	7,752	0%
		13,052	25%	36,053	14%	15,851	13%	5,911	24%
		26,105	50%	30,162	28%	13,583	25%	4,070	47%
		39,157	75%	24,270	42%	11,315	38%	2,229	71%
		52,209	100%	18,378	56%	9,047	50%	388	95%

SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/ Straw/Net/Seed/Fertilizer/Transplant					
				Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Upper Alabama									
Hudson Creek	**Autauga**	2,490	0%	5,231	0%	2,117	0%	1,353	0%
		623	25%	4,333	17%	1,772	16%	1,072	21%
		1,245	50%	3,434	34%	1,426	33%	791	42%
		1,868	75%	2,536	52%	1,080	49%	511	62%
		2,490	100%	1,638	69%	734	65%	230	83%
Hudson Creek	**Elmore**	8,304	0%	18,536	0%	7,450	0%	4,941	0%
		2,076	25%	15,256	18%	6,187	17%	3,916	21%
		4,152	50%	11,975	35%	4,924	34%	2,890	42%
		6,228	75%	8,694	53%	3,661	51%	1,865	62%
		8,304	100%	5,414	71%	2,398	68%	840	83%
Galbraith Mill Creek	**Montgomery**	3,000	0%	2,177	0%	951	0%	373	0%
		750	25%	1,930	11%	856	10%	295	21%
		1,500	50%	1,682	23%	761	20%	218	42%
		2,250	75%	1,435	34%	666	30%	141	62%
		3,000	100%	1,187	45%	570	40%	63	83%
Tallawessee Creek	**Lowndes**	17,923	0%	22,698	0%	9,426	0%	5,226	0%
		4,481	25%	19,228	15%	8,090	14%	4,142	21%
		8,962	50%	15,758	31%	6,754	28%	3,057	41%
		13,442	75%	12,287	46%	5,418	43%	1,973	62%
		17,923	100%	8,817	61%	4,082	57%	888	83%
Cypress Creek	**Lowndes**	8,766	0%	11,509	0%	4,767	0%	2,684	0%
		2,192	25%	9,728	15%	4,081	14%	2,127	21%
		4,383	50%	7,946	31%	3,395	29%	1,570	42%
		6,575	75%	6,164	46%	2,709	43%	1,013	62%
		8,766	100%	4,382	62%	2,023	58%	456	83%
Lower Big Swamp Creek	**Lowndes**	45,073	0%	58,748	0%	24,346	0%	13,664	0%
		11,268	25%	49,675	15%	20,853	14%	10,829	21%
		22,537	50%	40,603	31%	17,360	29%	7,993	41%
		33,805	75%	31,530	46%	13,867	43%	5,158	62%
		45,073	100%	22,457	62%	10,374	57%	2,323	83%
Upper Catoma Creek	**Montgomery**	37,475	0%	30,322	0%	13,089	0%	5,631	0%
		9,369	25%	26,583	12%	11,649	11%	4,463	21%
		18,738	50%	22,844	25%	10,210	22%	3,294	41%
		28,106	75%	19,104	37%	8,770	33%	2,126	62%
		37,475	100%	15,365	49%	7,330	44%	957	83%
Ramer Creek	**Montgomery**	16,383	0%	13,245	0%	5,718	0%	2,459	0%
		4,096	25%	11,613	12%	5,089	11%	1,948	21%
		8,192	50%	9,981	25%	4,461	22%	1,438	41%
		12,287	75%	8,348	37%	3,832	33%	928	62%
		16,383	100%	6,715	49%	3,204	44%	418	83%
Lower Mulberry	**Autauga**	23,000	0%	22,665	0%	9,684	0%	4,479	0%
		5,750	25%	19,690	13%	8,539	12%	3,550	21%
		11,500	50%	16,716	26%	7,394	24%	2,620	42%
		17,250	75%	13,742	39%	6,249	35%	1,691	62%
		23,000	100%	10,767	52%	5,103	47%	761	83%
Lower Mulberry	**Chilton**	41,272	0%	50,148	0%	20,975	0%	11,138	0%
		10,318	25%	42,752	15%	18,128	14%	8,827	21%
		20,636	50%	35,357	29%	15,281	27%	6,516	42%
		30,954	75%	27,961	44%	12,433	41%	4,205	62%
		41,272	100%	20,565	59%	9,586	54%	1,893	83%

SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/ Straw/Net/Seed/Fertilizer/Transplant					
				Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Lower Mulberry	Dallas	21,621	0%	27,676	0%	11,482	0%	6,403	0%
		5,405	25%	23,425	15%	9,845	14%	5,074	21%
		10,811	50%	19,174	31%	8,208	29%	3,746	41%
		16,216	75%	14,922	46%	6,571	43%	2,417	62%
		21,621	100%	10,670	61%	4,935	57%	1,088	83%
Soapstone Creek	Dallas	29,894	0%	38,552	0%	15,985	0%	8,942	0%
		7,474	25%	32,615	15%	13,699	14%	7,087	21%
		14,947	50%	26,677	31%	11,413	29%	5,231	42%
		22,421	75%	20,740	46%	9,128	43%	3,376	62%
		29,894	100%	14,802	62%	6,841	57%	1,520	83%
Valley Creek	Dallas	27,929	0%	36,225	0%	15,001	0%	8,455	0%
		6,982	25%	30,611	15%	12,839	14%	6,701	21%
		13,965	50%	24,997	31%	10,678	29%	4,946	41%
		20,947	75%	19,382	46%	8,517	43%	3,192	62%
		27,929	100%	13,768	62%	6,355	58%	1,437	83%
Lower Catoma Creek	Montgomery	18,700	0%	15,131	0%	6,531	0%	2,810	0%
		4,675	25%	13,265	12%	5,813	11%	2,227	21%
		9,350	50%	11,399	25%	5,095	22%	1,644	42%
		14,025	75%	9,533	37%	4,376	33%	1,061	62%
		18,700	100%	7,667	49%	3,658	44%	478	83%
Middle Alabama									
Mush Creek	Dallas	9,628	0%	12,525	0%	5,190	0%	2,914	0%
		2,407	25%	10,590	15%	4,445	14%	2,309	21%
		4,814	50%	8,655	31%	3,700	29%	1,705	42%
		7,221	75%	6,720	46%	2,955	43%	1,100	62%
		9,628	100%	4,786	62%	2,211	57%	495	83%
Mush Creek	Lowndes	10,243	0%	13,449	0%	5,570	0%	3,136	0%
		2,561	25%	11,367	15%	4,769	14%	2,485	21%
		5,122	50%	9,285	31%	3,967	29%	1,834	41%
		7,682	75%	7,202	46%	3,165	43%	1,184	62%
		10,243	100%	5,120	62%	2,364	58%	533	83%
Upper Boguechitto Creek	Dallas	11,718	0%	15,092	0%	6,258	0%	3,499	0%
		2,930	25%	12,769	15%	5,364	14%	2,773	21%
		5,859	50%	10,445	31%	4,469	29%	2,047	42%
		8,789	75%	8,122	46%	3,575	43%	1,321	62%
		11,718	100%	5,799	62%	2,680	57%	595	83%
Upper Boguechitto Creek	Perry	19,488	0%	24,983	0%	10,363	0%	5,785	0%
		4,872	25%	21,142	15%	8,884	14%	4,584	21%
		9,744	50%	17,301	31%	7,405	29%	3,384	42%
		14,616	75%	13,460	46%	5,926	43%	2,184	62%
		19,488	100%	9,619	61%	4,448	57%	983	83%
Lower Boguechitto Creek	Dallas	17,440	0%	22,462	0%	9,314	0%	5,208	0%
		4,360	25%	19,004	15%	7,983	14%	4,127	21%
		8,720	50%	15,546	31%	6,652	29%	3,046	42%
		13,080	75%	12,088	46%	5,321	43%	1,966	62%
		17,440	100%	8,630	62%	3,989	57%	885	83%
Chilatchee Creek	Dallas	26,096	0%	33,596	0%	13,932	0%	7,788	0%
		6,524	25%	28,425	15%	11,941	14%	6,172	21%
		13,048	50%	23,254	31%	9,950	29%	4,556	42%
		19,572	75%	18,083	46%	7,959	43%	2,940	62%
		26,096	100%	12,911	62%	5,968	57%	1,324	83%

SubWatershed	County	Acres of Forest Land	Percent of Acres Put in BMP	BMP - Forestry: Site Preparation/ Straw/Net/Seed/Fertilizer/Transplant					
				Nitrogen Load from Forest Land - With Percent Reductions (tons/year)		Phosphorus Load from Forest Land - With Percent Reductions (tons/year)		Sediment Load from Forest Land - With Percent Reductions (tons/year)	
Chilatchee Creek	**Marengo**	10,232	0%	13,178	0%	5,465	0%	3,055	0%
		2,558	25%	11,149	15%	4,684	14%	2,421	21%
		5,116	50%	9,121	31%	3,903	29%	1,787	42%
		7,674	75%	7,092	46%	3,122	43%	1,153	62%
		10,232	100%	5,063	62%	2,341	57%	519	83%
Chilatchee Creek	**Perry**	3,884	0%	4,977	0%	2,065	0%	1,152	0%
		971	25%	4,212	15%	1,770	14%	913	21%
		1,942	50%	3,447	31%	1,475	29%	674	42%
		2,913	75%	2,682	46%	1,181	43%	435	62%
		3,884	100%	1,917	61%	886	57%	196	83%
Chilatchee Creek	**Wilcox**	20,826	0%	26,998	0%	11,182	0%	6,297	0%
		5,207	25%	22,817	15%	9,572	14%	4,990	21%
		10,413	50%	18,636	31%	7,962	29%	3,683	42%
		15,620	75%	14,455	46%	6,353	43%	2,377	62%
		20,826	100%	10,274	62%	4,743	58%	1,070	83%
Lower Alabama									
Randons Creek	**Monroe**	39,095	0%	32,787	0%	14,177	0%	6,025	0%
		9,774	25%	28,787	12%	12,636	11%	4,774	21%
		19,548	50%	24,787	24%	11,096	22%	3,524	41%
		29,321	75%	20,786	37%	9,556	33%	2,274	62%
		39,095	100%	16,786	49%	8,016	43%	1,024	83%
Wallers Creek	**Monroe**	52,209	0%	41,944	0%	18,119	0%	7,752	0%
		13,052	25%	36,797	12%	16,138	11%	6,143	21%
		26,105	50%	31,650	25%	14,156	22%	4,535	41%
		39,157	75%	26,503	37%	12,174	33%	2,926	62%
		52,209	100%	21,282	49%	10,158	44%	1,313	83%



ALABAMA RIVER BASIN

Including Sub-Watersheds (HUC-11)

Dams

Highways

Hydrobase Streams

Subwatersheds

County Boundaries

Alabama River
Basin Managment Plan

Map Number: 1

20 10 0 20

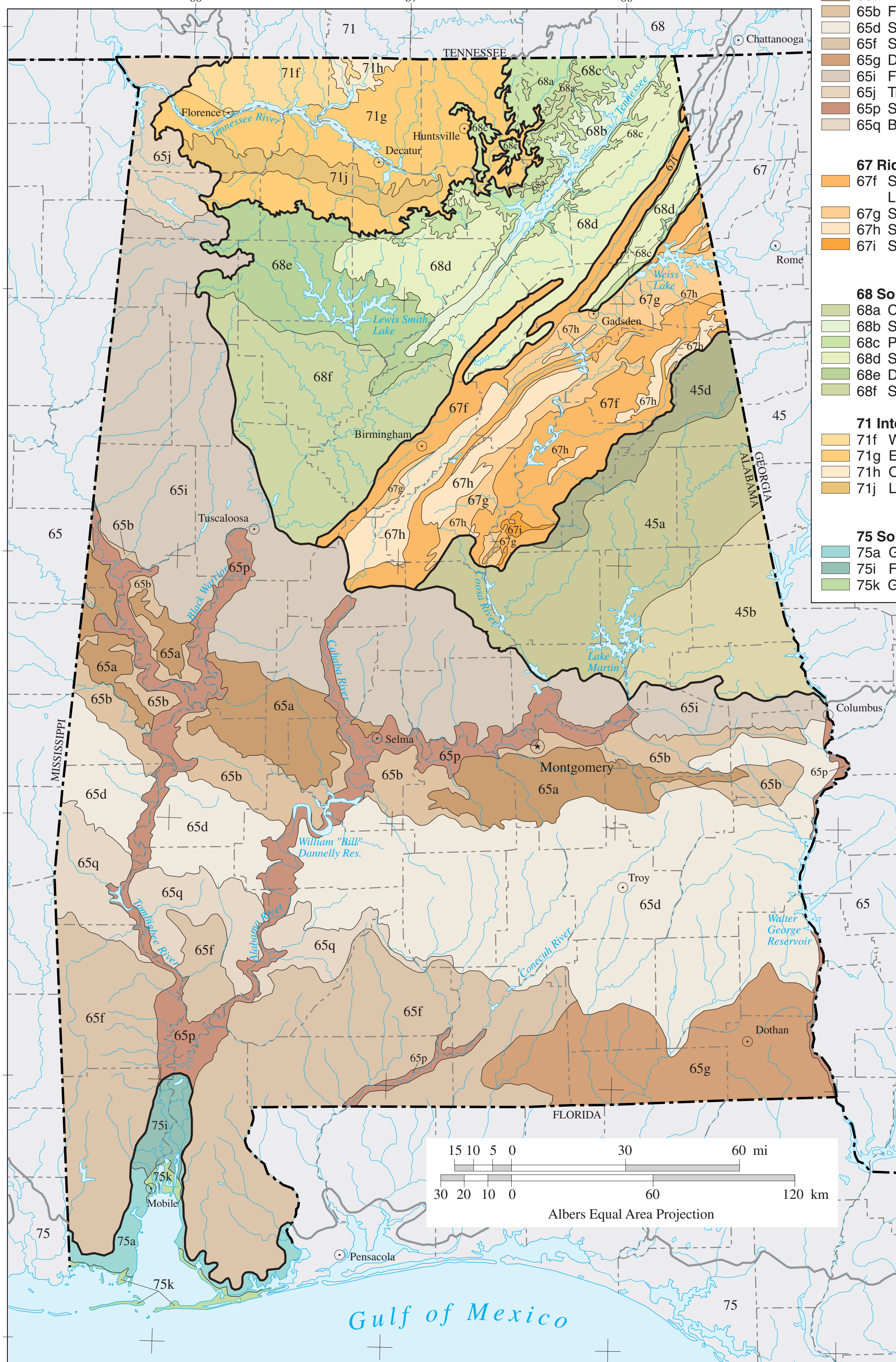
Miles

Map produced for: ALABAMA CLEAN WATER PARTNERSHIP

Map produced by: Kleinschmidt Energy & Water Resource Consultants

Data made available from ADEM & ESRI
Dam locations derived from National Dam Inventory

Level III and IV Ecoregions of Alabama



45 Piedmont
- 45a Southern Inner Piedmont
- 45b Southern Outer Piedmont
- 45d Talladega Upland

65 Southeastern Plains
- 65a Blackland Prairie
- 65b Flatwoods/Blackland Prairie Margins
- 65d Southern Hilly Gulf Coastal Plain
- 65f Southern Pine Plains and Hills
- 65g Dougherty Plain
- 65i Fall Line Hills
- 65j Transition Hills
- 65p Southeastern Floodplains and Low Terraces
- 65q Buhrstone/Lime Hills

67 Ridge and Valley
- 67f Southern Limestone/Dolomite Valleys and Low Rolling Hills
- 67g Southern Shale Valleys
- 67h Southern Sandstone Ridges
- 67i Southern Dissected Ridges and Knobs

68 Southwestern Appalachians
- 68a Cumberland Plateau
- 68b Sequatchie Valley
- 68c Plateau Escarpment
- 68d Southern Table Plateaus
- 68e Dissected Plateau
- 68f Shale Hills

71 Interior Plateau
- 71f Western Highland Rim
- 71g Eastern Highland Rim
- 71h Outer Nashville Basin
- 71j Little Mountain

75 Southern Coastal Plain
- 75a Gulf Coast Flatwoods
- 75i Floodplains and Low Terraces
- 75k Gulf Barrier Islands and Coastal Marshes

Level III ecoregion
Level IV ecoregion
County boundary
State boundary

PRINCIPAL AUTHORS:
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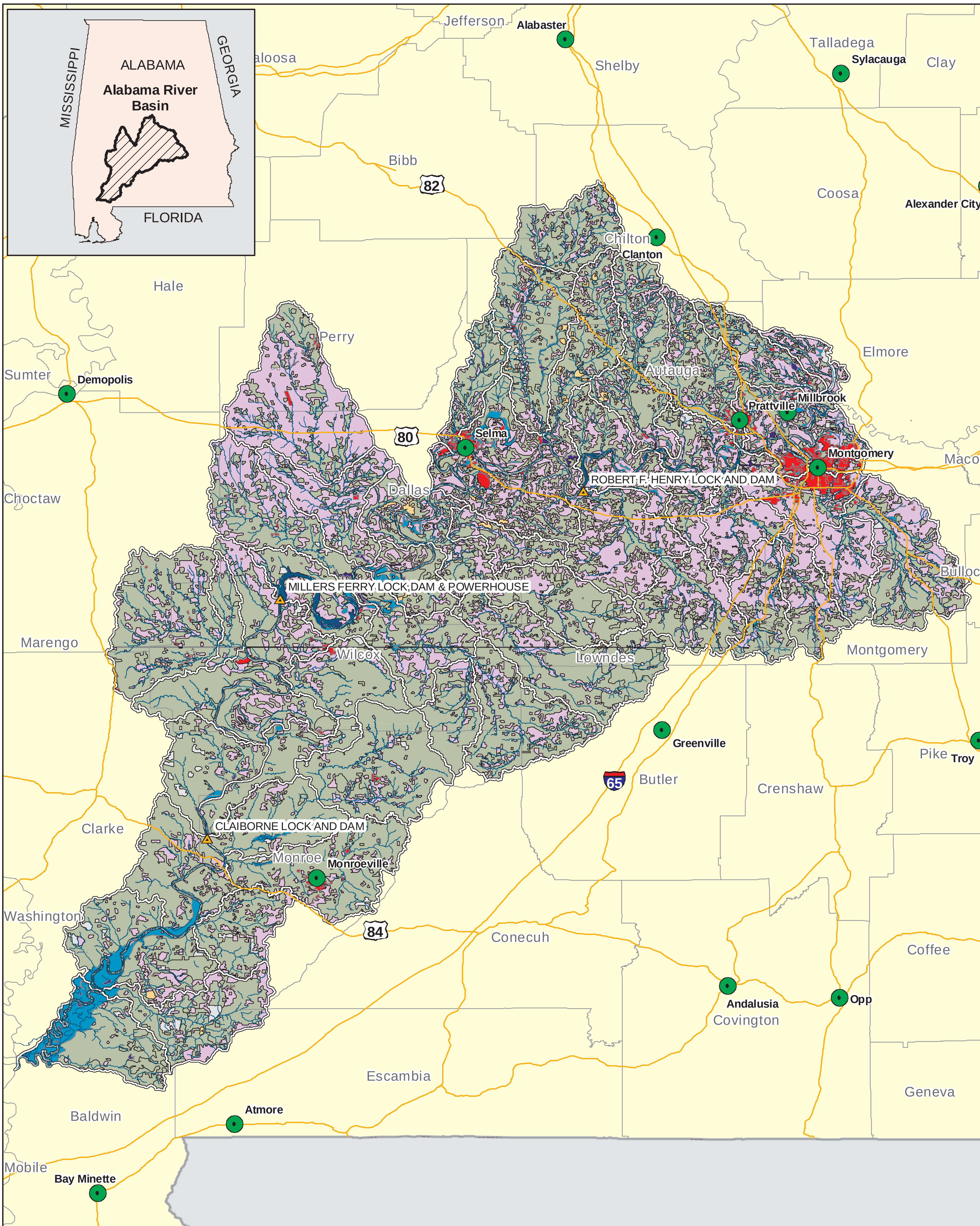
CITING THIS MAP:
Griffith, G.E., J.M. Omernik, J.A. Comstock, G. Martin, A. Goddard, and V.J. Hulcher. 2001. Ecoregions of Alabama. U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, OR.

This project was partially supported by funds from the Alabama Department of Environmental Management through grants provided by the U.S. Environmental Protection Agency Region IV under the provisions of Section 319(h) of the Federal Water Pollution Control Act .



Dams
Highways
County Boundaries
Subwatersheds

Land Use Code

Unknown
Urban
Agricultural
Rangeland
Forest
Water
Wetlands
Barren

LAND USE

Alabama River Basin Managment Plan

Map Number: 3

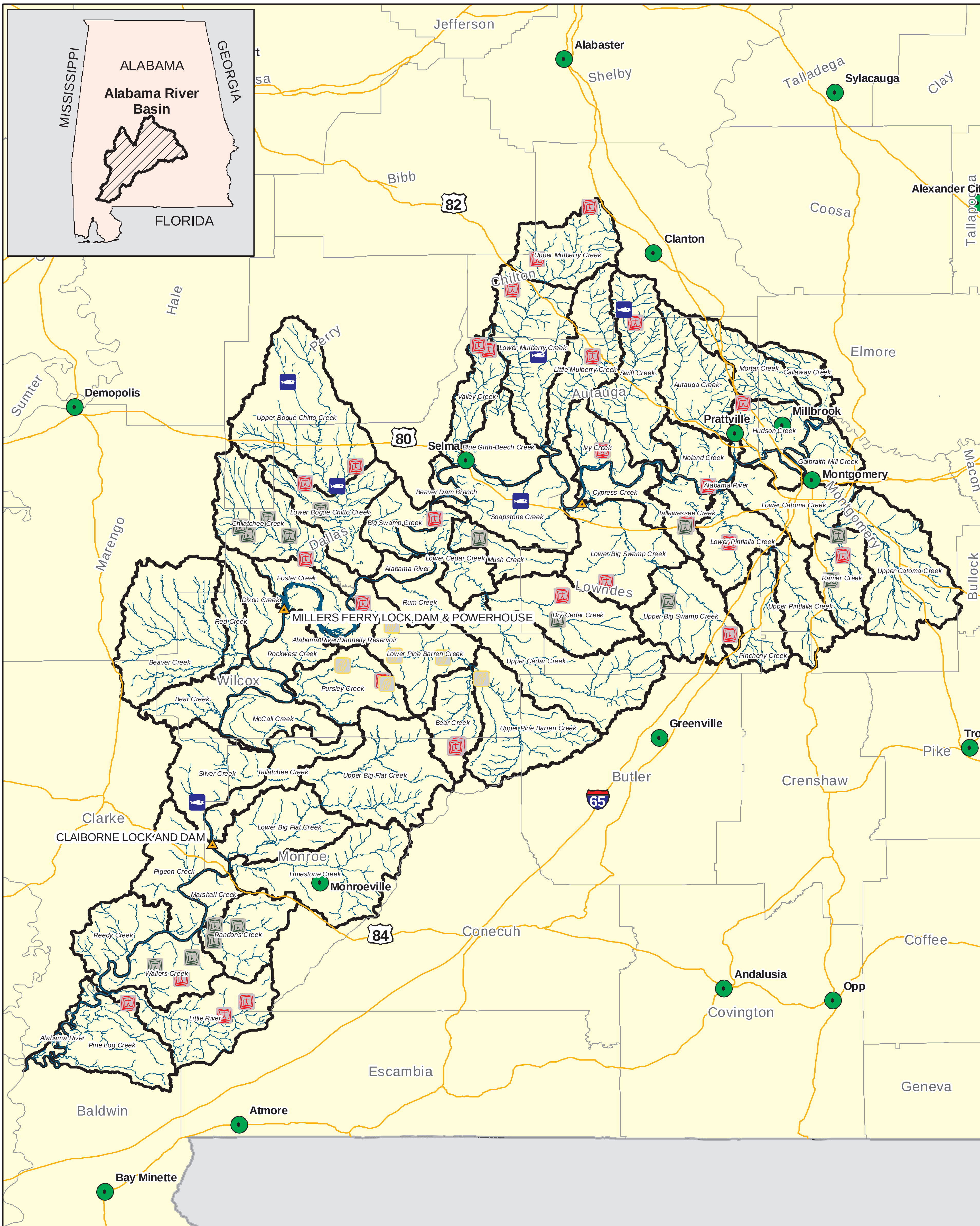
Map produced for: ALABAMA CLEAN WATER PARTNERSHIP

Map produced by: Kleinschmidt Energy & Water Resource Consultants

20 10 0 20

Miles

Land Use data developed by USGS, 1990
Dam locations derived from National Dam Inventory



Dams

1997-2001 ALAMAP Stations

ACT Stations

2000 303d Stations

Ecological Reference Sites

Hydrobase Streams

Subwatersheds

Data made available from ADEM & ESRI
Dam locations derived from National Dam Inventory

DATA COLLECTION POINTS 1990 - 2002

Alabama River Basin Managment Plan

20 10 0 20
Miles

Map Number: 4

Map produced for: ALABAMA CLEAN WATER PARTNERSHIP

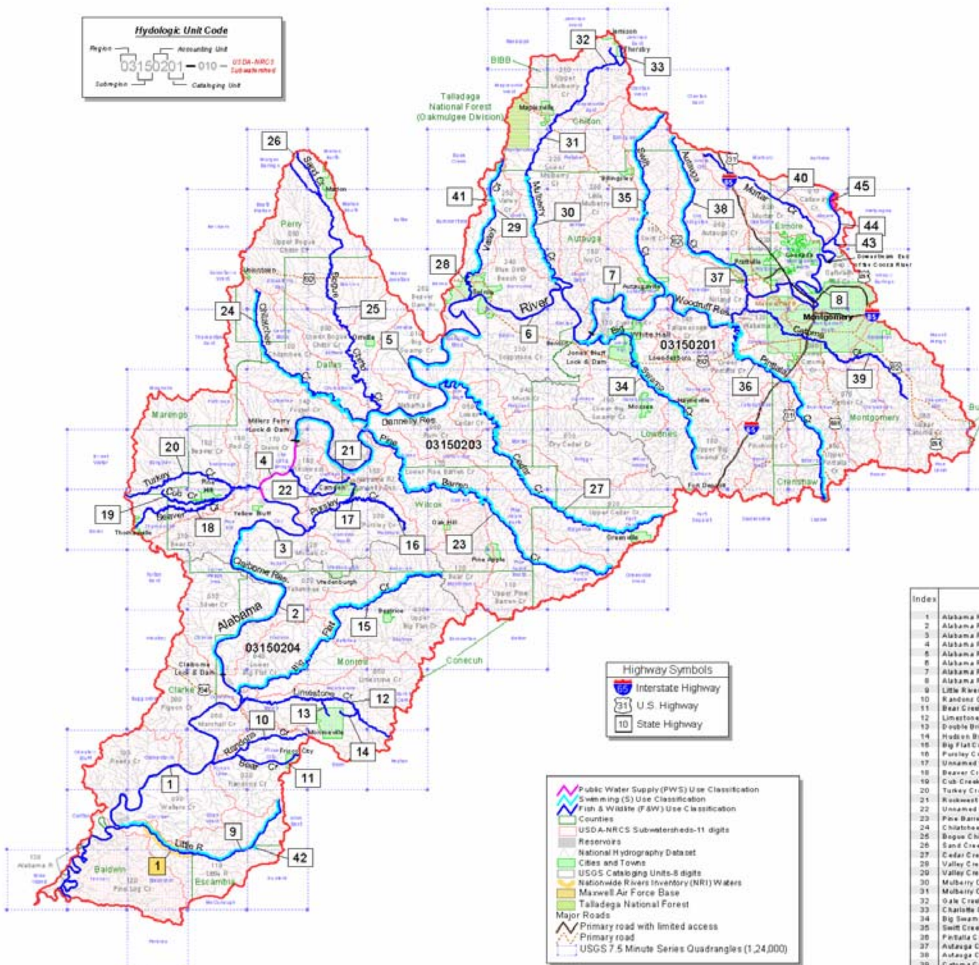
Map produced by: Kleinschmidt Energy & Water Resource Consultants

FINAL

Alabama River Basin Classified Waters

ADEM Water Division - Water Quality Program
Chapter 335-6-11
Water Use Classifications For Interstate and Intrastate Waters
Effective Date: 01/12/2001

USGS Catalog No	Quad Name	ADEM Map No
32086-D6	Autaugaville	105NW
31087-H7	Bashi	80NE
31087-F2	Beatrice	63NW
32086-C7	Benton	106SE
31086-F8	Bethel	62NW
31087-B8	Bilbo Island	38NW
32086-F6	Billingsley	120NW
31087-B6	Blacksher	37NW
32087-C1	Blackwell Bend	107SE
32086-A7	Braggs	91SE
32087-D3	Browns	108NE
32087-F1	Buck Creek	122NE
32086-D8	Burnsville	106NW
31087-E2	Burnt Corn	63SW
32086-A5	Calhoun	39NE
32087-A3	Camden North	78NE
31087-H3	Camden South	130SW
32086-C4	Cantelous	234SE
32087-A1	Carlowville	62SE
31087-C7	Carlton	33NE
32087-B4	Catherine	195NE
32087-C4	Central Mills	195NW
31087-F5	Chance	65NE
32085-A8	China Grove	87SW
31087-D7	Choctaw Bluff	52NE
31087-C6	Chrysler	51SW
31087-E5	Claiborne	65SE
32086-G5	Clanton East	134SE
32086-G6	Clanton West	134SW
32086-B7	Collirene	91NE
31087-H4	Coy	78NW
32087-B3	Cromptonia	93NE
31086-H4	Danielsville	74NW
32085-B2	Davis Crossroads	88NW
32086-E4	Deatsville	119SW
32086-D7	Durant Bend	106NE
32087-B1	Elm Bluff	92NE
32086-E3	Elmore	119SE
31087-D3	Excel	50NE
32085-B8	Fitzpatrick	87NW
32087-B5	Flatwood	94NE
31087-D6	Flynns Lake	51NE
31086-G7	Forest Home	76SE
32086-D5	Forester	105NE
31086-H6	Fort Dale	75NW
31086-H5	Fort Deposit	75NE
31087-F4	Franklin	64NW
31087-D4	Frisco City	50NW
31087-G6	Fulton East	79SW
31087-D6	Gainestown	51NW
32086-B6	Gordonsville	90NW
31086-G6	Greenville West	75SW
32086-B5	Hayneville	90NE
32086-F3	Holtville	119NE
31087-B4	Huxford	36NW
31087-G4	Hybart	78SW
32086-H6	Jemison East	134NW
32086-H7	Jemison West	135NE
32086-E8	Jones	121SW
32087-A5	Kimbrough	94SE
31086-H3	Lapine	74NE
32087-A4	Lee Long Bridge	93SW
32086-B4	Letohatchee	89NW
31087-G5	Lower Peach Tree	79SE
32086-C5	Lowndesboro	105SE
32087-B6	Magnolia	94NW
32086-G7	Maplesville East	135SE
32086-G8	Maplesville West	135SW
32086-F4	Marbury	119NW
32087-D2	Marion Junction	107NW
32087-F3	Marion North	123NE
32087-E3	Marion South	123SE
31087-B5	McCullough	37NE
31087-G1	McWilliams	77SE
31087-E4	Mexia	64SW
32086-E7	Milton	121SE
32086-A8	Minter	91SW
31087-E3	Monroeville	64SE
32086-D3	Montgomery North	104NE
32086-C3	Montgomery South	104SE
32087-F4	Morgan Springs	123NW
32086-C1	Mount Meigs	103SE
32086-A6	Mount Willing	90SW
31087-G2	Nadawah	77SW
31087-F3	Natchez	64NE
32087-E5	Newbern	124SE
31087-H1	Oak Hill	77NE
32086-E5	Old Kingston	120SE
32087-C2	Orrville	107SW
31087-A6	Perdido	37SW
31086-H8	Pine Apple North	76NW
31086-G8	Pine Apple South	76SW
31087-H5	Pine Hill	79NE
32086-A1	Pine Level	88SE
32086-F8	Plantersville	121NW
32085-B8	Pleasant Hill	91NW
32086-F7	Pletcher	121NE
32086-D4	Prattville	104NW
32086-A2	Ramer	88SW
32086-H8	Randolph	136NW
31087-D2	Repton	49NW
31086-H7	Ridgeville	76NE
31087-H2	Rosebud	77NW
32087-C3	Safford	108SE
32086-A4	Sandy Ridge	89SW
32086-C8	Sardis	106SW
32087-E4	Scott Station	123SW
32086-A3	Sellers	89SE
32087-D1	Selma	107NE
31087-F1	Skinnerton	63NE
32086-B3	Snowdoun	89NE
31087-E6	Suggsville	65SW
32087-E1	Summerfield	122SE
32087-A6	Surginer	94SW
32087-E2	Suttle	122SW
32087-A7	Sweet Water	95SE
32087-B2	Tasso	92NW
32086-B1	Teasleys Mill	88NE
31087-B7	Tensaw	38NE
32087-C5	Thomaston East	109SE
31087-H6	Thomasville	79NW
32087-A2	Tilden	92SW
32087-D5	Uniontown West	109NW
31087-C4	Uriah East	50SW
31087-C5	Uriah West	51SE
32086-E6	Vida	120SW
31087-G3	Vredenburgh	78SE
32086-E2	Wetumpka	118SW
31087-F6	Whatley	66NW
32086-F5	White City	120NE
32086-C6	White Hall	105SW
32086-D2	Willow Springs	103NW



10 0 10 Miles
10 0 10 Kilometers
Scale 1:600,000

Software: ESRI's Arcview ™ 3.2
Extension: RTI's NHD-RIT
Avenue Script: R. Buurman's Graphtab.ave
Projection: Geographic/Unprojected
Datum: NAD83
Date: 12/14/2001
By: Mike Rief mjr@adem.state.al.us
ADEM Water Quality Branch

1 Nationwide Rivers Inventory (NRI)

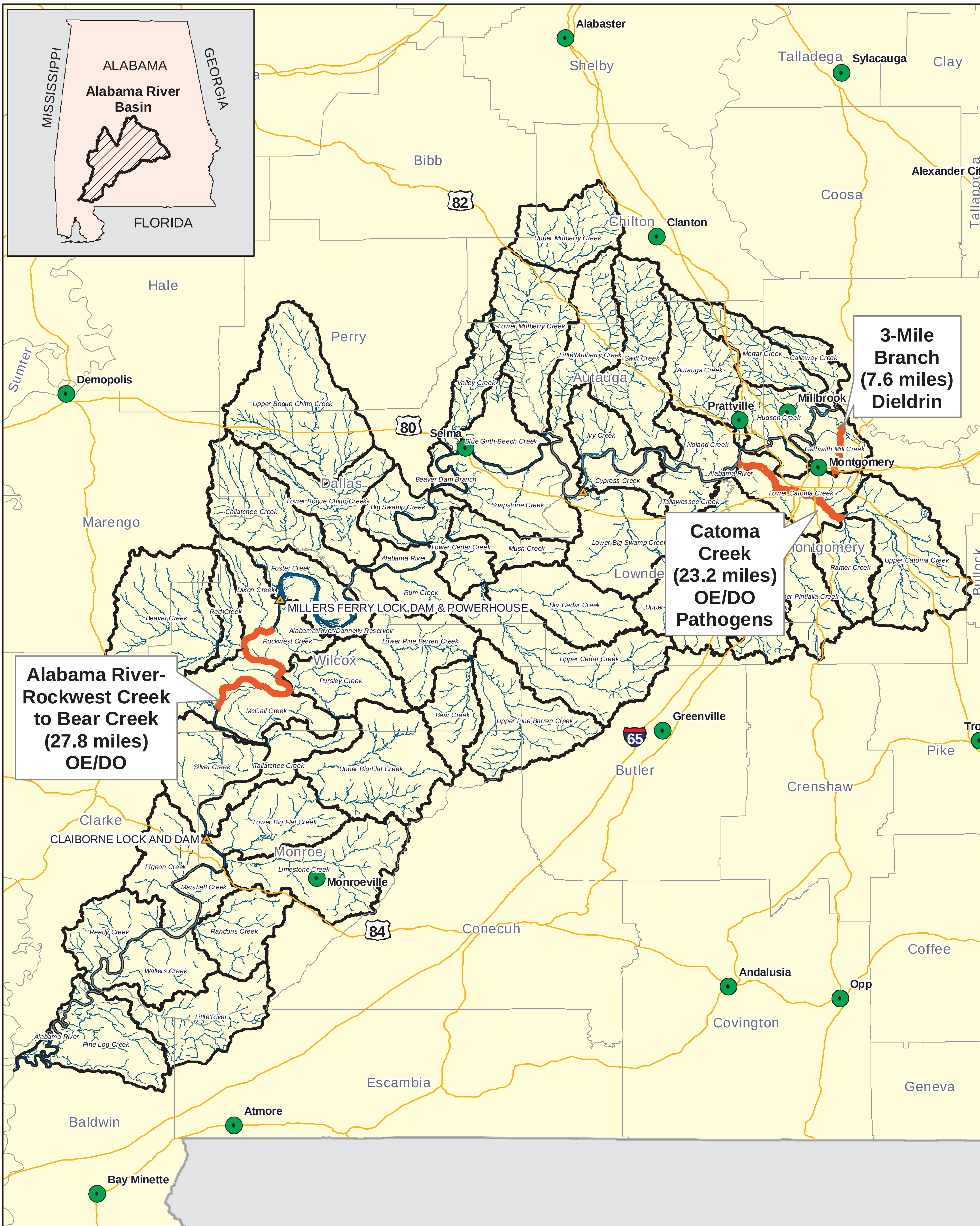
Index	Waterbody	Location	ORVs[1]	Comments
1	Little River	From AL 59 To Co. Rd. 1	Scenic Recreation Fish Wildlife	Outstanding State coastal canoe stream with numerous sand bars.

1 Outstandingly Remarkable Values > S=Scenery, R=Recreation, G=Geology, F=Fish, W=Wildlife, H=History, C=Cultural
The NRI can be obtained from http://www.nps.gov/rivers/

1-45 Alabama River Basin Classified Waters

Index	Stream	From	To	Classification
1	Alabama River	MOBILE RIVER		F&W
2	Alabama River	Claiborne Lock and Dam		S/F&W
3	Alabama River	Frisco Railroad Crossing	Claiborne Lock and Dam	F&W
4	Alabama River	River Mile 131	Frisco Railroad Crossing	PWS
5	Alabama River	Millers Ferry Lock and Dam	River Mile 131	S/F&W
6	Alabama River	Blackwell Bend (Six Mile Creek)	Millers Ferry Lock and Dam	F&W
7	Alabama River	Jones Bluff Lock and Dam	Blackwell Bend (Six Mile Creek)	S/F&W
8	Alabama River	Pintlalla Creek	Jones Bluff Lock and Dam	F&W
9	Little River	ALABAMA RIVER	Pintlalla Creek	S/F&W
10	Randons Creek	ALABAMA RIVER	Its source	F&W
11	Bear Creek	Randons Creek	Its source	F&W
12	Limestone Creek	ALABAMA RIVER	Its source	F&W
13	Double Bridges Creek	Limestone Creek	Its source	F&W
14	Hudson Branch	Limestone Creek	Its source	F&W
15	Big Flat Creek	ALABAMA RIVER	Its source	S/F&W
16	Pursley Creek	ALABAMA RIVER	Its source	F&W
17	Unnamed tributary south of Camden	Pursley Creek	Its source	F&W
18	Beaver Creek	ALABAMA RIVER	Its source	F&W
19	Cub Creek	Beaver Creek	Its source	F&W
20	Turkey Creek	Beaver Creek	Its source	F&W
21	Rockwest Creek	ALABAMA RIVER	Its source	F&W
22	Unnamed tributary west of Camden	Rockwest Creek	Its source	F&W
23	Pine Barren Creek	ALABAMA RIVER	Its source	S/F&W
24	Chilatchee Creek	ALABAMA RIVER	Its source	S/F&W
25	Bogue Chitto Creek	ALABAMA RIVER	Its source	F&W
26	Sand Creek	Bogue Chitto Creek	Its source	F&W
27	Cedar Creek	ALABAMA RIVER	Its source	S/F&W
28	Valley Creek	ALABAMA RIVER	Its source	F&W
29	Valley Creek	Selma-Summerfield Rd.	Its source	S/F&W
30	Mulberry Creek	ALABAMA RIVER	Selma-Summerfield Rd.	S/F&W
31	Mulberry Creek	Plantersville	Its source	F&W
32	Gale Creek	Mulberry Creek	Plantersville	F&W
33	Charlotte Creek	Gale Creek	Its source	F&W
34	Big Swamp Creek	ALABAMA RIVER	Its source	S/F&W
35	Swift Creek	ALABAMA RIVER	Its source	S/F&W
36	Pintlalla Creek	ALABAMA RIVER	Its source	S/F&W
37	Autauga Creek	ALABAMA RIVER	Its source	F&W
38	Autauga Creek	Western boundary of Prattville	Its source	S/F&W
39	Catoma Creek	ALABAMA RIVER	Western boundary of Prattville	F&W
40	Mortar Creek	COOSA RIVER	Its source	F&W
41	Valley Creek Lake	Within Valley Creek State Park	Its source	S/F&W
42	Little River Lake	Within Little River State Park	Its source	S/F&W
43	Coosa River*	ALABAMA RIVER	Jordan Dam	F&W
44	Bouldin Canal (Callaway Creek)*	COOSA RIVER	Bouldin Dam	F&W
45	Coosa River (Lake Jordan)*	Bouldin Dam	Alabama Highway 111	PWS/S/F&W

* In Chapter §335-6-11 these classifications are listed under the Coosa River Basin section



- Dams
- Hydrobase Streams
- Impaired Streams
- Subwatersheds
- County Boundaries

303(d) Streams from ADEM, 2002 and 2004
Modified by Kleinschmidt Associates
Dam locations derived from National Dam Inventory

IMPAIRED WATERS OF THE ALABAMA RIVER BASIN

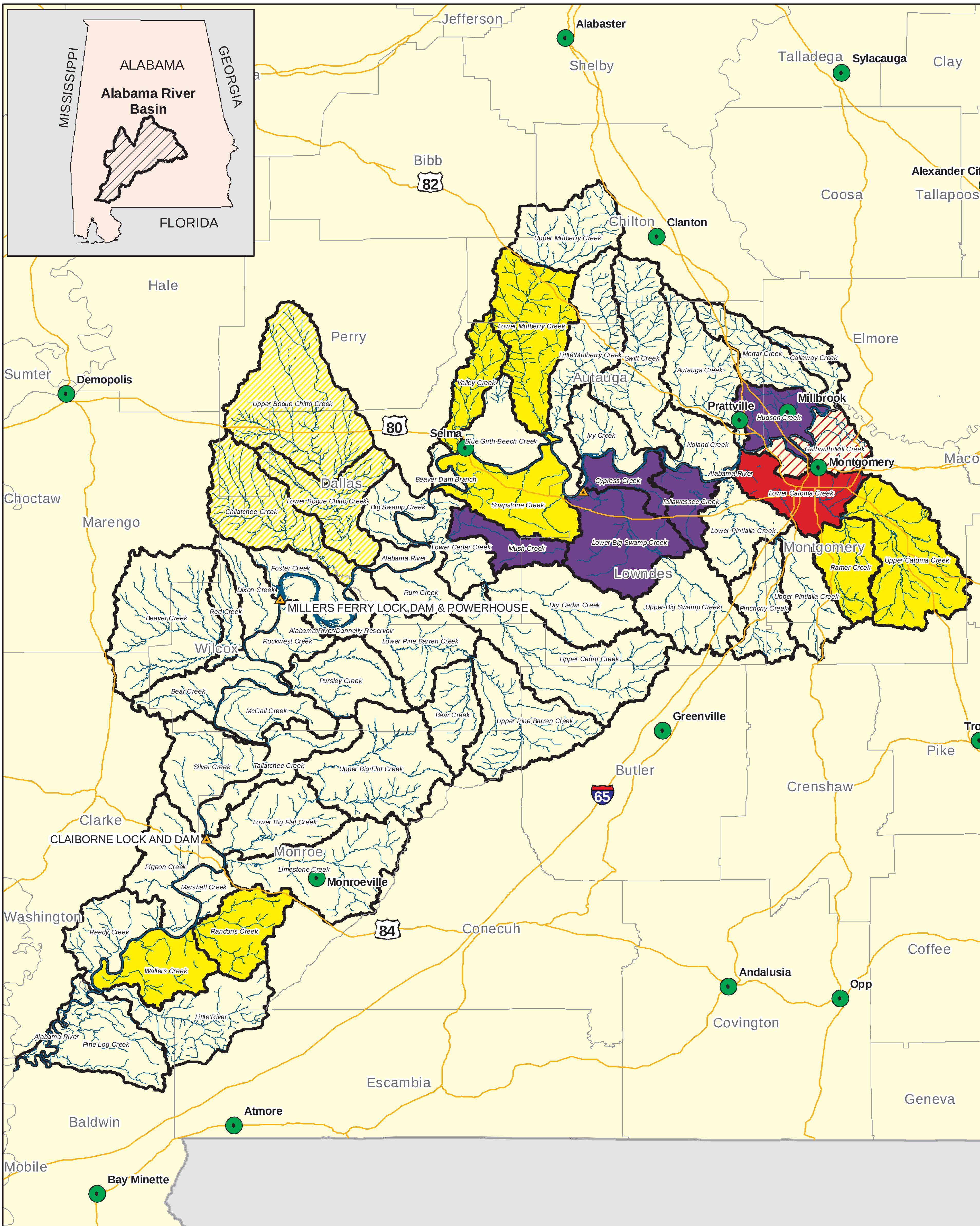
Alabama River Basin Managment Plan

20 10 0 20
Miles

Map Number: 6

Map produced for: ALABAMA CLEAN WATER PARTNERSHIP

Map produced by: Kleinschmidt Energy & Water Resource Consultants



Dams

Highways

Hydrobase Streams

County Boundaries

Target Subwatersheds

N/A

303(d)

ADEM Priority SW

High NPS Potential

High NPS Potential; 303(d)

High NPS Potential; ADEM Priority SW

TARGET SUBWATERSHEDS

Alabama River
Basin Managment Plan

Map Number: 7

Map produced for:

ALABAMA
CLEAN WATER PARTNERSHIP

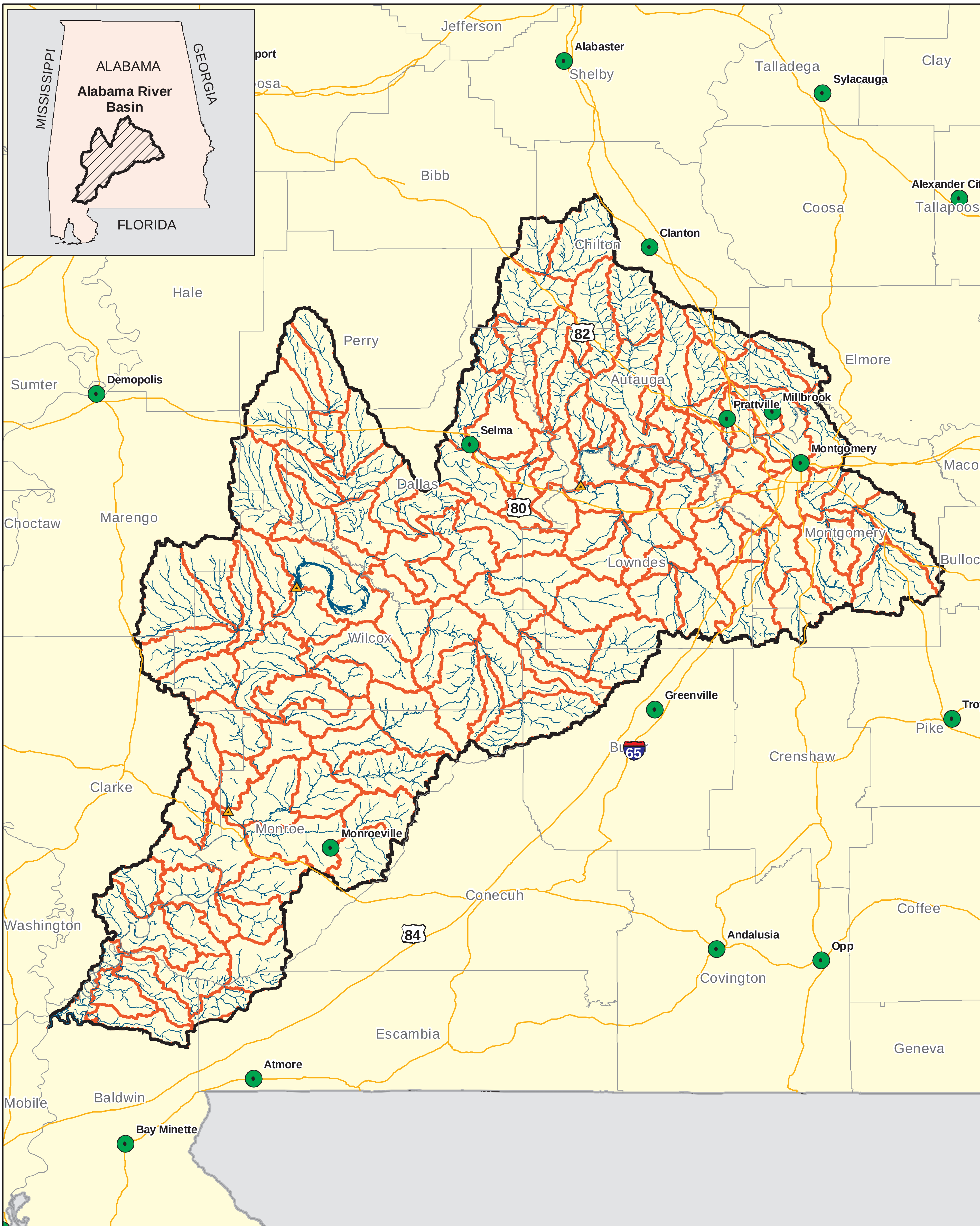
Map produced by:

Energy & Water Resource Consultants

20 10 0 20

Miles

Data made available from ADEM & ESRI
Dam locations derived from National Dam Inventory
Target Watersheds data from ADEM, 2003



Dams

Highways

Hydrobase Streams

County Boundaries

Watershed (HUC 12 Boundary)

ALABAMA RIVER BASIN

Including Watersheds (HUC 12)

Alabama River Basin Managment Plan

20 10 0 20

Miles

Map Number: 8

Map produced for: ALABAMA CLEAN WATER PARTNERSHIP

Map produced by: Kleinschmidt Energy & Water Resource Consultants

Data made available from ADEM & ESRI
Dam locations derived from National Dam Inventory