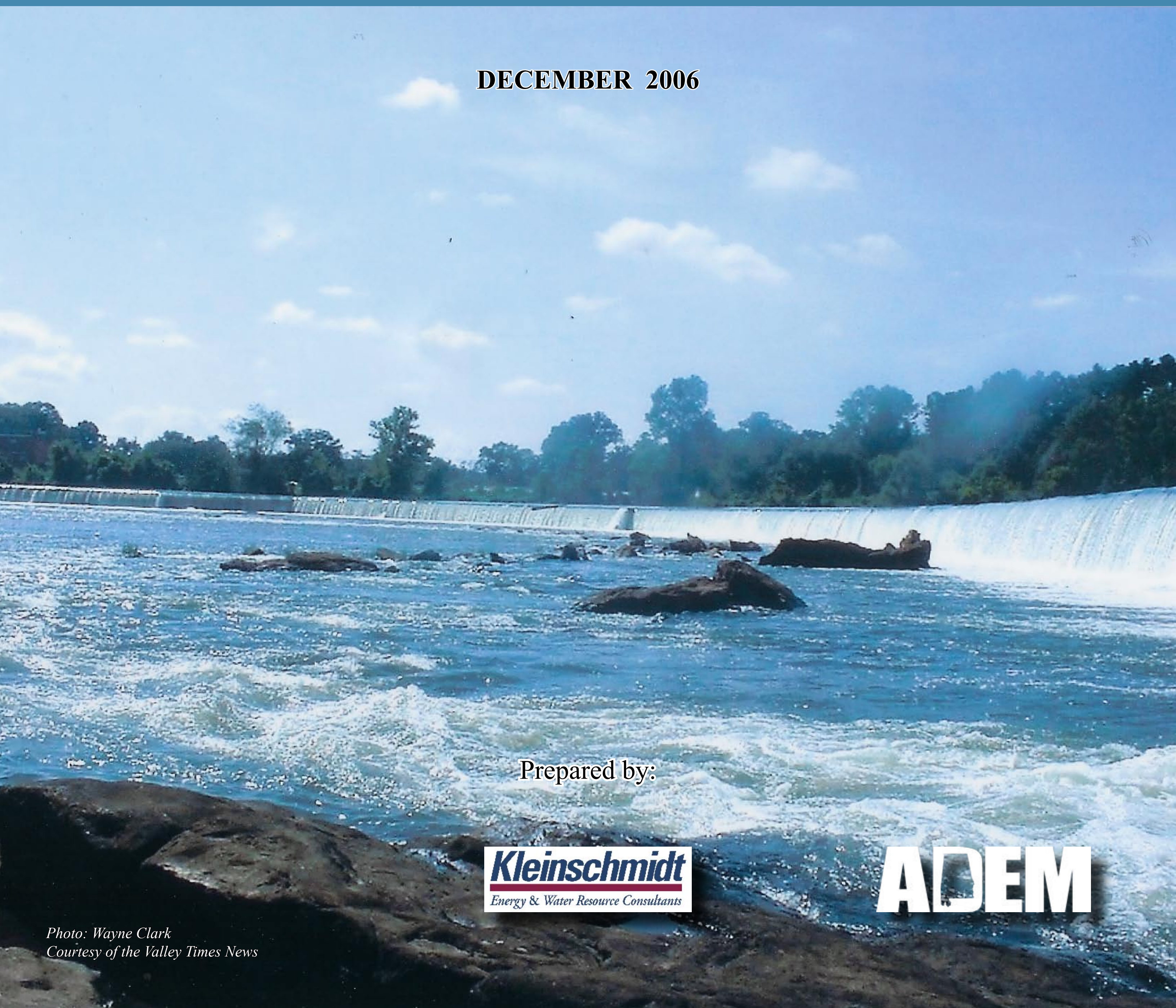
CHATTAHOOCHEE & CHIPOLA RIVERS BASIN MANAGEMENT PLAN

Alabama Clean Water Partnership

Montgomery, Alabama



DECEMBER 2006

Prepared by:

Kleinschmidt
Energy & Water Resource Consultants

ADEM

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CHATTAHOOCHEE & CHIPOLA RIVERS
BASIN MANAGEMENT PLAN

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Alabama Clean Water Partnership

Alabama Department of Environmental Management

Columbus Water Works, Columbus, GA

U. S. Coast Guard

Auburn University Environmental Institute

City of Eufaula

The Nature Conservancy

Kleinschmidt Associates

Chipola River Partnership

Alabama Bass Federation

U. S. Army Corps of Engineers

Southern Nuclear Power

Natural Resource Conservation Service

Voyage of Discovery, Inc.

Tri Rivers Waterway Development Association

WestPoint Home

Columbus State University / Oxbow Meadows Environmental Center

U. S. Army, Fort Benning, GA

U. S. Fish and Wildlife Service

MeadWestvaco

Chattahoochee Riverkeeper

SE AL Regional Planning/Development Commission

Plum Creek

Water Works and Sanitary Sewer Board of Montgomery, AL

Georgia Conservancy

Troy University

Eufaula National Wildlife Refuge

COMMONLY USED ACRONYMS AND ABBREVIATIONS

ac	acres
ACES	Alabama Cooperative Extension System
ACF	Apalachicola-Chattahoochee-Flint Rivers
ac-ft	acre-feet
ACWP	Alabama Clean Water Partnership
ADAI	Alabama Department of Agriculture and Industries
ADCNR	Alabama Department of Conservation and Natural Resources
ADECA	Alabama Department of Economic and Community Affairs
ADECA-OWR	Alabama Department of Economic and Community Affairs – Office of Water Resources
ADEM	Alabama Department of Environmental Management
ADIR	Alabama Department of Industrial Relations – Mining and Reclamation
ADPH	Alabama Department of Public Health
AEMA	Alabama Emergency Management Agency
AFC	Alabama Forestry Commission
AFO	Animal Feeding Operation
AL	Alabama
ALAMAP	Alabama Monitoring and Assessment Program
ALDOT	Alabama Department of Transportation
AL-FL	Alabama - Florida
ALNEMO	Alabama Nonpoint Source Education for Municipal Officials
ASMC	Alabama Surface Mining Commission
ASWCC	Alabama Soil and Water Conservation Committee
AUCE	Auburn University, Civil Engineering
AWW	Alabama Water Watch
BMP	Best Management Practice
BOD	Biological Oxygen Demand

CAFO	Concentrated Animal Feeding Operation
CDBG	Community Development Block Grant Program
CEU	Continuing Education Unit
cfs	cubic feet per second
CSO	Combined Sewer Outfall
CVA	Clean Vessels Act
CWA	Clean Water Act
CWW	Columbus Water Works
DDT	Dichlorodiphenyltrichloroethane
DO	Dissolved Oxygen
EFC	Environmental Finance Center
EIS	Environmental Impact Statement
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FL	Florida
FLDEP	Florida Department of Environmental Protection
FLDOH	Florida Department of Health
FNAI	Florida Natural Areas Inventory
Ft	feet
FFWCC	Florida Fish and Wildlife Conservation Committee
GA	Georgia
GDNR	Georgia Department of Natural Resources
GA EPD	Georgia Environmental Protection Department
GPC	Georgia Power Company
GSA	Geological Survey of Alabama
HUC	Hydrologic Unit Code

Kw	kilowatt
LA	Load allocation
LID	Low-Impact Development
MCRS	Middle Chattahoochee River Stewards
MESC	Marine Environmental Services Consortium
mi^2	square miles
MLRA	Major Land Resource Area
MOS	Margin of safety
MW	Megawatts
NAWQA	National Water Quality Assessment
NEMO	Nonpoint Education for Municipal Officials
NFWF	National Fish and Wildlife Foundation
NGO	Nongovernmental Organizations
NOAA	National Oceanic and Atmospheric Administration
NPDES	Nonpoint Pollution Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NRI	National Rivers Inventory
NSMP	Nonpoint Source Management Program
NWFWMD	Northwestern Florida Water Management District
NWR	National Wildlife Refuge
ORVs	Outstanding Remarkable Values
OSDS	Onsite Sewage Disposal System
PCB	Polycarbonate biphenyl
POTW	Public-Owned Treatment Work
QCIP	Qualified Credentialed Inspection Program Certification
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

SFI	Sustainable Forestry Initiative
SMP	Shoreline Management Plan
SWCC	Soil and Water Conservation Committee
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSI	Trophic State Index
TSS	Total Suspended Solids
U.S.	United States
UIC	Underground Injection Control
USACOE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDOT	U. S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground storage tank
WHiP	Wildlife Habitat Incentive Program
WLA	Waste load allocation
WRP	Wetlands Reserve Program
WWTP	Wastewater Treatment Plant

PREFACE

This Basin Management Plan (Plan) for the Chattahoochee and Chipola River Basins focuses on nonpoint source-related water quality concerns and potential strategies to restore and protect the waters of the Basins within the State of Alabama. The document is organized by subbasins, allowing a stakeholder to select the chapter pertaining to their subbasin of interest, without having to read the entire Plan.

Chapters 1.0 through 3.0 provide discussion regarding the scope of the Plan and how it was developed, details regarding watershed management in Alabama, and an overview of basin management issues for the Chattahoochee River. This is followed by detailed information regarding water quality and biological data, management concerns and management strategies for each of three Chattahoochee subbasins – the Upper Middle, Lower Middle and Lower Subbasins – in Chapters 4.0, 5.0, and 6.0 respectively. The Chipola River Basin within Alabama is comparatively small and is covered in its entirety in Chapter 7.0, including detail on physical characteristics, water quality and biological data, management concerns and management strategies. Potential sources of funding for watershed management projects in both the Chattahoochee and Chipola basins are provided in Chapter 8.0.

CHATTAHOOCHEE & CHIPOLA RIVERS
BASIN MANAGEMENT PLAN

1.0 INTRODUCTION

Of all the rivers in Alabama, the Chattahoochee River is the longest and quite possibly, the most fought-over. Beginning in the Blue Ridge Mountains north of Atlanta, Georgia, the Chattahoochee River is tapped as a drinking water source, harnessed for hydropower, controlled for navigation, enjoyed for recreation, and recognized as a state border. As it flows into Florida, it meets the Flint River to form the Apalachicola at Lake Seminole, and then it meets the Chipola River and spreads out across the coastal plain to drain into the Gulf of Mexico. All of these rivers and their surrounding drainages make up the Apalachicola-Chattahoochee-Flint (ACF) River Basin. Over the past two decades, this basin has been the subject of intense scientific research, residential, commercial, and industrial development, and political debate. The management of the quantity and quality of water within this vast hydrological system now walks hand-in-hand with the sustainability of the entire region from Metro Atlanta to the Gulf of Mexico.

Management of this basin requires equal participation and earnest cooperation on behalf of the governments, businesses and citizens of Alabama, Florida, and Georgia and their federal agency partners. Everyone who relies on the water resources within the basin is a stakeholder in this management process. These stakeholders share interests in the *quantity* and *quality* of the water in the basin for the sake of hydropower, navigation, recreation, and drinking water supply, in addition to its natural beauty and intrinsic value.

Alabama's part in this process is defined by its political jurisdiction. In the ACF River Basin, the State of Alabama holds jurisdiction over the western tributaries flowing into the rivers, and shares jurisdiction of the Chattahoochee River with Georgia.[1] Activities within these drainages, or *watersheds*, affect water availability and quality downstream, regardless of political boundaries.

This Basin Management Plan (Plan) for the Chattahoochee-Chipola River Basin focuses on nonpoint source-related **water quality concerns** and outlines strategies to restore and protect the water resources of the Chattahoochee-Chipola River Basin. This Plan, coordinated by the Alabama Clean Water Partnership (ACWP) with a United States Environmental Protection Agency (USEPA) Section 319(h) grant from the Alabama Department of Environmental Management (ADEM) and USEPA, is the first of its kind for this basin in Alabama, paralleling previous basin planning efforts completed or underway in other basins of the state.

[1] The question of Alabama's jurisdiction over the Chattahoochee River has been the subject of considerable legal debate. In fact, common law suggests that Alabama's border stops at the western shores of the river. However, over time Alabamian land owners have exercised their riparian rights to the Chattahoochee and rights have been ceded from Georgian authorities to Alabamian authorities for a variety of river uses. In the case of freshwater fisheries, Alabama and Georgia are party to a reciprocal agreement to cooperatively administer rights to fishing the river. For more information, please see Carriker, 2000 (UF ILFAS) and Alabama Regulation 220-2-.122.

The Plan was written with two overarching principles in mind:

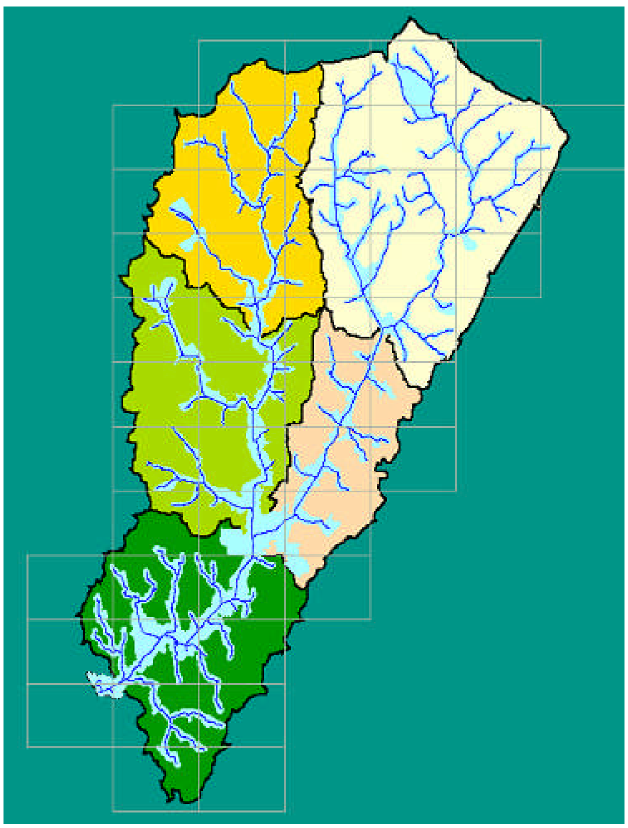
1. The Plan should educate readers about nonpoint source pollution in the Chattahoochee and Chipola River Basins and instruct them regarding how it can be effectively managed.

2. The Plan should support the efforts of individuals and organizations working on the management of the Chattahoochee and Chipola River Basins.

1.1 Background

A watershed is made up of all of the land that drains into a particular body of water such as a stream, river or lake (Figure 1-1). 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*. The topography of the land helps direct the flow of water and defines a watershed's boundaries.

Figure 1-1. Graphical Illustration of a Watershed



Although a watershed is simply defined as the divide separating one drainage area from another, there is an accepted hierarchy to watersheds according to size. For the sake of classification, watersheds for large rivers are referred to as *river basins* or simply, *basins*. Basins are made up of *subbasins*. Subbasins are made up of *watersheds.* And, watersheds are made up of sub-watersheds (tributaries).

What we do in the watersheds where we live has a direct affect on the quality of water in our local streams. As rainwater flows across the land, it picks up and carries pollutants to our creeks, rivers and lakes. We commonly refer to this 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 source. Land uses such as forestry operations, mining, road construction, urban development, and certain farming practices can increase nonpoint source pollution and negatively impact water quality, if they are not properly managed. Common homeowner practices such as washing the car, applying fertilizers and pesticides, and improperly disposing of pet and household wastes can also lead to nonpoint source pollution. Practicing sound and careful management, or **Best**

Management Practices, plus a little common sense and courtesy for others, can minimize and control the impact we have on water quality.

Best Management Practices (BMPs) are designed practices used to improve our waterways by minimizing polluted runoff. Goals of BMPs include reducing nonpoint source pollution from agricultural activities, forestry, aquaculture operations, roads, construction, and mining activities. BMPs may be employed to protect and restore wetlands and fish and wildlife habitats, improve river recreation management, promote resource education and outreach, and track resource trends in river basins (ACWP, 2006).

Over the past 35 years, the United States has improved its effectiveness in controlling point sources of pollution such as toxic chemicals and human wastes coming from the end of discharge pipe. Now, the greatest threats to watershed health and water quality come from nonpoint sources of pollution, including runoff of sediment, nutrients, animal and human waste, and petroleum products from widespread, hard-to-identify sources stemming from a wide variety of land uses. The information contained in Figure 1-2 provides a clear comparison of point and nonpoint sources of pollution and how each pollutant impacts water quality.

Figure 1-2. Common Water Pollutants and Their Sources

Pollutant	Potential Sources		Impacts on Waterbody Uses
	Point Sources	Nonpoint Sources	
Pathogens	• WWTPs • CSOs/SSOs • Permitted CAFOs • Discharges from meat processing facilities • Landfills	• Animals (domestic, wildlife, livestock) • Malfunctioning septic systems • Pastures • Boat pumpout facilities • Land application of manure • Land application of wastewater	• Primarily human health risks • Risk of illness from ingestion or from contact with contaminated water through recreation • Increased cost of treatment of drinking water supplies • Shellfish bed closures
Metals	• Urban runoff • WWTPs • CSO/SSOs • Landfills • Industrial facilities • Mine discharges	• Abandoned mine drainage • Hazardous waste sites (unknown or partially treated sources) • Marinas	• Aquatic life impairments (e.g., reduced fish populations due to acute/chronic concentrations or contaminated sediment) • Drinking water supplies (elevated concentrations in source water) • Fish contamination (e.g., mercury)
Nutrients	• WWTPs • CSOs/SSOs • CAFOs • Discharge from food- processing facilities • Landfills	• Cropland (fertilizer application) • Landscaped spaces in developed areas (e.g., lawns, golf courses) • Animals (domestic, wildlife, livestock) • Malfunctioning septic systems • Pastures • Boat pumpout • Land application of manure or wastewater	• Aquatic life impairments (e.g., effects from excess plant growth, low DO) • Direct drinking water supply impacts (e.g., dangers to human health from high levels of nitrates) • Indirect drinking water supply impacts (e.g., effects from excess plant growth clogging drinking water facility filters) • Recreational impacts (indirect impacts from excess plant growth on fisheries, boat/swimming access, appearance, and odors) • Human health impacts
Sediment	• WWTPs • Urban stormwater systems	• Agriculture (cropland and pastureland erosion) • Silviculture and timber harvesting • Rangeland erosion • Excessive streambank erosion • Construction • Roads • Urban runoff • Landslides • Abandoned mine drainage • Stream channel modification	• Fills pools used for refuge and rearing • Fills interstitial spaces between gravel (reduces spawning habitat by trapping emerging fish and reducing oxygen exchange) • When suspended, prevents fish from seeing food and can clog gills; high levels of suspended sediment can cause fish to avoid the stream • Taste/odor problems in drinking water • Impairs swimming/boating because of physical alteration of the channel • Indirect impacts on recreational fishing

Source: USEPA, 2005, page 2-10
WWTP = Wastewater Treatment Plant; CSO = Combined Sewer Overflow; SSO = Sanitary Sewer Overflow; CAFO = Concentrated Animal Feeding Operation; DO = Dissolved Oxygen

Because water quality of the Chattahoochee and Chipola Rivers and their tributaries is affected by our daily activities, it is worth considering the following ways we depend on these precious resources to enhance our quality of:

➢ **Drinking water supply**–The Chattahoochee River provides drinking water for over 3 million people in the Atlanta area and for approximately a half-million people in eastern Alabama.

- **Wastewater discharge**–Cities of eastern Alabama, including Dothan, Eufaula, and Phenix City rely on the Chattahoochee and/or Chipola Rivers to assimilate discharges from their wastewater treatment plants.

- **Agriculture**–Water in the Chattahoochee-Chipola River Basin is used to provide drinking water to animals and to irrigate crops.

- **Electricity**–There are ten hydropower generating facilities from West Point Lake Dam to George W. Andrews Lock and Dam.

- **Industrial uses**–Industries use water in manufacturing of products and in assimilations of wastewater discharges.

- **Recreation and tourism**–Watersheds provide recreational sites for boating, swimming and fishing.

- **Economic benefits**–The reservoirs and streams of the Chattahoochee-Chipola River Basin provides significant economic value by providing waterfront property and an enhanced tourism industry.

- **Flood risk reduction**–Watersheds and wetlands store and disburse flood waters. After heavy rains, watersheds and wetlands help reduce or minimize flooding risks.

- **Habitat**–Healthy watersheds provide both aquatic and terrestrial habitat for fish and wildlife.

In order to maintain healthy watersheds and assure that water stays clean and abundant to sustain all of these uses, it is essential that we actively *manage* them just like we would manage our homes or businesses. Management measures or practices can be conducted for a variety of purposes, such as protecting water resources, aquatic wildlife habitat, and downstream areas from increased pollution and flood risks. Water and land management measures can also help limit pollutant loads of stormwater runoff by:

- Reducing the availability of pollutants (*e.g.*, reducing fertilizer, manure, and pesticide applications),

- Reducing the pollutants generated (*i.e.*, source reduction such as erosion control),

- Slowing transport or delivery of pollutants in the watershed by reducing the volume of water transported or by causing the pollutant to be deposited near the point of origin where it can be treated,

- Direct the pollutant off-site before it reaches the waterbody,

- Remediate the pollutant before or after it is delivered to the water resource through chemical or biological transformation.

The *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* prepared by the USEPA provides a comprehensive list of **structural** (in the ground) and **nonstructural** (human activities) management practices that can be employed to manage our watersheds (Figure 1-3) (USEPA, 2005).

Figure 1-3. Structural and Nonstructural Watershed Management Practices

	Structural Practices	Nonstructural Practices
Agriculture	• Contour buffer strips • Grassed waterway • Herbaceous wind barriers • Mulching • Live fascines • Live staking • Livestock exclusion fence (prevents livestock from wading into streams) • Revetments • Riprap • Sediment basins • Terraces • Waste treatment lagoons	• Brush management • Conservation coverage • Conservation tillage • Educational materials • Erosion and sediment control plan • Nutrient management plan • Pesticide management • Prescribed grazing • Residue management • Requirement for minimum riparian buffer • Rotational grazing • Workshops/training for developing nutrient management plans
Forestry	• Broad-based dips • Culverts • Establishment of riparian buffer • Mulch • Temporary cover crops • Revegetation of firelines with adapted herbaceous species • Planning and proper road layout and design • Windrows • Preharvest planning	• Education campaign on forestry-related nonpoint source controls • Erosion and sediment control plans • Forest chemical management • Fire management • Operation of planting machines along the contour to avoid ditch formation • Training loggers and landowners about forest management practices, forest ecology, and silviculture
Urban	• Bioretention cells • Breakwaters • Water quality swales • Brush layering • Infiltration basins • Green roofs • Live fascines • Marsh creation/restoration • Establishment of riparian buffers • Riprap • Stormwater ponds • Sand filters • Sediment basins • Tree revetments • Vegetated gabions	• Planning for disconnection of impervious surfaces (*e.g.*, eliminating or reducing curb and gutter) • Educational materials • Erosion and sediment control plan • Fertilizer management • Ordinances • Pet waste programs • Pollution prevention plans • No-wake zones • Setbacks • Workshops on proper installation of structural practices • Zoning overlay districts

Source: USEPA, 2005 pg 10-5

The following list of common BMPs illustrates simple things people can do to help safeguard the waters of the Chattahoochee-Chipola River Basin.

Home and Gardening

- Maintain septic tank and field lines to prevent sewage pollution. Septic tanks should be pumped every three to five years.
- Open paint containers and allow the paint to dry (or stir in kitty litter to solidify the liquid) before throwing away.
- Park vehicles on a lawn area or other grassy surface when washing.
- Don’t litter. Regularly clean up trash and debris; especially from parking areas.
- Collect and properly dispose of litter and trash found along roadways and curbs.
- Identify and cap inactive wells.
- Follow recommended product application rates for fertilizers, herbicides and insecticides as given on product directions.
- Consider landscaping options such as increased native and adapted plant beds or mulched or native areas, rather than high maintenance turf, to reduce the need for chemicals, water, and mowing.
- Compost your yard trimmings and create a beneficial soil conditioner that will reduce the fertilizer and watering requirements for the plants in your landscape.
- Maintain and protect existing trees and shrubs, or add new trees and shrubs to your garden or yard. Trees and shrubs help prevent erosion.

How We Build

- Preserve natural areas like greenways and open space in development projects.
- Minimize the area of impervious surfaces in the design and construction of developments, roadways, and parking lots; especially areas near structures, drainage ways (including curb and gutter) and flowing streams.
- Install vegetated buffers between parking bays and around the edge of parking lots.
- Follow soil conservation and erosion prevention practices to minimize land disturbance activities.
- Plant or replant trees in open areas along waterways.

- Leave vegetation undisturbed within the first 25 feet of property adjacent to streams.

Community Clean Ups

- Initiate clean-up programs to eliminate illegal dumps.
- Promote hunter education to prevent the improper disposal of deer carcasses.
- Initiate "adopt a stream" programs to regularly monitor and clean waterways.
- Support and participate in the Adopt-A-Mile program to maintain clean roadways and accompanying drainage channels and support on-going lake clean up efforts such as Alabama Power’s Renew Our Rivers Campaign.

Habitat Conservation

- Develop partnerships to increase awareness of protected species and critical habitat issues with a goal of protecting and conserving identified species.
- Organize efforts to acquire known habitat areas through land trust organizations.

Boating

- Reduce water pollution through proper fueling, waste disposal and maintenance.
- When cleaning your boat, use detergents sparingly and use environmentally friendly cleaning methods and products like baking soda, vinegar and lemon juice.
- Adhere to speed restrictions and “no wake zones” to minimize shoreline erosion.
- Protect sensitive habitat by going slowly in shallow areas and avoid boating through dense hydrilla mats to minimize spreading of hydrilla.
- Collect, carry out, and properly dispose of any trash you have from your boating and fishing trips.

Water Quality Monitoring

- Promote Alabama Water Watch training and monitoring activities as a simple way to address water quality monitoring needs.
- Work with Alabama Water Watch to encourage citizen training in visual stream assessments and to encourage participation in water quality monitoring.

1.2 Basin Plan Development Process

Basin or watershed planning is a well-defined process in which many groups across the country participate. Even though the conditions of the planning process (*e.g.*, timeline, funding, participants, scope) may vary, there are several fundamental steps that occur. USEPA (2005) provides guidance in this regard. Figure 1-4 is a snapshot of the basin plan development process. The development of this Plan is the first, broad step in the process, with separate watershed plans to be incorporated as they are developed.

Figure 1-4. Steps in the Basin or Watershed Planning Process

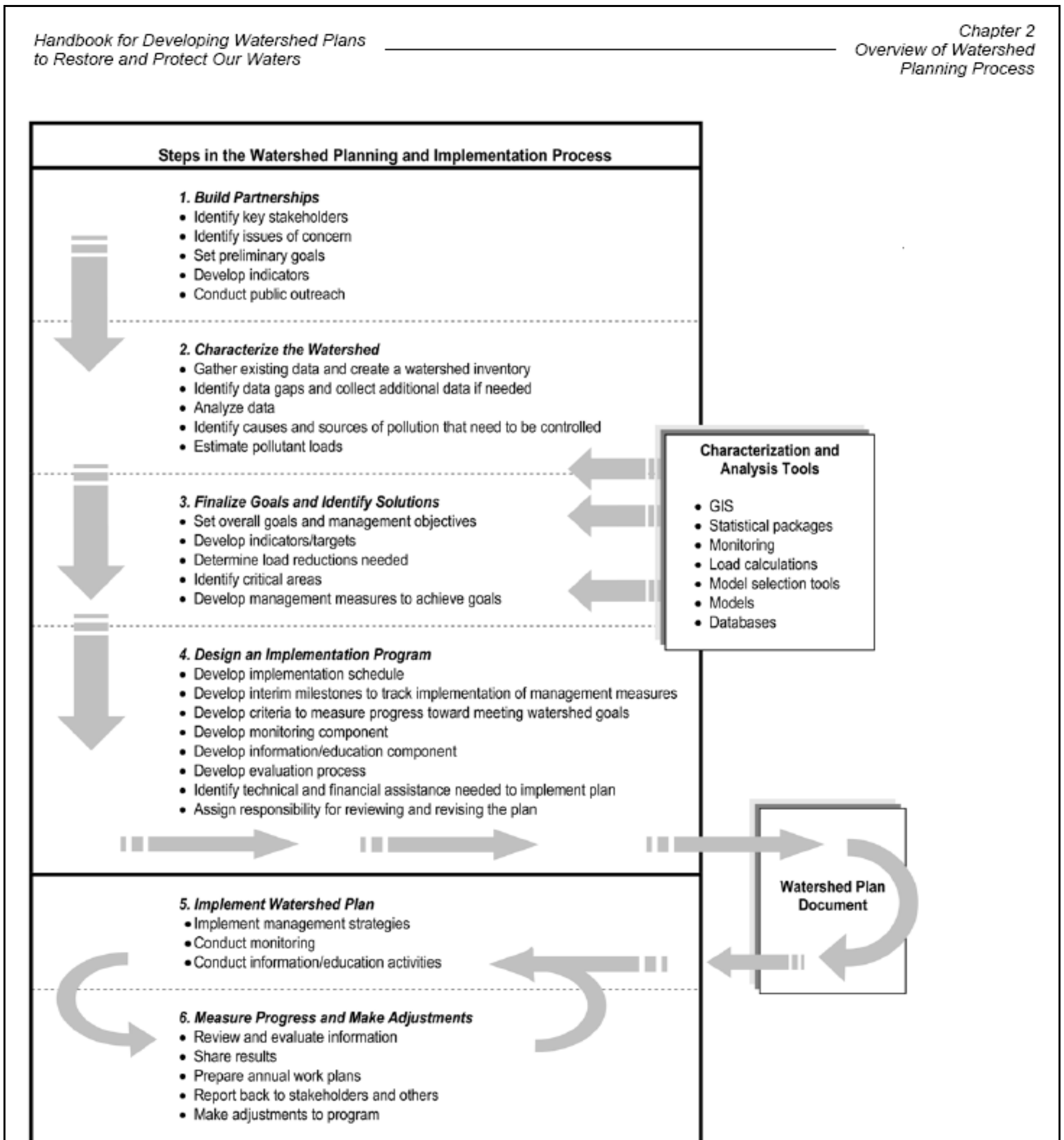


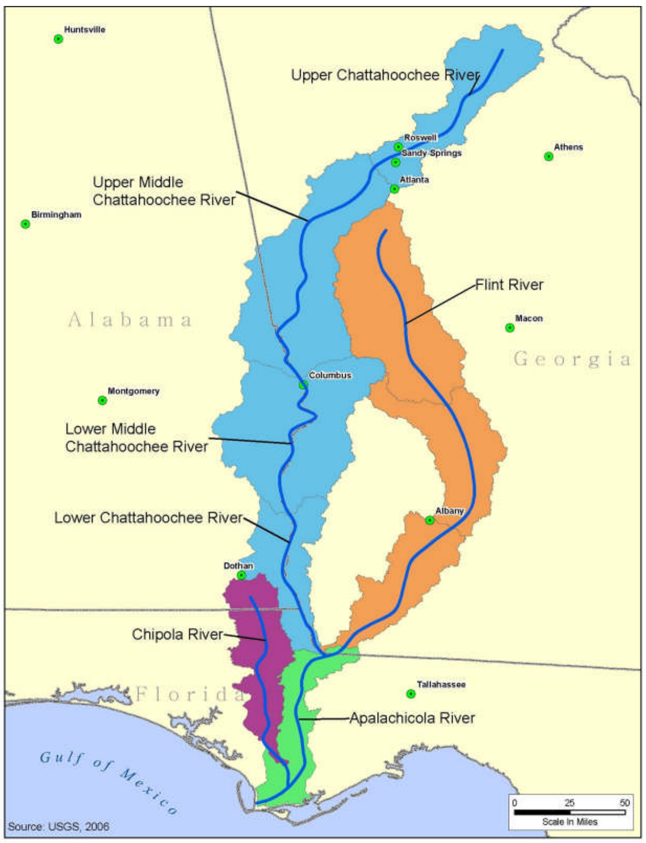
Figure 2-1. Steps in the watershed planning process.

Source: USEPA, 2005, pg 2-7

1.3 Geographic Scope of the Basin Management Plan

This Basin Management Plan was developed for the portions of the Chattahoochee and Chipola River Basins within the State of Alabama. Because this is such a large geographic area to manage, the basins were subdivided into four smaller management areas, with three sections devoted to the three designated subbasins of the Chattahoochee River (Upper Middle, Lower Middle and Lower) and one section devoted to the Chipola River (Figure 1-5). These subdivisions facilitate a more focused management approach that includes organizing stakeholder groups and economizing on limited financial and human resources.

Figure 1-5. Chattahoochee and Chipola River Basins



This Plan focuses on water quality concerns at the smallest scale practical. The scope of watershed management recommendations is determined primarily by the size of the water body of concern and the extent of the nonpoint sources of pollution in its drainage (watershed). The 12-digit hydrologic unit code (HUC-12) is the smallest watershed delineation used nationally to organize water resources data and to prescribe management activities. This Plan uses the HUC-12 system to identify creeks and their watersheds, when applicable.[2]

1.3.1 Stakeholder Involvement

The basin management planning process depends on stakeholder involvement to succeed. With regard to this Planning effort, stakeholder involvement comes through the Chattahoochee-Chipola River Basin Clean Water Partnership Steering Committee

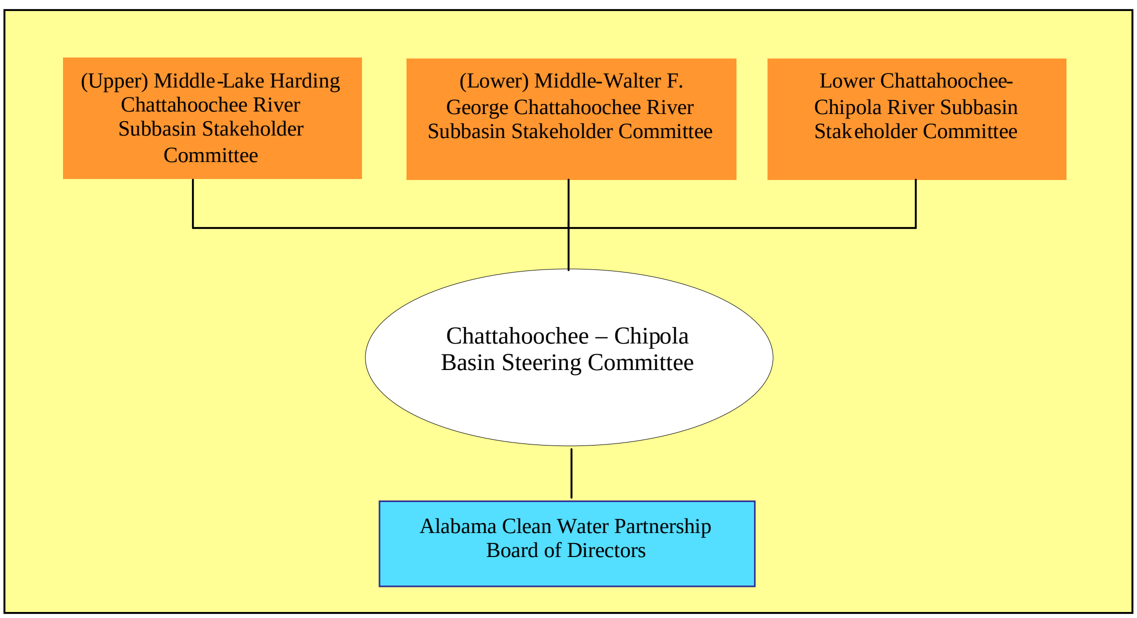
[2] For guidance on the scale and scope of watershed plans and nonpoint source pollution projects, please refer to: Nonpoint Source Program and Grants Guidelines for States and Territories, published by the USEPA (2003). FRL-7577-6. Federal Register. Vol. 68, No. 205. Thursday, October 23, 2003. Notices. Page 60660.

(Steering Committee), and its three subbasin stakeholder groups. The Steering Committee, providing basin-wide leadership, is facilitated by the Chattahoochee-Chipola River Basin Facilitator who serves the central role of coordinating stakeholder participation for the basin. The Steering Committee meets bi-monthly to support water quality related activities in the basin, including the development of this Basin Management Plan. The Steering Committee will provide direction to implement this Plan as well as actual on-the-ground ACWP-related projects throughout the Chattahoochee-Chipola River Basin.

Three subbasin stakeholder groups were organized by the ACWP to support the development and implementation of this Basin Management Plan (Figure 1-6). The following subbasin groups correspond to the subbasins of the Chattahoochee River in Alabama:

- Upper Middle Chattahoochee
- Lower Middle Chattahoochee
- Lower Chattahoochee-Chipola

Figure 1-6. Organization of the Alabama Clean Water Partnership in the Chattahoochee and Chipola River Basins

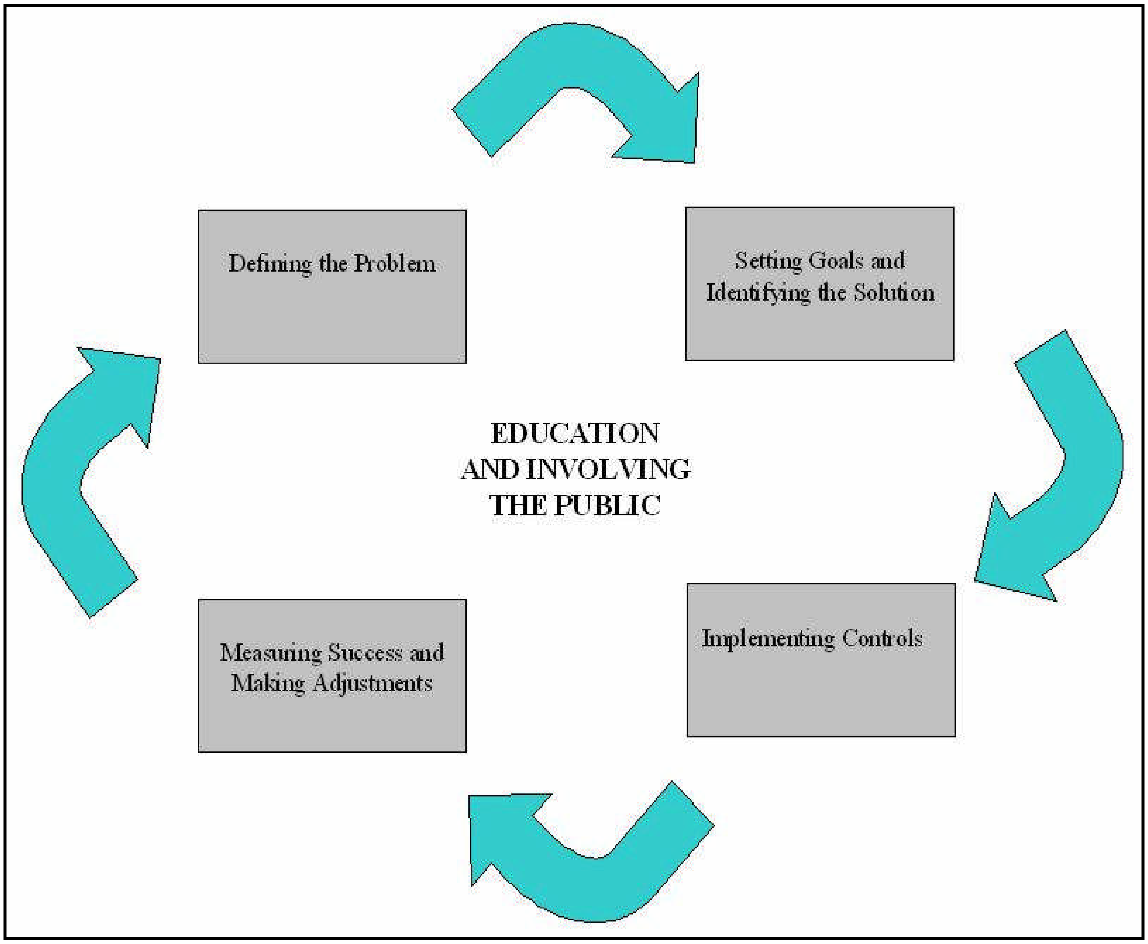


Due to the small area of the Chipola River Basin in Alabama, and the fact that many of the stakeholders are the same as those identified for the Lower Chattahoochee Subbasin, the ACWP combined the Lower Chattahoochee and Chipola subbasin stakeholder groups.

Input from stakeholders is central to the basin management planning process as the illustration in Figure 1-7 suggests. The local knowledge and values of stakeholders, as well as their endorsement of future activities and long-term buy-in, will assure success of the process. In other words, stakeholders help to:

- define potential problems,
- set watershed management goals,
- devise strategies for measuring success, and
- encourage implementation of management measures.

Figure 1-7. Basin Planning Cycle



Meetings of the subbasin stakeholder groups were integrated into the schedule of the basin management planning process to provide opportunities for their participation (Table 1-1). The subbasin stakeholder groups met for public workshops in January of 2006. The workshops were designed to educate participants about the basin management planning process and to solicit their input on water quality concerns in the basin.

Table 1-1. Chattahoochee and Chipola Stakeholder Meetings

Upper Middle Chattahoochee River Subbasin Stakeholders Tuesday, January 17, 2006, 5:30 p.m., MeadWestvaco Auditorium, Phenix City, AL
Lower Middle Chattahoochee River Subbasin Stakeholders Wednesday, January 18, 2006, 5:30 p.m., Eufaula Chamber of Commerce, Eufaula, AL
Lower Chattahoochee-Chipola River Subbasin Stakeholders Thursday, January 19, 2006, 5:30 p.m., Highland Oaks C.C., Dothan, AL

1.3.2 Assessment of Current Watershed Conditions

Data and other valuable information about the Chattahoochee-Chipola River Basin were gathered from existing sources. The greater proportion of data is available through federal and state agencies. An abundance of data about the ACF Basin can be obtained from the U.S. Army Corps of Engineers (USACOE), U.S. Geological Survey (USGS) and the U.S. Fish and Wildlife Service (USFWS). On the state level, ADEM and the Georgia Department of Natural Resources (GDNR) keep historic and current data pertaining to the basin water quality. Other sources consulted during this process include Alabama Water Watch (AWW), NatureServe, and the Southern Company.

Alabama's biannual §303(d) List of Impaired Waters identifies creeks, lakes, and rivers that do not meet state water quality standards. On a five year rotational basis, ADEM completes a river basin monitoring assessment to identify streams that are not completely meeting water quality standards for their use classification.[3]

There are currently no water bodies in the Upper Middle Chattahoochee Subbasin on the §303(d) list.[4] ADEM has identified a single creek within the Lower Middle Chattahoochee Subbasin that does not meet water quality standards for its use classification. Barbour Creek from its source to the confluence with the Chattahoochee River is impacted by siltation to the point that it no longer supports the fish and wildlife habitat expected to be there. In the Lower Chattahoochee Subbasin, Poplar Spring Branch to Omussee Creek has been identified as having lower than expected pH and no longer supports the fish and wildlife habitat expected to be there. It is thought this finding is due to industrial discharges. Finally, on the Chipola River, ADEM has identified Cypress Creek, a tributary to Limestone and Big Creeks, as containing excessive nutrients, organic enrichment, and low DO. Potential sources of this pollution are thought to be stormwater from urbanized industrial areas and wastewater discharges.

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[3] All streams in the Upper Middle Subbasin are classified as Fish & Wildlife, except for two branches of the Chattahoochee River/West Point Lake at the confluence with Finley and Veasey Creeks which are classified for swimming as well.

[4] These statements are based on the *Final 2004 §303(d)* list of impaired waters. There currently is a Draft *2006 §303(d)* under review by USEPA. Until the 2006 list is approved, the 2004 list is considered the current final document. Both document can be viewed at <http://www.adem.state.al.us/waterdivision/WQuality/303d/WQ303d.htm>.

ADEM's Nonpoint Source Screening Assessments (ADEM, 2002; ADEM, 2006) assign *nonpoint source impairment potential* and *nonpoint source priority status* to creeks with water quality and/or habitat impacts warranting greater concern and need of investigation.

Physical, chemical and biological assessments were conducted for several subwatersheds in the subbasin. NPS pollution impairment potential was assigned to subwatersheds based on surrounding land uses and evidence of pollution detected by monitoring. NPS potential was rated based on Alabama Soil and Water Conservation Districts' (SWCD) watershed (land use) assessments. A subwatershed is recommended for priority status if, during the assessment, it receives a rating of "fair" or "poor" for the stream's benthic (macroinvertebrate) or fish community (ADEM, 2002; ADEM 2006).

Table 1-2 provides the NPS rating and the land use with the greatest *potential* for causing the impairment for areas identified in the Chattahoochee and Chipola River Basins. More detailed information on this topic is provided in the subbasin sections of this Plan.

Table 1-2. Priority Sub-watersheds within the Chattahoochee and Chipola River Subbasins in Alabama

YEAR[a]	11-DIGIT HYDROLOGIC UNIT CODE (HUC)			WATERBODY NAME	STATION NAME[b]
Upper Middle Chattahoochee Subbasin					
1999	0313	0003	060	Little Uchee Creek	LUC-3
1999	0313	0002	190	Wedhadkee Creek	WECR-1
					WECR-2
1999	0313	0002	220	Barrow Creek	BWCC-1
1999	0313	0002	220	Well Creek	WLCC-1
2004	0313	0002	250	Moores Creek	MOOC-2
					MOOC-1
2004	0313	0002	310	Mill Creek	MLLL-1
Lower Middle Chattahoochee Subbasin					
1999 & 2004	0313	0003	060	Little Uchee Creek	LUC-3
1999 & 2004	0313	0003	100	Ihagee Creek	IHGR-1
1999 & 2004	0313	0003	120	Hatchechubbee Creek	HECR-2
1999 & 2004	0313	0003	180	Barbour Creek	BRC-2
Lower Chattahoochee Subbasin					
1999	0313	0004	020	Bennett Mill Creek	BMCH-1
1999	0313	0004	020	McRae Creek	MMCH-1
2004	0313	0004	040	Abbie Creek	ABBH-5
2004	0313	0004	040	Sandy Creek	SNCH-1
2004	0313	0004	040	Ward Creek	WRDH-1
2004	0313	0004	100	Bryans Creek	BRYH-1
Chipola River Basin					
2004	0313	0012	010	Cowarts Creek	CWTH-1

Source: ADEM, 2002; 2006

a Indicates the year of the monitoring.
b The station name is a code assigned by ADEM for the basin screening assessments.

1.3.3 Watershed Management Measures

Watershed management measures are proposed in this Plan and strive to address the issues and concerns identified by stakeholders. Each measure is defined in terms of its approach and desired impact when implemented. Implementation and monitoring strategies are discussed for each management measure as well.

1.3.4 Plan Preparation

The Basin Management Plan is the sum of all the parts mentioned in this section. In fact, it may be considered four plans in one because each of the subbasin sections (Upper Middle Chattahoochee, Lower Middle Chattahoochee, Lower Chattahoochee, and Chipola) should stand on its own and address the concerns of the stakeholders in each of these subbasins. Compiled together, this Plan is a master watershed planning document to help guide future management activities for the Chattahoochee-Chipola River Basin.

1.4 References

Alabama Clean Water Partnership, 2006. *Living Together in the Alabama River Basin*. Published January 2006. Available at: <http://www.cleanwaterpartnership.org>.

Carriker, Roy R., 2000. Water Wars: Water Allocation Law and the Apalachicola-Chattahoochee-Flint River Basin. Document FE 208. Department of Food and Resource Economics, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Published November 2000. <http://edis.ifas.ufl.edu/pdffiles/FE/FE20800.pdf>.

U.S. Environmental Protection Agency, 2005. *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*. Draft. Office of Water Nonpoint Source Control Branch. Washington, D.C. 20460. USEPA 841-B-05-005.

U.S. Environmental Protection Agency, 2003. Nonpoint Source Program and Grants Guidelines for States and Territories. FRL-7577-6. Federal Register. Vol. 68 No. 205 Thursday, October 23, 2003. Notices. Page 60660.

2.0 WATERSHED MANAGEMENT IN ALABAMA

2.1 Introduction

Protecting Alabama's waters by properly managing its watersheds is a cooperative pursuit. The protection of Alabama's creeks, rivers and lakes begins with reducing the impacts of human activities on the watershed. To do so we focus on the connection between land and water and how pollutants collected on the land wash off with the rain. This nonpoint source pollution (polluted runoff) is the primary cause of water quality problems in Alabama and across the United States (ADEM, 2005). In fact, over three-quarters of the impaired waters of the Nation are impacted by nonpoint source pollution (USEPA, 2001). Because sources of nonpoint source pollution are so diverse, they are best addressed on a watershed basis.

Every Alabamian can play a role in watershed management by preventing nonpoint source pollution. Polluted runoff results from our everyday activities. Therefore, opportunities to prevent pollution exist for many of us every day. For example, we can maintain our cars and properly dispose of waste fluids at a local collection site. When we fertilize our lawn, we can follow the application guidelines to minimize the washing away of excess fertilizer with the rain. When we build a home or plant a field, we can make sure that we control soil erosion by using the proper soil conservation techniques. Simply by being aware of how our actions may cause pollution, we can reduce the possibility that Alabama's valuable waters will become polluted.

Because industry and businesses are located within a watershed, their actions, in urban and rural settings, also have an impact and, therefore, play a large role in watershed management. If the quality and quantity of the water decreases, it will have a negative impact on the environment, and that will have a negative impact on the industry or businesses located within a particular watershed. The long term availability of usable water for industrial purposes and the impact of that use on the watershed, will determine the long range well being of the area and the industry. Water resource protection is critical for industry.

Alabama's industries consume water for operational purposes during manufacturing as well as when processing waste. For example, the pulp and paper industry uses water to produce paper products while discharging treated industrial wastewater to local rivers. Industries are required by ADEM to maintain permits to discharge wastes into Alabama's waters.

Industry and business also produce nonpoint source pollution. Any activity that alters the natural landscape potentially results in erosion, increased runoff, and pollution. Agriculture and forestry, two of the state's largest industries, rely on water to irrigate trees and crops and to provide drinking water for livestock. Unless proper practices are used, forestry and agriculture may impact large areas of land when planting, harvesting, and raising animals. These industries dedicate resources to preventing nonpoint source pollution as well as point source pollution. Similar to the good housekeeping principles that help us reduce polluted runoff at home, farmers, foresters and other industries also manage activities that impact the watershed.

2.2 An Overview of Watershed Management Policy

Watershed management in Alabama occurs by regulatory and voluntary means. Regulatory measures include the rules and regulations mandating certain management approaches or water quality limits embodied in a permit or license to operate. Voluntary measures include good-housekeeping practices and management approaches that are monitored or enforced through self-policing. Nonpoint source and point source pollution are managed through both approaches. However, point sources of pollution are invariably regulated or permitted according to water quality standards. Only some nonpoint sources are regulated, while most typically rely on voluntary management approaches.

In the United States, the Clean Water Act[5] (CWA) mandates the designation of water quality standards, rules, and regulations that limit water pollution. Water quality standards are determined by factoring in the known uses[6] of the water (*e.g.*, swimming, fishing), chemical and biological criteria (*i.e.*, acceptable levels of mercury, 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, or voluntary strategies such as providing technical and financial assistance to industry, farmers, and municipalities.

Administration of the CWA in Alabama is the responsibility of the ADEM, with support from the USEPA Region 4, which covers the southeastern United States and provides federal guidance and oversight of ADEM's programs to fulfill the mandates of the CWA. ADEM's responsibilities include, but are not limited to, the development of water quality standards;[7] monitoring and reporting the state and condition of Alabama's waters;[8] creating a list of impaired waters;[9] regulating point sources of pollution (*i.e.*, CWA Section 402 – National Pollution Discharge Elimination System (NPDES)); setting limits to concentrations and volumes of pollutant inputs (Total Maximum Daily Loads

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[5] 33 U.S.C. 1251 – 1376.

[6] Alabama's use classification system contains the following use classifications: Public Water Supply, Swimming and Other Whole Body Water Contact, Shellfish Harvesting, Fish and Wildlife, Limited Warmwater Fishery, Outstanding Alabama Water, and Agricultural and Industrial Water Supply.

[7] 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, 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 in quality (degradation) of the State's waters.

[8] ADEM completed the *Integrated Water Quality Monitoring & 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. This report was updated and published in 1996, too late for incorporation into this study. Both documents can be viewed at <http://www.adem.state.al.us/waterdivision/WQuality/305b/WQ3050report.htm>.

[9] 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, now in the integrated report.

(TMDLs)); and providing technical and financial assistance to landowners, municipalities and businesses to reduce nonpoint source pollution (Section 319).[10] Table 2-1 summarizes the water quality management programs administered by ADEM. Together, all of these programs constitute the core of the regulatory and non-regulatory activities ADEM carries out to protect water quality.

Table 2-1. Watershed and Water Quality Management Programs Administered by ADEM

PROGRAM	DESCRIPTION
Integrated Water Quality Report to Congress: 305(b) State of the State's Waters	Biannual assessment and documentation of the water quality of Alabama's waters.
Section 303(d) List of Impaired Waters	List of waterbodies that are polluted or degraded and do not meet their designated and existing uses.
Water Quality Restoration Planning (TMDL)	Developed for the waters listed under 303(d), these plans set limits to the quantities of pollutants into impaired waters
Point Source Discharges: National Pollution Discharge Elimination System (NPDES)	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 Management: NPDES Phase I & Phase II	Permits to limit runoff and pollution from municipal separate storm sewer systems and construction sites
Section 319 Nonpoint Source Management Program	Administers the Section 319 Program that provides financial and technical assistance to governmental and nongovernmental organizations to control nonpoint source pollution.
Surface Mining Rules	In addition to NPDES permits, surface mines must submit pollution prevention plans to ADEM.
Freshwater Wetlands	Authorized through Section 404 of the Clean Water Act. Certain activities that may impact waterways and wetlands must be permitted. US Army Corps is the lead agency.
Ground Water Protection	Regulations for underground storage tanks (UST) and underground injection (UIC) and septic systems over 10,000 gallons/day

[10] *See Section 319 Alabama Nonpoint Source Management Program Last Updated: August 2003,* 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.

2.3 Nonpoint Source Management Program

Under Section 319 of the CWA, the state is required to develop a Nonpoint Source (NPS) Management Program to implement best management practices to address NPS problems identified in the Alabama Nonpoint Source Assessment Report. The mission of the Nonpoint Source Management Program in Alabama is 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 NPS Unit administers the implementation of the actual NPS Management Program. The policy is periodically updated, most recently in August of 2003. Within this latest update we find a description of Alabama's watershed approach to nonpoint source pollution management.

"…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, 2003

The policy framework for this Basin Management Plan originates with Alabama's NPS Management Program. The Plan's emphasis on voluntary involvement and implementation evolved from the NPS Management Program's underlying philosophy that stakeholder involvement in assessing the watershed and addressing identified issues is essential. In fact, all of Alabama's basin management plans were developed through collaborative efforts by the ACWP through a Section 319 grant from ADEM's NPS Management Program and USEPA.

2.4 Impaired Waters and Total Maximum Daily Loads

An impaired body of water within a watershed is one that does not support its designated and existing uses due to high levels of a particular pollutant. Through a variety of water quality data and related information, ADEM determines the use support status of a particular stream. If a waterbody is determined to be impaired, then it is placed on the 303(d) List of Impaired Waters. ADEM must determine which of the State's waters falls into this category during its biennial monitoring and assessment for the 305(b) report. Water bodies remain on the 303(d) list until a TMDL has been developed or additional data indicate that the water body is unimpaired.

ADEM is required to develop TMDLs for every pollutant identified in each impaired waterbody on the 303(d) list. A TMDL identifies the maximum quantity (load) of a given pollutant (*e.g.,* bacteria, nitrogen, phosphorus) allowed in a body of water so that it still meets water quality standards. An allocation or limit for the problem pollutant is estimated by determining the capacity of a waterbody to accept a pollutant before exceeding water quality standards. This capacity is referred to as a waterbody's "assimilative capacity." The assimilative capacity is determined by considering the waste load allocation (WLA) for point sources, the load allocation (LA) for nonpoint sources, and a margin of safety (MOS).[11] Each TMDL requires considerable water quality monitoring and field work to determine the pollutant of concern. Once this work is completed, TMDLs are made available for public comment and must be approved by USEPA before they can be adopted and implemented.

Once suspected sources are identified and the TMDL is determined, then a watershed approach to eliminate or minimize the pollution is implemented. For contributing sources that are point sources, the load reduction is implemented through regulatory means, usually through a reduction in a NPDES permit. For contributing sources that are nonpoint sources, the watershed management process becomes the vital implementation method. Within the watershed management process, potential nonpoint sources of a particular pollutant are identified and may be addressed through programs such as voluntary on-the-ground projects targeting stormwater runoff, or through targeted educational programs and workshops.

2.5 Other State Agencies

ADEM works with many different agencies to improve the water quality of Alabama's lakes, streams and rivers. Several other state agencies are directly involved and implement regulatory and non-regulatory programs that deal with the environment. Table 2-2 lists the state agencies involved in the management of water and other natural resources in Alabama. The Alabama Cooperative Extension System, for instance, plays a critical role in providing technical assistance to state and county governments ranging from water quality monitoring, engineering services, and education and outreach to industries such as agriculture and forestry. Agencies like the Alabama Forestry Commission and Alabama Soil and Water Conservation Committee perform outreach to forestry groups and farmers, respectively, to reduce water quality impacts from associated activities. Watershed management often requires multi-agency coordination and response to effectively tackle pollution issues.

[11] The MOS provides for uncertainties and to help ensure environmental and public health protection.

Table 2-2. State Agencies Involved in the Management of Water and Other Natural Resources Important to Watershed Management

ACRONYM	AGENCY	DESCRIPTION
ACES	Alabama Cooperative Extension System	▪ Provides technical assistance and educational resources to industries, government agencies and nongovernmental organizations.
ADAI	Alabama Department of Agriculture and Industries	▪ Works with farms to protect the health of livestock and poultry in Alabama, administering programs to prevent, control, and eradicate diseases.
ADCNR	Alabama Department of Conservation and Natural Resources	▪ Lead state agency for the management of freshwater fish, wildlife, threatened/endangered species, marine resources, waterway safety, state lands, state parks, and other natural resources.
ADECA-OWR	Alabama Department of Economic and Community Affairs-Office of Water Resources	▪ Administers programs for river basin management, river assessment, water supply assistance, water conservation, and water resources development. ▪ Serves as the State liaison with federal agencies on major water resources-related projects and conducts any special studies on instream flow needs. ▪ Conducts environmental education and outreach programs to increase awareness of Alabama's water resources.
ADIR	Alabama Department of Industrial Relations – Mining and Reclamation	▪ Works with industry to restore land and water resources which have been adversely affected by past coal mining. ▪ Regulates non-fuel surface mining and reclamation activities.
ALDOT	Alabama Department of Transportation	▪ Lead agency on the state's transportation system, which includes an extensive stormwater management system.
ADPH	Alabama Department of Public Health – Environmental Services	▪ Administers permit and inspection program for onsite wastewater disposal in cooperation with county health departments. ▪ Oversees the management of solid waste (*e.g.*, trash removal, litter issues) for the State. ▪ Provides oversight and services for the provision of safe drinking water.
AEMA	Alabama Emergency Management Agency	▪ State lead on emergency preparedness and response for man-made and natural catastrophes, including hurricanes and floods.

ACRONYM	AGENCY	DESCRIPTION
AFC	Alabama Forestry Commission	▪ Works with landowners to carry out responsible forest management on their property and protect forests from harm. ▪ Provides professional technical assistance and education to industry and the public about the value of forests.
ASWCC	Alabama Soil and Water Conservation Committee	▪ Directs the activities of 67 soil and water conservation districts in Alabama. ▪ Collaborates with the U.S. Department of Agriculture (USDA) NRCS on a variety of federal soil and water management programs including Wetlands Reserve Program and Environmental Quality and Improvement Program.
ASMC	Alabama Surface Mining Commission	▪ Provides regulatory oversight of coal mining in Alabama.
GSA	Geological Survey of Alabama	▪ Gathers data and conducts research on Alabama's natural resources.
MESC	Marine Environmental Sciences Consortium	▪ Alabama's main marine education and research center located on Dauphin Island in the Gulf of Mexico.

2.6 Federal Agencies

In addition to USEPA, there are several other federal agencies that play a major role in watershed management in Alabama. Many of these agencies offer technical and financial assistance to Alabama's citizens, businesses, industries, counties and agencies. In some cases, such as with the USACOE and freshwater wetlands, a federal agency has direct regulatory authority over the resource. In the cases of USFWS, USDA NRCS and the USDA Forest Service, these agencies are heavily involved in the on-the-ground gathering of scientific data and project implementation related to fish and wildlife habitat, agriculture, and forestry, respectively. Similarly, the USGS plays a central role in monitoring surface and ground water resources across the state. Almost all of the federal agency activities either feed information directly into management decision-making or fund/implement actual projects in Alabama.

2.7 County and City Governments

At the municipal level, city and county governments may have jurisdiction over a wide range of environmental issues, including water pollution. Municipal staff responsible for stormwater management and wastewater treatment provide valuable assistance with watershed management implementation. For example, county transportation, public works and health departments routinely deal directly with water quality issues. Also, planning and zoning commissions and city councils tackle nonpoint source issues through the development approval process. In practice, local government activities constitute important facets of watershed management and must be included in the planning and implementation.

2.8 Nongovernmental Organizations

Private, not-for-profit watershed organizations play a key role in basin management in Alabama. Some groups are politically active, while others focus on environmental education or community action. In most cases, these groups have a wide range of skills, access to resources (*e.g.*, volunteers, funding) and enthusiasm to implement strategies to monitor, protect or improve water quality.

In the Chattahoochee-Chipola River Basin, there are several active watershed organizations. Some of these groups are affiliated with universities. Others are a part of a larger environmental network. These groups include the Chattahoochee/Chipola Basins Clean Water Partnership, the Chattahoochee Riverkeepers, Earth Share of Georgia, the Middle Chattahoochee River Stewards, Oxbow Meadows Environmental Learning Center, the Nature Conservancy, and Georgia Conservancy. The Alabama Clean Water Partnership is an umbrella organization that helps coordinate other watershed organizations, as well as governmental and business organizations.

2.9 References

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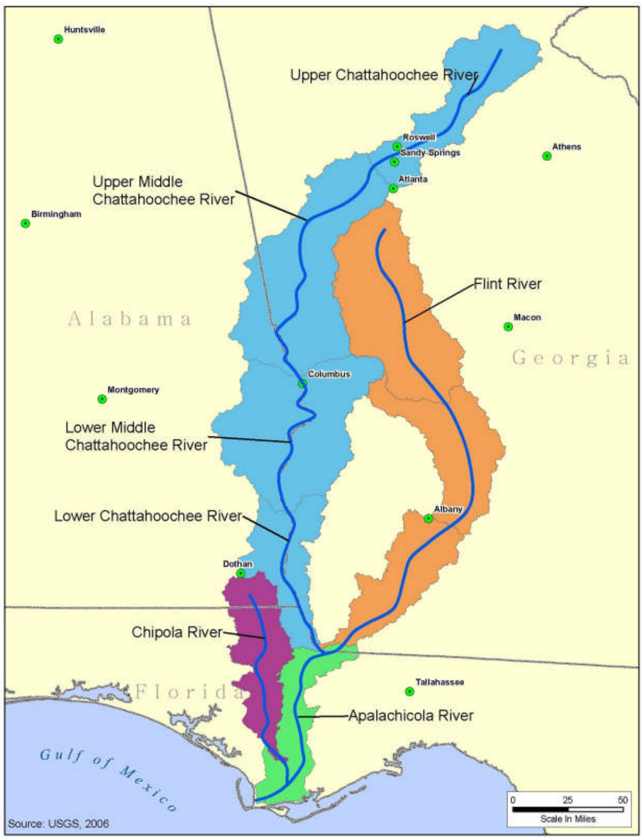
3.0 OVERVIEW OF THE CHATTAHOOCHEE RIVER BASIN

The Chattahoochee River is the 11th largest river in the United States. Originating in the Blue Ridge Mountains of northern Georgia at a spring on Coon Den Ridge in southeastern Union County, it flows southwesterly passing west of Atlanta and flowing approximately 85 miles where it meets the West Point Dam forming West Point Lake. From West Point Lake, the river flows south to Florida, marking the Alabama-Georgia state line. The Chattahoochee River in Florida consists of a short stem of the river and Lake Seminole, an impoundment at the confluence of the Chattahoochee and Flint Rivers. The Apalachicola River flows out of Lake Seminole, through Apalachicola Bay and its associated estuary, and into the Gulf of Mexico.

Figure 3-1. Chattahoochee River Subbasins



The Chattahoochee River Basin drains an area of approximately 8,770 square miles. The four major subbasins are the

(1) Upper Chattahoochee,
(2) Upper Middle Chattahoochee,
(3) Lower Middle Chattahoochee, and
(4) Lower Chattahoochee.

With the exception of the Upper Chattahoochee subbasin which falls entirely within in the State of Georgia, all or parts of these subbasins drain waters from the states of Alabama, Florida and Georgia (Figure 3-1). Roughly 2,545 square miles of the Chattahoochee Basin lies within the State of Alabama, encompassing all or portions of nine Alabama counties, including Randolph, Chambers, Lee, Russell, Macon, Bullock, Barbour, Henry and Houston. A total of 94 named tributaries to the Chattahoochee River flow within Alabama, draining their own HUC-12 watersheds as represented in Figure 3-2.[12]

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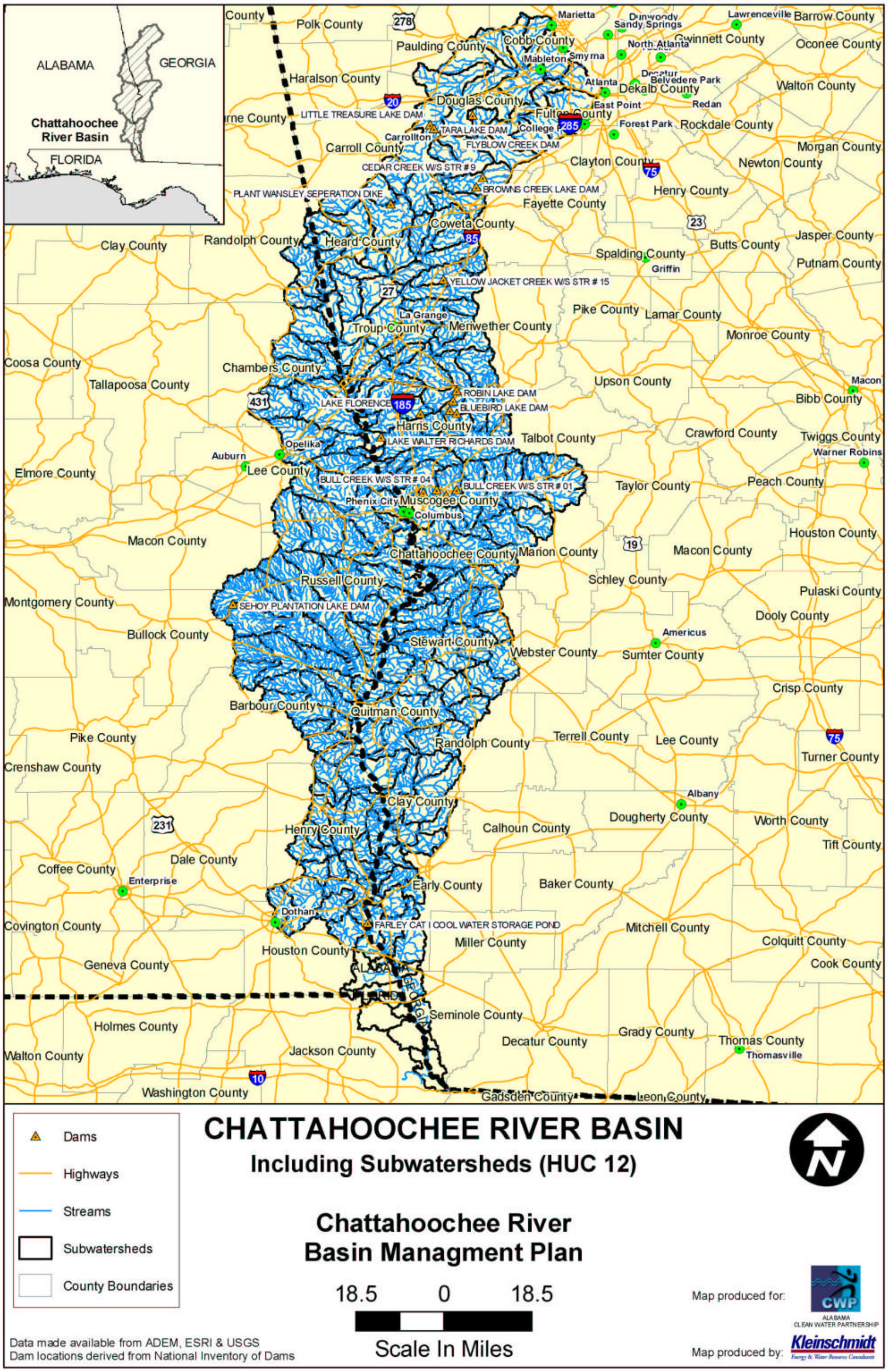
[12] The USGS has identified hydrologic units as the unit of choice for examining hydrology within the United States. The country is divided and sub-divided into successively smaller hydrologic units and identified by a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system. For a complete description of hydrologic units, see the USGS website at <http://water.usgs.gov/GIS/huc.html>.

Figure 3-2. Chattahoochee River Basin Map



The waters of the Chattahoochee River Basin serve as a multi-purpose natural resource of immeasurable value to the people and businesses of Alabama. The river and its tributaries constitute an interconnected system used for flood control, hydropower, navigation, recreation and water supply for the majority of the population of approximately 455,000 people living and working in the nine counties of the basin. The Chattahoochee River is one of the most industrialized rivers in the Southeast United States and has more dams than any other river in the region (Hartup and Deutsch, 2003).

3.1 Physical Characteristics

3.1.1 Physiography and Geology

The name "Chattahoochee" is thought to come from a Creek Indian word meaning "river of painted rocks". This description may provide an historic testimony to the river's geological setting that varies from the Blue Ridge Mountains at its northern headwaters, through the transitional foothills of the Piedmont, to the flat, Coastal Plain. These three distinct provinces – Blue Ridge, Piedmont, Coastal Plain – make up the physiography or physical geography of the Chattahoochee River (Figure 3-3). The distinct geology and topography of each of these physiographic provinces influences the river's course, flow, quality, and ecology.

Figure 3-3. Physiographic Provinces of the ACF River Basin

After leaving its mountainous origin in north Georgia, the Chattahoochee River flows through the Piedmont physiographic province. This region's geology consists of ancient (Precambian and Paleozoic) crystalline rocks (*e.g.*, schists, gneisses, granites). This rocky underground is oriented in a northeast-southwest direction that the river follows on its way to the Alabama-Georgia border. Where the river widens to form West Point Lake, it changes course and flows north to south with an ever-increasing flood plain down to Lake Seminole in Florida. The groundwater in this region is typically trapped in bedrock fractures or held in the relatively shallow layer of earth above it, providing the storage that constitutes the Piedmont's primary aquifers.

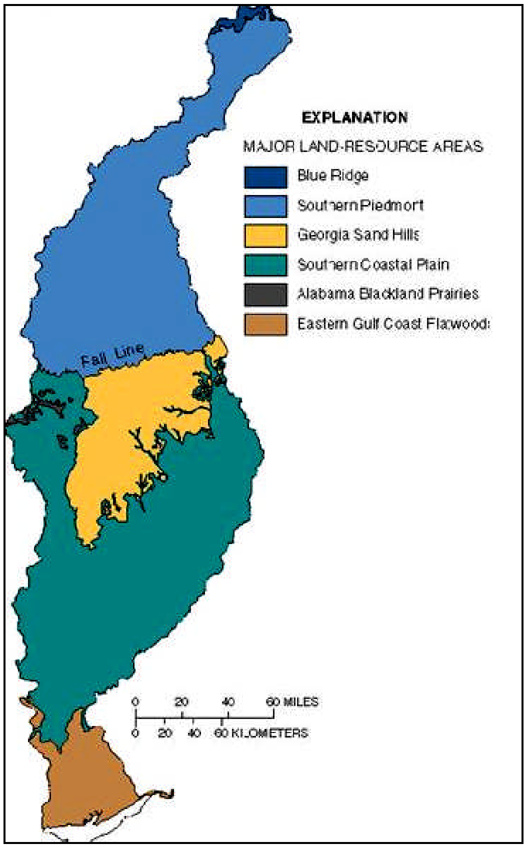
The Fall Line boundary in the Chattahoochee Basin marks the transition from the steeper slopes of the Piedmont region to the Coastal Plains and lies in the area of Phenix City, Alabama and Columbus, Georgia. At this transition to the Coastal Plain, the topography eases from rocky ledges to smooth, rolling hills to easy-sloping lands in the south. Due to the sudden changes in gradient, streams that flow across the Fall Line are characterized by the presence of rapids and shoals. As the streams flow into the Coastal Plain province, the stream geomorphology changes to low gradient, sandy bottom streams with increased sinuosity and floodplains. The Coastal Plain topography is mostly rolling hills all the way to the Florida border, where some karst[13] topography can be seen.

3.1.2 Soils

Soils in the Chattahoochee River Basin vary in age and character. There are two major soil orders present - ultisols and entisols. A third order, spodosols, may be present in the lowest reaches of the basin. Ultisols are characterized by sandy or loamy surface horizons and loamy or clayey subsurface horizons. These deeply weathered soils are derived from underlying crystalline and metamorphic rock. Entisols are young soils with little or no change from parent material and with poorly developed subhorizons. These soils are frequently infertile and dry because they are deep, sandy, well-drained, and subject to active erosion. Spodosols are characterized by a thin sandy subhorizon underlaying the A horizon. The Chattahoochee River Basin is similar to much of the southeastern coastal plain in the dominance of ultisols. Entisols are found at and below the Fall Line District and in the Dougherty Plain; and spodosols are found in the Gulf Coast Lowlands.

[13] Karst topography is a landscape marked by sinkholes, caves, disappearing streams, and springs due to the predominance of highly soluble limestone.

Figure 3-4. Major Land-Resource Areas within the ACF River Basin



Source: USGS 2004

The Chattahoochee River Basin in Alabama has a relatively narrow range of soil and climatic conditions. Geographically, the basin can be divided into three soil provinces, often referred to as major land resource areas (MLRA). A MLRA is a geographic land area characterized by a particular combination or pattern of soils, climate, water resources, land use and types of farming. The three MLRAs covering the basin are (1) Southern Coastal Plains, (2) Georgia Sand Hills, and (3) Southern Piedmont (Figure 3-4). Ultisols dominate in the Southern Piedmont and are acidic and low in nitrogen and phosphorus. This area lacks its original topsoil because of intensive cotton cultivation in the 1800s. Ultisols are also found throughout the Southern Coastal Plain except in areas of the Georgia Sand Hills, where entisols are present.

Understanding the soil and its characteristics within the basin is important because these factors play a part in determining the quality of rivers, streams, lakes, and ponds. In the Chattahoochee River Basin, the knowledge of soil leaching and potential runoff rates provides information on areas that may be susceptible to greater contaminant transport through infiltration or runoff. Soils with high leaching rates are concentrated in the sandy sediments below the fall line. The potential for runoff is based on the inherent capacity of bare soil to permit infiltration, as well as factors such as slope, frequency of flooding during the growing season, and permeability. Soils with high runoff ratings are distributed throughout the basin, but are concentrated in areas having low permeability, steep slopes; or where flooding is frequent or the water table is near the surface, such as in floodplains and other low-lying areas. In the Chattahoochee River Basin, soils with the highest runoff rate are present on steep slopes in the Blue Ridge Province, several areas in the Piedmont Province and the hilly region near the Fall Line (Couch, *et al.*, 1996).

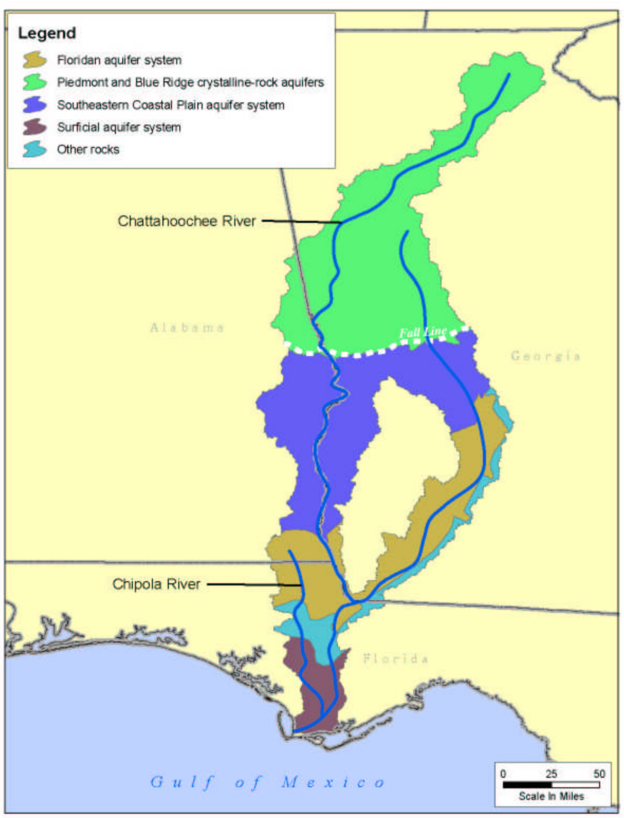
3.1.3 Climate

The Chattahoochee River Basin's climate is warm, humid, and temperate. Weather in the basin varies based on latitude (north vs. south), topography (hills vs. plains) and proximity to the Gulf of Mexico. The average annual temperature ranges from about 60°F in the north to near 70°F in the south. Daily temperatures in the basin, on average, range from about 40°F to 55°F in January, to about 75°F to 80°F in July. In the winter, cold winds from the northwest cause the minimum temperature to dip below freezing for short periods. Summer temperatures commonly range from the 70's to the 90's. Precipitation is great in both the mountains, as a result of their orographic effect, and near the Gulf of Mexico, as a result of the availability of moist air. Average annual precipitation in the basin, primarily as rainfall, is about 55 inches, but ranges from a low of 45 inches in the east-central part of the basin to a high of 60 inches in the Florida panhandle (Frick, *et al.*, 1998). Evapotranspiration generally increases from north to south and ranges from about 32 to 42 inches per year. In the east-central part of the basin, precipitation and evapotranspiration are about equal. Average annual runoff ranges from 15 to 40 inches. Runoff is greatest in the steeper slopes of Blue Ridge Mountains and near the Gulf Coast where land is saturated with water.

3.2 Ground Water

Groundwater in the Chattahoochee River Basin varies according to the basin's topography and geology. There are six aquifers underlying the basin and each one has unique characteristics determined by the make up of the sub-surface environment (*i.e.*, bedrock, sediments). From north to south, these aquifers are called: the crystalline rock aquifer, the Providence aquifer, the Clayton aquifer, the Claiborne aquifer, the Floridan aquifer system, and the surficial aquifer system (Figure 3-5).

Figure 3-5. Aquifers of the ACF River Basin



In the Blue Ridge and Piedmont regions of the basin, groundwater is found in the crystalline rock aquifer. This aquifer is comprised of cracks and other openings in the igneous and metamorphic bedrock as well as the poorly sorted deposits of material lying over the bedrock (known as, "regolith"). The yield of this aquifer is not great relative to the sandy aquifers to the south (Couch *et al.*, 1996). Therefore, the development of wells in this region of the basin may have unpredictable results because of the fracture nature of the bedrock. This aquifer underlies those parts of the basin in Alabama and Georgia north of the Fall Line (*i.e.*, Phenix City Area) where the land is undulating, steep and characterized by rocky outcroppings.

Below the Fall Line, strata of sand varying in age from older Cretaceous to younger Eocene-Paleocene formations replace the crystalline rocks of the Piedmont region. From here to the Gulf of Mexico, the topography begins as rolling hills before easing to the gradual slopes of the lower Coastal Plain. Here, groundwater occupies various strata of water-bearing sand to make up the Providence, Clayton, and Claiborne (Couch *et al.*, 1996). Also, in this physiographic environment exists the Florida aquifer system, which is one of the most productive aquifers on the continent and extends well north to South Carolina and far south into central Florida. Parts of the Florida aquifer system are comprised of limestone topography (*i.e.*, karst topography) that is commonly noted for its sinkholes and disappearing streams. These features are mostly found at the southern extent of the basin at and below the Alabama-Florida border.

The surficial aquifer is made up of poorly sorted sand and gravel that are shallow and mostly unconfined by any rock formations. Throughout the river basin these sediment layers are common and can be found in association with rivers and streams. Only in the southern reaches of the basin, in the lower Coastal Plain does the surficial aquifer produce groundwater that is tapped for domestic use (Couch *et al.*, 1996).

3.3 Surface Water

Arising out of the Blue Ridge Mountains as a cold-water mountain spring, the Chattahoochee River flows 434 miles to its confluence with the Flint River and Lake Seminole in Florida.

USGS maintains stream gages in several locations in the Chattahoochee River Basin. The name, number and location of these stations are listed in Table 3-1. USGS uses these stations to monitor water flows in the river. At some stations, the river height, or stage, is also provided. These data can be reviewed in real-time through the USGS website <http://waterdata.usgs.gov/al/nwis/rt>.

Along the Alabama border, the Chattahoochee River's flow has been measured as low as 480 cfs (cubic feet per second) in October 1931 and as high as 120,000 cfs in February 1961 (Psinakis, *et al.*, 2005). Late winter and early spring bring the highest flows for the Chattahoochee River, whereas less rain and higher evapotranspiration in the summer result in reduced flows (USACOE, 1998). The Columbus, Georgia, gaging station readings for the years 2002 – 2004 ranged from 2,161 cfs in June 2002 to 22,240 cfs in May 2003 (Psinakis, *et al.*, 2005).

Table 3-1. USGS Hydrological Stations in the Chattahoochee River Basin in Alabama

STATION NAME	COUNTY	STATION NUMBER
West Point Lake near West Point, GA	Troup, GA	02339400
Chattahoochee River at West Point, GA	Troup, GA	02339500
Chattahoochee River at GA 280 near Columbus, GA	Muscogee, GA. Russell, AL	02341505
Uchee Creek near Fort Mitchell	Russell, AL	02342500
South Fork Cowkiee Creek near Batesville	Barbour, AL	02342933
Chattahoochee River at Coast Guard Dock at Eufaula	Barbour, AL	0234296910
Walter F. George Lake near Fort Gaines, GA	Clay, GA	02343240
Chattahoochee River near Columbia	Early, GA. Houston, AL	02343801

Source: USGS Water Data Report AL-04-01

3.3.1 Dams on the Chattahoochee

Over most of its length, flow in the Chattahoochee River is regulated by hydropower facilities. Many of these hydropower facilities store water on a daily and weekly basis, an operation referred to as “pondage”, which is used to produce electricity. The effect of these operations results in flow variations that are different from a nonregulated (not dammed) river. A nonregulated stream responds to precipitation and runoff with a peak flow, or discharge, occurring after a rain event followed by diminishing flow rates over time until the river reaches its base flow. On a regulated river like the Chattahoochee, dams may hold back water after a rain event so that the reservoirs fill and store water for use in generating power. When generation commences, water is released through the hydroelectric plant to drive the turbines, thereby producing energy. On the Chattahoochee River, this management regime results in daily river stage fluctuations, which may alter water levels on lakes by 4 feet or more (Frick, *et al.*, 1998).

There are eleven dams on the main stem of the Chattahoochee River in Alabama (Figure 3-6). The dams, some with associated locks, are operated by Georgia Power Company, the USACOE, City Mills and Consolidated Hydro (Table 3-1). Dams serve as navigational, flood control, power production, and recreational purposes.

Figure 3-6. Dams Located on Mainstem Chattahoochee River

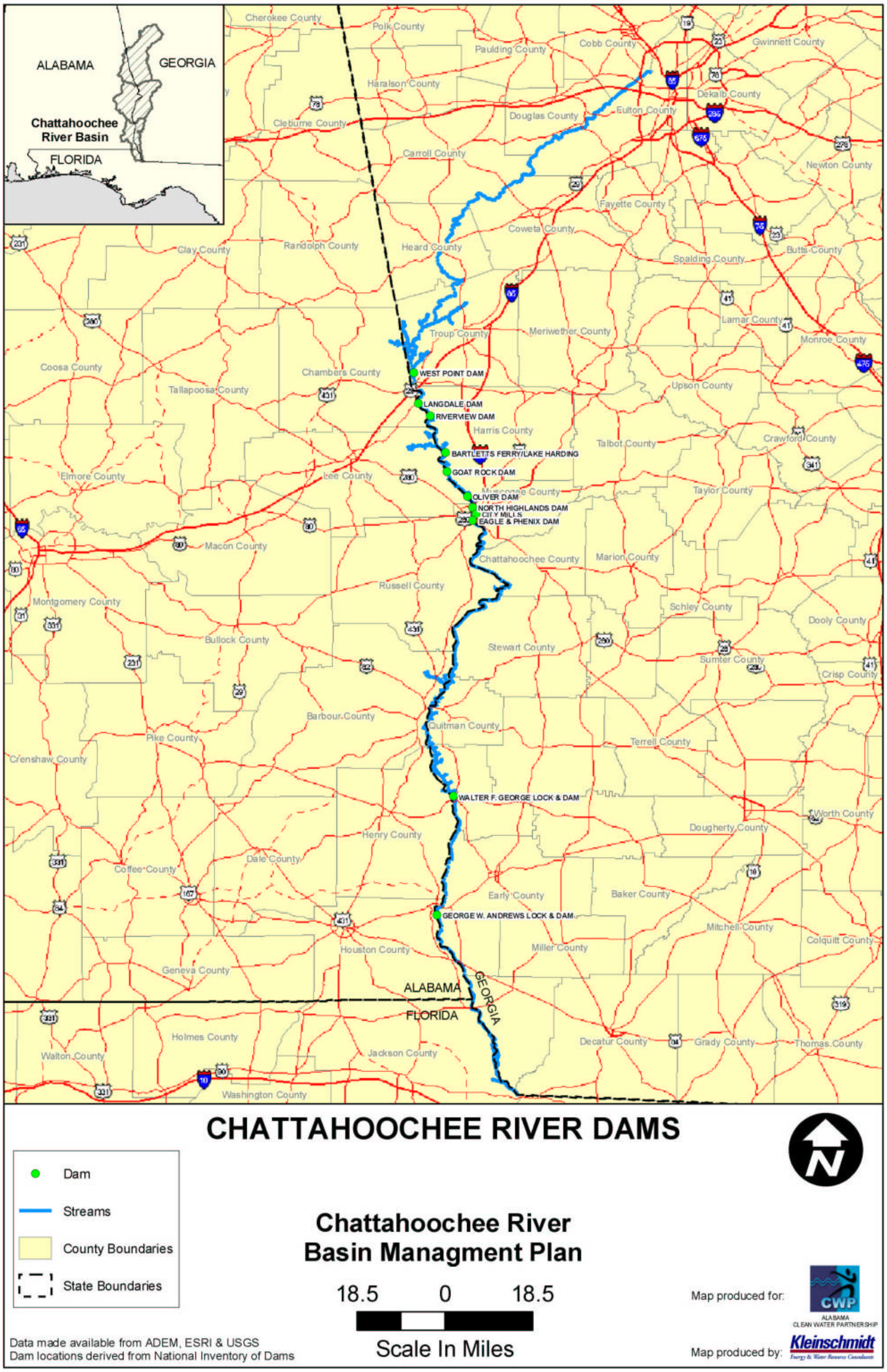


Table 3-2. Dams on the Chattahoochee River in Alabama

NAME	OWNER	DATE	DRAINAGE AREA (MI^2)	LOCATION	SURFACE AREA (AC)	TOTAL RESERVOIR STORAGE (AC-FT)
West Point Dam	USACOE	1975	3,440	Troup County, GA	25,900	604,500
Langdale Dam	GPC	1860	3,600	Chambers County, AL	152	NA
Riverview Dam	GPC	1902	3,600	Chambers County, AL	75	NA
Bartletts Ferry/Lake Harding	GRPC	1926	4,260	Lee County, AL	5,850	182,500
Goat Rock Dam	GPC	1912	4,500	Lee County, AL	1,050	11,000
Oliver Dam	GPC	1959	4,630	Lee County, AL	2,150	32,000
North Highlands Dam	GPC	1900	4,630	Lee, Russell County, AL	131	1,500
City Mills	City Mills	1963	4,630	Russell County, AL	110	684
Eagle and Phenix Dam	Consolidated Hydro	1834	4,640	Russell County, AL	NA	260
Walter F. George Lock and Dam	USACOE	1963	7,460	Henry County, AL	45,180	934,400
George W. Andrews Lock and Dam	USACOE	1963	8,210	Houston County, AL	1,540	18,180

Dam construction on the Chattahoochee River began in the early 1800's above the fall line at Columbus, Georgia. Within the fall line area from West Point Dam to Phenix City, Alabama, the river is at its steepest with a slope of 9 feet per mile. From Phenix City southward, the river flattens to a slope of 1 foot per mile. According to the USACOE (1998), the annual flow of the Chattahoochee River has not been appreciably altered by the system of dams, although storage is used to augment flows during periods of low flow; and daily fluctuations below some reservoirs can be dramatic. Pronounced decreases in the frequency of high and low flows have occurred since the start of operation of Buford Dam that forms Lake Sidney Lanier. Lake Sidney Lanier, West Point Lake, and Lake Walter F. George provide most water storage available to regulate flows in the basin (USACOE, 1998).

In recent years, the potential for removing or breaching the City Mills and Eagle and Phenix Dams has been investigated as part of a Chattahoochee River Restoration Effort. Both of these dams are operated under the oversight of the Federal Energy Regulatory Commission.

3.3.2 Water Quality Issues

Water quality data for the Chattahoochee River and its tributaries are most readily available from state and federal sources. Studies concerned with the entire ACF Basin can be obtained from the USACOE, USGS and the USFWS. On the state level, the ADEM, FLDEP and the GDNR keep historic and current water quality data pertaining to the river basin (Table 3-3). Other sources of water quality data, including Alabama Water Watch (AWW), NatureServe, and others, were also utilized and are discussed in greater detail in the individual subbasin chapters that follow.

Table 3.3. Inventory of Water Quality and Biological Data for the Chattahoochee River Basin in Alabama

SOURCE	STUDY PERIOD	PROJECT/REPORT SUBJECT	DATA TYPE
ADPH and GDNR	2005	Fish Consumption Advisories for Alabama (ADHP, 2005) and Georgia (GDNR, 2006)	Fish
USGS	2004	Water Resources for Water Year 2004 – Alabama (USGS, 2004)	Chemical, physical
ADEM	2002 - 2003	Alabama's 2004 Integrated Water Quality & Assessment Report (§305(b) Report) (ADEM, 2005)	Chemical, physical, habitat, biological
FLDEP	2002	Group 2 Basin Status Report, Apalachicola-Chipola (FLDEP, 2002)	Chemical, physical, habitat, biological

SOURCE	STUDY PERIOD	PROJECT/REPORT SUBJECT	DATA TYPE
ADEM	2001	Intensive Water Quality Survey of Chattahoochee and Conecuh River Basin Reservoirs 1999 (ADEM, 2001)	Chemical, physical, habitat, biological
ADEM	1999 – 2000	§303(d) Water Body Monitoring Project (ADEM, 2000c)	Chemical, habitat, biological
ADEM	1999	Middle Chattahoochee River Water Quality Study (ADEM, 1999b)	Biological
ADEM	1999	Southeast Alabama Poultry Industry Impact Study (ADEM, 1999a)	Chemical, physical, biological
ADEM	1999	Nonpoint Source Screening Assessment of Southeast Alabama River Basins – 1999, Volume I - Chattahoochee and Chipola Basins (ADEM, 2002)	Chemical, habitat, biological
AUCE	1999	Water Quality of the Lower Chattahoochee and Choctawhatchee River Basins (AUCE, 1999)	Chemical, physical, biological
ADEM	1998 – 2000	University Reservoir Tributary Nutrient Study (ADEM, 2000b)	Physical, chemical
USACOE	1998	Draft EIS for Water Allocation for the Apalachicola-Chattahoochee-Flint (ACF) River Basin (USACOE, 1998)	Chemical, physical, habitat, biological
ADEM	1997 – 2000	Alabama Monitoring and Assessment Program (ALAMAP) (ADEM, 2000d)	Chemical, physical, habitat
ADEM	1992 – 2000	Ecoregional reference site data (ADEM, 2000a)	Chemical, physical, biological/habitat
CWW	1990 – 1993	Middle Chattahoochee River Watershed Assessment (CWW, 2001)	Chemical, physical, biological, watershed monitoring
USGS	1992 – 1995	Water Quality in the Apalachicola-Chattahoochee-Flint (ACF) River Basin Study (Frick, *et al.*, 1998).	Chemical, physical, biological

3.3.3 The Tri State Water Negotiations ("Water Wars")

The Chattahoochee River has been the subject of considerable concern in recent decades, marked by political debate and legal action. In the center of the controversy is the question of water availability and how it should be fairly allocated to meet the increasing demands of the Atlanta Metropolitan Area while supporting the many other water demands downstream in Alabama and Florida. In addition, there is great concern about the environmental effects that alternative water allocation formulas would have on the land and water resources of the ACF Basin. As a result, financial and technical resources were invested in the 1990s to study many aspects of the basin and the probable effects of allocating water to meet the many growing demands.

The participants in the management debate over the waters of the ACF Basin are the states of Alabama, Florida, Georgia and the USACOE. Authorized by Congress to assist Georgia with its water supply concerns, the USACOE considered several options for developing water supplies in the ACF Basin to meet Atlanta's growing demands. In 1989, the USACOE released a report which recommended that a portion of the water being used for hydropower in Lake Lanier be reallocated for water supply in the Atlanta Region. Out of concern that upstream modifications to the Chattahoochee River would affect downstream uses, the State of Alabama sued the USACOE for failing to act neutrally as a steward of water resources in the Basin and also for failing to conduct an environmental assessment of the impacts of its reallocation decision. Later, Florida, Georgia and several organizations joined the lawsuit (Carriker, 2000).

A Memorandum of Agreement between the three states and the USACOE was signed in 1992 that stopped litigation and called for a comprehensive study of water resources in the ACF River Basin. This comprehensive study aimed to provide the technical and strategic information to manage water resources in the basin. In addition to developing a valuable data set and management approaches for water use, the study helped bring the states into interstate compacts to cooperatively manage water resources. Alabama, Florida, and Georgia entered into an interstate compact that was ratified by President Clinton in the Fall of 1997. As negotiations between the states proceeded, the USACOE embarked on a mission to complete a Programmatic EIS for three water allocation scenarios (high flow, medium flow, low flow). The resultant Draft EIS (1998) (which is cited frequently in this Plan) was to provide the negotiations with enough environmental and economic impact data to decide which allocation formula would "work" for the states (Carriker, 2000). Ultimately, a deadline was set (and has passed) under the aegis of the Interstate Compact for the states to decide on an allocation formula. Negotiations continue as of the date of this report.

The Interstate Compact has raised the awareness of millions of people in the ACF River Basin, highlighting the importance of the Chattahoochee's waters to our own livelihood, as well as that of the natural environment that we enjoy and from which we benefit. Most significant to this Basin Management Plan is the body of information available through the various studies resulting from these intense water resource management deliberations. Much of the information presented in this Plan comes from these earlier studies. The *ACF River Basin Study* (USGS, 2004) and *Water Allocation in the ACF Basin*

(USACOE, 1998) provide technical and strategic information required to develop a basin-wide management plan for water. Although these studies considered data that is now more than ten years old, the key findings provide historical context for water quality issues in the basin as well as reflections on current water quality trends.

The *Water Quality in the Apalachicola-Chattahoochee-Flint River Basin, Georgia, Alabama, and Florida, 1992-95,* (Frick, *et al.*, 1998) was completed for the National Water Quality Assessment (NAWQA) Program in support of the USACOE's Draft EIS for Water Allocation Study (1998). Below are several key findings from the NAWQA study pertinent to this basin Plan:

- Urban land uses in the Chattahoochee River Basin have the most important effect on its watersheds and water quality because of impervious surfaces/increased runoff, industrial discharges, and wastewater discharges. The growth of the Metro Atlanta Region has had significant (negative) impact on water quality and biological integrity of the Upper Chattahoochee River Basin.

- Impacts to water quality and aquatic life from nonpoint source pollution are more pronounced in the Piedmont Province compared to the Coastal Plain and Blue Ridge Provinces, especially where urbanization has occurred in the watersheds of headwater streams. Coastal Plain streams that are typically encroached by agriculture and suburban development benefit from forested floodplains and intact wetland buffers.

- The construction of dams resulted in sediments accumulating in the reservoirs of the Chattahoochee River. Sediment core samples from West Point Lake, Lake Harding, and Walter F. George provide evidence of the upstream land uses in the basin, due to the presence of metals, chlordane, DDT, and PCBs in sediments.

- Nutrients (nitrogen and phosphorus) act like fertilizer in rivers and lakes. In excessive quantities, nutrients can trigger dramatic biological and chemical changes to the water that result in severely degraded quality conditions. Nitrogen in the form of ammonia or nitrate at certain concentrations in the surface and ground water can be toxic to fish and humans. Point sources such as wastewater treatment facilities, combined sewer overflows, and industrial discharges are common sources of nutrients to the Chattahoochee, especially in urban areas. Nonpoint sources of nutrients in the Chattahoochee River are animal/poultry manure used for fertilizer, septic systems, atmospheric deposition and decomposing organic matter.

- Phosphorus concentrations in streams are generally highest in tributaries draining watersheds predominated by poultry farms and urban/suburban land uses, particularly during storm flow conditions, and in the Chattahoochee River downstream from Atlanta, including the river sections flowing along Alabama. Phosphorus loading to the river continues to be a *primary water quality concern* despite Georgia's efforts to reduce these loading from Atlanta's wastewater and industrial discharges. Nonpoint source loadings of phosphorus are increasing throughout the basin due to more widespread domestic and industrial use of fertilizers and cleaning agents.

- Despite widespread alteration of the ACF River Basin environment, the basin is noteworthy for its remaining biological diversity and support of commercial fisheries for oysters, shrimp, blue crabs, and a variety of fin fish in Apalachicola Bay.

3.4 Ecological Resources of the Chattahoochee River Basin

With its origin in the Blue Ridge Mountains of Georgia and its ultimate destination being the Gulf of Mexico, the Chattahoochee River and its associated Basin covers a mosaic of different ecosystem types. The basin can be divided into three ecological regions, or ecoregions. Ecoregions, as defined by the USEPA, "…denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources" (USEPA, 2006). The USEPA 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 a hierarchal classification system that corresponds to the spatial scale of the ecoregion (*i.e.*, I being the coarsest and IV more refined).

The headwaters of the Chattahoochee begin in the Blue Ridge ecoregion, one of the richest centers of biodiversity in the eastern U.S. The region of forested slopes, high-gradient, cool, clear streams, and rugged terrain lies upon a mix of igneous, metamorphic, and sedimentary geology. Its vegetation includes Appalachian oak, northeastern hardwood, and southeastern spruce-fir forests as well as shrub, grass, and hemlock, cove hardwood, and oak-pine communities.

The Chattahoochee River flows into the Piedmont ecoregion as it reaches the Alabama border. The Piedmont is a transitional area from the Blue Ridge to the Southeastern Plains marked by hills formed in a northeast-southwest orientation. This part of the basin is approximately 75 percent forested with oak-hickory-pine forests, the primary vegetative cover. In areas not managed for timber, commonly found trees are loblolly pine, shortleaf pine, white oak, northern red oak, post oak, hickories, tulip poplar, persimmon, and eastern red cedar. Substory woody plants found in these communities include flowering dogwood, sourwood, eastern redbud, shadbush, black gum, American holly, blackberry, viburnums, sumacs, greenbriers, grapes, and honeysuckle (USACOE, 1998).

Near Phenix City, Alabama and Columbus, Georgia area, the river flows into the Southeastern Plains ecoregion. The Southeastern Plains are composed of irregular plains consisting of croplands, forests and pasture (Griffith, *et al.*, 2001). Forests are mostly pine and oak, although mixed southern hardwoods occur more frequently in the southern basin reaches. Streams are low-gradient and wetland areas are more abundant. The soils are very sandy in this region as evidenced by sandy-bottomed streams.

Freshwater wetlands associated with the Chattahoochee flowing through Alabama are mostly forested. It is common to find wet forests throughout this part of the basin called "bottomland hardwoods", which are forested floodplains serving as a riparian system. Typically, these systems are biologically diverse and rich. Other wetlands found in the basin consist of smaller, marsh-like, vegetation.

As the Chattahoochee River leaves Alabama and joins the Flint River at Lake Seminole, it continues to flow through the Southeastern Coastal Plains. Halfway through the Florida Panhandle, the Chattahoochee (now the Apalachicola River) occupies the Southern Plain ecoregion. This ecoregion consists of many swamps, marshes, and slow-flowing streams. This area was once dominated by typical southern hardwoods like, magnolia, sweetgum, and laurel oak but has been converted to commercially important pine forests, pastures, and urban lands (Griffith, *et al.*, 2001). Ultimately, the Apalachicola meets the Gulf and forms Apalachicola Bay, an estuary of significant ecological and economic significance.

The diversity of freshwater and estuarine habitats in the Chattahoochee River Basin provides for a diversity of aquatic life that is distinguished worldwide. These habitats range from the small headwater streams in the Blue Ridge Mountains to the Apalachicola Estuary on the Gulf of Mexico, including the rivers and tributaries throughout the basin. Below are several USFWS statistics describing the ACF Basin, which demonstrate these natural assets (USFWS, 2006).

- The number of recorded aquatic species in the ACF Basin:
  - Fish: 122 species
  - Mussels: 29 species
  - Crayfish: 30 species
- ACF Basin has the highest density (population/area) of reptiles and amphibians in the United States.
- The Apalachicola Bay and Estuary is one of most productive saltwater fisheries in North America.
- The dams and reservoirs support multi-million dollar fishing and hunting opportunities.
- The Eufaula National Wildlife Refuge is an 11,184 acre refuge established in 1964 on the Walter F. George Reservoir (Lake Eufaula). The refuge lies from river mile 104 to 116 within Barbour and Russell Counties in Alabama, and Stewart and Quitman Counties in Georgia. It is managed for waterfowl and game mammals.
- The Nature Conservancy considers tributaries of the lower Chattahoochee River and Apalachicola River "hot spots" for freshwater mussels and priorities for conservation efforts in the Southeastern United States (Smith, *et al.*, 2002).

3.4.1 Protected Species

Several agencies and organizations maintain lists of protected, rate, threatened, or endangered species. The Alabama Natural Heritage Program was established by The Nature Conservancy to collect, manage, and disseminate information about the status and distribution of species in Alabama. The Alabama Department of Conservation and Natural Resources' State Lands Division maintains a list of the non-game species protected by Alabama state law and /or regulation (Alabama Administrative Code 220-2-.92, 220-2-.98). The USFWS Daphne Field Office maintains a web-based list of all federally designated threatened or endangered species, in addition to those proposed for listing, candidate list, and species for which critical habitat has been designated (USFWS, 2005). NatureServe is the membership organization for an international network of natural heritage programs that maintains a comprehensive database on rare and endangered species. This database includes plant and animal species listed under the Federal Endangered Species Act as well as species that have no formal designation under the federal law. NatureServe's website provides online access to this database <http://www.natureserve.org/>. For this report, individual species identified as protected in Alabama under state or federal law are identified in subsequent chapters for the subbasin in which they are found.

3.5 Cultural History of the Basin

The Chattahoochee River was the home of Native Americans dating back to 1,000 B.C. Discovery of large burial mounds provides evidence of their presence in the basin (Willoughby, 1999). More established human settlements occurred nearly 2,000 years later and continued until the arrival of the Europeans. Tribes of this Mississippian culture left behind sites that revealed that they were most likely the first peoples to systematically cultivate the land for beans, squash, pumpkins and corn. There are six significant Mississippian sites along the Chattahoochee River in Alabama: two sites in Houston County (Omussee Creek and Spann's Landing), three near Eufaula (Reeves, Lampley mound and Lynn's Fish Pond) and one in Russell County called the Abercrombie Mound.

Perhaps the most popularly know early inhabitants of the Chattahoochee River Valley were the Creek Indians. More a federation of smaller, disjointed tribes than a tribe, the Creeks banded together as a result of the disharmony and epidemics following the inland migration of the newly arrived Europeans. In fact, it was the Europeans that gave the Creeks their name because of the Native Americans' dependence on networks of waterways that supported their livelihood, including their transportation and warfare (Willoughby, 1999).

The area occupied now by Phenix City, Alabama and Columbus, Georgia is of great historical and cultural significance in the context of the Creeks and early white settlers. Two major Native American settlements sat on opposite side of the falls [at Phenix City]: Coweta and Cusseta. The cities served as separate population centers for the Creek Nation between southern tribes in the Coastal Plain and northern tribes in the Piedmont. Thousands of Creeks lived in Coweta (Phenix City) in the 16th Century and it functioned as the capitol of politics and war. Today, Alabama State Docks sits just north of the former Coweta site. Cusseta, the Creek's center for peace and religious activities sat on the eastern bank where the current location of Lawson Air Field at Fort Benning sits today. Many of these populations spoke variations of the Muscogee language, which was a unifying tribal identity for many Native Americans in the region (Willoughby, 1999).

By the mid-1800s, white settlers had expanded their hold of territory along the Chattahoochee River. In 1826, the Creeks were forced to cede all lands east of the Chattahoochee to the U.S. Government for occupation by settlers. At this time, Eufaula, Alabama was still a Creek village. Despite the land agreements, whites continued to occupy land in Alabama along the western banks of the Chattahoochee. Within several years, new treaties were developed and settlers were allowed to move west of the river. The inevitable wars between the Creeks and the settlers led to several devastating losses for the Creeks, which ultimately resulted in their relocation to reservations west of the Mississippi River (Willoughby, 1999).

The dispute over water and property rights in the Chattahoochee began in the Civil War Era. Alabama and Georgia historically have disputed each other's rights to access and development of this resource. One of the major disagreements resulted over the construction of the first bridge of the Chattahoochee in Columbus. (The famous bridge-builder and slave, Horace King, oversaw this and several other bridge construction projects on the river.) In response to legal fighting over this issue, in 1855 the U.S. Supreme Court granted to Georgia the jurisdiction over the river to the high-water mark on both river banks (Willoughby, 1999). The repercussions of this decision have been recently discussed in the issue of water allocation for Alabama, Georgia and Florida.

The City of Eufaula was originally named Irwinton until 1843 for the famous and wealthy cotton planter General William Irwin. Due mostly to its role in the production and shipping of cotton, it rose to a status of one of the wealthiest river towns. Even today it boasts one of the largest concentrations of Antebellum homes in the river basin. It has been recorded that over 200 riverboats navigated the Chattahoochee River serving cities like Eufaula. Because it flowed through the richest cotton lands, the Chattahoochee River helped make the interstate navigation a central and extremely profitable industry for the entire region until the coming of the railroads (Willoughby, 1999).

The era of the steamboats introduced the era of modifying the Chattahoochee River for navigation and then hydropower. By the end of the 19^{th} Century, the Chattahoochee was difficult to navigate, especially north of Eufaula (Willoughby, 1999). Channel-widening and dredging occurred for twenty years until federal funding and the steamboat industry dwindled at the turn of the century. Not only was the region suffering from widespread depression, the river itself was showing signs of the land clearing for farming, forestry and urbanization. "The river's natural character of drying up to a rivulet in the region north of Eufaula during periods of low rainfall was exacerbated by settlement of the lands along its banks. As farmers and developers loosened the red clay by forest clearing and plowing, wind and rain swept the dirt into the river bed (Willoughby, 1999, pg. 133)."

Phenix City was developed as a housing community for mill workers supplying labor to the textile plants across the river in Columbus. The Eagle and Phenix Mills of Columbus were two of largest antebellum plants in the South. Columbus was also the birthplace of the region's modern hydropower generation corporation. By 1930, all of the power generation interests had become assets of the Georgia Power Company. The company held a monopoly on power generation and owned riparian rights to 44 percent of the succession of waterfalls between West Point and Columbus – a valuable 15-miles stretch of river because it cascaded down over 300 feet in elevation through a series of falls (Willoughby, 1999).

The post-World War II era brought with it the most indelible changes to the Chattahoochee River. With the passage of the Rivers and Harbors Act of 1946, the USACOE was empowered to alter the Chattahoochee River (as well as the Apalachicola and Flint Rivers) to address flood control, navigation, and hydropower needs for the region and the Nation. By this point in the basin's history, flooding had been added to the management concerns. Also, the demand for electricity was increasing with economic growth.

The first major civil works project occurred at the confluence of the Chattahoochee and Flint River. The construction of Jim Woodruff lock and dam began in 1947 and was completed in 1957 at a cost of 46.5 million. Electric power generated by the Jim Woodruff Powerhouse served both homes and industry (USACOE, 2006). Several more projects were completed on the river and to this day, the USACOE maintains a navigation channel (9 feet deep by 100 feet wide) on the Chattahoochee River from the mouth of the Apalachicola in Florida to Phenix City/Columbus.

3.5.1 Sociodemographics

The Chattahoochee River's role as the foundation for the economies up and down its length is as important today as it was throughout history. As a source of energy and the receiving waters of wastewater discharges, the river provides the people, businesses, and industries a place to flourish. South of Atlanta and West Point Lake, the human populations and economic activity of the river basin are found in and around the modern day cities of Columbus in Georgia and Phenix City, Eufaula and Dothan in Alabama. Table 3-4 provides a glance at demographic data for the counties that make up the Alabama portion of the Basin. Population data is available only by county, rather than by watershed boundaries, so these numbers suggest more people live in the basin than actually do. However, when major population centers fall within the basin boundary, population data for those places are included in the table for the sake of clarification.

Table 3-4. Population Data and Median Income for the Alabama Counties in the Chattahoochee River Basin

County	Estimated 2004 Total Population (Major City Pop.)	2000 Total Population	Percent Population Change, 2000-2004	Percent Population Change, 1990-2000	Median Household Income (1999)
Randolph	22,603	22,380	1.0%	12.6%	$28,675
Chambers	35,567 (Valley = 8,600)	36,583	-2.8%	-8.0%	$29,667
Lee†	120,714	115,092	4.9%	32.1%	$30,952
Russell	49,262 (Phenix City = 28,000)	49,756	-1.0%	6.7%	$27,492
Macon	23,179	24,105	-3.8%	-3.3%	$21,180
Bullock	11,229	11,714	-3.4%	6.1%	$20,605
Barbour	28,557 (Eufaula = 13,500)	29,038	-1.7%	14.2%	$25,101
Henry	16,699	16,310	2.4%	6.1%	$30,353
Houston	92,947 (Dothan = 62,000)	88,787	4.7%	9.2%	$34,431
State Total	*4,530,182*	*4,447,100*	*1.9%*	*10.1%*	*$34,135*

Source: U.S. Census Bureau, 2006

† A very small portion of Lee County falls within the basin. The greater proportion of its population can be attributed to the Cities of Auburn and Opelika, which fall within the Tallapoosa River Basin.

Population and economic growth in the Chattahoochee River Basin is expected to continue, if not accelerate. There are several major developments that have been announced in the past two years that will undoubtedly drive change in the basin. Outside of the expanding Atlanta Metro Area, the communities along the Alabama-Georgia border will see several developments that will attract more people and businesses to both sides of the River. Two of the most notable plans are the expansion of Fort Benning, Georgia and the construction of a 3,300-acre, $1.2 billion Kia automobile manufacturing facility in West Point, Georgia.[14]

[14] For more details there are several articles readily available on the Internet. For a detailed overview of the Kia-West Point development deal, visit: <http://www.siteselection.com/ssinsider/bbdeal/>. Accessed on May 2, 2006.

3.5.2 Land Use

Land use can influence water quality. By understanding the location and types of land use activities, we can make preliminary observations about potential water quality concerns, and can identify distinct geographical areas to target for informational programs and campaigns designed to target specific types of users.

The entire Chattahoochee River Basin encompasses approximately 5.62 million acres (8,770 square miles). The Alabama portion of this basin occupies almost 30 percent of the total basin, or approximately 1.65 million acres (2,454 square miles).

Forestry and agriculture are the predominant land uses in the river basin (Figure 3-7). This is true not only for the Chattahoochee River Basin, but also for the portion of the basin that lies within the state of Alabama (Figures 3-8 and 3-9). Other land uses are minor in comparison.

Figure 3-7. Land Use in the Chattahoochee River Basin

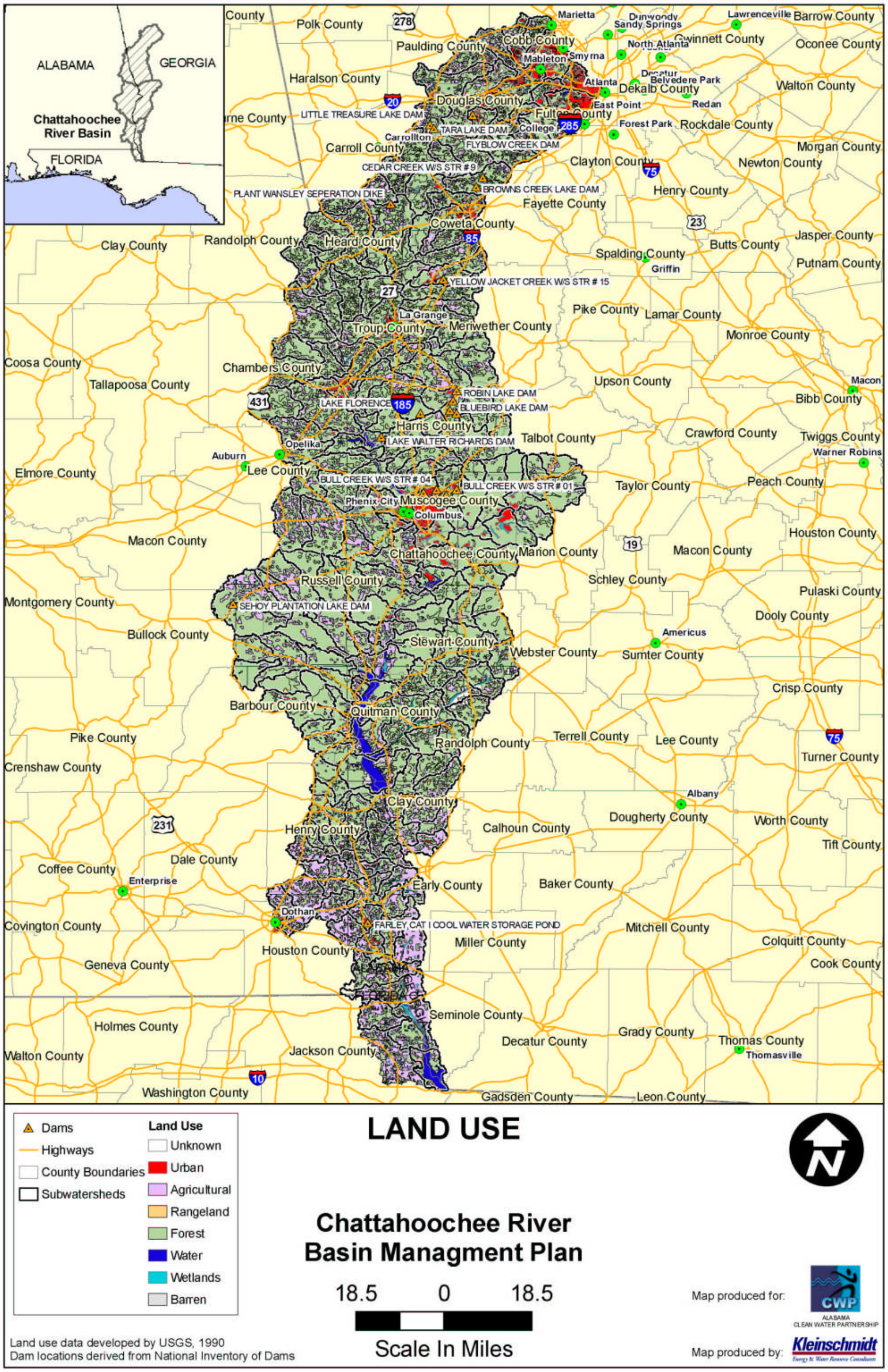
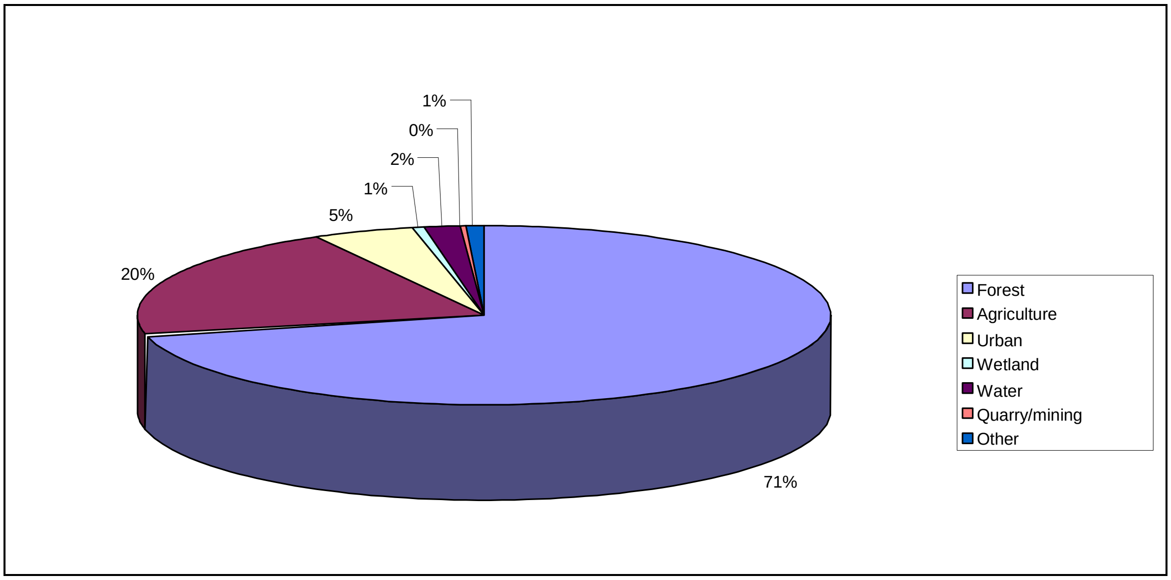
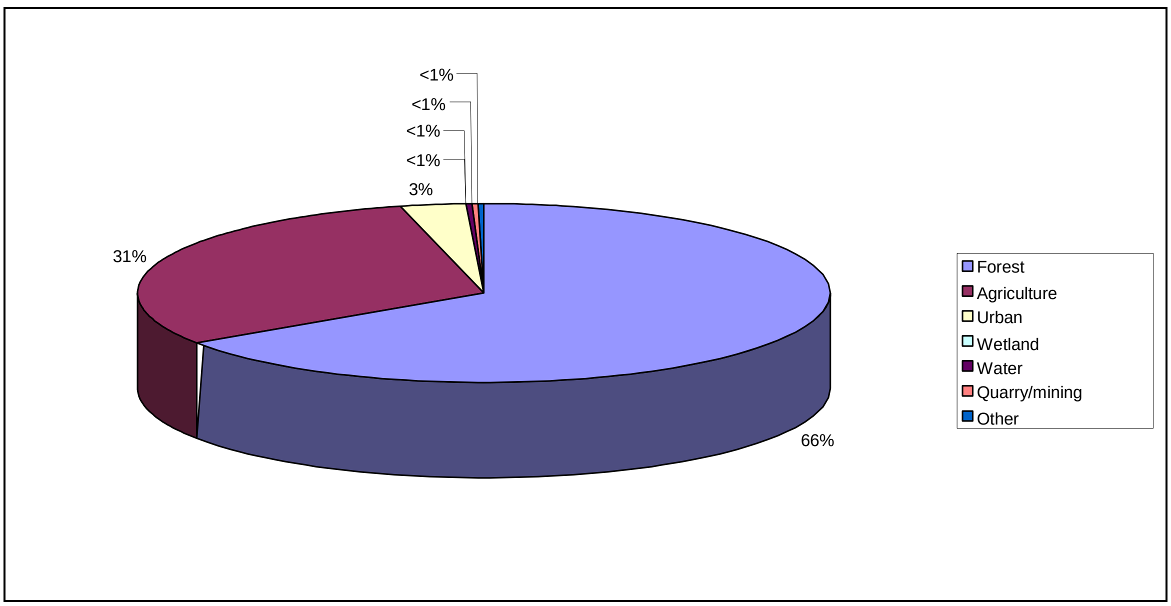


Figure 3-8. Land Use Coverage Percentages for the Chattahoochee River Basin, Alabama, Florida, and Georgia



Source: USGS, 1999 (as modified by Kleinschmidt, 2006)

Figure 3-9. Land Use Coverage Percentages for the Chattahoochee River Basin in Alabama



Source: USGS, 1999 (as modified by Kleinschmidt, 2006)

3.5.2.1 Forestry

Table 3-5 quantifies the acres of potentially harvestable forestland in the Alabama portion of the River Basin. Generally, trends in these data show that there is more timberland in the counties of the lower Middle Chattahoochee (Walter F. George). These areas are the transitional areas of the Fall Line District and correspond to Barbour, Bullock, Lee and Macon Counties.

Table 3-5. Area of Timberland by County and Class for the Alabama Counties of the Chattahoochee River Basin

Ownership Class								
County	All Classes	National Forest	Misc. Federal	State	County and Municipal	Forest Industry	Nonindustrial Private	
							Corporate	Individual
Thousands of Acres								
Randolph	289.5	-	-	-	5.1	12.6	12.6	259.2
Chambers	319.2	-	1.5	-	-	65.0	36.1	216.6
Lee	273.6	-	-	-	5.9	39.7	-	228.0
Russell	309.4	-	18.0	-	2.8	59.3	12.0	217.3
Macon	307.3	10.6	-	-	-	18.1	-	278.7
Bullock	316.5	-	-	-	-	51.6	-	264.9
Barbour	450.6	-	10.7	13.8	-	76.2	-	349.8
Henry	224.5	-	-	-	-	26.5	10.6	187.4
Houston	166.1	-	5.3	-	-	-	12.0	148.8

Source: Hartsell and Brown, 2002

3.5.2.2 Agriculture

An overview of agricultural data for Alabama illustrates the relative volume of these predominant land use activities. Trends in land use, particularly the intensity of the land use (*e.g.*, number of animals per acre of pasture, number of acres in row crops versus pasture, pounds of animal manure produced) are related to water quality threats. It has been noted that for several years, the total acreage used for cultivated crops and pasture has been decreasing slightly, and there is a trend toward conversion to forestland (Burns, 2002).

In 1999, the SWCC completed land use surveys including estimates of the number of animal units occupying each watershed and county. A summary of the land use data is provided in Table 3-6. The SWCC also provides online maps of agricultural land uses (Figure 3-10), which can aid in identifying potential sources of NPS pollution and ranking priority areas.

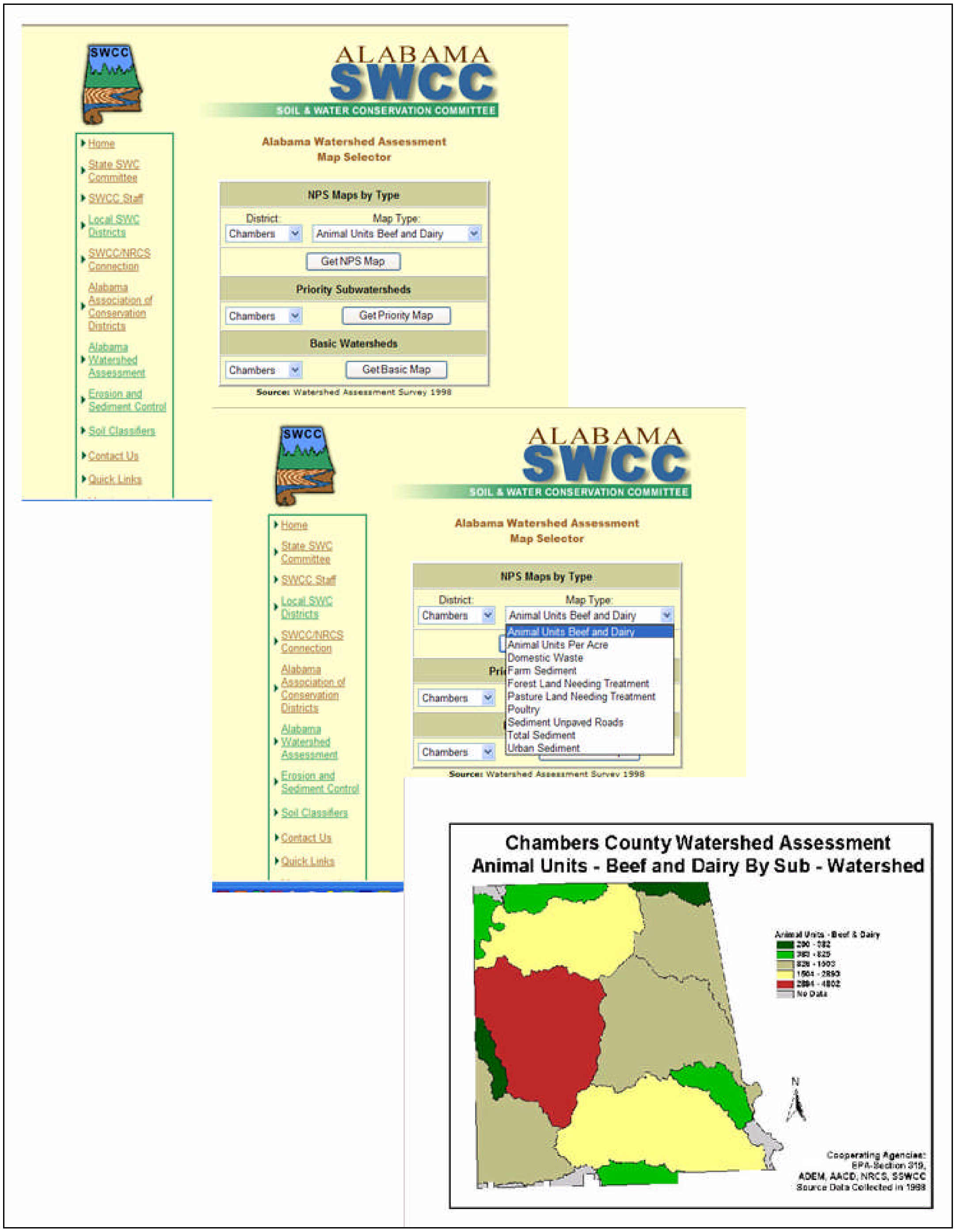
Table 3-6. Agricultural Statistics for Chattahoochee and Chipola River (Alabama Only) Basins for 1998

SUB-BASIN NAME	FOREST	ROW CROP	PASTURE	MINING	URBAN	OPEN WATER	OTHER
Upper Middle Chattahoochee	82%	1%	8%	0%	5%	4%	0%
Lower Middle Chattahoochee	35%	35%	18%	0%	10%	1%	<1%
Lower Chattahoochee	47%	33%	14%	1%	3%	1%	2%
Chipola	35%	35%	18%	0%	10%	1%	<1%

Source: Alabama SWCC, 1998

The following is an example of a map that can be selected on the Alabama SWCC website <www.swcc.state.al.us/watershedmenu.htm>.

Figure 3-10. Alabama Soil and Water Conservation Committee NPS Maps



In addition, agricultural statistics are available for the counties in the watershed from the Alabama Field Office of the National Agricultural Statistics Service. These data illustrate the relative volume of predominant land use activities (Table 3.7). More detailed estimates of animal concentrations for each watershed are available in ADEM's 1999 and 2004 Nonpoint Source Screening Assessments (ADEM, 2002; ADEM, 2006).

Table 3-7. Agricultural Statistics for the Alabama Counties of the Chattahoochee River Basin

	2004 Cash Receipts					Census of Agriculture 2002					
County	Crops (in Thousands of Dollars)	Livestock & Poultry	Forest Products	Total Farm & Forestry		Number of Farms	Land in Farms (Acres)	Average Farm Size (Acres)		Primary Agricultural Products	Highest and Notable State Rankings and Ranked Products (2004)
Randolph	974	60,503	8,505	74,560		610	109,648	180		Eggs, hay	6th, Eggs
Chambers	1,312	5,368	16,541	23,878		306	92,810	23,878		Cattle, hay	38th, Cattle
Lee	27,613	3,297	8,216	41,762		336	74,039	220		Cotton, cattle, hay	30th, Cotton
Russell	7,915	3,956	7,389	21,378		245	105,452	430		Hay	64th, Cattle
Macon	8,229	4,213	6,692	21,639		368	129,034	351		Cotton, cattle, hay	20th, Cotton
Bullock	21,439	11,683	8,704	45,336		273	146,248	536		Poultry (broilers), hay	37th, Broilers
Barbour	14,512	57,559	13,425	95,052		531	190,815	359		Peanuts, corn, cotton, hay	11th, Peanuts
Henry	18,972	23,274	6,063	57,655		346	150,838	436		Peanuts, corn, cattle, poultry, wheat, cotton, soybeans, hay	3rd, Peanuts; 7th, Wheat; 8th, Corn
Houston	37,363	14,855	2,646	66,958		700	188,413	269		Peanuts, corn, cattle, poultry, wheat, cotton, soybeans, hay	1st, Peanuts; 4th, Wheat; 6th, Cotton; 9th, Soybeans

Source: National Agricultural Statistics Survey, 2005

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4.0 UPPER MIDDLE CHATTAHOOCHEE SUBBASIN

4.1 Introduction

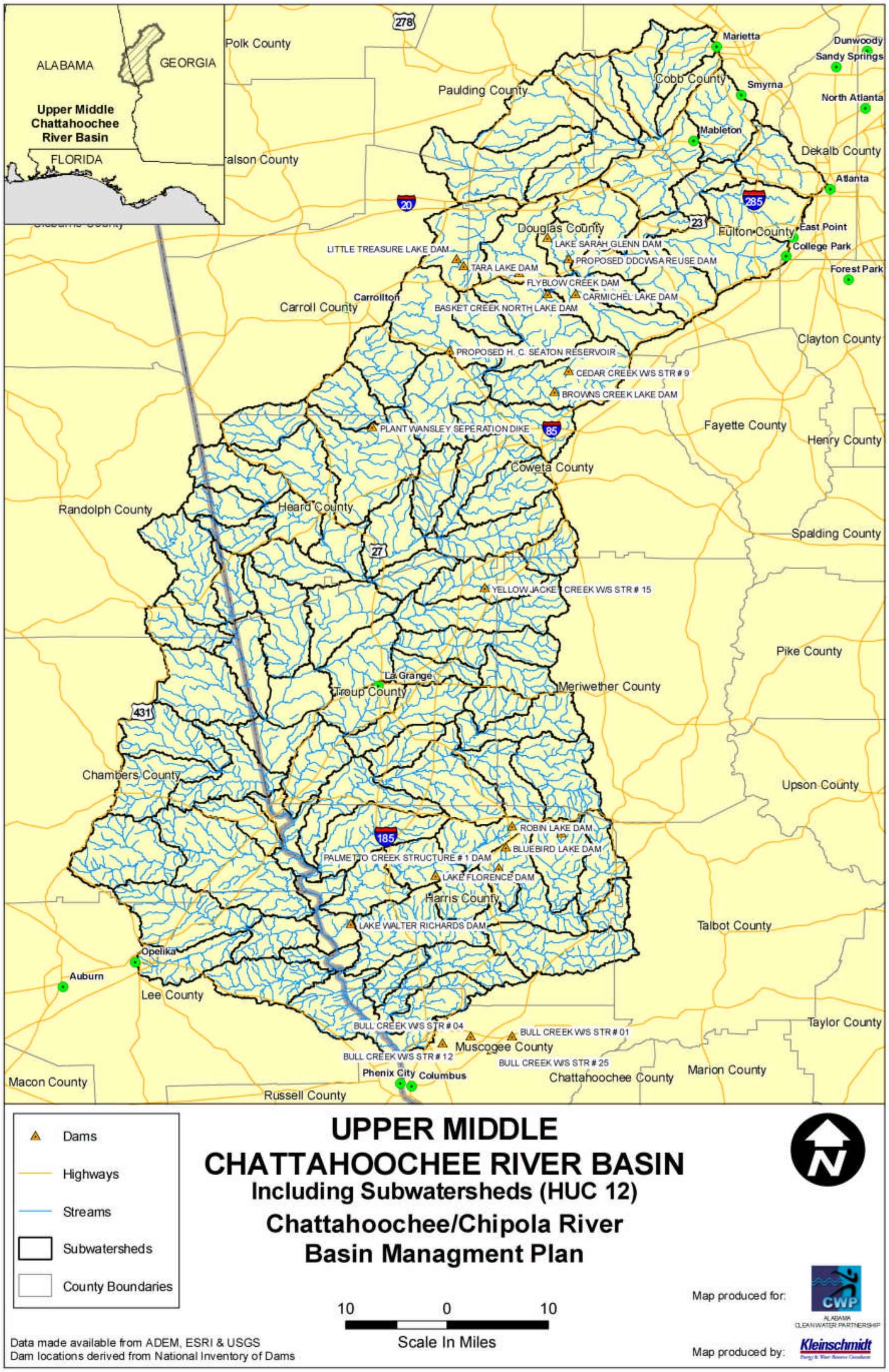
The Alabama portion of the Middle Chattahoochee River Subbasin is also referred to as the *Upper* Middle Chattahoochee subbasin (Figure 4-1). This subbasin includes the land on both sides of the Chattahoochee River from West Point Dam to Bartlett's Ferry Dam (Lake Harding). The entire subbasin covers a total area of 3,041 square miles (1.9 million acres). Less than one-quarter (approximately 700 square miles) of the subbasin lies within Alabama covering portions of Randolph, Chambers, and Lee counties. The Alabama communities of Lanette, Valley Rock Mills and Huguley are all within the boundaries of the Upper Middle Subbasin, as are portions of the City of Opelika.

The subbasin contains 22 tributaries flowing to the Chattahoochee River and 4 reservoirs. Entire lengths or segments of 22 creeks flow through Alabama within the Upper Middle Chattahoochee River Subbasin (Table 4-1). These creeks and their drainages (*subwatersheds*) make up a portion of the headwaters and tributaries of the Upper Middle Chattahoochee River Basin.

Table 4-1. Alabama Tributaries (HUC 12) to the Upper Middle Chattahoochee River Subbasin

Barrow Creek	Lower Osanippa Creek
Cedar Creek	Upper Osanippa Creek
Guss Creek	Upper Oseligee Creek
Upper Halawakee Creek	Soap Creek
Lower Halawakee Creek	Veasey Creek
Hillabahatchee Creek	Wacoochee Creek
Long Cane Creek	Little Wehadkee Creek
Mill Creek	Lower Wehadkee Creek
Moores Creek	Upper Wehadkee Creek
Mountain Oak Creek	Wells Creek
Mountain Springs Church	Lower West Point Lake

Figure 4-1. Upper Middle Chattahoochee Subbasin



Four dams are positioned on the mainstem of the Chattahoochee in the Upper Middle Subbasin, forming four separate reservoirs. West Point Lake is a 25,900-acre reservoir behind the West Point Dam located on the Alabama-Georgia state line. It is the youngest of the reservoirs on the Chattahoochee River, constructed by the USACOE in 1975. At 35 miles long with over 525 miles of shoreline, West Point Lake is a multi-use water body. The USACOE maintains the dam and lake for fishing, flood control, navigation, power generation, recreation, and wildlife habitat. In addition, the City of LaGrange, Georgia uses the lake as a water supply and the discharges from its wastewater treatment facility. The powerhouse has three generators that produce enough power yearly to serve 24,000 homes (USACOE, 2006).

Feeding geese at the West Point Dam. Photo credit to USACOE, 2006.

Langdale Dam and Riverview Dam are two hydroelectric dams owned and operated by Georgia Power Company (GPC) and licensed by the Federal Energy Regulatory Commission (FERC). Langdale Dam impounds a small 152-acre lake and Riverview Dam impounds approximately 75 acres between Valley and Phenix City, AL on the Chattahoochee.

Bartlett's Ferry Dam is also owned and operated by GPC and licensed by the FERC. Bartlett's Ferry Dam creates Lake Harding. The project is the largest of the GPC's assets on the Chattahoochee in the Upper Middle Subbasin (GPC, 2003). Lake Harding has a surface area of 5,850 acres and a drainage area of 4,240 square miles. It is a multi-purpose, man-made water body. In addition to recreation and hydropower, Lake Harding is also used as a water supply by the City of Opelika (Auburn Water Works Board, 2004).

4.2 Existing Water Quality and Biological Information

Alabama's biannual §303(d) List of Impaired Waters identifies creeks, lakes, and rivers that do not meet state water quality standards. On a five year rotational basis, ADEM completes a river basin monitoring assessment to identify streams that are not completely meeting water quality standards for their use classification.[15] The streams to be tested are identified through past assessments and impairments, complaints, and stakeholder

[15] All streams in the Upper Middle Subbasin are classified as Fish & Wildlife, except for two branches of the Chattahoochee River/West Point Lake at the confluence with Finley and Veasey Creeks which are classified for swimming as well.

identification of problem areas. *There are currently no water bodies in the Upper Middle Chattahoochee Subbasin on the §303(d) list*.[16]

4.2.1 Priority Subwatersheds

ADEM's Nonpoint Source Screening Assessments were primary sources of water quality information for this Planning effort (ADEM, 2002; ADEM, 2006). These studies provide the most useful scientific analyses of the basin because they are current (*i.e.,* completed every 5 years) and completed according to USEPA-approved water quality standards. Subwatersheds based on the 11-digit hydrologic unit code are the focus of the current ADEM assessments although that will change in the future.[17] This scale was used for this Planning effort because it is the smallest scale for which data is available. Based on assessment results, ADEM assigns *nonpoint source impairment potential* and *nonpoint source priority status* to creeks with water quality and/or habitat impacts warranting greater concern and need of investigation.

Physical, chemical and biological assessments were conducted for several subwatersheds in the subbasin. NPS pollution impairment potential was assigned to subwatersheds based on surrounding land uses and evidence of pollution detected by monitoring. Assessments of aquatic habitat and macroinvertebrate populations concluded in a determination of "priority" status for the subwatershed.

Five subwatersheds were selected for priority consideration. A subwatershed is recommended for priority status if, during the assessment, it receives a rating of "fair" or "poor" for the stream's benthic (macroinvertebrate) or fish community (ADEM, 2002; ADEM 2006). NPS potential was rated based on Alabama Soil and Water Conservation Districts' (SWCD) watershed (land use) assessments. Table 4-2 provides the NPS rating and the land use with the greatest *potential* for causing the impairment.

[16] These statements are based on the *Final 2004 §303(d)* list of impaired waters. There currently is a Draft *2006 §303(d)* under review by USEPA. Until the 2006 list is approved, the 2004 list is considered the current final document. Both document can be viewed at <http://www.adem.state.al.us/waterdivision/WQuality/303d/WQ303d.htm>.

[17] There are some limits to using the Rotational Screening Assessment reports in this Plan. ADEM (2002; 2006) conducted water quality and biological assessments at subwatershed (11-digit HUC) scale, which was abandoned in 2005 for the 10-digit HUC and 12-digit HUC delineations. Currently, the standard scale for watershed planning and implementation is nationally recognized at the HUC 12 sub-watershed scale. It is expected that ADEM will utilize the HUC 12 delineations for the next rotational basin assessment in 2009.

Table 4-2. Priority Sub-watersheds within the Upper Middle Chattahoochee Subbasin

Year[a]	11-digit Hydrologic Unit Code (HUC)			Waterbody Name	Station Name[b]	Screening Assessment Results			NPS ratings of "moderate" or "high" based on 1998 SWCD sub-watershed assessments[c]
						Habitat[d]	*WMB-EPT*[e]	*Fish*	
1999	0313	0003	060	Little Uchee Creek	LUC-3	1999	0313	0003	060
1999	0313	0002	190	Wedhadkee Creek	WECR-1	Excellent	Good	Fair	Animal husbandry, pasture runoff
					WECR-2	Excellent	Good	Fair	Animal husbandry, pasture runoff
1999	0313	0002	220	Barrow Creek	BWCC-1	Good	Fair	Not Assessed	Unknown
1999	0313	0002	220	Well Creek	WLCC-1	Good	Fair	Not Assessed	Unknown
2004	0313	0002	250	Moores Creek	MOOC-2	Fair	Poor	Not Assessed	Urban, Development, Sedimentation, Forestry Pasture Runoff
					MOOC-1	Good	Poor	Not Assessed	Urban, Development, Sedimentation, Forestry Pasture Runoff
2004	0313	0002	310	Mill Creek	MLLL-1	Good	Fair	Not Assessed	Sedimentation, Failing Septic Tanks

Source: ADEM, 2002; 2006

a Indicates the year of the monitoring.
b The station name is a code assigned by ADEM for the basin screening assessments.
c The Alabama Soil and Water Conservation Districts conducted land use evaluations of Alabama’s subwatersheds in 1998. The potential for nonpoint source (NPS) pollution within individual subwatersheds was assessed based on existing land uses. Watersheds where land uses associated with high or moderate potential for NPS were prevalent were identified and the land use indicated.
d This column includes the results of ADEM’s habitat evaluations.
e “WMB-EPT” is an abbreviation for “Wadeable Multi-habitat Bioassessments - Ephemeroptera, Plecoptera, Trichoptera” that describes the results of biological assessments of streams according to the sum of the number of families within the orders Ephemeroptera, Plecoptera and Trichoptera – all orders of macroinvertebrates commonly found in freshwater streams.

4.2.2 Permitted Discharges and Stormwater Sources

Approximately 53 NPDES permits were active in the Upper Middle Chattahoochee Subbasin as of April 2006. Fifty (50) of these permits were for stormwater releases associated with construction or earth work, and two were for surface mining operations. No current CAFO permits were identified in the Upper Middle Chattahoochee Subbasin. One mining permit on Wehadkee Creek and a NPDES permit are connected to operations located on three of the NPS priority streams named above, specifically Wehadkee, Osanippa, and Osiligee Creeks.

4.2.3 Fish Tissue Surveys and Consumption Advisories

ADEM Field Operations conducts annual fish tissue sample surveys in lakes and rivers across the state to monitor environmental health and to safeguard public health. The sample fish tissues are analyzed for the presence of toxic substances, and results serve as the basis for the AL Department of Public Health's Fish Consumption Advisories. For 2005, no advisories for fish consumption were issued by Alabama that pertain to the Upper Middle Chattahoochee River Subbasin. However, Georgia Department of Natural Resources (GDNR), which conducts the same type of monitoring for the State of Georgia, posted several advisories for the basin, two of which include the reservoirs of the Middle Chattahoochee subbasin.

In 2005, Georgia issued fish consumption advisories for hybrid bass, striped bass and channel catfish from West Point Lake. For Lake Harding, Georgia's fish consumption advisories included largemouth bass, spotted bass, hybrid bass, black crappie and striped bass. These fish advisories are the result of PCBs and mercury found in fish tissue. Both substances are found in river sediments, which work their way through the food chain to fish. The presence of these chemicals typically indicates historical, and not necessarily current, water pollution issues.

4.2.4 Reservoir Studies

West Point and Harding Lakes are classified eutrophic based on the mean (53) Trophic Status Index values were determined by 1999 reservoir evaluations (ADEM, 2002).[18] In 2001, ADEM published the results of this 1999 water quality survey of the reservoirs of the Chattahoochee River Basin (ADEM, 2001). The results of these monitoring studies are summarized in this section.

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18 Trophic Status Index (TSI) is a scale of numbers from 1 to 100 that can be used to indicate the relative trophic state of a waterbody. Low TSI values indicate lower levels of biological productivity, and higher TSI values indicate higher levels. The TSI is a relatively simple-to-use way of classifying the level of biological activity of a waterbody, which relates to several factors of its overall health (Carlson, 1977). The index is related to the level of "biomass" (*e.g.*, the aggregate of its biological material) in a waterbody. Biomass is driven by factors such as nutrient loading – an anthropomorphic water quality issue related to the use of fertilizers. Therefore, the trophic index provides a measure of pollutant impacts on a waterbody, such as a lake or pond, based on the measurement of the biological material present.

West Point Lake

Assessment of the water quality of West Point Lake resulted from a 1999 ADEM Study of the Chattahoochee's reservoirs. The study sampled three locations in the reservoir to evaluate the health of the lake. The three sampling stations were in the upper (Highway 109), middle (Wehadkee Creek) and lower portions of the reservoir. Chemical, physical and biological variables were measured. The key variables considered by the study were nutrient levels (nitrogen and phosphorus), algal growth, chlorophyll a, trophic level (*e.g.*, Carlson Trophic Status Index), dissolved oxygen, and total suspended solids (ADEM, 2001). Trophic Status refers to the overall level of biological productivity (or fertility) of a lake and is usually defined by the concentrations of key nutrients (phosphorus and nitrogen) and algae that are present. Lakes are divided into three trophic categories: oligotrophic, mesotrophic, and eutrophic. An oligotrophic lake is crystal clear with very few nutrients and is biologically less productive. A eutrophic lake, on the other hand, is typically murkier shallow water with a soft, mucky bottom and lots of plants and algae blooms. If deep enough to thermally stratify, the bottom waters are devoid of oxygen. Mesotrophic in an intermediate trophic state with characteristics between the other two. These results led ADEM to determine that West Point Lake was in need of Clean Lakes Program Phase I Diagnostic/Feasibility Studies, for which $100,000 in federal funding was obtained for restoration activities (ADEM, 2002).

ADEM's findings indicate several potential issues concerning water quality and impacting the use of West Point Lake. According to monthly samples taken from April through October 1998 (one 20-liter sample per month), nutrient indicators measured at Highway 109 in the upper part of the reservoir were the highest of all the Chattahoochee sampling stations. Trophic status for the lake (*i.e.*, all three sampling locations) between April and September was eutrophic. However, the Wehadkee Creek and lower sampling station indicated a mesotrophic state. The upper reservoir sampling station also failed to meet 5.0 mg/l dissolved oxygen threshold in August (ADEM, 2001). These conditions indicate a process called "cultural eutrophication" which describes the alteration of water quality and biology due to point and nonpoint source pollution and the consequent increased sedimentation and nutrient loading.

Lake Harding

The ADEM 1999 Reservoir Study assessed Lake Harding's water quality and trophic status as better than West Point Lake. Generally, the four Harding study sampling sites yielded lower results for nutrients, algal growth, chlorophyll a, and total suspended solids than West Point. Dissolved oxygen measured above the 5.0 mg/l threshold. However, the sampling point in the upper reaches of Harding had the second highest mean total nitrogen (TN) values for the entire Chattahoochee River in Alabama territory. Its trophic state varied between mesotrophic and eutrophic with better conditions measured in the late summer/early fall (ADEM, 2001). For Lake Harding, the trophic state was the highest during the growing season with the highest TSI values from late June through September. Oscillations in the trophic index vary because of factors effecting nutrient loads such as seasonal changes, grazing, mixing depth, *etc*.

4.2.5 Rare, Threatened and Endangered Resources

The health of aquatic life in the subbasin is a measure of the health of the watershed. Fish and wildlife, especially the diversity of fishes, amphibians, and invertebrates living in the waters of the subbasin, rely on clean water and functional wetlands as their habitat. When these resources are compromised, fish and wildlife populations can be threatened.

The Southeastern United States is considered a hotbed of biological diversity. The Upper Middle Chattahoochee River Subbasin is a subbasin of the greater AFC River Basin, which is recognized for its vast and unique biodiversity.

The waters of the basin provide habitat for 122 fish species, 29 mussel species and 30 crayfish species (USFWS, 2006). However, due to the long history of industrialization of the river, many of these species are thought to be at risk for extinction. Rare plant and animal resources of the Upper Middle Chattahoochee Subbasin are tracked and/or protected by several sources including natural heritage programs, and state and federal laws. Appendix 4A provides a description of the programs that monitor rare species for this subbasin and the state laws that provide them protection. Also listed in Appendix 4A are the wildlife species of the Upper Middle Chattahoochee Subbasin that are protected by Alabama state law (Table A-1) or have been identified by NatureServ (the Natural Heritage Database) as imperiled or vulnerable to extinction/extirpation (Table A-2).

Eight species are listed as federally threatened or endangered in the three counties of the Upper Middle Chattahoochee Subbasin (Table 4-3). With the exception of the bald eagle, all listed species in the subbasin are aquatic. Activities that would lead to water quality impacts would most likely lead to habitat impacts for these creatures. Because water quality and aquatic habitat are inextricably linked, the water quality objectives of this Plan tend to overlap with the management objectives for these species.

Bald Eagle

Table 4.3. Federally Threatened and Endangered Species in the Upper Middle Chattahoochee River Subbasin

RANDOLPH COUNTY
T – Bald eagle (*Haliaeetus leucocephalus*)
T – Little amphianthus (*Amphianthus pusillus*) [plant]
CHAMBERS COUNTY
T – Little amphianthus (*Amphianthus pusillus*) [plant]
LEE COUNTY
E – Relict trillium (*Trillium reliquum*) [plant]
E – Ovate clubshell mussel (*Pleurobema perovatum*)
T – Purple bankclimber (*Eliptoideus sloatianus*) [mussel]
E – Southern clubshell mussel (*Pleurobema decisum*)
T – Fine-lined pocketbook mussel (*Lampsilis altilis*)
Codes: E – Endangered; T – Threatened

Source: USFWS, 2005

On June 6, 2006, the USFWS published its intention to designate critical habitat for 7 species of freshwater mussels in several drainages to the Gulf of Mexico including the ACF River Basin.[19,20] No proposed critical habitat units were identified within the Upper Middle Chattahoochee Subbasin.

4.3 Stakeholder Issues of Concern

Sometimes water quality problems are identified by citizens, and brought to the attention of agency staff for further examination. Issues may be anecdotal in the sense that they

[19] "Critical habitat" has a specific definition within the Endangered Species Act (Endangered Species Act of 1973, as amended, Section 3 (Paragraph 5A-C)). It refers to specific geographic areas that have habitat characteristics essential for the conservation of a threatened or endangered species, and which may require special management and protection. 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 who play a part in managing listed species found on their property.

[20] 50 CFR Part 17. Federal Register, Volume 71, No. 108, Tuesday, June 6, 2006. pp. 32746 – 32796. On March 16, 1998 (63 FR 12664), the USFWS listed the 7 species of freshwater mussels under the Endangered Species Act and declared that the assignment of critical habitat was not prudent because designation does not afford additional, cost-effective protections compared to other conservation actions. However, the USFWS went ahead with the designation because the Center for Biological Diversity filed a lawsuit in the U.S. District Court for the Northern District of Georgia (Civil Action No. 1:04 CV–0729–GET) on March 15, 2004, alleging that USFWS violated the ESA by failing to designate critical habitat for the seven mussels.

describe a perceived water quality problem or watershed management issue without thorough scientific investigation. However, this citizen input, or stakeholder input, is invaluable in assisting in the identification of potentially impaired or at risk waters and helps guide future assessment activities and remedial action.

In support of this Basin Management Plan, issues of concern were collected from stakeholders during public ACWP Steering Committee Meetings and Subbasin Stakeholder Workshops. The Stakeholder meeting for the Upper Middle Chattahoochee River Subbasin was held Thursday, January 17, 2006, in Phenix, Alabama. Stakeholders identified issues relating to water quality, land use, environmental management and politics. Some stakeholders also provided suggestions about how to proceed with watershed management for the subbasin and basin. Other stakeholders identified specific water quality impacts or sources of those impacts. Table 4-4 summarizes suspected issues of concern identified by the stakeholders for specific water bodies or locations. Some concerns were associated with specific creeks or subwatersheds, whereas others apply generally throughout the subbasin.

Table 4-4. Water Quality Issues of Concern Identified by Stakeholders in the Upper Middle Chattahoochee River Subbasin

Creek/Subwatershed Name	Suspected Water Quality Concern(s)	Possible Source(s)
Upper Halawakee Creek (HUC 031300021106)	Nutrients, bacteria	Animal Feeding Operations – Poultry Farming
Lower Halawakee Creek (HUC 031300021106)	Nutrients, bacteria	Animal Feeding Operations – Poultry Farming
Lake Harding	Shoreline erosion	River traffic; recreational boating
	Dumping, litter	
Entire Upper Middle Chattahoochee Subbasin	Soil loss, polluted stormwater	Impervious surfaces
	Aesthetic concerns, bacteria pollution	Improper disposal of deer carcasses
	Soil and habitat loss	Loss of stream buffers
	Bacterial pollution	Failing septic systems

Stakeholders reviewed a list of common nonpoint sources of pollution and identified issues they thought were relevant to the subbasin. Table 4-5 lists the most common nonpoint source issues stakeholders generally recognized as issues in the subbasin.

Table 4-5. Common Nonpoint Source Issues Recognized by Stakeholders as Potential Problems in the Upper Middle Chattahoochee River Subbasin

Nonpoint source pollution from agricultural activities - cropland, pastureland, and animal husbandry
• livestock access to streams • nutrient runoff from pasture and cropland • livestock overgrazing and soil erosion/sediment loading from pasture and cropland • gully erosion • animal waste management impacts • pesticides and pathogens runoff from cropland
Nonpoint source pollution from forestry
• soil erosion and sediment loading from harvested forestland • soil erosion and sediment loading from logging roads • gully erosion on hillsides on harvested forestland
Nonpoint source pollution from roads, road banks, and new road construction
• soil erosion and sediment from dirt roads and road banks • gully erosion
Nonpoint source pollution from urban and residential areas
• septic tank failures leading to nutrient loading and pathogen pollution • soil erosion and sediment loading from new road construction • soil erosion and sediment loading from land clearing and construction activities • soil erosion and sediment loading from urban land development • stormwater runoff - pathogens and toxins
Nonpoint source pollution from mining activities
• soil erosion and sediment loading from sand and gravel pits • mining and excavation impacts on surface waters
Wetlands and fish and wildlife habitat loss
• wetland and aquatic habitat destruction due to road construction and land development
Impacts from river use and recreation
• shoreline erosion from boat wakes • litter from boats • litter and dumping trash at boat ramps • stormwater runoff at boat ramps

4.4 Water Quality and Watershed Management Goals

The goals and strategies that address water quality involve restoration, protection, and education projects or tasks focused on attaining specific goals. Table 4-6 provides proposed management goals for each concern and issue identified for the Upper Middle Chattahoochee Subbasin.

Table 4-6. Upper Middle Chattahoochee River Subbasin Management Goals

Goal 1: *Reduce nonpoint source pollution from agricultural activities – cropland, pastureland, and animal husbandry*	**Goal 5:** *Reduce nonpoint source pollution from urban and residential areas*
• livestock access to streams, and stream bank erosion • nutrient runoff from pasture and cropland • sediments from pasture and cropland • gully erosion and erosion from critical areas • animal waste management impacts • livestock overgrazing of pastureland • pesticides, bacteria and pathogens in surface waters	• nutrient and pathogen loading due to improperly maintained or failing septic systems and sewage treatment facilities • soil erosion from new road construction • soil erosion and sediment loading from urban development, including land clearing, construction activities, and impervious surfaces • stormwater runoff – bacteria and toxins
Goal 2: *Reduce nonpoint pollution from forestry*	**Goal 6:** *Reduce nonpoint source pollution from mining activities*
• erosion and sediment loading from harvested forestlands • erosion and sediment loading from logging roads • gully erosion on hillsides from harvested forestland	• sediment loading from sand and gravel pits • mining and excavation impacts on surface waters
Goal 3: *Track resource trends through water quality monitoring in the subbasin to measure progress in restoration and protection efforts, fill in data gaps, and identify new resource concerns and issues*	**Goal 7** *Protect and restore aquatic habitat and aquatic species diversity*
• limited water quality monitoring within the watershed • limited baseline data for many creeks in the subbasin	• wetland and aquatic habitat destruction due to road construction and land development • loss of fish and mussel species diversity • eutrophication of reservoirs • loss of stream buffers
Goal 4: *Reduce nonpoint source pollution from roads, road banks, and new road construction*	**Goal 8:** *Promote environmentally safe recreational uses on the Chattahoochee*
• soil erosion from roads and road banks (especially new and/or unpaved roads) • gully erosion	• erosion from boating traffic • dumping trash from boats • boat ramp litter problems • oil, gas and sewage discharges from boats • introduction of invasive aquatic species

Additional goals that are not directly related to specific water quality management issues but are essential to basin management are also identified. These goals are:

GOAL 9: Promote watershed and community stewardship through resource education, outreach and the promotion of volunteer opportunities throughout the watershed.

GOAL 10: Promote watershed management technology transfer across industries and across state lines of Alabama, Georgia and Florida. Coordinate watershed assessment, planning, restoration conservation efforts between subbasin and basin stakeholders in all three states.

GOAL 11: Develop a framework in the subbasin to implement the projects and tasks in this Plan.

These goals are critical to the implementation and success of this river basin Plan. In the following pages, each goal is addressed individually, and strategies designed to achieve the goal are discussed. If there is a specific creek/subwatershed associated with an issue, either by ADEM or stakeholders, then the name of the creek/watershed is identified

4.5 Implementation Strategies to Achieve Water Quality and Watershed Management Goals

Targeted subwatersheds should be prioritized for action in order to address water quality management concerns that are most critical in a given watershed. 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. For each strategy, specifics are provided regarding:

- agencies or groups that are integral to implementing 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.

The following list of organizations and their associated acronyms is provided as a key for the tables to follow. With each watershed management strategy, agencies and organizations are identified that would be the most likely lead or participant in implementing the strategy.

AAGC	Alabama Association of General Contractors
ABBA	Alabama Bridge Builders Association
ACES	Alabama Cooperative Extension System
ACWP	Alabama Clean Water Partnership
ADAI	Alabama Department of Agriculture and Industry
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
ADIR	Alabama Department of Industrial Relations
ADPH	Alabama Department of Public Health
AFA	Alabama Forestry Association
AFC	Alabama Forestry Commission
AFPA	American Forest and Paper Association
ALC	Alabama Loggers Council
ALDOT	Alabama Department of Transportation
ALFA	Alabama Farmers Federation
ALNEMO	Alabama Nonpoint Education for Municipal Officials
AMI	Alabama Mining Institute
ANHP	Alabama Natural Heritage Program
ANLA	Alabama Nursery and Landscape Association
AOWA	Alabama Onsite Wastewater Association
AOWB	Alabama Onsite Wastewater Board
APEA	Alabama Poultry and Egg Association
APPC	Alabama Pulp and Paper Council
ARA	Alabama Rivers Alliance
ARBA	Alabama Road Builders Association
ASTA	Alabama Septic Tank Association
ATA	Alabama Turfgrass Association
AUMERC	Auburn University Marine Extension Resource Center
AWF	Alabama Wildlife Federation
AWW	Alabama Water Watch
AWWA	Alabama Water Watch Association
CRK	Chattahoochee Riverkeeper
FFA	Future Farmers of America
FS	United States Forest Service
FSA	Farm Services Agency
GA EPD	Georgia Environmental Protection Division
GDNR	Georgia Department of Natural Resources
GPC	Georgia Power Company
GSA	Geological Survey of Alabama
HBAA	Home Builders Association of Alabama
HOBOs	Home Owners and Boat Owners Associations
MCWC	Middle Chattahoochee Water Coalition
MPD	Marine Police Division
NRCS	Natural Resources Conservation Service
OMELC	Oxbox Meadows Environmental Learning Center
SFI	Sustainable Forestry Initiative
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
USACOE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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

Issues and Concerns in the Subbasin:

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

Targeted Creeks: Wedhadkee Creek, Moores Creek, Lake Harding, West Point Lake, Hillabatchee Creek, Upper and Lower Hawlakee Creek

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP[a]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
Implement streambank fencing and identify alternate water sources for excluded cattle and other grazing animals. Implement streambank restoration projects.				
Landowners; NRCS, SWCD, SWCC, AWF, ALFA	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, ALFA	Medium priority, continuous, long term	Medium to high; private/ public	Quarterly for BMP condition	Acres of cropland of implemented BMPs
Implement pastureland BMPs to reduce sediment and nutrient loading to surface waters.				
Landowners; NRCS, SWCD, SWCC, ACES, ALFA	High priority, continuous, long term	Medium to high; private/ public	Quarterly for BMP condition	Acres of pastureland of implemented BMPs

LEAD AGENCY OR GROUP[a]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
Implement effective agricultural waste management systems				
Landowners; NRCS, SWCD, SWCC, ACES, ALFA, APEA	Medium 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, ALFA	High priority, continuous, long term	Medium; private/ public	Quarterly for erosion effectiveness	Number of acres in which BMP has been implemented
Establish goals in each subwatershed, where needed, for the voluntary implementation of agricultural BMPs.				
Farming Community, FSA, NRCS, SWCD, SWCC, ALFA	Medium 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, ALFA	Medium 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, ALFA	Medium 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, ALFA	Medium priority, continuous, long term	Low to Medium; private/ public	Annual progress reports	Number of outreach events and number of groups and youth engaged

LEAD AGENCY OR GROUP[a]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
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, ALFA	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

a. Lists responsible parties/primary actors.
b. 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).
c. 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.
d. Captures the monitoring need and sets a frequency.
e. Performance indicator(s) are those measures or metrics that will indicate the degree of success in implementing the strategy.

Best Management Practices to Address the Strategies for Goal 1:

The strategies to address concerns and issues related to agricultural land use lie primarily in the implementation of BMPs focused on cropland, pastureland, streambank fencing and streambank buffers, animal waste management systems, and erosion control for gullies and critical areas. Goals and strategies that include education, outreach, and recognition compliment these efforts and help to support continued implementation of the BMPs. Several 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 stop 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 along with the provision of an alternate water source.	

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.

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.

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 and/or spreading 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.

There are many agricultural BMPs available to farmers and landowners today. A good review of agricultural BMPs is provided by Alabama A&M and Auburn University through their Alabama Cooperative Extension System (Hairston, *et. al*., 2001). It describes the types of BMPs used to control nonpoint pollution in agriculture and also discusses how to select the appropriate BMP. USDA NRCS and SWCD provide technical and financial assistance for willing program participants. Several documents provide good reviews of agricultural BMPs, including the Alabama SWCC's "*Protecting Water Quality on Alabama's Farms*"; the ACES's and NRCS's "*Nutrient Management Planning for Animal Feeding Operations*".

GOAL 2: *Reduce nonpoint source pollution from forestry activities.*

Issues and Concerns in the Subbasin:

- erosion and sediment loading from harvested forestlands
- erosion and sediment loading from logging roads
- gully erosion on hillsides from harvested forestland

Targeted Creeks: Moores Creek

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, ALFA, SFI	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 road banks to reduce sediment and nutrient loading to surface waters.				
Landowners; AFA, AFC, APPC, ALC, SWCD, ACES, county engineers, stakeholders, ALFA, SFI	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, ALFA, SFI	High 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, ALFA, SFI	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

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Educate forest landowners concerning the importance of BMPs in reducing nonpoint source pollution associated with timber management.				
Landowners; AFC, AFA, APPC, ALC, ACES, ACWP, ALFA, SFI	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
Initiate and/or continue education and outreach programs with students involved in forestry activities.				
AFC, AFA, APPC, FFA, 4H, schools, SWCS, SWCD, NRCS, ACWP, ALFA	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, SFI	High 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, ALFA	High priority, continuous, long term	Low; private/ public	Annual progress reports	Number of outreach efforts or events completed; number of funding sources identified

Best Management Practices to Address the Strategies for Goal 2:

The continued implementation of forestry BMPs within the river basin is important to reducing the sediment and nutrient loading from forested land. These BMP implementation strategies are focused on commercially forested land, in-use and abandoned logging roads, and areas of gully and critical area sediment erosion. The protection of streams, streambanks, and riparian wetlands is also crucial to enhancing aquatic systems health in the basin. The establishment and maintenance of stream buffers and wetlands in forested areas can be accomplished through stringent incorporation of forestry BMPs.

There are numerous forestry BMPs being implemented throughout Alabama that can be applied to the Chattahoochee-Chipola 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 "*Alabama's Best Management Practices for Forestry*" (Alabama Forestry Commission, 1999) and "*Georgia's Best Management Practices for Forestry*" (Georgia Forestry Commission (GFC), 1999). These documents 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. An additional resource is the Sustainable Forestry Initiative (SFI). The SFI program is a comprehensive system of principles, objectives and performance measures developed by professional foresters, conservationists and scientists, which combines sustainable forestry practices with long-term protection of wildlife, plants, soil and water quality.

Strategies supportive of, and essential to, forestry BMP implementation efforts include promotion of BMP use through education, outreach, and recognition. Currently, there are several active programs run by various entities that can be used to encourage responsible forestry management. For example, information on SFI methods and BMP implementation are available through the American Tree Farm System, Alabama Loggers Council, and various specific Sustainable Forestry Initiative programs. Some groups are already active in workshops and the distribution of educational materials, including educational efforts with youth. Also, the TREASURE Forest program provides a significant mechanism for BMP promotion and stewardship recognition. For more information regarding these groups or programs and the many technical resources they provide, refer to the following websites:

- Sustainable Forestry Initiative (SFI®) Program <http://www.aboutsfi.org/core.asp>
- American Tree Farm System <http://www.treefarmsystem.org/>
- Alabama Loggers Council <http://www.alaforestry.org>
- Alabama Forestry Commission <http://www.forestry.state.al.us/>
- TREASURE Forest program <http://www.atfa.net/>

The following are additional key BMPs that address forestry:

Seeding and Mulching

Seeding is effective in establishing vegetation on bare patches of land to prevent soil erosion. It 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.

Streamside Management Zones

Streamside Management Zones (SMZs) are protective buffer strips immediately adjacent to waterways where soils, organic matter and vegetation are managed to protect the physical, chemical and biological integrity of surface waters adjacent to and downstream from forestry operations (AFC, 1999). Trees and other vegetation in the SMZ provide shade that buffers water temperatures, woody debris vital to the aquatic ecosystem, natural filtration of *sediment* and other *pollutants* (nutrients and pesticides), and travel corridors and habitat for wildlife (GFC, 1999). Management activities may occur within a SMZ provided that the disturbance to soil or ground cover is minimized. Water quality objectives should prevent movement of soil or other potential *pollutants* from within the SMZ into the watercourse and protect stream bank integrity (GFC, 1999).

Among the practices that should be avoided in SMZs are the following (GFC, 1999).

- Cutting trees.
- Constructing unnecessary access roads and main skid trails.
- Significant soil compaction and rutting by harvesting.
- Removal of ground cover or understory vegetation.
- Felling trees or leaving logging debris in streambeds.
- Servicing or refueling equipment.
- Mechanical site preparation and site preparation burning.
- Mechanical tree planting.
- Broadcast application of pesticides or fertilizers.
- Handling, mixing, or storing toxic or hazardous materials lubricants, solvents, pesticides, or fertilizers).

There is no uniform formula to determine the appropriate width of a SMZ; however, they must *always* be wide enough to maintain water quality standards. In general, the steeper the slope and more erosive the soil, the wider the SMZ should be. In no cases should SMZ be less than 35 feet however, they may be as wide as 100 feet or more if the slope perpendicular to the streambank is steep (>40%) or the soils are highly erosive. Both Alabama and Georgia provide guidance on determining the appropriate BMPs for protecting waterways in areas subject to forestry and silvicultural activities (see AFC, 1999; GFC, 1999).

Forestry

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.

Logging Road Maintenance

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. Thus, proper placement and planning of access roads is a priority. Also, soil bioengineering techniques can be used whereby plants are used as an important structural component along roadsides to reinforce soils and act as barriers to earth movement.

Streambank Stabilization

Streambank erosion is the wearing-away of soil and rock that forms 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 addition of impervious (nonporous) surfaces in the watershed, including roof tops, pavement, *etc*.. 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.

GOAL 3: *Track resource trends in the subbasin through water quality monitoring to measure progress in restoration and protection efforts, fill in data gaps, and identify new resource concerns and issues.*

Issues and Concerns in the Subbasin:

- limited baseline data set for many creeks in the subbasin
- limited water quality monitoring within the watershed

Targeted Creeks: None identified

Recommended Strategies to Achieve Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Build on the baseline of water quality and biological integrity of the 22 creeks (HUC 12) in the subbasin by expanding citizen monitoring program in the subbasin.				
AWWA, OMELC, CRK, ACWP, ADEM, universities, schools, ARA, AWW	High priority, continuous, long term	Low; private/ public	Monthly physical and chemical data collection; annual progress reports	Measurements of turbidity, dissolved oxygen, temperature, chlorophyll a, nutrients
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.				
ACWP, ADEM, watershed groups, ARA, AWWA, universities, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of sites monitored; number of monitoring programs
Expand biological monitoring to regularly assess aquatic integrity of the priority creeks with existing baseline information and those with imperiled aquatic species.				
AWW, universities, ACWP, ADEM, USFWS, GDNR, GSA, USGS	Medium priority, continuous, long term	Medium; public /private	Quarterly monitoring	Species richness, composition, tolerance; habitat quality

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Target monitoring to §303(d) streams (if present) and other priority subwatersheds to track management progress over time. Document trends in water quality.				
AWW, OMELC, CRK, ACWP, USGS, GSA	High priority, continuous, long term	Low; private/ public	Monthly physical and chemical data collection.	Measurements of turbidity, dissolved oxygen, temperature, chlorophyll a, nutrients
Monitor impervious surface cover/land use on watershed basis.				
Universities, OMELC, CRK, ACWP, USGS, GSA, SWCC, ACES, ADEM	Medium priority, continuous, long term	Medium; private/ public	Annual GIS layer update (based on aerial photography or field surveys)	Impervious surface cover over time (as percentage of subwatershed)
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.				
ACWP, ADEM, watershed groups, ARA	High priority, continuous, long term	Low; public	Annual implementation progress reports	Number of plan implementation projects supported by monitoring data

Best Management Practices to Address the Strategies for Goal 3:

Monitoring plans are developed to track resource conditions over time. Monitoring should focus on “metrics” or measurable “indicators” such as fecal coliform bacteria concentrations or total suspended solids (TSS). Typically, a watershed group set targets for the desired conditions of a water body then performs long term monitoring to track selected metrics. Discrepancies between existing and desired resource conditions, as measured by the metrics, are identified along with their probable cause and a plan is established and implemented to address the discrepancies. Monitoring is a long term task and should continue throughout the implementation of any initiative to track its success. This information ultimately functions as a report of progress (or lack thereof) and should inform future planning and management decisions.

Federal and state agencies, universities, and citizen volunteers monitor the water resources of the subbasin. Water quality data is collected primarily by ADEM, Alabama Water Watch groups, the Chattahoochee Riverkeeper and many private interests that hold permits for wastewater discharges in the subbasin. Collectively, these groups generate the water quality data for the creeks of the subbasin.

ADEM is responsible for the lion's share of water and natural resource monitoring in the subbasin (and throughout Alabama). Six programs make up ADEM's regular monitoring effort: Nonpoint Source Assessment Program; Point Source Assessment Program; Ecoregion Reference Assessment Program; Upland Alamap Monitoring and Assessment Program; Clean Water Act §303(d) Support Assessment/Monitoring Program, and Fixed Ambient Trend Monitoring Program.

Alabama Water Watch works with many citizen monitors throughout the state. In this subbasin, one citizen water quality monitoring group is active - the Middle Chattahoochee River Stewards, Inc. (Table 4-7). This group is a private nonprofit corporation that concentrates on the Chattahoochee River from the base of West Point Dam to the northern-most reaches of Lake Harding. Their latest monitoring series focused on Osanippa Creek in 2005. Additional information about this group is provided in the *Citizen Guide to Alabama Rivers, Chattahoochee and Coastal Plain Streams* (Hartup and Deutsch, 2003).

Table 4-7. Alabama Water Watch Groups in the Upper Middle Chattahoochee River Subbasin

Group Name Abbreviation	Group Name	Date Established	Number of Active Sites	Number of Inactive Sites	Last Date of Recorded Data	Active
MCRS	Middle Chattahoochee River Stewards	7/13/2002	1	2	9/28/2005	Yes

Source: AWW, 2006

The Chattahoochee Riverkeeper based in Columbus, GA conducts wter quality tests on the River and its tributaries. Water quality sampling is conducted as follow-up to reported concerns but is not a part of a comprehensive water quality monitoring program. The possibility for creating such a program in Alabama may exist, however, these endeavors require considerable technical and financial resources.

Water quality monitoring is an important component in determining whether goals are being achieved. While the performance indicators listed in this Plan are important for determining implementation success, restoration success is measured by field 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 strategic monitoring sites are being assessed.

As BMPs are 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 be necessary to monitor a large number of sites in a subwatershed where BMPs are implemented before water quality improvements can be observed in field data. Monitoring commitments should be established over the long-term, targeting specific watersheds included in monitoring plans.

Biological monitoring and land use assessments (*e.g.*, determining impervious surface cover) can be labor intensive and require specialized knowledge and skills. Monitoring has become more complicated as USEPA has implemented tighter quality assurance protocols for sampling (if it is to be used by the states for documenting water conditions). Thus, some monitoring strategies are better left to the universities to complete since volunteers can not be expected to handle all of the monitoring responsibilities required. Further, ADEM and USEPA will only accept ADEM monitoring results for the purposes of listing or delisting an impaired stream.

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 4: *Reduce nonpoint source pollution from roads, road banks, and new road construction.*

Issues and Concerns in the Subbasin:

- soil erosion from roads and road banks (especially new and/or unpaved roads
- gully erosion

Targeted Creeks: Moores Creek, Mill Creek

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 roadways and road banks to reduce erosion and protect water quality. Address gullies that have developed from improper road drainage.				
County engineers, public works departments, local governments, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	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 road banks 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, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	Medium priority, continuous, long term	Medium; public	Annual report on improvements	Miles of paved roads where road bank improvements have been made
Implement recommended construction practices for new roadways and road banks, 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, ALDOT, home builders associations, HBAA, SWCD, NRCS, AGC, ARBA, ABBA	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

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Identify and rank unpaved roads in the subwatersheds that contribute most to sediment loading to surface waters.				
County engineers, public works departments, local governments, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	Medium priority, continuous, long term	Low; public	Periodic updates on ranking of needs in subwatersheds	Percent of unpaved roadways ranked in the watershed
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, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	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>Best Management Practices to Address the Strategies for Goal 4:</u>

Unpaved roads, road improvement projects and eroding road banks are commonly recognized sources of nonpoint pollution, due especially to soil loss/sedimentation. The implementation of BMPs and recommended maintenance practices for unpaved roads are the solutions for reducing this load. The Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority (2000) published an excellent guide for improving unpaved roads and reducing their environmental impacts. This guide, titled "*Recommended Practices Manual A Guideline for Maintenance and Service of Unpaved Roads*", is available at: <http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/ResourceMat/unpavedtxtonly.pdf>.

Educational outreach and workshops are key to promoting the implementation of these BMPs and practices. ADEM and ALDOT play an important role in working with the development community including the Home Builders Association of Alabama, and other homebuilders and construction companies. 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.

Road Bank Ditch Design and Maintenance	
Efficient disposal of runoff from roads helps preserve roadbed and banks. Well-vegetated ditches act to slow, control, and filter runoff. This provides an opportunity for sediments to settle-out before runoff enters surface waters. Ideally, “turn-outs” (intermittent discharge points also called “tail ditches”) will help maintain stable velocity and proper flow capacity within the road ditches by timely discharging of water. This helps 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 grow with time and continue down-cutting until resistant material is reached, expanding 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 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.	

Unpaved Road Design and Maintenance

If not properly designed and maintained, unpaved roads can contribute heavily to water quality problems. The most important factor in proper road management is managing runoff, or drainage. Priority should be given during road development to nonstructural BMPs that minimize the creation of new runoff, limit erosion, and protect the health of waterways. Examples of nonstructural BMPs include maintaining natural buffers and drainage ways that are stable and well-vegetated. Natural vegetation will help infiltrate runoff, reduce the velocity of the runoff, and help remove sediments in the runoff. Also, the creation of steep slopes should be avoided unless effective stabilization methods are employed. Surface water that is not effectively conveyed from the road surface to a drainage channel can result in deterioration of the road surface and leads to various erosion problems, thus, proper road construction and maintenance is essential. General road surface principles include preserving and maintaining a proper road crown for good drainage, keeping the road surface tight and impervious, and performing regular drainage maintenance and grading. Appropriately installed and maintained ditches, culverts, bank stabilization methods, and outlet structures that reduce water velocity are also required to ensure adequate drainage for unpaved roads.

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

Issues and Concerns in the Subbasin:

- nutrient and pathogen loading due to improperly maintained or failing septic systems and sewage treatment facilities
- soil erosion from new road construction
- soil erosion and sediment loading from urban development, including land clearing, construction activities, and impervious surfaces
- stormwater runoff – bacteria and toxins

Targeted Creeks: Moores Creek, Mill Creek

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Work with municipalities to 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	Medium 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
Work with cities to 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, ALNEMO, AAGC	Medium priority, continuous, long-term	Medium to high, private/ public	Annual report on progress	Number of urban BMP demonstration projects
Encourage responsible site design for new residential and commercial construction.				
Local governments, ADEM, USACOE, SWCD, HBAA, ALNEMO, SWS	High priority, continuous, long-term	Low to medium, public	Annual report on progress	Number of new developments with low impact development techniques.

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote outreach with commercial landscapers 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, ALNEMO, 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/low impact development techniques 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). Promote improvements through 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 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 through OSDS workshops.				
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

Best Management Practices to Address the Strategies for Goal 5:

As urban centers expand, the effects of increased development on surface and ground waters also need to be considered. Sediments, nutrients, pathogens, and toxics can enter surface and ground waters through storm water runoff that originates from construction sites, business developments, and residential communities. Reductions in contaminant loading can be made on several fronts to deal with nutrient, bacteria, sedimentation, and solid waste pollution typical of urban areas (Table 4-8).

Table 4-8. Management Options for Addressing Water Pollution in Urban Areas

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	

Source: CH2MHILL, 2005

Because urban development can have such severe effects on water quality, environmentally sensitive or low-impact development is essential in protecting and enhancing hydrologic systems in urban areas. Low Impact Development (LID) is a new, comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds. LID practices aim to reduce floods in developed areas, reduce storm water storage requirements, improve water quality of runoff, and help maintain and restore fish habitat. When implemented properly, LID allows for developmental growth with minimal environmental effects. More information on LID is available at USEPA's website <http://www.epa.gov/nps/lid/>.

To reduce the quantity and improve the quality of stormwater runoff, stormwater management BMPs and management protocols should be pursued. Stormwater pollution is likely to occur when construction and development companies are not diligent during land clearing, road building, and construction work, thus, education regarding BMPs implementation and enforcement of their use is essential. Where feasible, innovative stormwater management approaches such as the use of constructed and natural wetlands for water treatment can be implemented. Finally, the incorporation of pervious surfaces during new construction should be also fostered as well as retrofitting of existing impervious surfaces.

Many of these measures are 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 that identifies the builder as possessing a working knowledge of environmental BMPs for the development process. More information on QCIP can be found online at HBAA's website <http://www.hbaa.org/pdf/qci_brochure.pdf>.

The nutrient and pathogen loading from improperly functioning onsite sewage disposal systems (OSDS) can have severe impacts on surface waters. Volunteer bacteriological water monitoring (trained through AWW) can help to identify areas of failing or leaking systems. If problems are detected, watershed groups can work with the local health departments to identify areas with significant impacts from overflows or failures. Watershed groups can also promote education of homeowners on regular pumpouts of septic tanks, and nutrient and bacteriological problems from leaking and failing onsite systems through educational workshops and materials. Improvements to these identified OSDSs can be pursued through monitoring, education and outreach, and incentives. Alternative onsite sewage treatment system demonstration projects may be needed in some instances, especially in areas of dense development, poor soil drainage, and areas adjacent to sensitive water resources.

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 that collects wastewater and transports it through small diameter sewer lines to a local treatment facility. Treatment using a decentralized wastewater system is typically accomplished by using effective attached growth biological processes that treats the effluent on-site. The treated effluent is dispersed or reused via in-ground methods. If properly managed (sited, designed, maintained), decentralized systems are capable of treating wastewater to a high level of quality. 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 underground injection control (UIC) permits for systems with capacities greater than 10,000 gpd and by ADPH for systems of lesser capacities. More information on proper management and community planning for decentralized wastewater systems is provided by USEPA at <www.epa.gov/owm/onsite>.

The basis of the education and outreach strategies involves demonstration projects and workshops that educate citizens, landowners, and the building and industrial community of the need to incorporate BMPs and green initiatives. Educating the construction and development industry in proper utilization of BMPs in land clearing, road building, and construction work would facilitate responsible development. To foster a proactive environment and encourage coordination among entities, public recognition of builders that incorporate initiatives beyond measures required by law, perhaps by the Clean Water Partnership and watershed organizations, may be worth considering. Additional outreach opportunities include educating landscapers on the impacts on nutrient loading in surface and ground water from improper fertilization, and instructing homeowners on environmentally friendly solutions to address hazardous waste disposal, water conservation, lawn care and fertilization, and septic system maintenance. Coordination with municipal and county engineers, planners, and governments is also an important component of this outreach.

Excellent reference materials are available that focus on urban and stormwater BMPs:

- 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 (Alabama SWCC, 2006).

- Troy State University published a report in May 2000 titled "How To" Guide for Stormwater and Urban Watershed Management (Troy State University, 2000).

- The City of Knoxville, Tennessee also published an extensive report on Best Management Practices Manual through their Stormwater Engineering Division (City of Knoxville (TN), 2006).

These sources provide excellent background on approaches that can be utilized to minimize sediment and water quality impacts from urban development. Watershed protection tools dealing with better site and road design are also available through the Center for Watershed Protection at <http://www.cwp.org/tools_protection.htm>.

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

Issues and Concerns in the Subbasin:

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

Targeted Creeks: None identified

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote 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	High 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

Best Management Practices to Address the Strategies for Goal 6:

Resource extraction is a nonpoint source category as defined by the USEPA, as it can contribute to the degradation of surface waters. Identified by ADEM in surface water assessments as a potential source of sediment in the subbasin, resource extraction includes sand and gravel mining. Contamination of streams can occur from sand and gravel mining at times of heavy or sustained rainfall, mining too close to streams, and from the gravel washing processes. Good management practices should be followed in order to keep nonpoint source pollution at a minimum. In Alabama, runoff from surface mining activities is regulated and enforced through the permitting and inspection process by ADEM.

The Alabama Department of Industrial Relations (ADIR) is responsible for surface mining of non-fuel related minerals. This program ensures that lands mined for non-fuel minerals are reclaimed in accordance with state law. Examples of non-fuel minerals that are currently mined in this basin include sand, gravel, and bauxite. ADIR issues mining permits, ensures that mine sites are properly bonded for reclamation purposes, and makes periodic inspections.

GOAL 7: *Protect and restore aquatic habitat and aquatic species diversity.*

Issues and Concerns in the Subbasin:

- wetland and aquatic habitat destruction due to road construction and land development
- loss of fish and mussel species diversity
- eutrophication of reservoirs
- loss of stream buffers

Targeted Creeks: None identified

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Identify subwatersheds and stream segments with habitats of exceptional quality and high aquatic species diversity, and target parcels for acquisition or conservation projects.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, GSA, GDNR, CRK, TNC, Forever Wild	High priority, continuous, long term	Medium; public	Biennial report of rankings and priorities	Basinwide prioritizations of stream segments and habitats, supported by participants
Identify the specific causes for the loss of fish and mussel species diversity in targeted stream segments, and prioritize restoration and BMP projects to reduce those land use impacts.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, GSA, GDNR, CRK USACOE	High priority, continuous, long term	Medium; public	Biennial report of targeted streams, causes for diversity losses, and restoration and BMP projects	Basinwide prioritizations of targeted streams and projects, supported by participants
Implement habitat restoration and BMP projects that will target specific causes for the loss of fish and mussel species diversity in the priority stream. Identify funding programs and mechanisms that support these projects.				
USFWS, ANHP, ADCNR, SWCD, NRCS, ADEM, AWF, TNC, ACWP, GSA, GDNR, CRK, USACOE, ACWP, TNC	High priority, continuous, long term	High; public/ private	Annual report of restoration and protection progress; monitoring of fish and mussel species	Acres of habitat protected; acres of habitat restored; increases in species diversity metrics

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Pursue habitat protection initiatives through acquisition and easement mechanisms, utilizing grant and assistance programs for these purposes. These mechanisms include Environmental Quality Incentives Program (EQIP), Wetlands Reserve Program (WRP), Conservation Reserve Program (WHIP), Forever Wild and Partners for Wildlife (USFWS).				
USFWS, ANHP, ADCNR, SWCD, NRCS, Forever Wild, Land Trusts, TNC	High priority, continuous, long term	High to medium; public/ private	Annual report of habitat protection progress	Acres of habitat protected

<u>Best Management Practices to Address the Strategies for Goal 7:</u>

Alabama's diversity of freshwater mussels is greater than anywhere else in the world and some of this diversity is represented in this subbasin. Losses in species diversity and in rare and endangered species have been attributed to aquatic habitat alterations, including flow modifications from dams and navigation projects, river channel dredging and channelization, sand and gravel mining, the loss of riparian buffers, access of livestock to streams, and other nonpoint sediment sources.

Habitat restoration and 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* and the Recovery Plan for federally listed mussel species that occur in the Subbasin (USFWS. 2003) and will be coordinated with the Alabama Department of Conservation and Natural Resources' (ADCNR) and GDNR's wildlife conservation plans, for consistency.

GOAL 8: *Improve shoreline recreation management on the Chattahoochee.*

Issues and Concerns in the Subbasin:

- erosion from boating traffic
- dumping trash from boats
- boat ramp litter problems
- oil, gas and sewage discharges from boats
- introduction of invasive aquatic species

Targeted Waterbody: Lake Harding

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Work with the ADCNR, USACOE, the Alabama Marine Police Division, GADNR, and Georgia Power Company to identify the probable causes of and solutions for shoreline erosion.				
ADCNR, USACOE, USCG, MPD, ACWP, GPC, HOBOs, and marina operators	Medium priority, continuous, long term	Low; public	Annual progress reports	Source of problem identified
Work with the ADCNR, USACOE, the Alabama Marine Police Division, GDNR, and FLDEP to identify the probable causes of and solutions for shoreline erosion.				
ADCNR, USCG, USACOE, MPD, ACWP, HOBOS, marina operators, ADEM, Clean Marina Program, and watershed groups	Medium priority, continuous, long term	Low; public	Annual progress reports	Reduction in complaints

Best Management Practices to Address the Strategies for Goal 8:

There is a regulatory framework in place to address management of lakefront shorelines, boater behavior, and NPS pollution originating from overboard discharge of sewage. Watershed associations can play a key role in supporting these regulations by promoting education of boaters, shoreline residents, and commercial entities utilizing the shoreline (*e.g.*, marinas) regarding the impacts of their actions, ways to avoid or mitigate the effects of those actions, and existing regulations.

A formalized framework to address these concerns could be established via a committee or working group, with representation of those with concerns and those that can remedy them. Critical first steps to devising a comprehensive management strategy are to 1) better define the problems or issues, and 2) identify their likely sources. For example, many factors can contribute to shoreline erosion – wakes from recreational boats are only one factor. Other factors may include topography, soil type, fetch, vegetation cover, water level fluctuations, current, river load, commercial boat traffic, and existing shoreline uses. It will be important to identify the primary cause(s) of shoreline erosion prior to expending valuable resources to address the issue. Many factors may also contribute to water quality degradation. Recreational boating can affect water quality by contributing to nonpoint source pollution, other sources may also be important to identified. Boater-generated impacts can be grouped into four general categories: toxic metals, oil and gasoline, solid waste and debris, and bacteria and nutrients. Toxic metals come from antifouling paints used on boat hulls; oil and gasoline are generally from boat operation and maintenance activities; solid waste and debris can come from intentional and unintentional overboard disposal of material; and the source of bacteria and nutrients generally come from sewage disposal. Bacteria and nutrients may also be introduced via other venues such as failing septic systems. Again, proper identification of the source is a key component of developing any plan to adequately address the issue.

Once the issues are defined and their sources identified, watershed associations are encouraged to learn the regulatory framework that is currently in place for addressing these issues, and identify methods to supplement and/or promote knowledge of them.

Boating Regulations

The Alabama Marine Police Division is responsible for promoting responsible use of resources on Alabama's waterways, including enforcement, education and community activities. In Alabama, boaters are prohibited from operating vessels in violation of any established speed zone or in a reckless manner. In Georgia, the Department of Natural Resources Law Enforcement has responsibility for enforcement of boating regulations. In Georgia, state boating regulations restrict vessels to idle speed within 100 feet of shoreline next to a residence, public park, public beach, public swimming area, marina, restaurant, or other public use area.

Toxic Material Regulations

USEPA regulations address the proper use and disposal of toxic materials used by recreational boaters.

Sewage Disposal Regulations

Alabama's Clean Boating Act addresses direct sewage discharges from recreational boats. ADEM provides informational brochures on the Act, which authorizes inspections of marine sanitary devices and requires all marinas with boat customers that use marine sanitary devices with holding tanks to install a boat sewage pump-out system.

Shoreline Management

Although not a recreational issue, shoreline management and development activity may also contribute to shoreline erosion. The USACOE is the agency responsible for managing shoreline development in connection with private use of public lands by landowners adjacent to its lakes. Such development typically includes boat docks, utility lines, walkways, *etc.*, and may also include shoreline erosion control measures such as seawalls. GPC is responsible for managing and permitting similar developments on Lake Harding and the impoundments of Langdale and Riverview Dams. Information on shoreline management for GPC's hydroelectric projects can be obtained from GPC's Land Management Office (1-888-472-5253). Both the USACOE and GPC support responsible shoreline development and provide information on acceptable development methods designed to minimize shoreline erosion.

Shoreline Erosion

With respect to shoreline erosion, watershed associations can work collaboratively with boats and anglers, shoreline homeowners, commercial operators such as marinas, Alabama Marine Police, USACOE, Georgia Power and the U.S. Coast Guard, to identify and address problems and problem areas. Stakeholder concerns have centered on boat traffic on Lake Harding and at boat ramps. Watershed groups can petition state agencies for the creation of no-wake zones in waters adjacent to eroding shorelines, and can support state educational efforts by providing additional access to state-provided boater education materials. Watershed groups may also arrange for agency staff to participate in public speaking engagements in an effort to distribute additional educational information regarding the forces of wave action on shorelines.

Water Quality

Watershed associations can focus on education and outreach efforts to promote awareness of existing regulations, to promote environmental awareness, and to promote voluntary use of BMPs and responsible behavior by public users. To address direct discharges (pollution) from boats, ADEM provides informational brochures on the Alabama Clean Boating Act. The act authorizes inspections of marine sanitary devices and requires all marinas with boat customers that use marine sanitary devices with holding tanks to install a boat sewage pump-out system. The use and expansion of pump-out facilities by boaters should be promoted, and can be aided by funding from Alabama's Clean Vessels Act (CVA) Program. Since 1993, the CVA program has awarded more than $500,000 to marinas to install boat sewage pumpout stations. Eligible marinas can get reimbursed for 75% of the investment of a station by applying to the Alabama Department of Environmental Management. More information regarding Alabama's Clean Vessel Act Program can be obtained from the ADCNR website <http://www.outdooralabama.com/boating/clean-waters/>.

Alabama-Mississippi Clean Marina Program

There are several programs that address direct discharges from boats. Marina operators can become part of the Alabama-Mississippi Clean Marina Program (AUMERC) which recognizes marinas that promote sewage pumpouts, fuel spill controls, solid waste management, vessel cleaning and repair, and stormwater management and erosion control. Sewage pumpout and expansion of pump-out facilities for boaters can also be promoted, and can be aided by funding from the CVA program. More information can be found at <http://www.masgc.org/cleanmarinas>.

GOAL 9: *Promote watershed and community stewardship through resource education and outreach and the promotion of volunteer opportunities throughout the watershed.*

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote participation and membership in the subbasin committee and establish watershed groups or action teams 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 Chattahoochee 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).				
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, OMELC, schools	Medium priority, continuous, long term	Low; public	Annual progress reports	Number of educational programs and schools involved
Promote river clean-ups throughout the subbasin.				
ACWP, ADEM, watershed groups, ARA, AWWA, SWCD, APPC, USACOE, OMELC, CRK	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, OMELC, news outlets	High priority, continuous, long term	Low; public	Annual progress reports	Number of events and publicized mechanisms utilized for promotion

Best Management Practices to Address the Strategies for Goal 9:

The successful implementation of this Basin Management 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 should be made to increase involvement of watershed stakeholders in organized watershed associations. Regional and subwatershed organizations that are functionally active are an immediate need.

Later in this chapter, a more detailed Information and Education component is discussed to lay the groundwork for implementing a watershed outreach campaign. Financial strategies are also discussed in Chapter 8. It is recommended that additional grant monies be secured and utilized to foster the establishment and participation in these regional watershed groups. Strong leadership should be identified and efforts focused from the beginning to develop momentum for implementing the plan.

GOAL 10: *Promote watershed management technology transfer across industries and across state lines of Alabama, Georgia, and Florida. Coordinate watershed assessment, planning, restoration and conservation efforts between subbasin and basin stakeholders in all three states.*

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote watershed management technology transfer across industries, and promote the integration of watershed management techniques in restoration projects.				
ACWP, ADEM, agencies/organizations representing land use industries, watershed groups, ADCNR, SWCD, NRCS	High priority, continuous, long term	Low; public	Annual progress reports on transfer and integration efforts	Number of meetings and workshops, number of participants, number of industries represented
Coordinate watershed planning, restoration, and conservation projects between Alabama and Georgia, recognizing hydrologic connections and impacts on restoration success.				
ACWP, ADEM, ADCNR, MCWC, watershed groups, SWCD, USFWS, FS, TNC, ANHP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated projects
Promote the coordination of water quality and biological monitoring between Alabama and Georgia, particularly with respect to impaired lakes and streams.				
ADEM, ACWP, GA EPD, GDNR, watershed groups, USGS, GSA, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated monitoring programs

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote the coordination of the Clean Water Act Section 303(d) TMDL activities between Alabama and Georgia on streams where impairment impacts cross the state line. Joint TMDL development should be considered in this river basin.				
ADEM, GA EPD, GDNR, USEPA, watershed groups, ACWP, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated monitoring programs
Promote and publicize the coordination efforts between Alabama and Georgia on the Chattahoochee River Basin. Develop web-based and printed media coverage, and utilize the news media, to promote these coordinated efforts at restoration and conservation.				
ACWP, ADEM, GA EPD, watershed groups, ARA, AWWA, news outlets, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on promotion efforts	Number of events and publicized mechanisms utilized for promotion

<u>Best Management Practices to Address the Strategies for Goal 10:</u>

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 should 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.

GOAL 11: *Develop a framework in the subbasin 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 Chattahoochee 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 the subbasin committee and establish watershed groups or action teams 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

Best Management Practices to Address the Strategies for Goal 11:

As discussed under the education and outreach goal (Goal 9), 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 stakeholders in an organized framework.

4.6 Management Strategies for Common Water Quality Concerns

In addition to the specific, action-oriented strategies listed above, a general list of watershed management strategies is provided in Table 4-9. The list is organized according to water quality or biological concerns. It may serve as a general guide for stakeholders searching for strategies to address common water quality concerns. The contents of this table were adapted from recommendations made by the Tallapoosa River Basin Management Plan Stakeholders (CH2MHILL, 2005)

Table 4-9. Strategies for Addressing Common Water Quality Concerns

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Nutrient enrichment	Encourage the use of buffers around streambanks.
	Advocate the banning of detergents containing phosphates or taxing products with phosphates. Use education to encourage the use of phosphate-free products.
	Use federally funded cost share programs (*e.g.,* EQIP, WHiP) to help landowners use BMPs (waste management for animal waste).
	Employ education about septic system maintenance (Septic Tank Workshop for homeowners).
	Advocate for regular/periodic inspections of septic systems.
	Search for funding for the installation of alternative waste management systems.
	Encourage septic system installers to attend onsite wastewater training.
	Promote education for septic dischargers/haulers (certification required). Use Continuing Education Units (CEUs) as incentives to haulers.
	Encourage the use of proper city planning and development and low impact development (*e.g.,* decrease impervious surfaces, protection of green spaces) by engaging county officials and staff in Nonpoint Education for Municipal Officials (NEMO) training.
	Encourage incentives for developers (fast-track permit approval) that use low impact development.
	Encourage/promote recycling and reuse – promote biosolids reuse and water recycling through land application.
	Encourage the use of environmental impact fees on businesses that leave abandoned buildings.
	Educate point sources about funding to correct issues (WWTP, WWTP lagoons).
	Educate golf course owners by distributing BMP manuals, encourage course management workshops, and promote use of natural design (natural areas).

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Nutrient enrichment (cont.)	Encourage homeowners to reuse gray water. Study phosphorus loads from clear-cut areas. Use education to encourage land objectives that would promote lighter cuts.
Pathogen contamination	Encourage the use of buffers around streambanks. Use federally-funded cost share programs to help landowners use BMPs (waste management for animal waste). Employ education about septic system maintenance (Septic Tank Workshop for homeowners). Advocate for regular/periodic inspections of septic systems. Search for funding for the installation of alternative waste management systems. Encourage septic system installers to attend onsite wastewater training. Promote education for septic dischargers (certification required). Support AWW program–encourage the expansion of the program so that monitoring sites are located on all creeks in the subbasin. Promote and support the NRCS EQIP program. Apply for Section 319 grant funds where applicable.
Soil loss/Sedimentation	Promote registered forester program. Report failing forestry BMPs using the SFI "Inconsistent Practices" form and reporting system. Encourage the use of buffers around streambanks. Use federally-funded cost share programs to help landowners use BMPs (waste management for animal waste). Encourage county engineers to use and maintain proper BMPs for construction of dirt roads; sponsor the ADEM dirt road workshop. Report failing BMPs and other problems to ALDOT/County engineer representative. Initiate open space preservation or environmentally sensitive development initiatives.

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Low dissolved oxygen	Support AWW program–encourage the expansion of the program to monitoring all creeks in the subbasin by recruiting volunteer monitors from community groups, schools and businesses.
Habitat alteration	Encourage use of conservation easements – land trusts. Report failing road BMPs/other development-related problems to ALDOT/County engineer representative. Promote AL Forestry Commission education programs. Encourage forest landowners to participate in the Forestry Commission registered forester programs. Encourage the use of buffers around streambanks. Encourage landowners to participate in USFWS habitat management programs, especially for imperiled species.
pH	Promote water quality training for master gardeners, other volunteer groups, and developers/contractors through advertisement. Promote incentive-based fertilizer education.
Pesticides	Educate golf course owners by distributing BMP manuals, encourage course management workshops, promote use of natural design (natural areas). Organize a Household and Agricultural Hazardous Waste Collection day. Educate general public and significant users (*e.g.*, ALDOT, Alabama Power) with seminars and flyers.
Litter/Illegal Dumping	Promote annual creek cleanups (Earth or Rivers Day). Identify litter hot spots (research where it is coming from), report results to ADEM and local sheriff. Educate adults and contractors about illegal dumping and litter through anti-litter campaigns – *see* Information and Education component of this Plan. Encourage enforcement of county prima facie litter law. Advocate the use of bottles and cans deposits. Explore adoption of countywide mandatory garbage collection. Implement the Adopt-a-highway program.

4.7 Plan Implementation

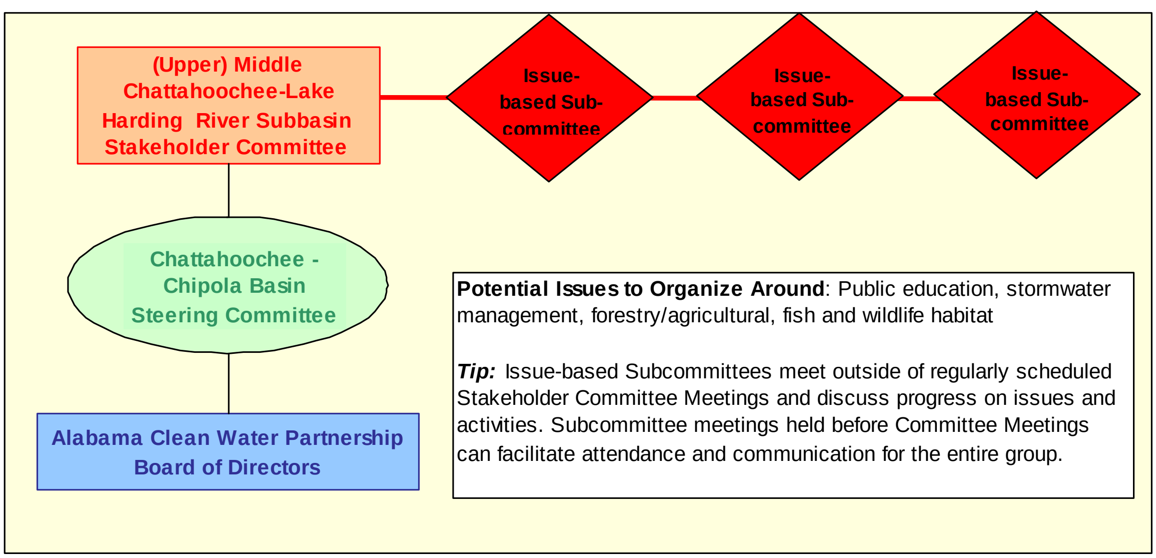
Successful water quality management projects require organizational structure and support to successfully plan projects, monitor resource conditions, and implement initiatives if required. It is a continuous process, and is generally long term.

4.7.1 Organizational Structure

ACWP Subbasin Stakeholder Committees are tasked with the responsibility to oversee the development and implementation of their respective parts of the Plan. However, organizationally, a further division of labor must occur so that the Subbasin Committee is not overwhelmed with the diversity of issues and strategies.

One possible step toward implementing this Plan might be that the Subbasin Stakeholder Committee organizes issue-based sub-committees to tackle specific issues or specific creeks/subwatersheds. Figure 4-2 illustrates this organizational structure in the context of the basin and state-wide organizational layers. Each "issue-based sub-committee" could form around a priority issue or creek to develop and implement a short-term action plan based on the issues and strategies discussed in this Plan. The Subcommittee would report back to the greater Committee, who would be responsible for gathering technical and financial resources, when needed. This approach allows the Subbasin Stakeholder Committee the opportunity to focus resources and energies to achieve results in the short-term on a manageable scale.

Figure 4-2. Proposed Organizational Structure for the Stakeholder Committee



4.8 Information and Education Component

Raising public awareness about water quality and watershed protection is vital to successful outreach. Because of this, providing informational and educational programs may be the most important component of this Basin Management Plan. It is important to educate the public on the importance of clean water and to inform them of their ability to effect positive change within their watershed. It is an ongoing process because the population within the watershed is dynamic, but the effort is well worth the time. The USEPA provides an excellent guide for conducting outreach activities, titled "*Getting in Step: A Guide for Conducting Watershed Outreach Campaigns*" (USEPA, 2003).

4.8.1 Current Education and Outreach Efforts

There are several organizations that actively educate the public about water resources (quality and quantity) and environmental issues in the subbasin. These groups target a broad audience but often develop programs for localities with a specific interest.

Alabama Clean Water Partnership – With three subbasin stakeholder committees formed for the Chattahoochee River Basin, the ACWP is active on many watershed management fronts including basin management planning, education and outreach, and the development of public/private partnerships in the name of sustainable water resource management.

Alabama Rivers Alliance – Through its Watershed Outreach Project the Alabama Rivers Alliance (ARA) is developing local leaders and stewards for sustainable watershed management through education and outreach.

Alabama Water Watch – Through its highly successful citizen water quality monitoring program, AWW trains citizens to be water scientists and involve themselves in local environmental management. There are is one active monitoring group in the Upper Middle Chattahoochee Subbasin.

Chattahoochee Riverkeeper – Originating from the Upper Chattahoochee River Basin in Georgia, this non-governmental river stewardship organization is very active in educating governmental agencies, industry, businesses and the general public. Historically, their emphasis was in Georgia.

Middle Chattahoochee Water Coalition – With focus on the Middle and Lower Chattahoochee River, this public/private partnership formed to champion equitable, optimal use and good stewardship of the water resources of the ACF Basin.

Oxbow Meadows Environmental Learning Center – An outreach program of Columbus State University, in association with the Columbus Water Works, which offers a wide range of environmental education programs.

Working with these organizations, partnering with local schools, and building on current efforts, this Plan proposes an Information and Education program consisting of six steps:

Step 1: Define Information and Education goals and objectives.

Step 2: Identify and analyze the target audiences.

Step 3: Create the messages for each audience.

Step 4: Package the message to various audiences.

Step 5: Deliver the messages.

Step 6: Evaluate the Information and Education program.

As the Subbasin Stakeholder Committee or a designated Sub-Committee takes on this Information and Education program, it should be customized to reflect their goals, concerns and ideas.

Step 1: Information and Education Goals and Objectives

A primary goal for this subbasin is to promote watershed and community stewardship through resource education and outreach (Goal 9). Below are specific watershed management objectives related to informing and educating the public. Some of these objectives are broader than the others. In some cases, it may be necessary to raise awareness about a water quality issue. In other cases, a water quality issue may be commonly recognized; therefore, the goal may be to educate people about possible remedies. As plan implementation proceeds and Information and Education objectives are met, the plan will have to be updated to reflect progress and to identify new challenges. Possible objectives include:

- Increase public awareness about the link between water quality and watershed management.
- Increase public awareness about the most threatened creeks in the subbasin.
- Educate landowners in selected subwatersheds regarding available financial and technical assistance programs.
- Educate county officials and department staff regarding stormwater management and the protection of water quality.

Step 2: Target Audiences

The challenge in implementing an Information and Education campaign is to identify the target audiences. The following chart lists several examples of target audiences based on watershed issues and/or management objectives.

Table 4-10. Potential Target Audiences Based on Watershed Issue and/or Management Objective

ISSUE / MANAGEMENT OBJECTIVE	POTENTIAL TARGET AUDIENCE
General watershed education	School children and their parents; church congregations; fair and festival audiences
Stormwater management	County officials; County transportation and/or public works staff; developers/homebuilders
Agricultural Best Management Practices (Available techniques and financial resources)	Farmers; soil conservation district members; property owners
Forestry Best Management Practices (Available techniques and financial resources)	Forest landowners; logging companies

Step 3: Create the Messages for Each Audience

An effective message carries a lot of power. Environmental and watershed education can be complex, so it is important to tailor the message in a way most appropriate to the target audience. There are many, free-of-charge resources to assist with creating a powerful message for watershed issues. For instance, the ACWP has brochures about the Subbasin Stakeholder Committee as well as popular campaigns/messages that it uses for public service advertisements that consist of a message and eye-catching posters (visit the ACWP website at <www.cleanwaterparnership.org> to view the posters). Examples of campaign messages from ACWP follow:

"When Your Pet Goes On the Lawn, Remember It Doesn't Just Go On the Lawn" When our pets leave those little surprises, rain washes all of that pet waste and bacteria into our storm drains. And then pollutes our waterways. So what to do? Simple. Dispose of it properly (preferable in the toilet). Then that little surprise gets treated like it should.

"When You're Fertilizing the Lawn, Remember You Aren't Just Fertilizing the Lawn" You fertilize the lawn. Then it rains. The rain washes the fertilizer along the curb into the storm drain, and directly into our lakes, streams and bays. This causes algae to grow, which uses up oxygen that fish need to survive. So if you fertilize, please follow directions and use sparingly.

"When Your Car's Leaking Oil On the Street, Remember It's Not Just Leaking Oil On the Street" Leaking oil goes from car to street and is washed from the street into the storm drain and into our lakes, streams and bays. Now imagine the number of cars in the area and you can imagine the amount of oil that finds its way from leaky gaskets into our water. So please, fix oil leaks.

"When You're Washing Your Car in the Driveway, Remember You're Not Just Washing Your Car in the Driveway" All the soap, scum, and oily grit flows along the curb and into a storm drain, winding up in our lakes, streams, and bays. And that causes pollution which is unhealthy for fish. So how do you avoid the whole mess? Easy. Wash your car

on the grass or gravel instead of the street. Or better yet, take it to a car wash where the water gets treated and recycled.

Step 4: Package the Message to Various Audiences

Once the message has been crafted, it must be packaged for the audiences. There are several approaches to packaging a watershed message:

- Work with the media
- Develop effective print materials
- Hold events (*e.g.*, canoe/kayak trips, water monitoring workshops, stream clean-ups, Groundwater Festivals)
- Leverage existing information and education programs/resources (*i.e.*, "piggyback" on existing efforts and programs).

Step 5: Deliver the Message

Money is typically the limiting factor, so it is important to figure out how to cost-effectively reach the audience. Here are several common delivery techniques:

- Mailing lists
- Phone calls
- Interviews
- Focus groups
- Presentations to boards, commissions, trade groups, neighborhood associations, library groups, garden clubs, *etc.*
- Demonstrations; guided tours

Step 6: Evaluation of Information and Education Campaign

Before embarking on any facet of an information and education campaign it is critical to define the "measures of success" to be used in determining whether Information and Education goals have been met. Indicators or milestones are an excellent way to establish – from the beginning – how success will be measured. Indicators must be clear, realistic, and practical. For an outreach campaign, a group may consider *programmatic* or *social* indicators such as those listed in Table 4.11.

Table 4-11. Indicators of Success for Information and Education Campaigns

TYPE OF INDICATOR	EXAMPLE INDICATOR	METHOD OF MEASUREMENT
Programmatic	Number of brochures mailed	Mailing lists
Programmatic	Number of participants	Attendance lists
Social	Number of follow-up phone calls	Phone records
Social	Increased awareness of watershed issues	Pre- and post- surveys, interviews, focus groups
Social	Number of landowners requesting assistance for management practice installation	Phone records, site visits
Social	Number of landowners aware of technical and financial assistance for watershed management measures	Pre- and post- surveys, interviews

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Appendix 4A – Rare and State Protected Plant and Animal Species of the Upper Middle Chattahoochee River Subbasin

Alabama and Georgia maintain Natural Heritage Programs and databases that keep track of the ecological resources or biodiversity of each state. These inventories contain records of rare and endangered natural communities, plants, and animals. In addition, each state has a system under which plant and animal species receive state protection.

The Georgia Natural Heritage Program data center provides rare species and natural community data for species protected by Georgia's Wildflower Preservation Act and Georgia's Endangered Wildlife Act, as well as for species protected under the U.S. Endangered Species Act. They also track rare and imperiled non-listed species. To receive more information on Georgia's state protected species, refer to Georgia's Department of Natural Resources' webpage <http://georgiawildlife.dnr.state.ga.us/content/displaycontent.asp?txtDocument=89&txtPage=1>.

The Alabama Natural Heritage Program (ALNHP) provides the best available scientific information on the biological diversity of Alabama to guide conservation action and promote sound stewardship practices. It was established by The Nature Conservancy in 1989 as one of a network of such programs. For a fee, this database can be queried for location information on rare, threatened and state protected plant and animal species, and natural communities. Searches can be done by USGS Quadrangle, Legal Township, Range & Section(s), County(ies), or species. For more information, and to order a location search, refer to the ALNHP's website at <http://www.alnhp.org/track_2006.pdf>.

In addition, Alabama state law awards protections to a list of nongame species via the Nongame Species Regulation (Section 220-2-.92, page 79-82) and the Invertebrate Species Regulation (Section 220-2-.98, pages 77-78) of the *Alabama Regulations for 2005-2006 on Game, Fish, and Fur Bearing Animals*. Copies of these regulations may be obtained from the Division of Wildlife & Freshwater Fisheries, Alabama Department of Conservation & Natural Resources, 64 North Union Street, Montgomery, AL 36104. A digital version of these regulations is available online at <http://www.dcnr.state.al.us/hunting/regulations/regbook2005-2006-final.pdf>.
The Nongame Species Regulation (Section 220-2-.92, page 79-82) is available online at: <http://www.dcnr.state.al.us/watchable-wildlife/regulations/nongame.cfm>. The current list of Alabama species protected under state law is provided as Table 4A-1.

Table 4A-1. Wildlife Species Protected by the State of Alabama According to the Nongame Species Regulation

	COMMON NAME	SCIENTIFIC NAME
Fish		
	Cavefish, Alabama	*Speoplatyrhinus poulsoni*
	Cavefish, Southern	*Typhlichthys subterraneusls*
	Chub, Spotfin	*Cyprinella monacha*
	Darter, Boulder	*Etheostoma wapiti*
	Darter, Coldwater	*Etheostoma ditrema*
	Darter, Crystal	*Crystallaria asprella*
	Darter, Goldline	*Percina aurolineata*
	Darter, Holiday	*Etheostoma brevirostrum*
	Darter, Lollipop	*Etheostoma neopterum*
	Darter, Slackwater	*Etheostoma boschungi*
	Darter, Snail	*Percina tanasi*
	Darter, Tuscumbia	*Etheostoma tuscumbia*
	Darter, Vermilion	*Etheostoma chermocki*
	Darter, Watercress	*Etheostoma nuchale*
	Madtom, Frecklebelly	*Noturus munitus*
	Sculpin, Pygmy	*Cottus paulus*
	Shad Alabama	*Alosa alabamae*
	Shiner, Blue	*Cyprinella caerulea*
	Shiner, Cahaba	*Notropis cahabae*
	Shiner, Palezone	*Notropis albizonatus*
	Sunfish, Spring Pygmy	*Elassoma alabamae*
	Sturgeon, Alabama Shovelnose	*Scaphirvnchus suttkusi*
	Sturgeon, Gulf	*Acipenser oxyrhynchus desotoi*
Amphibian		
	Frog, Dusky Gopher	*Rana capito sevosa*
	Hellbender, Eastern	*Cryptobranchus alleganiensis alleganiensis*
	Salamander, Flatwoods	*Ambystoma cingulatum*
	Salamander, Green	*Aneides aeneus*

	COMMON NAME	SCIENTIFIC NAME
	Salamander, Red Hills	*Phaeognathus hubrichti*
	Salamander, Seal (of Coastal Plain origin)	*Desmognathus monticola*
	Salamander, Tennessee Cave	*Gyrinophilus palleucus*
	Treefrog, Pine Barrens	*Hyla andersonii*
Reptile		
	Coachwhip, Eastern	*Masticophis flagellum flagellum*
	Sawback, Black-knobbed	*Graptemys nigrinoda*
	Snake, Black Pine	*Pituophis melanoleucus lodingi*
	Snake, Eastern Indigo	*Drymarchon corais couperi*
	Snake, Florida Pine	*Pituophis melanoleucus mugitus*
	Snake, Gulf Salt Marsh	*Nerodia fasciata clarkii*
	Snake, Southern Hognose	*Heterodon simus*
	Terrapin, Mississippi Diamondback	*Malaclemys terrapin pileata*
	Tortoise, Gopher	*Gopherus polyphemus*
	Turtle, Alabama Map	*Graptemys pulchra*
	Turtle, Alabama Red-bellied	*Pseudemys alabamensis*
	Turtle, Alligator Snapping	*Macroclemys temminckii*
	Turtle, Barbour's Map	*Graptemys barbouri*
	Turtle, Escambia Bay Map	*Graptemys ernsti*
Bird		
	Crane, Mississippi Sandhill	*Grus canadensis pulla*
	Dove, Common Ground	*Columbina passerina*
	Eagle, Bald	*Haliaeetus leucocephalus*
	Eagle, Golden	*Aguila chrysaetos*
	Egret, Reddish	*Egretta rufescens*
	Falcon, Peregrine	*Falco peregrinus*
	Hawk, Cooper's	*Accipiter cooperi*
	Merlin	*Falco columbarius*
	Osprey	*Pandion haliaetus*
	Oystercatcher, American	*Haematopus palliatus*
	Pelican, American White	*Pelecanus erthrorhynchos*

	COMMON NAME	SCIENTIFIC NAME
	Plover, Piping	*Charadrius melodus*
	Plover, Snowy	*Charadrius alexandrinus*
	Plover, Wilson's	*Charadrius wilsonia*
	Stork, Wood	*Mycteria americana*
	Tern, Gull-billed	*Sterna nilotica*
	Warbler, Bachman's	*Vermivora bachmani*
	Woodpecker, Red-cockaded	*Picoides borealis*
	Wren, Bewick's	*Thryomanes bewickii*
Mammal		
	Bat, Gray Myotis	*Myotis grisescens*
	Bat, Indiana	*Myotis sodalis*
	Bat, Rafinesque's Big-eared	*Corynorhinus rafinesquii*
	Bat, Southeastern	*Myotis austroriparius*
	Gopher, Southeastern Pocket	*Geomys pinetis*
	Mouse, Alabama Beach	*Peromyscus polionotus ammobates*
	Mouse, Meadow Jumping	*Zapus hudsonius*
	Mouse, Perdido Key Beach	*Peromyscus polionotus trissylepsis*
	Weasel, Long-tailed	*Mustela frenata*

Source (ACDNR, 2006)

Together, Alabama's and Georgia's natural heritage programs, like many other natural heritage programs, are linked through an organization called NatureServe. NatureServe is a non-profit conservation organization that has partnered with international conservation organizations and natural heritage inventories. An abundance of information about the plants and animals, native and exotic, can be found online via NatureServe, which can be queried by ecological community, plant and animal species, county, and HUC 8 watershed codes. Table 4A-2 lists the species identified by NatureServe within the Upper Middle Chattahoochee River Subbasin (HUC 03130002) that have either a critically imperiled, imperiled, or vulnerable to extirpation/extinction status or have a status designation according to the U.S. Endangered Species Act.

Table 4A-2. Results of NatureServe Data Query for Upper Middle Chattahoochee River Subbasin (HUC 03130002)

Scientific Name / Common Name	Status* NatureServe	Status* US ESA	U.S. Distribution
Crustaceans			
Cambarus harti Piedmont Blue Burrower	G1		GA
Mollusks			
Alasmidonta triangulata Southern Elktoe	G1Q		AL, FL, GA
Elliptio arctata Delicate Spike	G2G3Q		AL, FL, GA, MS, SC, TN
Medionidus penicillatus Gulf Moccasinshell	G1G2	LE	AL, FL, GA
Pleurobema pyriforme Oval Pigtoe	G2	LE	AL, FL, GA
Quincuncina infucata Sculptured Pigtoe	G3		AL, FL, GA
Elimia boykiniana Flaxen Elimia	G3Q		AL, GA
Fish			
Cyprinella callitaenia Bluestripe Shiner	G2G3		AL, FL, GA
Notropis hypsilepis Highscale Shiner	G3		AL, GA
Moxostoma sp. 1 Apalachicola Redhorse	G3		AL, FL, GA
Ameiurus serracanthus Spotted Bullhead	G3		AL, FL, GA
Micropterus cataractae Shoal Bass	G3		AL, FL, GA
Black madtom Noturus funebris			
Plants			
Isoetes melanospora Black-spored Quillwort	G1	LE	GA, SC
Aesculus parviflora Small-flowered Buckeye	G3		AL, DC, GA, NJ, PA, SC
Amorpha nitens Shining Indigobush	G3?		AL, AR, GA, IL, KY, LA, OK, TN
Amphianthus pusillus Little Amphianthus	G2	LT	AL, GA, SC
Arabis georgiana Georgia Rockcress	G1	C	AL, GA

Scientific Name / Common Name	Status*: NatureServe	Status*: US ESA	U.S. Distribution
Baptisia megacarpa Apalachicola Wild Indigo	G2		AL, FL, GA
Croomia pauciflora Croomia	G3		AL, FL, GA, LA
Cuscuta harperi Harper's Dodder	G2G3		AL, GA
Helianthus longifolius Longleaf Sunflower	G3		AL, GA, NC
Hexastylis shuttleworthii var. harperi Harper's Heartleaf	G4T3		AL, GA, MS
Panax quinquefolius American Ginseng	G3G4		AL, AR, CT, DC, DE, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, VA, VT, WI, WV
Phacelia dubia var. georgiana Outcrop Small-flower Phacelia	G5T3		AL, GA
Platanthera integrilabia White Fringeless Orchid	G2G3	C	AL, GA, KY, MS, NC, SC, TN
Pycnanthemum curvipes Stone Mountainmint	G3		AL, GA, NC, TN
Rhododendron prunifolium Plumleaf Azalea	G3		AL, GA
Schisandra glabra Bay Starvine	G3		AL, AR, FL, GA, KY, LA, MS, NC, SC, TN
Sedum nevii Nevius' Stonecrop	G3		AL, GA, TN, WV
Sedum pusillum Granite Rock Stonecrop	G3		AL, GA, NC, SC
Trillium reliquum Confederate Trillium	G3	LE	AL, GA, SC
Waldsteinia lobata Lobed Barren-strawberry	G2		GA, NC, SC
Status*: NatureServe G = Global, across entire range; T=subspecies/variety with different status than species as a whole.			
1=critically imperiled; 2 = imperiled; 3= vulnerable to extirpation/extintion;4 = apparently secure; 5 = widespread, abundant and secure			
US ESA: US Endangered Species Act Listing, LE = listed endangered; LT = listed threatened; C= candidate			

Source: (NatureServe, 2006)

Citations

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5.0 LOWER MIDDLE CHATTAHOOCHEE SUBBASIN

5.1 Introduction

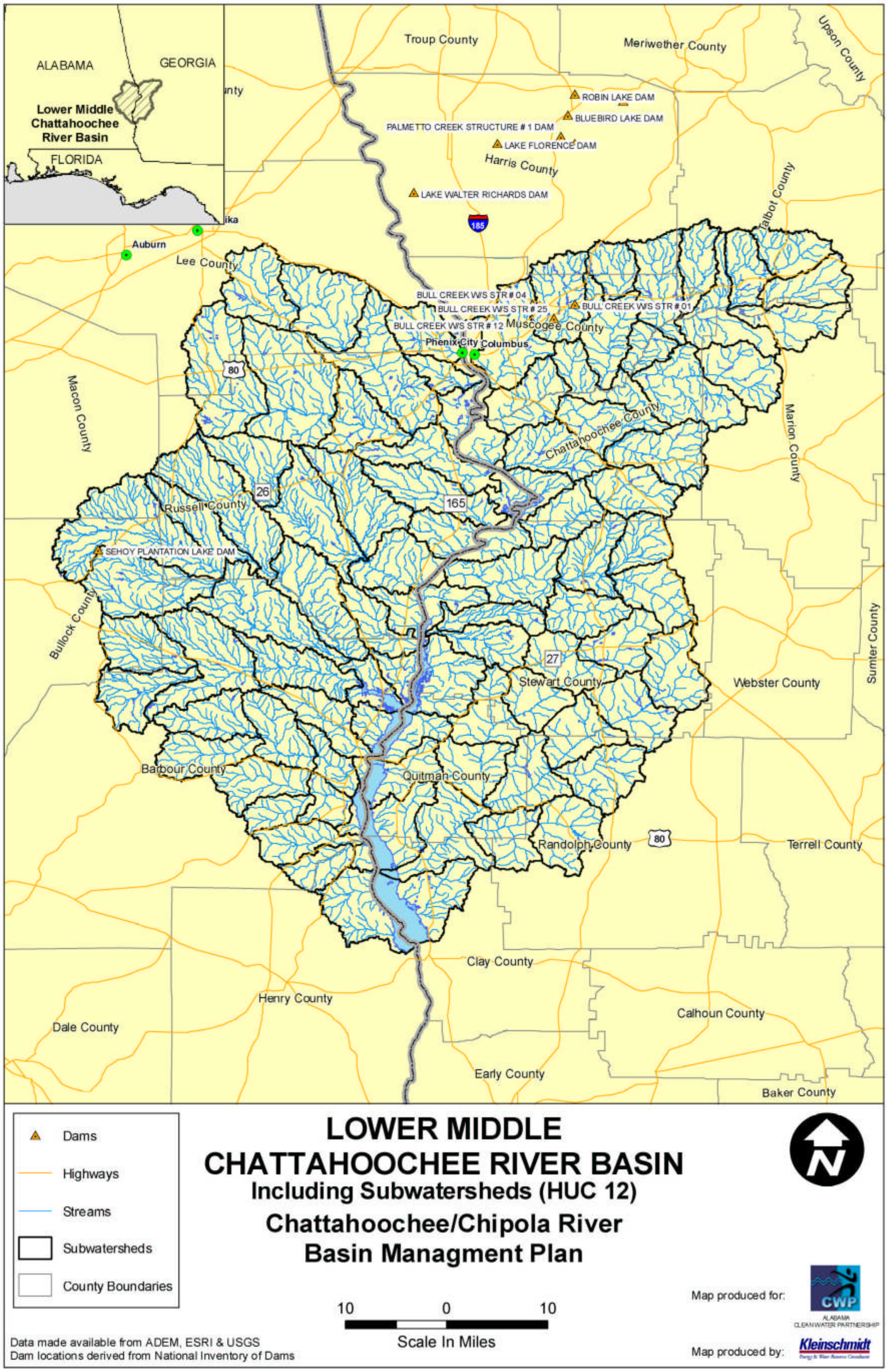
The Alabama portion of the Lower Middle Chattahoochee River subbasin includes the Walter F. George Reservoir, which is known as Lake Eufaula in Alabama. The subbasin includes land on both sides of the Chattahoochee River from below Bartlett's Ferry Dam to the Walter F. George Lock and Dam (Figure 5-1). The entire subbasin covers a total area of 2,837 square miles (1.8 million acres) in Alabama and Georgia. Approximately one-half (1,440 square miles) of the subbasin lies within Alabama covering portions of six Alabama counties – Barbour, Bullock, Henry, Lee, Macon, and Russell. The Alabama communities of Phenix City, Smiths Station, Ladonia, Huntsboro, and Eufaula are all within the boundaries of the Lower Middle Subbasin.

The subbasin contains 46 tributaries flowing to the Chattahoochee River and 6 reservoirs. Entire lengths or segments of these tributaries flow through Alabama within the Lower Middle Chattahoochee River Subbasin (Table 5-1).

Table 5-1. Alabama Tributaries (HUC 12) to the Lower Middle Chattahoochee River Subbasin

Mill Creek	Cowikee Creek
Upper Little Uchee Creek	Leak Creek
Middle Little Uchee Creek	Upper Barbour Creek
Lower Little Uchee Creek	Middle Barbour Creek
Watula Creek	Lower Barbour Creek
Brush Creek	Chipola Creek
Horselot Branch	Lower Cheneyhatchee Creek
Cowpen Creek	Oak Creek
Ihagee Creek	Sandy Creek
Upper Hatchechubbee Creek	Soap Creek
Middle Hatchechubbee Creek	Moon Lake
Watermelon Creek	Broken Arrow Creek
Lower Hatchechubbee Creek	Oswichee Creek
Upper North Fork Cowikee Creek	Bluff Creek
Hurtsboro Creek	Talipahoga Creek - Cliatt Branch
Lower North Fork Cowikee Creek	Little Barbour Creek
Upper Middle Fork Cowikee Creek	Cool Branch
Martin Creek	Chewalla Creek
Lower Middle Fork Cowikee Creek	Foy's Pond
Upper South Fork Cowikee Creek	Tobannee Creek
Johnson Creek	Drag Nasty Creek
Middle South Fork Cowikee Creek	Walter F. George Reservoir – Thomas Mill
Lower South Fork Cowikee Creek	Wacoochee Creek

Figure 5-1. Lower Middle Chattahoochee River Subbasin



Six separate dams are positioned on the mainstem of the Chattahoochee in the Lower Middle Subbasin, each forming a separate reservoir. From north to south (upriver to downriver) they are Goat Rock, Oliver, North Highlands, City Mills, Eagle and Phenix (upper and lower), and Walter F. George Lock and Dam. With the exception of Walter F. George Lock and Dam, these dams occupy the Fall Line section of the Chattahoochee – the transitional area between the Piedmont and Coastal Plain, which is characterized by relatively steep, rocky slopes.

Goat Rock Dam is located below Lake Harding and the Bartlett's Ferry Dam, at river mile 172.2. The Oliver and North Highlands are located at river miles 163.5 and 162.5, respectively. Goat Rock, Oliver and North Highlands are run-of-river hydropower facilities grouped together into Georgia Power's Middle Chattahoochee Hydro Project. The Goat Rock Dam creates a 5.7-mile-long, 965-acre impoundment. The Oliver Dam creates a 9-mile-long, 2,280-acre impoundment. North Highlands Dam creates a mile long, 131-acre impoundment.

Downstream of the North Highlands Dam are two privately owned dams that were once used for power generation. City Mills and Eagle and Phenix Dam (upper and lower) are rock and masonry structures built approximately 170 years ago for hydroelectric power generation purposes (Eubanks and Buckalew, 2005). The City Mills Dam is approximately 10 feet high, and creates a 1.37-mile long 110-acre run-of-the-river reservoir. The Eagle and Phenix Dam is 17 feet high and creates a mile long, run-of-the-river reservoir of approximately 45 acres.

The Walter F. George Lock and Dam is the southernmost of the six dams located on this section of river. The Walter F. George Lake (Lake Eufaula) is formed by the Walter F. George Lock and Dam, an USACOE facility. The lake's area is 45,181 acres with a shoreline length of 640 miles. The lake, lock and dam are operated for navigation and recreational purposes. Boating, hunting and fishing are major uses of the lake and shoreline.

5.2 Existing Water Quality and Biological Information

The Columbus Water Works (CWW) of Columbus, Georgia engaged in a three-part demonstration program focused on the middle Chattahoochee River (Boner, 2003). The project developed cost-effective procedures and innovative technologies to address the river's water quality issues. The project (1) investigated wet weather treatment technologies to control combined sewer outfalls (CSOs) from the CWW service area;[21] (2) monitored watersheds, modeled and implemented the TMDL framework; and (3) examined alternative approaches to source water assessment and protection of drinking water supplies.

[21] Combined sewer outfalls (CSOs) result when storm water (rain runoff) is collected into the same drainage system that carries wastewater (domestic and industrial). After certain volumes of rain enter the system, it overflows through a series of outfalls designed to relieve the system and prevent flooding. As a result, a mixture of stormwater and untreated wastewater spills from the system into local waters, carrying potentially harmful pollutants with it.

The second part of this project – the watershed study – is most relevant to this Planning effort. The watershed study included river flow and pollutant sampling throughout 2,400 square miles of the Middle Chattahoochee River watershed. These data were used to calibrate the USEPA BASINS model – a watershed model used to estimate pollutant loading in wet and dry conditions. The data collection and modeling considered the following parameters of watershed quality: turbidity, temperature, conductivity, and dissolved oxygen. In addition, to the watershed modeling surveys of macro-invertebrates and fish were completed using the USEPA bio-assessment protocols (Boner, 2003).

A summary of key findings from the watershed study are (Boner, 2003):

- Urban areas produce water pollutants at an order of magnitude greater than rural areas. Urban areas marked by impervious surfaces (*i.e.*, asphalt, concrete) produce more runoff that carries higher levels of pollutants than in rural areas. Results suggest that capturing and controlling urban runoff is a key watershed strategy to protect the Middle Chattahoochee.
- Long-term water quality monitoring should include a network of creek and river stations. Creeks should be monitored over time to measure the effectiveness of urban watershed restoration and CSO management activities.
- CSOs, whether treated or untreated, do not contribute to the noncompliant exceedences of fecal coliform bacteria in water samples from watersheds in the Columbus Metro Area in Alabama or Georgia.
- Results reinforce the long-term watershed management approach inherent in the development and implementation of a TMDL for pollutants associated with urban areas and CSOs (*e.g.,* bacteria).
- Broad-based stakeholder participation and cooperation are essential elements of watershed management, including assessment and restoration activities.

Alabama's biannual §303(d) List of Impaired Waters identifies creeks, lakes, and rivers that do not meet state water quality standards. On a five year rotational basis, ADEM completes a river basin monitoring assessment to identify streams that are not completely meeting water quality standards for their use classification, which is Fish and Wildlife in this subbasin. The streams to be tested are identified through past assessments, impairments, complaints, and stakeholder identification of problem areas. ADEM has identified a single creek within the subbasin that does not meet water quality standards for its use classification. Barbour Creek, from its source to its confluence with the Chattahoochee River, is impacted by *siltation* to the point that it no longer supports the fish and wildlife habitat expected to be there.[22] Siltation signifies a stream condition where excessive amounts of sediment (dirt) enter the creek, thereby altering its channel and aquatic habitat. Siltation is typically caused by streambank erosion along the creek or sediment-laden stormwater discharged to the creek.

[22] These statements are based on the *Final 2004 §303(d)* list of impaired waters. There currently is a Draft *2006 §303(d)* under review by USEPA. Until the 2006 list is approved, the 2004 list is considered the current final document. Both document can be viewed at <http://www.adem.state.al.us/waterdivision/WQuality/303d/WQ303d.htm>.

Although not listed by Alabama, Lake Eufaula is listed on Georgia's recent draft §303d list as not fully supporting its designated use classification for recreation (GAEPD, 2007). This difference in listing is due to a difference in assessment and listing methodologies between Alabama and Georgia.

5.2.1 Priority Subwatersheds

ADEM's Nonpoint Source Screening Assessments were primary sources of water quality information for this Planning effort (ADEM, 2002; ADEM, 2006). These studies provide the most useful scientific analyses of the basin because they are current (*i.e.,* completed every 5 years) and completed according to USEPA-approved water quality standards. Subwatersheds, based on the 11-digit hydrologic unit code, are the focus of the current ADEM assessments although that will change in the future.[23] This scale is used because it is the smallest scale for which data is available. Based on assessment results, ADEM assigns *nonpoint source impairment potential* and *nonpoint source priority status* to creeks with water quality and/or habitat impacts warranting greater concern and need of investigation.

Physical, chemical and biological assessments were conducted for several subwatersheds in the subbasin. Nonpoint source pollution impairment potential was assigned to subwatersheds based on surrounding land uses and pollution evidence detected by monitoring. Assessments of aquatic habitat and macroinvertebrate populations concluded in a determination of "priority" status for the subwatershed.

Four subwatersheds were selected for priority consideration (ADEM, 2002; ADEM, 2006). A subwatershed is recommended for priority status if the assessment received a "fair" or "poor" rating for the stream's benthic macroinvertebrate or fish community (ADEM, 2002; ADEM, 2006). NPS potential was rated based on SWCD watershed (land use) assessments. Table 5-2 provides the NPS rating which ranks the land use with the greatest *potential* for the causing the impairment.

[23] There are some limits to using the Rotational Screening Assessment reports in this Plan. ADEM (2002; 2006) conducted water quality and biological assessments at subwatershed (11-digit HUC) scale, which was abandoned in 2005 for the 10-digit HUC and 12-digit HUC delineations. Currently, the standard scale for watershed planning and implementation is nationally recognized at the HUC 12 sub-watershed scale. It is expected that ADEM will utilize the HUC 12 delineations for the next rotational basin assessment in 2009.

Table 5-2. Priority Sub-watersheds within the Lower Middle Chattahoochee Subbasin

Year[a]	11-digit Hydrologic Unit Code (HUC)			Waterbody	303(d)/ TMDL[b]	Station[c]	Screening Assessment Results			NPS ratings of "moderate" or "high" based on 1998 SWCD sub-watershed assessments[d]
							Habitat[e]	*WMB-EPT*[f]	*Fish*	
1999 & 2004	0313	0003	060	Little Uchee Creek	--	LUC-3	Excellent	Fair	Not Assessed	Cropland runoff, agriculture
1999 & 2004	0313	0003	100	Ihagee Creek	--	IHGR-1	Excellent	Good	Poor	Pasture runoff
1999 & 2004	0313	0003	120	Hatchechubbee Creek	--	HECR-2	Good	Fair	Not Assessed	Pasture runoff
1999 & 2004	0313	0003	180	Barbour Creek	303(d)	BRC-2	Good	Fair	Not Assessed	Siltation from Agriculture

Source: ADEM, 2002; ADEM, 2006

a Indicates the year of the monitoring.
b Indicates whether the waterbody is part of the 303(d) List of Impaired Waters or is subject to the development of a Total Maximum Daily Load.
c The station name is a code assigned by ADEM for the basin screening assessments.
d The Alabama Soil and Water Conservation Districts conducted land use evaluations of Alabama's subwatersheds in 1998. The potential for nonpoint source (NPS) pollution within individual subwatersheds was assessed based on existing land uses. Watersheds where land uses associated with high or moderate potential for NPS were prevalent were identified and the land use indicated.
e This column includes the results of ADEM's habitat evaluations.
f "WMB-EPT" is an abbreviation for "Wadeable Multi-habitat Bioassessments - Ephemeroptera, Plecoptera, Trichoptera" that describes the results of biological assessments of streams according to the sum of the number of families within the orders Ephemeroptera, Plecoptera and Trichoptera – all orders of macroinvertebrates commonly found in freshwater streams.

5.2.2 Permitted Discharges and Stormwater Sources

Approximately 200 NPDES permits were active in the Lower Middle Chattahoochee River Basin as of April 2006. These permits cover industrial discharges, sewage treatment plants, mining operations, construction sites, and CAFOs. These records provide an indication of current land use activities in the watershed and potential water quality stressors. For example, numerous stormwater/construction permits were issued for Mill Creek (62) and Little Uchee (26) compared to much fewer similar permits for other watersheds in the subbasin. Some records could not be associated with a specific subwatershed. For instance, Russell County and the City of Phenix maintain a total of two NPDES Phase II (Stormwater Management) permits for runoff from the urban Phenix City area and county roads. Permits without specific location information are not included in this assessment.

5.2.3 Fish Tissue Surveys and Consumption Advisories

ADEM Field Operations conduct annual fish tissue sample surveys in lakes and rivers across the state to monitor environmental health and to safeguard public health. The sample fish tissues are analyzed for the presence of toxic substances, and results serve as the basis for the ADPH's Fish Consumption Advisories. For 2005, no advisories for fish consumption were issued by Alabama that pertain to the Lower Middle Chattahoochee River Subbasin. However, GDNR, which conducts the same type of monitoring for the State of Georgia, posted several advisories for reservoirs of the Upper Middle Chattahoochee Subbasin, which feed into the Lower Middle Chattahoochee River Subbasin.

In 2005, Georgia issued fish consumption advisories for channel catfish, hybrid bass and largemouth bass. These fish advisories are the result of PCBs and mercury found in fish tissue. Both substances are found in river sediments, which work their way through the food chain to fish. The presence of these chemicals typically indicates historical, and not necessarily current, water pollution issues.

5.2.4 Reservoir Studies

Walter F. George Lake (Lake Eufaula)

W.F. George Lake was assessed in ADEM's (2002) water quality study of the reservoirs in the subbasin. Three locations (upper, mid, lower) in the reservoir were sampled to evaluate the health of the lake. Sampling measured a suite of water quality parameters (ADEM, 2001), including:

- total nitrogen (TN) and total phosphorus (TP) to be used as indicators of the nutrient content in the waterbody;
- algal growth potential to determine the total algal biomass "supportable by test waters and of the limiting nutrient;"

- corrected chlorophyll a as an indicator of algal biomass;
- Carlson Trophic State Index (TSI),[24] calculated from corrected chlorophyll a concentrations as a means of trophic state classification of the reservoir;
- dissolved oxygen (DO) concentrations, used as a more direct indicator of water quality because severe depletion can negatively impact the biological components of the waterbodies and interfere with water supply and recreational uses; and
- total suspended solids (TSS) as an indicator of sediment inflow.

ADEM's findings highlighted water quality concerns for W.F. George Lake, namely nutrient pollution. Based on monthly samples taken from April through October 1998 (one, 20-liter sample per month), mean nutrient indicators for the lake revealed relatively low total nitrogen (TN) (under 0.9 mg/l) and relatively high mean total phosphorus (TP). High phosphorus levels indicate a greater tendency toward eutrophication of the system. In fact, trophic status for the lake between April and September was eutrophic with values at all sampling sites falling between 50 and 70 TSI (ADEM, 2005). A 50 TSI is the threshold for eutrophic conditions while 70 is the threshold for hypertrophic conditions. Results suggest the lake is undergoing a process called "cultural eutrophication" which describes the alteration of water quality and biology due to point and nonpoint source pollution and the consequent increased sedimentation and nutrient loading (ADEM, 2001). Results allowed ADEM to initiate the Clean Lakes Program Phase I Diagnostic/Feasibility Studies, which has provided for $70,000 in federal funding for restoration activities (ADEM, 2005).

Goat Rock, Oliver and North Highlands Reservoirs

Georgia Power Company (GPC) owns and operates the Middle Chattahoochee Hydro Project, which includes Goat Rock, Oliver, and North Highlands reservoirs. The project is licenses by FERC. In accordance with the project's license, GPC completed a shoreline management plan (SMP) to guide public and private use of shoreline within the boundaries of the project (GPC, 2004). It addresses protection of riparian buffers and shorelines, aquatic species conservation, aesthetic concerns, and watershed health.

Goat Rock – The shoreline and upland areas around Goat Rock Reservoir are largely undeveloped. GPC has stated its interest in protecting as much of the land along the reservoir and tributaries as it controls with a 100-ft protective buffer and forestry best management practices. In an effort to protect tributaries to the reservoir, the SMP focuses attention on Wacoochee Creek (Lee County) in the

[24] Trophic State Index (TSI) is a scale of numbers from 1 to 100 that can be used to indicate the relative trophic state of a waterbody. Low TSI values indicate lower levels of biological productivity, and higher TSI values indicate higher levels. TSI is a relatively simple-to-use way of classifying the level of biological activity of a waterbody, which relates to several factors of its overall health (Carlson,1977). The index is related to the level of "biomass" (*e.g.*, the aggregate of its biological material) in a waterbody. Biomass is driven by factors such as nutrient loading – an anthropomorphic water quality issue related to the use of fertilizers. Therefore, the trophic index provides a measure of pollutant impacts on a waterbody, such as a lake or pond, based on the measurement of the biological material present.

upper part of the subbasin. GPC stated that it has a Memorandum of Understanding with MeadWestvaco Timber Operations to protect a 100-foot buffer along this creek.

Oliver – The land around Oliver Reservoir is heavily developed and GPC relies on a permit system to manage shoreline access and development issues such as dock construction, erosion control activities, and vegetation management. GPC works with adjacent property owners and agencies to provide and manage public recreational access to the reservoir, water quality, home maintenance and development.

North Highlands – GPC owns the lands on both side of the river around the North Highlands reservoir, and maintains a protective buffer along the river, where applicable.

It is important to recognize GPC's management efforts on this section of the River. Several of these efforts could prove demonstrative for future plan implementation. Also, GPC and its other resource partners are very active in supporting basin management and will most likely serve as a reliable partner in the future.

5.2.5 Rare, Threatened and Endangered Resources

The health of aquatic life in the subbasin is a measure of the health of the watershed. Fish and wildlife, especially the diversity of fishes, amphibians, and invertebrates living in the waters of the subbasin, rely on clean water and functional wetlands as their habitat. When these resources are compromised, fish and wildlife populations can be threatened.

The Southeastern United States is considered a hotbed of biological diversity. The Lower Middle Chattahoochee River Subbasin is a subbasin of the greater Apalachicola – Chattahoochee – Flint River Basin, which is recognized for its great and unique biodiversity. The Eufaula National Wildlife Refuge (NWR) is located in the basin just north of Eufaula, Alabama and is the only NWR in the basin west of the river. Consisting of 11,200 acres of forests and wetlands, the Eufaula NWR is managed as habitat for a variety of game and non-game species of fish and wildlife, including some species of special significance.

The waters of the basin provide habitat for 122 fish species, 29 mussel species and 30 crayfish species (USFWS, 2005). However, due to the long history of industrialization of the river, many of these species are thought to be at risk for extinction. Rare plant and animal resources of the Lower Middle Chattahoochee Subbasin are tracked and/or protected by several sources including natural heritage programs, and state and federal laws. Appendix 5A provides a description of the programs that monitor rare species for this subbasin and the state laws that protects them. Also listed in Appendix A are the wildlife species of the Lower Middle Chattahoochee Subbasin that are protected by Alabama state law (Table 5A-1) or have been identified by NatureServe (the Natural Heritage Database) as imperiled or vulnerable to extinction/extirpation (Table 5A-2).

Twenty species are listed as federally threatened or endangered in the six counties of the Lower Middle Chattahoochee Subbasin (Table 5-3). Although not all the species are aquatic, all do rely on water resources of the subbasin during some point in their lifecycle. Activities that would lead to water quality impacts would most likely lead to habitat impacts for these creatures. Because water quality and aquatic habitat quality are inextricably linked, the water quality objectives of this Plan tend to overlap with the management objectives for these species.

Red-cockaded woodpecker

Table 5-3. Federally Threatened and Endangered Species in the Lower Middle Chattahoochee River Subbasin

BARBOUR COUNTY
E - Wood stork (*Mycteria americana*)
T - Bald Eagle (*Haliaeetus leucocephalus*)
BULLOCK COUNTY
E - Red cockaded woodpecker (*Picoides borealis*)
E - Relict trillium (*Trillium reliquum*)
HENRY COUNTY
T - Bald eagle (*Haliaeetus leucocephalus*)
E - Wood stork (*Mycteria americana*)
E - Relict trillium (*Trillium reliquum*)
LEE COUNTY
E - Relict trillium (*Trillium reliquum*) [plant]
E - Ovate clubshell mussel (*Pleurobema perovatum*)
T - Purple bankclimber (*Eliptoideus sloatianus*) [mussel]
E - Southern clubshell mussel (*Pleurobema decisum*)
T - Fine-lined pocketbook mussel (*Lampsilis altilis*)
MACON COUNTY
E - Red-cockaded woodpecker (*Picoides borealis*)
E - Wood stork (*Mycteria americana*)
E - Southern clubshell mussel (*Pleurobema decisum*)
E - Ovate clubshell mussel (*Pleurobema perovatum*)
T - Fine-lined pocketbook mussel (*Lampsilis altilis*)
RUSSELL COUNTY
E - Shiny-rayed pocketbook mussel (*Lampsilis subangulata*)
E - Red-cockaded woodpecker (*Picoides borealis*)
C - Georgia rockcress (*Arabis georgiana*)
Codes: Federal Status E – Endangered; T – Threatened; C - Candidate Species

Source: USFWS, 2005

5.2.5.1 Critical Habitat for Freshwater Mussels

On June 6, 2006, the USFWS published its intention to designate critical habitat for 7 species of freshwater mussels in several drainages to the Gulf of Mexico including the ACF River Basin.[25,26] All of these mussels are considered endemic to the ACF River Basin. This designation is one facet of the USFWS's comprehensive recovery plan to preserve the remaining mussel habitat and to restore habitat and populations, where feasible (USFWS, 2003). The recovery plan consists of many similar objectives to this Basin Management Plan, which are incorporated into the management goals and recommendations detailed at the conclusion of this chapter.

The mussels listed as endangered species of the ACF Basin include the fat threeridge, shinyrayed pocketbook, Gulf moccasinshell, Ochlockonee moccasinshell, and oval pigtoe. Two mussel species are considered *threatened*: Chipola slabshell and purple bankclimber. Historically, these mussels, except the Ochlockonee moccasinshell and Chipola slabshell, were found in the mainstem and tributaries of the Chattahoochee River Basin, mostly in the Coastal Plain portions (below Phenix City) of this subbasin (USFWS, 2003; USFWS, 2006). Most mussel species are thought to be now extirpated from the Upper and Lower Middle Chattahoochee. However, the shinyrayed pocketbook, Gulf moccasinshell, and the oval pigtoe still occupy Uchee Creek (Figure 5-2). Therefore, the USFWS has designated this creek "Unit 3"[27] of the eleven potential critical habitat units for all of the listed species (USFWS, 2006).

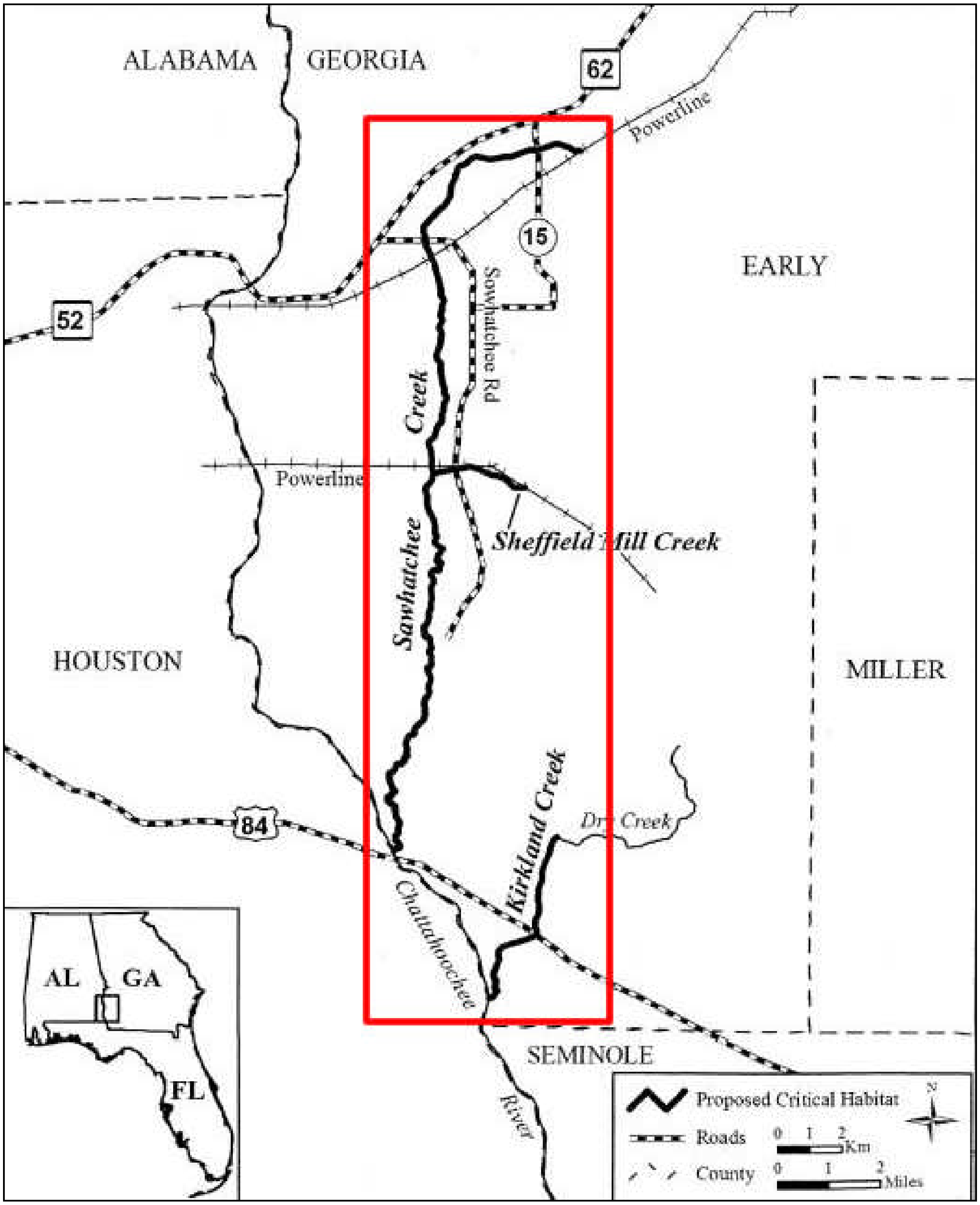
Shineyrayed Pocketbook

[25] 50 CFR Part 17. Federal Register, Volume 71, No. 108, Tuesday, June 6, 2006. pp. 32746 – 32796. On March 16, 1998 (63 FR 12664), the USFWS listed the 7 species of freshwater mussels under the ESA and declared that the assignment of critical habitat was not prudent because designation does not afford additional, cost-effective protections compared to other conservation actions. However, the USFWS went ahead with the designation because the Center for Biological Diversity filed a lawsuit in the U.S. District Court for the Northern District of Georgia (Civil Action No. 1:04 CV–0729–GET) on March 15, 2004, alleging that USFWS violated the ESA by failing to designate critical habitat for the seven mussels.

[26] "Critical habitat" has a specific definition within the Endangered Species Act. It refers to specific geographic areas that have habitat characteristics essential for the conservation of a threatened or endangered species, and which may require special management and protection. 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 who play a part in managing listed species found on their property.

[27] Unit 3 encompasses a total length of 34.2 km (21.2 mi) of the main stem of the Uchee Creek from its confluence with the Chattahoochee River upstream to Island Creek. It is located in Russell County, Alabama (USFWS, 2006).

Figure 5-2. Proposed Critical Habitat Unit 3 for Fresh Water Mussels in the Lower Middle Chattahoochee River Subbasin



Source: USFWS, 2006

The decline of freshwater mussels in the Chattahoochee River Basin is strongly linked to the loss or severe modification of their habitat. Freshwater mussels need sandy, gravelly or cobble streambeds; stable stream flow and stream banks; and few or no predators to survive. Along the Chattahoochee River, the loss of suitable mussel habitat is attributed to impoundments, channelization, pollution, sedimentation, and other factors. In smaller creeks, like Uchee Creek, nonpoint source pollution and sedimentation from agricultural, forestry and development activities are the most probable causes of habitat degradation (USFWS, 2003).

5.3 Stakeholder Issues of Concern

Sometimes water quality problems are identified by citizens and brought to the attention of agency staff for further examination. Issues may be anecdotal in the sense that they describe a perceived water quality problem or watershed management issue without thorough scientific investigation. However, this citizen input, or stakeholder input, is invaluable in assisting in the identification of potentially impaired or at risk waters and helps guide future assessment activities and remedial action.

In support of this Basin Management Plan, issues of concern were collected from stakeholders during public ACWP Steering Committee Meetings and Subbasin Stakeholder Workshops. Stakeholders identified issues relating to water quality, land use, environmental management and politics. Some stakeholders also provided suggestions about how to proceed with watershed management for the subbasin and basin. Other stakeholders identified specific water quality impacts or sources of those impacts. Table 5-4 summarizes suspected issues of concern identified by the stakeholders for specific water bodies.

Table 5-4. Water Quality Issues of Concern Identified by Stakeholders in the Lower Middle Chattahoochee River Subbasin

Creek/Subwatershed Name	Suspected Water Quality Concern(s)	Possible Source(s)
Chewalla Creek (HUC12: 031300031301)	Sedimentation	Development – Conversion of forests and pastures to residential and commercial development.
Cheneyhatchee Creek (HUC12: 031300031310)	Sedimentation	Development – Conversion of forests and pastures to residential and commercial development.
Lower Cowikee (HUC12: 031300031205)	Bacterial pollution	Poultry farms – manure management
White Oak Creek (HUC12: 031300031311)	Bacterial pollution	Failing septic systems
Thomas Mill Creek*	Bacterial pollution	Failing septic systems

**Thomas Mill Creek was identified by Stakeholders, however the creek is not identified by USGS.*

The stakeholder meeting was held on Wednesday, January 18, 2006 in Eufaula, Alabama. Stakeholders reviewed a list of common nonpoint pollution sources and identified issues they thought were relevant to the subbasin (Table 5-5).

Table 5-5. Common Nonpoint Source Issues Recognized by Stakeholders as Potential Problems in the Lower Middle Chattahoochee River Subbasin

Nonpoint source pollution from agricultural activities - cropland, pastureland, and animal husbandry
• livestock access to streams (cattle crossings in the upper part of the subbasin) • nutrient runoff from pasture and cropland • livestock overgrazing and soil erosion/sediment loading from pasture and cropland • gully erosion • animal waste management impacts (poultry farms in the subbasin) • pesticides and pathogens runoff from cropland
Nonpoint source pollution from forestry
• soil erosion and sediment loading from harvested forestland • soil erosion and sediment loading from logging roads • gully erosion on hillsides on harvested forestland
Nonpoint source pollution from roads, road banks, and new road construction
• soil erosion and sedimentation from dirt roads and road banks (especially new and/or unpaved roads) • gully erosion
Nonpoint source pollution from urban and residential areas
• septic tank failures leading to nutrient loading and pathogen pollution • soil erosion and sediment loading from new road construction • soil erosion and sediment loading from urban land development • lack of stormwater management in urban areas (*e.g.*, City of Eufaula)
Nonpoint source pollution from mining activities
• sediment loading from sand and gravel pits • mining and excavation impacts on surface waters

Wetlands and fish and wildlife habitat loss
• wetland and aquatic habitat destruction due to road construction and land development • habitat impacts from increased sedimentation • loss of fish and imperiled mussels species • loss of stream buffers
Impacts from river use and other recreational uses
• litter from boats • stormwater runoff at boat ramps • improper disposal of deer carcasses in creeks and at road bridges • possible shoreline erosion from boat wakes

5.4 Water Quality and Watershed Management Goals

The goals and strategies that address water quality involve restoration, protection, and education projects or tasks focused on attaining a specific goal. Table 5-6 provides proposed management goals for each concern and issue identified for the Lower Middle Chattahoochee Subbasin.

Table 5-6. Lower Middle Chattahoochee River Subbasin Management Goals

Goal 1: *Reduce nonpoint source pollution from agricultural activities – cropland, pastureland, and animal husbandry*	**Goal 5:** *Reduce nonpoint source pollution from urban and residential areas*
• livestock access to streams, and stream bank erosion • nutrient runoff from pasture and cropland • sediments from pasture and cropland • gully erosion and erosion from critical areas • animal waste management impacts • livestock overgrazing of pastureland • pesticides, bacteria and pathogens in surface waters	• nutrient and pathogen loading due to improperly maintained or failing septic systems and sewage treatment facilities • soil erosion from new road construction • soil erosion and sediment loading from urban development, including land clearing, construction activities, and impervious surfaces • stormwater runoff – bacteria and toxics
Goal 2: *Reduce nonpoint pollution from forestry*	**Goal 6:** *Reduce nonpoint source pollution from mining activities*
• erosion and sediment loading from harvested forestlands • erosion and sediment loading from logging roads • gully erosion on hillsides from harvested forestland	• sediment loading from sand and gravel pits • mining and excavation impacts on surface waters
Goal 3: *Track resource trends through water quality monitoring in the subbasin to measure progress in restoration and protection efforts, fill in data gaps, and identify new resource concerns and issues*	**Goal 7** *Protect and restore aquatic habitat and aquatic species diversity*
• limited water quality monitoring within the watershed • limited baseline data for many creeks in the subbasin	• wetland and aquatic habitat destruction due to road construction and land development • loss of fish and mussel species diversity • eutrophication of reservoirs • loss of stream buffers
Goal 4: *Reduce nonpoint source pollution from roads, road banks, and new road construction*	**Goal 8:** *Promote environmentally safe recreational uses on the Chattahoochee*
• soil erosion from roads and road banks (especially new and/or unpaved roads) • gully erosion	• erosion from boating traffic • dumping trash from boats • boat ramp litter problems • oil, gas and sewage discharges from boats • introduction of invasive aquatic species

Additional goals that are not directly related to specific water quality management issues but are essential to basin management are also identified. These goals are:

GOAL 9: Promote watershed and community stewardship through resource education, outreach and the promotion of volunteer opportunities throughout the watershed.

GOAL 10: Promote watershed management technology transfer across industries and across state lines of Alabama, Georgia and Florida. Coordinate watershed assessment, planning, restoration and conservation efforts between subbasin and basin stakeholders in all three states.

GOAL 11: Develop a framework in the subbasin to implement the projects and tasks in this Plan.

These goals are critical to the implementation and success of this river basin plan. In the following pages, each goal is addressed individually, and strategies are established to achieve the goal. If there is a specific creek/subwatershed associated with an issue, either by ADEM or stakeholders, then the name of the creek is identified.

5.5 Implementation Strategies to Achieve Water Quality and Watershed Management Goals

Targeted subwatersheds should be prioritized for action in order to address water quality management concerns that are most critical in a given watershed. 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. Strategies for achieving management goals are provided herein with specifics regarding:

- agencies or groups that are integral to implementing 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.

The following list of organizations and their associated acronyms is provided as a key for the tables to follow. With each watershed management strategy, agencies and organizations are identified that would be the most likely lead or participant in implementing the strategy.

AAGC	Alabama Association of General Contractors
ABBA	Alabama Bridge Builders Association
ACES	Alabama Cooperative Extension System
ACOE	United States Army Corps of Engineers
ACWP	Alabama Clean Water Partnership
ADAI	Alabama Department of Agriculture and Industry
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AFA	Alabama Forestry Association
AFC	Alabama Forestry Commission
AFPA	American Forest and Paper Association
ALC	Alabama Loggers Council
ALDOT	Alabama Department of Transportation
ALFA	Alabama Farmers Federation
ALNEMO	Alabama Nonpoint Education for Municipal Officials
AMI	Alabama Mining Institute
ANHP	Alabama Natural Heritage Program
ANLA	Alabama Nursery and Landscape Association
AOWA	Alabama Onsite Wastewater Association
AOWB	Alabama Onsite Wastewater Board
APEA	Alabama Poultry and Egg Association
APPC	Alabama Pulp and Paper Council
ARA	Alabama Rivers Alliance
ARBA	Alabama Road Builders Association
ASTA	Alabama Septic Tank Association
ATA	Alabama Turfgrass Association
AUMERC	Auburn University Marine Extension Resource Center
AWF	Alabama Wildlife Federation
AWW	Alabama Water Watch
AWWA	Alabama Water Watch Association
FFA	Future Farmers of America
FSA	Farm Services Agency
GA EPD	Georgia Environmental Protection Division
GDNR	Georgia Department of Natural Resources
GPC	Georgia Power Company
GSA	Geological Survey of Alabama
HBAA	Home Builders Association of Alabama
HOBOs	Home Owners and Boat Owners Associations
MCWC	Middle Chattahoochee Water Coalition
MPD	Marine Police Division
NRCS	Natural Resources Conservation Service
OMELC	Oxbow Meadows Environmental Learning Center
SFI	Sustainable Forestry Initiative
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
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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

<u>Issues and Concerns in the Subbasin</u>:

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

Targeted Creeks: Wedhadkee Creek, Moores Creek, Lake Harding, West Point Lake, Hillabatchee Creek, Upper and Lower Hawlakee Creek

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP[A]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
Implement streambank fencing and identify alternate water sources for excluded cattle and other grazing animals. Implement streambank restoration projects.				
Landowners; NRCS, SWCD, SWCC, AWF, ALFA	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, ALFA	Medium priority, continuous, long term	Medium to high; private/ public	Quarterly for BMP condition	Acres of cropland of implemented BMPs
Implement pastureland BMPs to reduce sediment and nutrient loading to surface waters.				
Landowners; NRCS, SWCD, SWCC, ACES, ALFA	High priority, continuous, long term	Medium to high; private/ public	Quarterly for BMP condition	Acres of pastureland of implemented BMPs

Lead Agency or Group[A]	Timeframe[b]	Level of Funding[c]	Monitoring Need[d]	Performance Indicator[e]
Implement effective agricultural waste management systems.				
Landowners; NRCS, SWCD, SWCC, ACES, ALFA, APEA	Medium 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, ALFA	High priority, continuous, long term	Medium; private/ public	Quarterly for erosion effectiveness	Number of acres in which BMP has been implemented
Establish goals in each subwatershed, where needed, for the voluntary implementation of agricultural BMPs.				
Farming Community, FSA, NRCS, SWCD, SWCC, ALFA	Medium 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, ALFA	Medium 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, ALFA	Medium 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, ALFA	Medium priority, continuous, long term	Low to Medium; private/ public	Annual progress reports	Number of outreach events and number of groups and youth engaged

LEAD AGENCY OR GROUP[A]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
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, ALFA	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

a. Lists responsible parties/primary actors.
b. 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).
c. 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.
d. Captures the monitoring need and sets a frequency.
e. Performance indicator(s) are those measures or metrics that will indicate the degree of success in implementing the strategy.

Best Management Practices to Address the Strategies of Goal 1:

The strategies to address concerns and issues related to agricultural land use lie primarily in the implementation of BMPs focused on cropland, pastureland, streambank fencing and streambank buffers, animal waste management systems, and erosion control for gullies and critical areas. Goals and strategies that include education, outreach, and recognition compliment these efforts and help to support continued implementation of the BMPs. Several BMPs are described herein.

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 stop water flow and store it or guide 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 along with the provision of an alternate water source.

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.

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.

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 and/or spreading 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.

There are many agricultural BMPs available to farmers and landowners today. A good review of agricultural BMPs is provided by Alabama A&M and Auburn University through their Alabama Cooperative Extension System (Hairston, *et. al.*, 2001). It describes the types of BMPs used to control nonpoint pollution in agriculture and also discusses how to select the appropriate BMP. USDA NRCS and SWCD provide technical and financial assistance for willing program participants. Several documents provide good reviews of agricultural BMPs, including the Alabama SWCC's "*Protecting Water Quality on Alabama's Farms*"; the ACES's and NRCS's "*Nutrient Management Planning for Animal Feeding Operations*".

GOAL 2:	*Reduce nonpoint source pollution from forestry activities*
	Issues and Concerns in the Subbasin: • erosion and sediment loading from harvested forestland • erosion and sediment loading from logging roads • gully erosion on hillsides from harvested forestland
Targeted creeks: South Fork Cowikee Creek, Wacoochee Creek	

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, GPC, SWCD, ACES, ALFA, SFI	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 road banks to reduce sediment and nutrient loading to surface waters.				
Landowners; AFA, AFC, APPC, ALC, SWCD, ACES, county engineers, stakeholders, ALFA, SFI	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, ALFA, SFI	High 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, GPC, SWCD, SWCC, AFA, AFC, ALC, ACES, ACWP, ALFA, SFI	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

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Educate forest landowners concerning the importance of BMPs in reducing nonpoint source pollution associated with timber management.				
Landowners; AFC, AFA, APPC, ALC, ACES, ACWP, ALFA, SFI	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
Initiate and/or continue education and outreach programs with students involved in forestry activities.				
AFC, AFA, APPC, FFA, 4H, schools, SWCS, SWCD, NRCS, ACWP, ALFA	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, SFI	High 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, GPC, ALFA	High priority, continuous, long term	Low; private/ public	Annual progress reports	Number of outreach efforts or events completed; number of funding sources identified

Best Management Practices to Address the Strategies of Goal 2:

The continued implementation of forestry BMPs within the river basin is important to reducing the sediment and nutrient loading from forested land. These BMP implementation strategies are focused on commercially forested land, in-use and abandoned logging roads, and areas of gully and critical area sediment erosion. The protection of streams, streambanks, and riparian wetlands is also crucial to enhancing aquatic systems health in the basin. The establishment and maintenance of stream buffers and wetlands in forested areas can be accomplished through stringent incorporation of forestry BMPs.

Numerous forestry BMPs are being implemented throughout Alabama that can be applied to the Chattahoochee-Chipola 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 "*Alabama's Best Management Practices for Forestry*" (Alabama Forestry Commission, 1993) and the "*Georgia's Best Management Practices for Forestry*" (Georgia Forestry Commission (GFC), 1999). These documents 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. An additional resource is the Sustainable Forestry Initiative (SFI). The SFI program is a comprehensive system of principles, objectives and performance measures developed by professional foresters, conservationists and scientists, which combines sustainable forestry practices with long-term protection of wildlife, plants, soil and water quality.

Strategies supportive of, and essential to, forestry BMP implementation efforts include promotion of BMP use through education, outreach, and recognition. Currently, there are several active programs run by various entities that can be used to encourage responsible forestry management. For example, information on SFI methods and BMP implementation are available through the American Tree Farm System, Alabama Loggers Council, and various specific Sustainable Forestry Initiative programs. Some groups are already active in workshops and the distribution of educational materials, including educational efforts with youth. Also, the TREASURE Forest program provides a significant mechanism for BMP promotion and stewardship recognition. For more information regarding these groups or programs and the many technical resources they provide, refer to the following websites:

- Sustainable Forestry Initiative (SFI®) Program <http://www.aboutsfi.org/core.asp>
- American Tree Farm System <http://www.treefarmsystem.org/>
- Alabama Loggers Council <http://www.alaforestry.org>
- Alabama Forestry Commission <http://www.forestry.state.al.us/>
- TREASURE Forest program <http://www.atfa.net/>

The following are additional key BMPs that address forestry:

Seeding and Mulching

Seeding is effective in establishing vegetation on bare patches of land to prevent soil erosion. It 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.

Streamside Management Zones

Streamside Management Zones (SMZs) are protective buffer strips immediately adjacent to waterways where soils, organic matter and vegetation are managed to protect the physical, chemical and biological integrity of surface waters adjacent to and downstream from forestry operations (AFC, 1999). Trees and other vegetation in the SMZ provide shade that buffers water temperatures, woody debris vital to the aquatic ecosystem, natural filtration of *sediment* and other *pollutants* (nutrients and pesticides), and travel corridors and habitat for wildlife (GFC, 1999). Management activities may occur within a SMZ provided that the disturbance to soil or ground cover is minimized. Water quality objectives should prevent movement of soil or other potential *pollutants* from within the SMZ into the watercourse and protect stream bank integrity (GFC, 1999).

Among the practices that should be avoided in SMZs are the following (GFC, 1999).

- Cutting trees.
- Constructing unnecessary access roads and main skid trails.
- Significant soil compaction and rutting by harvesting.
- Removal of ground cover or understory vegetation.
- Felling trees or leaving logging debris in streambeds.
- Servicing or refueling equipment.
- Mechanical site preparation and site preparation burning.
- Mechanical tree planting.
- Broadcast application of pesticides or fertilizers.
- Handling, mixing, or storing toxic or hazardous materials lubricants, solvents, pesticides, or fertilizers).

There is no uniform formula to determine the appropriate width of a SMZ; however, they must *always* be wide enough to maintain water quality standards. In general, the steeper the slope and more erosive the soil, the wider the SMZ should be. In no cases should SMZ be less than 35 feet however, they may be as wide as 100 feet or more if the slope perpendicular to the streambank is steep (>40%) or the soils are highly erosive. Both Alabama and Georgia provide guidance on determining the appropriate BMPs for protecting waterways in areas subject to forestry and silvicultural activities (see AFC, 1999; GFC, 1999).

Roadside Erosion Control

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. Thus, proper placement and planning of access roads is a priority. Also, soil bioengineering techniques can be used whereby vegetation is used as an important structural component along roadsides to reinforce soils and act as barriers to earth movement.

Streambank Stabilization

Streambank erosion is the wearing-away of soil and rock that forms 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 addition of impervious (nonporous) surfaces in the watershed, including roof tops, pavement, *etc*.. 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.

GOAL 3: *Track resource trends in the subbasin through water quality monitoring to measure progress in restoration and protection efforts, fill in data gaps, and identify new resource concerns and issues.*

Issues and Concerns in the Subbasin:

- limited baseline data set for many creeks in the subbasin
- limited water quality monitoring within the watershed

Targeted Creeks: None identified.

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Build on the baseline of water quality and biological integrity of the 46 creeks (HUC 12) in the subbasin by expanding citizen monitoring program in the subbasin.				
AWW, OMELC, ACWP, ADEM, universities, schools, ARA	High priority, continuous, long term	Low; private/ public	Monthly physical and chemical data collection; annual progress reports	Measurements of turbidity, dissolved oxygen, temperature, chlorophyll a, nutrients
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.				
ACWP, ADEM, watershed groups, ARA, AWW, universities	High priority, continuous, long term	Low; public	Annual progress reports	Number of sites monitored; percent of creek miles monitored
Expand biological monitoring to regularly assess aquatic integrity of the priority creeks with existing baseline information and those with imperiled aquatic species.				
AWW, universities, ACWP, ADEM, USFWS, GDNR, GSA, USGS	Medium priority, continuous, long term	Medium; public/ private	Quarterly monitoring	Species richness, composition, tolerance; habitat quality

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Target monitoring to §303(d) streams (if present) and other priority subwatersheds to track management progress over time. Document trends in water quality.				
AWW, OMELC, ACWP, USGA, GSA	High priority, continuous, long term	Low; private/ public	Monthly physical and chemical data collection.	Measurements of turbidity, dissolved oxygen, temperature, chlorophyll a, nutrients
Monitor impervious surface cover/land use on watershed basis.				
Universities, OMELC, ACWP, USGS, GSA, SWCC, ACES, ADEM	Medium priority, continuous, long term	Medium; private/ public	Annual GIS layer update (based on aerial photography or field surveys)	Impervious surface cover over time (as percentage of subwatershed)
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.				
ACWP, ADEM, AWW, watershed groups, ARA	High priority, continuous, long term	Low; public	Annual implementation progress reports	Number of plan implementation projects supported by monitoring data

<u>Best Management Practices to Address the Strategies of Goal 3:</u>

Monitoring plans are developed to track resource conditions over time. Monitoring should focus on measurable "metrics" or "indicators" such as fecal colifom bacteria or total suspended solids (TSS). Typically, a watershed group sets targets for the desired conditions of a water body, and then performs long term monitoring of selected metrics. Discrepancies between existing and desired resource conditions, as measured by the metrics, are identified along with their probable causes and a plan is developed and implemented to address the discrepancies. Monitoring is a long term task and should continue throughout the implementation of any initiative to track its success. This information ultimately functions as a report of progress (or lack thereof) and should inform future planning and management decisions.

Federal and state agencies, universities, and citizen volunteers monitor the water resources of the subbasin. Water quality data is collected primarily by ADEM, Alabama Water Watch groups, the Chattahoochee Riverkeeper and many private entities that hold permits for wastewater discharges in the subbasin. Collectively, these groups generate the water quality data for the creeks of the subbasin.

ADEM is responsible for the lion's share of water and natural resource monitoring in the subbasin (and throughout Alabama). Six programs make up ADEM's regular monitoring effort: Nonpoint Source Assessment Program, Point Source Assessment Program, Ecoregion Reference Assessment Program, Upland Alamap Monitoring and Assessment Program, Clean Water Act §303(d) Support Assessment/Monitoring Program and Fixed Ambient Trend Monitoring Program.

Alabama Water Watch works with many citizen monitoring groups throughout the state. In this subbasin, there is one active volunteer water quality monitoring group that is coordinated through the Russell County Soil and Water Conservation District (SWCD). The Russell County SWCD monitors began monitoring one site on Little Uchee Creek this year. Historically, other groups have monitored water quality at sites in this subbasin but they are no longer active (Table 5-7). Additional information about these groups is provided in *Citizen Guide to Alabama Rivers, Chattahoochee and Coastal Plain Streams* (Hartup and Deutsch, 2003).

Table 5-7. Alabama Water Watch Groups in the Lower Middle Chattahoochee River Subbasin

Group Abbreviation	Group Name	Date Established	Waterbody Monitored	Last Data Collection Date	Active
RCSWCD	Russell County Soil Water Conservation District	6/1/2006	Little Uchee Creek	6/1/2006	Yes
EUFCGA	Eufaula Coast Guard Auxiliary	3/21/1998	Chattahoochee River	11/7/1998	No
LEU	Lake Eufaula	9/15/1994	Lake Eufaula	6/26/1995	No
TRCGA	Three Rivers Coast Guard Auxiliary	4/11/1998	Chattahoochee River – Cliatt Branch	9/26/1998	No

Source: AWW, 2006

Water quality monitoring is an important component in determining whether goals are being achieved. While the performance indicators 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 strategic monitoring sites are being assessed.

As BMPs are 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 considerable time 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 should be established over the long-term, targeting specific watersheds included in monitoring plans.

Biological monitoring and land use assessments (*e.g.*, determining impervious surface cover) can be labor intensive and require specialized knowledge and skills. Monitoring has become more complicated as USEPA has implemented tighter quality assurance protocols for sampling (if it is to be used by the states for documenting water conditions). Thus, some monitoring strategies are better left to the universities to complete since volunteers can not be expected to handle all of the monitoring responsibilities required. Further, ADEM and USEPA will only accept ADEM monitoring results for the purposes of listing or delisting an impaired stream.

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

Issues and Concerns in the Subbasin:

- soil erosion and sedimentation from roads and road banks (especially new and/or unpaved roads)
- gully erosion

Target Creeks: None identified

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 road banks. Address gullies that have developed from improper road drainage.				
County engineers, public works departments, local governments, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	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 road banks 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, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	Medium priority, continuous, long term	Medium; public	Annual report on improvements	Miles of paved roads where road bank improvements have been made
Implement recommended construction practices for new roadways and road banks, 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, ALDOT, home builders associations, HBAA, SWCD, NRCS, AGC, ARBA, ABBA	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

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Identify and rank unpaved roads in the subwatersheds that contribute most to sediment loading to surface waters.				
County engineers, public works departments, local governments, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	Medium priority, continuous, long term	Low; public	Periodic updates on ranking of needs in subwatersheds	Percent of unpaved roadways in the watershed
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, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	Medium priority, continuous, long term	Low; private/ public	Annual progress reports	Number of outreach efforts, workshops, or educational projects completed; number of groups engaged

Best Management Practices to Address the Strategies of Goal 4:

Unpaved roads, road improvement projects and eroding road banks are commonly recognized sources of soil loss and nonpoint pollution, especially sedimentation. The implementation of BMPs and recommended maintenance practices for unpaved roads are the solutions for reducing this load. The Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority (2000) published an excellent guide for improving unpaved roads and reducing their environmental impacts. This guide, titled "*Recommended Practices Manual – A Guideline for Maintenance and Service of Unpaved Roads*" is available at: <http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/ResourceMat/unpavedtxtonly.pdf>.

Important watershed protection tools include 'better site design', which is an approach to residential and commercial development that uses innovative site planning techniques to reduce the amount of impervious cover and stormwater runoff. Its aims at accomplishing three goals at every development site 1) reduce the amount of impervious cover, 2) increase natural lands set aside for conservation, and 3) use pervious areas for more effective stormwater treatment. A handbook detailing 'better site' design principals has been published by CWP (1998). CWP's also provides a slideshow at their website that describes the principals detailed in their text. It outlines some specific techniques for applying watershed management tools and highlights key choices a watershed manager should consider when applying them. The slideshow can be viewed at <http://www.stormwatercenter.net/Slideshows/8tools%20for%20smrc/sld001.htm>. Another useful resource is the Stormwater Manager's Resource Center website at <http://www.stormwatercenter.net/>. This site provides a good overview of 'better site design' techniques including alternative pavers, alternative turnarounds, open space design, green parking, and narrower residential streets. Educational outreach and workshops are fundamental to promoting the implementation of these BMPs and practices. ADEM and ALDOT play an important role in working with the development community (*i.e*., homebuilders, construction companies), such as the Home Builders Association of Alabama. Coordination with county engineers and governments is an important component of this outreach.

Road Bank Ditch Design and Maintenance	
Efficient disposal of runoff from roads helps preserve roadbed and banks. Well-vegetated ditches act to slow, control, and filter runoff. This provides an opportunity for sediments to settle-out before runoff enters surface waters. Ideally, "turn-outs" (intermittent discharge points also called "tail ditches") will help maintain stable velocity and proper flow capacity within the road ditches by timely discharging of water. This helps 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 grow with time and continue down-cutting until resistant material is reached, expanding 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 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.	

Unpaved Road Design and Maintenance

If not properly designed and maintained unpaved roads can contribute heavily to water quality problems. The most important factor in proper road management is managing runoff, or drainage. Priority should be given during road development to nonstructural BMPs that minimize the creation of new runoff, limit erosion, and protect the health of waterways. Examples of nonstructural BMPs include maintaining natural buffers and drainage ways that are stable and well-vegetated. Natural vegetation will help infiltrate runoff, reduce the velocity of the runoff, and help remove sediments in the runoff. Also, the creation of steep slopes should be avoided unless effective stabilization methods are employed. Surface water that is not effectively conveyed from the road surface to a drainage channel can result in deterioration of the road surface and leads to various erosion problems, thus, proper road construction and maintenance is essential. General road surface principles include preserving and maintaining a proper road crown for good drainage, keeping the road surface tight and impervious, and performing regular drainage maintenance and grading. Appropriately installed and maintained ditches, culverts, bank stabilization methods, and outlet structures that reduce water velocity are also required to ensure adequate drainage for unpaved roads.

GOAL 5: *Reduce nonpoint source pollution from urban and residential areas.*

Issues and Concerns in the Subbasin:

- nutrient and pathogen loading due to improperly maintained or failing septic systems and sewage treatment facilities
- soil erosion from new road construction
- soil erosion and sediment loading from urban development, including land clearing, construction activities, and impervious surfaces
- stormwater runoff – bacteria and toxins

Targeted Creeks: Barbour Creek, Cheneyhatchee Creek, Chewalla Creek, Hatchechubee Creek, Little Uchee Creek, Lower Uchee Creek, Mill Creek, Thomas Mill Creek, Upper Uchee Creek, White Oak Creek

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Work with municipalities to 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	Medium 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
Work with cities to 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, ALNEMO, AAGC	Medium priority, continuous, long-term	Medium to high, private/ public	Annual report on progress	Number of urban BMP demonstration projects

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Encourage responsible site design for new residential and commercial construction.				
Local governments, ADEM, USACOE, SWCD, HBAA, ALNEMO, SWS	High priority, continuous, long-term	Low to medium, public	Annual report on progress	Number of new developments with low impact development techniques.
Promote outreach with commercial landscapers 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, ALNEMO, 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/low impact development techniques 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). Promote improvements through 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 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 location, 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

Best Management Practices to Address the Strategies for Goal 5:

As urban centers expand, the effects of increased development on surface and ground waters also need to be considered. Sediments, nutrients, pathogens, and toxics can enter surface and ground waters through storm water runoff that originates from construction sites, business developments, and residential communities. Reductions in contaminant loading can be made on several fronts to deal with nutrient, bacteria, sedimentation, and solid waste pollution typical of urban areas (Table 5-8).

Table 5-8. Management Options for Addressing Water Pollution in Urban Areas

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	

Source: CH2MHILL, 2005

Because urban development can have such severe effects on water quality, environmentally sensitive or low-impact development is essential in protecting and enhancing hydrologic systems in urban areas. Low Impact Development (LID) is a new, comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds. LID practices aim to reduce floods in developed areas, reduce storm water storage requirements, improve water quality of runoff, and help maintain and restore fish habitat. When implemented properly, LID allows for developmental growth with minimal environmental effects. More information on LID is available at EPA's website <http://www.epa.gov/nps/lid/>.

To reduce the quantity and improve the quality of stormwater runoff, stormwater management BMPs and management protocols should be pursued. Stormwater pollution is likely to occur when construction and development companies are not diligent during land clearing, road building, and construction work, thus, education regarding BMPs implementation and enforcement of their use is essential. Where feasible, innovative stormwater management approaches such as the use of constructed and natural wetlands for water treatment can be implemented. Finally, the incorporation of pervious surfaces during new construction should be also fostered as well as retrofitting of existing impervious surfaces.

Many of these measures are promoted on an industry-wide basis by the Home Builders Association of Alabama. They offer a Qualified Credentialed Inspection Program Certification (QCIP) to their membership that identifies the builder as possessing a working knowledge of environmental BMPs for the development process. More information on QCIP can be found online at HBAA's website <http://www.hbaa.org/pdf/qci_brochure.pdf>.

The nutrient and pathogen loading from improperly functioning onsite sewage disposal systems (OSDS) can have severe impacts on surface waters. Volunteer bacteriological water monitoring (trained through AWW) can help to identify areas of failing or leaking systems. If problems are detected, watershed groups can work with the local health departments to identify areas with significant impacts from overflows or failures. Watershed groups can also promote education of homeowners on regular pumpouts of septic tanks, and nutrient and bacteriological problems from leaking and failing onsite systems through educational workshops and materials. Improvements to these identified OSDSs can be pursued through monitoring, education and outreach, and incentives. Alternative onsite sewage treatment system demonstration projects may be needed in some instances, especially in areas of dense development, poor soil drainage, and areas adjacent to sensitive water resources.

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 and transports it through small diameter sewer lines to a local treatment facility. Treatment using a decentralized wastewater system is typically accomplished by using effective attached growth biological processes that treats the effluent on-site. The treated effluent is dispersed or reused via in-ground methods. If properly managed (sited, designed, maintained), decentralized systems are capable of treating wastewater to a high level of quality. 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 underground injection control (UIC) permits for systems with capacities greater than 10,000 gpd and by ADPH for systems of lesser capacities. More information on proper management and community planning for decentralized wastewater systems is provided by EPA’s at their web site <www.epa.gov/owm/onsite>.

The basis of the education and outreach strategies involves demonstration projects and workshops that educate citizens, landowners, and the building and industrial community of the need to incorporate BMPs and green initiatives. Educating the construction and development industry in proper utilization of BMPs in land clearing, road building, and construction work would facilitate responsible development. To foster a proactive environment and encourage coordination among entities, public recognition of builders that incorporate initiatives beyond measures required by law, perhaps by the Clean Water Partnership and watershed organizations, may be worth considering. Additional outreach opportunities include educating landscapers on the impacts on nutrient loading in surface and ground water from improper fertilization, and instructing homeowners on environmentally friendly solutions to address hazardous waste disposal, water conservation, lawn care and fertilization, and septic system maintenance. Coordination with municipal and county engineers, planners, and governments is also an important component of this outreach.

Excellent reference materials and technical assistance regarding nonpoint source pollution, and implementation of urban and stormwater BMPs are available from various agencies and entities. Documents that provide guidance on minimizing sediment and water quality impacts from urban development include the following:

- Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas. Published by Alabama SWCC June 2003. Available at <http://www.swcc.state.al.us/erosion_handbook.htm>.

- How to Guide for Stormwater and Urban Watershed Management. Published May, 2000 by Troy State University. Available at <http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/ResourceMat/StrmwtrPhaseIIMan.pdf>.

- Best Management Practices Manual published by the City of Knoxville, TN. Available at <http://www.ci.knoxville.tn.us/engineering/bmp_manual/>.

There are also a number of programs and cooperative efforts among various entities aimed at providing education regarding the impact of land use on water resources. They include the following:

- <u>Business Partners for Clean Water (BPCW)</u>

  BPCW is a cooperative effort between local businesses, ADEM, and ACWP designed to give businesses the information they need to comply with water quality laws and to recognize businesses that take voluntary steps to protect local streams and lakes. ADEM provides education information regarding NPS pollution and water quality management to specific business sectors, such as construction, landscaping, automotive, building maintenance, and food-related businesses. Information and technical assistance is tailored to educate each business sector on NPS pollution, their unique contributions to it, and solutions for reducing those contributions. In return, businesses are formally recognized as being environmentally friendly if they prepare a simple pollution prevention plan that is approved by their city, in conjunction with ADEM. An informative brochure is available at <http://www.adem.state.al.us/Education%20Div/TakeAction/Brochures/BPCW.pdf>.

- <u>Alabama NEMO Alabama Department of Environmental Management</u>

  The NEMO Program (Nonpoint source Education for Municipal Officials) is a process for educating professional and volunteer municipal officials about the impacts of land use on water quality and about the options available for managing those impacts. NEMO uses geographic information system (GIS) and remote sensing technology as educational tools, in its promotion of environmentally sound land use planning efforts, which is focused on local land use decision makers as the primary target audience. This program can be found at <http://www.aces.edu/waterquality/nemo/intro.htm#NEMO>.

  Among the valuable educational resources provided by this Program and website, are comprehensive documents regarding natural resource based planning, Green site designs, and structural best management practices and restoration. These documents describe a watershed approach to site planning, that examine new ways to reduce pollutant loads and protect aquatic resources through non-structural and structural practices and improved construction site planning. They provide insight into the importance of imperviousness, watershed-based zoning, the concentration of development, headwater streams, stream buffers, green parking lots, and other land planning topics. The NEMO

National Site, found at <http://nemo.uconn.edu/>, is a useful resource with examples of how other states are working with local officials on issues of nonpoint source pollution.

- Center for Watershed Protection (CWP)

  The CWP is a non-profit corporation that provides local governments, activists, and watershed organizations around the country with the technical tools for protecting the nation's streams, lakes and rivers. The Center has developed and disseminated a multi-disciplinary strategy to watershed protection that encompasses watershed planning, restoration, research and training; stormwater management; better site design; and education and outreach. More information can be obtained at <http://www.cwp.org/mission.htm>.

- Alabama Clean Water Partnership (ACWP)

  The ACWP is a coalition of public and private individuals, companies, organizations and governing bodies working together to protect and preserve water resources and aquatic ecosystems throughout the state. The purpose of the ACWP is to bring together representatives of these groups to coordinate their individual efforts, share information and plan more effectively for protection and preservation. Their website is located at <http://www.cleanwaterpartnership.org/>.

- Raingarden Design

  Raingardens are a type of landscaping used to treat stormwater before it reaches local waters. When it rains, pollutants like oil, pet waste, clay, and excess pesticides may wash into our streams, rivers, and lakes. These pollutants can harm aquatic life and make our waters less desirable for activities like swimming, fishing, and boating. Rain gardens are shaped like bowls in order to catch stormwater for mini-processing. More information on constructing raingardens can be found at <http://www.raingarden.org/>.

  Several demonstration projects were constructed at locations around Alexander City, Alabama. The demonstration rain gardens were the result of collaboration among the Middle Tallapoosa Clean Water Partnership, City of Alexander City, AU Landscape Architecture Department and Alabama Cooperative Extension System. The gardens can be viewed at <http://www.aces.edu/waterquality/nemo/alex.htm>.

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

Issues and Concerns in the Subbasin:

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

Targeted Creeks: Mill Creek, Lower Uchee Creek, Middle Fork Cowikee Creek, Barbour Creek

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote 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	High 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

Best Management Practices to Address the Strategies of Goal 6:

Resource extraction is a nonpoint source category as defined by the USEPA, as it can contribute to the degradation of surface waters. Identified by ADEM in surface water assessments as a potential source of sediment in the subbasin, resource extraction includes sand and gravel mining. Contamination of streams can occur from sand and gravel mining at times of heavy or sustained rainfall, mining too close to streams, and from the gravel washing processes. Good management practices should be followed in order to keep nonpoint source pollution at a minimum. In Alabama, runoff from surface mining activities are regulated and enforced through the permitting and inspection process by ADEM.

The Alabama Department of Industrial Relations (ADIR) is responsible for surface mining of non-fuel relation minerals**.** This program ensures that lands mined for non-fuel minerals are reclaimed in accordance with state law. Examples of non-fuel minerals that are currently mined in this basin include sand, gravel, and bauxite. ADIR issues mining permits, ensures that mine sites are properly bonded for reclamation purposes, and makes periodic inspections.

GOAL 7: *Protect and restore aquatic habitat and aquatic species diversity.*

Issues and Concerns in the Subbasin:

- wetland and aquatic habitat destruction due to road construction and land development
- loss of fish and mussel species diversity
- eutrophication of reservoirs
- loss of stream buffers

Targeted Creek: Uchee Creek

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Identify subwatersheds and stream segments with habitats of exceptional quality and high aquatic species diversity, and target parcels for acquisition or conservation projects.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, GSA, GDNR, TNC, Forever Wild	High priority, continuous, long term	Medium; public	Biennial report of rankings and priorities	Basinwide prioritizations of stream segments and habitats, supported by participants
Identify the specific causes for the loss of fish and mussel species diversity in targeted stream segments, and prioritize restoration and BMP projects to reduce those land use impacts.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, GSA, GDNR, USACOE	High priority, continuous, long term	Medium; public	Biennial report of targeted streams, causes for diversity losses, and restoration and BMP projects	Basinwide prioritizations of targeted streams and projects, supported by participants
Coordinate efforts between Alabama and Georgia, and with federal agencies, to manage critical habitat for rare and endangered fish and mussel species. Develop special land use guidelines for the designated critical habitats areas for species protection through coordinated state and federal efforts.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, GSA, GDNR, USACOE, ALDOT	High priority, continuous, long term	Medium; public	Biennial report of critical habitats and proposed land use regulations	Basinwide support by participants for the report; progress in implementation of land use regulations

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Implement habitat restoration and BMP projects that will target specific causes for the loss of fish and mussel species diversity in the priority stream. Identify funding programs and mechanisms that support these projects.				
USFWS, ANHP, ADCNR, SWCD, NRCS, ADEM, AWF, TNC, ACWP, GSA, GDNR, USACOE, ACWP, TNC	High priority, continuous, long term	High; public/ private	Annual report of restoration and protection progress; monitoring of fish and mussel species	Acres of habitat protected; acres of habitat restored; increases in species diversity metrics
Pursue habitat protection initiatives through acquisition and easement mechanisms, utilizing grant and assistance programs for these purposes. These mechanisms include Environmental Quality Incentives Program (EQIP), Wetlands Reserve Program (WRP), Conservation Reserve Program (WHIP), Forever Wild and Partners for Wildlife (USFWS).				
USFWS, ANHP, ADCNR, SWCD, NRCS, Forever Wild, Land Trusts, TNC	High priority, continuous, long term	High to medium; public/ private	Annual report of habitat protection progress	Acres of habitat protected

<u>Best Management Practices to Address the Strategies of Goal 7:</u>

Alabama’s diversity of freshwater mussels is greater than anywhere else in the world and some of this diversity is represented in this subbasin. Losses in species diversity and in rare and endangered species have been attributed to aquatic habitat alterations, including flow modifications from dams and navigation projects, river channel dredging and channelization, sand and gravel mining, the loss of riparian buffers, access of livestock to streams, and other nonpoint sediment sources.

Habitat restoration and 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* and the recovery plan for federally listed mussels species that occur in the subbasin (USFWS, 2003), and will be coordinated with the ADCNR’s and GADNR’s wildlife conservation plans, for consistency.

GOAL 8:	*Improve shoreline and recreation management on the Chattahoochee*

<u>Issues and Concerns in the Subbasin</u>:

- erosion from boating traffic
- dumping trash from boats
- boat ramp litter problems
- oil, gas and sewage discharges from boats
- improper disposal of deer carcasses in creeks and at road bridges
- introduction of invasive aquatic species

Targeted Waterbody: Walter F. George Reservoir

Recommended Strategies to Achieve the Goal:

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Work with the ADCNR, USACOE, the Alabama Marine Police Division and GADNR to identify the probable causes of and solutions for shoreline erosion.				
ADCNR, USACOE, USCG, MPD, ACWP, GPC, HOBOs, and marina operators, AUMERC, watershed groups	Medium priority, continuous, long term	Low; public	Annual progress reports	Source of problem identified
Work with the ADCNR, ADEM, the Alabama Marine Police Division, the U.S. Coast Guard, and watershed groups to reduce pollution from recreational boaters by increasing awareness of Alabama's Clean Waters Initiative.				
ADCNR, ADEM, USCG, USACOE, MPD, ACWP, HOBOS, marina operators, ADEM, Clean Marina Program, and watershed groups	Medium priority, continuous, long term	Low; public	Annual progress reports	Reduction in complaints
Work with the ADCNR to provide hunter education on proper disposal of deer carcasses.				
ADCNR	Medium priority, continuous, long term	Low	Annual progress reports	Reduction in carcass sightings

Best Management Practices to Address the Strategies of Goal 8:

There is a regulatory framework in place to address management of lakefront shorelines, boater behavior, and NPS pollution originating from overboard discharge of sewage. Watershed associations can play a key role in supporting these regulations by promoting education of boaters, shoreline residents, and commercial entities utilizing the shoreline (*e.g.*, marinas) regarding the impacts of their actions, ways to avoid or mitigate the effects of those actions, and existing regulations.

A formalized framework to address these concerns could be established via a committee or working group, with representation of those with concerns and those that can remedy them. Critical first steps to devising a comprehensive management strategy are to 1) better define the problems or issues, and 2) identify their likely sources. For example, many factors can contribute to shoreline erosion – wakes from recreational boats are only one factor. Other factors may include topography, soil type, fetch, vegetation cover, water level fluctuations, current, river load, commercial boat traffic, and existing shoreline uses. It will be important to identify the primary cause(s) of shoreline erosion prior to expending valuable resources to address the issue. Many factors may also contribute to water quality degradation. Recreational boating can affect water quality by contributing to nonpoint source pollution, other sources may also be important to identify. Boater-generated impacts can be grouped into four general categories: toxic metals, oil and gasoline, solid waste and debris, and bacteria and nutrients. Toxic metals come from antifouling paints used on boat hulls; oil and gasoline are generally from boat operation and maintenance activities; solid waste and debris can come from intentional and unintentional overboard disposal of material; and the source of bacteria and nutrients generally come

Boating Regulations

The Alabama Marine Police Division is responsible for promoting responsible use of resources on Alabama's waterways, including enforcement, education and community activities. In Alabama, boaters are prohibited from operating vessels in violation of any established speed zone or in a reckless manner. In Georgia, the Department of Natural Resources Law Enforcement has responsibility for enforcement of boating regulations. In Georgia, state boating regulations restrict vessels to idle speed within 100 feet of shoreline next to a residence, public park, public beach, public swimming area, marina, restaurant, or other public use area.

Toxic Material Regulations

USEPA regulations address the proper use and disposal of toxic materials used by recreational boaters.

Sewage Disposal Regulations

Alabama's Clean Boating Act addresses direct sewage discharges from recreational boats. ADEM provides informational brochures on the Act, which authorizes inspections of marine sanitary devices and requires all marinas with boat customers that use marine sanitary devices with holding tanks to install a boat sewage pump-out system.

Shoreline Management

Although not a recreational issue, shoreline management and development activity may also contribute to shoreline erosion. The USACOE is the agency responsible for managing shoreline development in connection with private use of public lands by landowners adjacent to its lakes. Such development typically includes boat docks, utility lines, walkways, *etc.*, and may also include shoreline erosion control measures such as seawalls. The Shoreline Management Plan for Walter F. George Lake is provided on-line at <http://walterfgeorge.sam.usace.army.mil/shoreline.thm>. GPC is responsible for managing and permitting similar developments on Goat Rock, Oliver, and North Highland Lakes. Information on shoreline management for GPC's hydroelectric projects can be obtained from GPC's Land Management Office (1-888-472-5253). Both the USACOE and GPC support responsible shoreline development and provide information on acceptable development methods designed to minimize shoreline erosion.

from sewage disposal. Bacteria and nutrients may also be introduced via other venues such as failing septic systems. Again, proper identification of the source is a key component of developing any plan to adequately address the issue.

Once the issues are defined and their sources identified, watershed associations are encouraged to learn the regulatory framework that is currently in place for addressing these issues, and identify methods to supplement and/or promote knowledge of them.

Shoreline Erosion

With respect to shoreline erosion, watershed associations can work collaboratively with boats and anglers, shoreline homeowners, commercial operators such as marinas, Alabama Marine Police, USACOE, Georgia Power and the U.S. Coast Guard, to identify and address problems and problem areas. Stakeholder concerns have centered on boat traffic on Lake Harding and at boat ramps. Watershed groups can petition state agencies for the creation of no-wake zones in waters adjacent to eroding shorelines, and can support state educational efforts by providing additional access to state-provided boater education materials. Watershed groups may also arrange for agency staff to participate in public speaking engagements in an effort to distribute additional educational information regarding the forces of wave action on shorelines.

Water Quality

Watershed associations can focus on education and outreach efforts to promote awareness of existing regulations, to promote environmental awareness, and to promote voluntary use of BMPs and responsible behavior by public users. To address direct discharges (pollution) from boats, ADEM provides informational brochures on the Alabama Clean Vessel Act (CVA). The act authorizes inspections of marine sanitary devices and requires all marinas with boat customers that use marine sanitary devices with holding tanks to install a boat sewage pump-out system. The use and expansion of pump-out facilities by boaters should be promoted, and can be aided by funding from Alabama's CVA Program. Since 1993, the CVA program has awarded more than $500,000 to marinas to install boat sewage pumpout stations. Eligible marinas can get reimbursed for 75% of the investment of a station by applying to the Alabama Department of Environmental Management. More information regarding Alabama's Clean Vessel Act Program can be obtained from the ADCNR website <http://www.outdooralabama.com/boating/clean-waters/>.

Alabama-Mississippi Clean Marina Program

There are several programs that address direct discharges from boats. Marina operators can become part of the Alabama-Mississippi Clean Marina Program (AUMERC) which recognizes marinas that promote sewage pumpouts, fuel spill controls, solid waste management, vessel cleaning and repair, and stormwater management and erosion control. Sewage pumpout and expansion of pump-out facilities for boaters can also be promoted, and can be aided by funding from the CVA program. More information can be found at <http://www.masgc.org/cleanmarinas>.

GOAL 9: *Promote watershed and community stewardship through resource education, outreach and the promotion of volunteer opportunities throughout the watershed.*

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote participation and membership in the subbasin committee and establish watershed groups or action teams for key subwatersheds.				
ACWP, ADEM, watershed groups, ARA, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Promote the implementation of the Chattahoochee 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).				
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, OMELC, schools	Medium priority, continuous, long term	Low; public	Annual progress reports	Number of educational programs and schools involved
Promote river clean-ups throughout the subbasin.				
ACWP, ADEM, watershed groups, ARA, AWW, SWCD, APPC, USACOE, OMELC	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, AWW, OMELC, news outlets	High priority, continuous, long term	Low; public	Annual progress reports	Number of events and publicized mechanisms utilized for promotion

Best Management Practices to Address the Strategies of Goal 9:

The successful implementation of this Basin Management 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 should be made to increase involvement by watershed stakeholders in organized watershed associations. Regional and subwatershed organizations that are functionally active are an immediate need.

Later in this chapter, a more-detailed Information and Education component is discussed to lay the groundwork for implementing a watershed outreach campaign. Financial strategies are discussed in Chapter 8. It is recommended that additional grant monies be secured and utilized to foster the establishment and participation in these regional watershed groups. Strong leadership should be identified and efforts should be focused from the beginning to develop momentum for implementing the plan.

GOAL 10: *Promote watershed management technology transfer across industries and across state lines of Alabama, Georgia, and Florida. Coordinate watershed assessment, planning, restoration and conservation efforts between subbasin and basin stakeholders in all three states.*

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote watershed management technology transfer across industries, and promote the integration of watershed management techniques in restoration projects.				
ACWP, ADEM, agencies/organizations representing land use industries, watershed groups, ADCNR, SWCD, NRCS	High priority, continuous, long term	Low; public	Annual progress reports on transfer and integration efforts	Number of meetings and workshops, number of participants, number of industries represented
Coordinate watershed planning, restoration, and conservation projects between Alabama and Georgia, recognizing hydrologic connections and impacts on restoration success.				
ACWP, ADEM, ADCNR, MCWC, watershed groups, SWCD, USFWS, FS, TNC, ANHP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated projects
Promote the coordination of water quality and biological monitoring between Alabama and Georgia, particularly with respect to impaired lakes and streams.				
ADEM, ACWP, GA EPD, GDNR, watershed groups, USGS, GSA, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated monitoring programs

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Coordinate Clean Water Act Section 303(d) TMDL activities between Alabama and Georgia on streams where impairment impacts cross the state line. Joint TMDL development should be considered in this river basin.				
ADEM, GA EPD, GDNR, USEPA, watershed groups, ACWP, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated monitoring programs
Promote and publicize the coordination efforts between Alabama and Georgia on the Chattahoochee River Basin. Develop web-based and printed media coverage, and utilize the news media, to promote these coordinated efforts at restoration and conservation.				
ACWP, ADEM, GA EPD, watershed groups, ARA, AWW, news outlets, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on promotion efforts	Number of events and publicized mechanisms utilized for promotion

<u>Best Management Practices to Address the Strategies of Goal 10:</u>

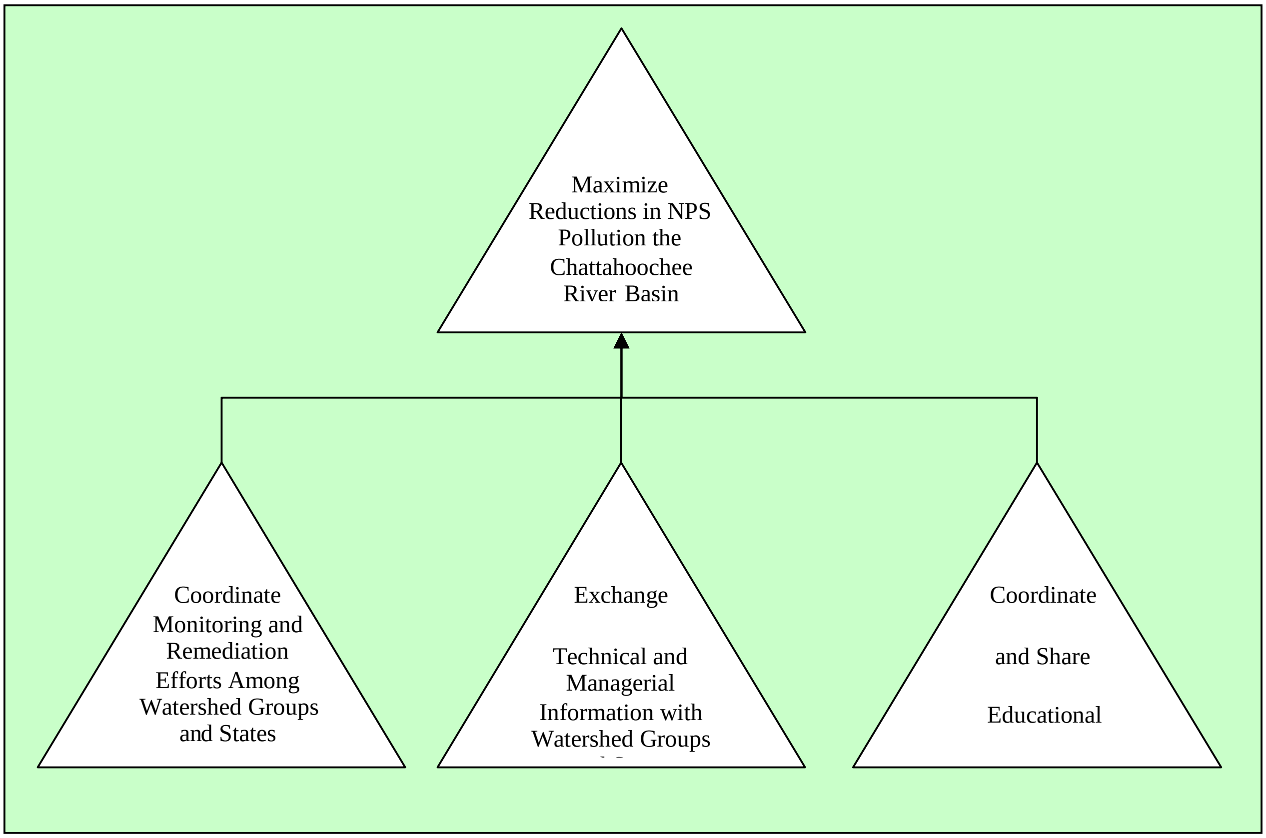
The successful implementation of this river basin plan is directly dependent on the involvement and commitment of watershed stakeholders and all the agencies and organizations identified in this plan. The first two strategies listed above are critical for moving this plan forward to implementation. Significant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

Stakeholder-based watershed management groups often compete against each other in securing scarce grant monies that are used to support public education, water quality monitoring, and mitigation for reducing nonpoint source pollution. One of the best ways to increase the efficiency of these efforts is through sharing of management technologies and efforts across stateliness and among watershed management groups. Collaboration between groups will result in efficient use of scarce resources (*e.g.*, grant monies), greater economies of scale (*e.g.*, sharing public education materials), and quick transfer of new information – all of which can supercede political boundaries.

The strategies for achieving this goal can be consolidated into three primary efforts that include:

- coordination of monitoring and remediation efforts;
- exchange of technical and managerial information; and
- coordination and sharing of public outreach and educational material.

Figure 5-3. Coordination of Effort and Resources Can Increase Efficient Use of Scarce Resources



Success will be dependent on each watershed association's ability to communicate and foster an atmosphere of communal effort between and within associations and industry. Methods of coordinating and managing monitoring and remediation efforts can include development of a common database for tracking basin-wide monitoring efforts; cooperative planning among watershed groups in securing grant monies for monitoring and remediation; and sharing of lessons learned, information sources, and material resources for remediation projects.

The exchange of technical and managerial information between watershed management groups and industries can be facilitated in a variety of ways. For example, watershed groups and industry within a subbasin or within a basin can establish periodic meetings or conferences, with an established agenda designed to share new information. If this effort is too costly, it may be possible to "tag along" at another organization's conference, and establish your own subbasin meeting on the side. At these meetings, establish subcommittees to address and work out ways for joint TMDL development and monitoring. Another example is to encourage participation from universities and colleges. These institutions tend to have access to new technologies that may be beneficial to watershed groups and industry. They also have a ready source of potential staff and volunteers for research projects for which grants can be obtained. Further, their information is shared in a forum that reaches a much broader audience than the individuals within a watershed group, and therefore, can bring a broader range of information and experience to the table. A third method for exchanging information between groups and industry is to collaborate on newsletters and/or websites at the subbasin or basin level to create a clearing house for information. This results in a sharing of information among a broader geographic audience, allowing groups to capitalize on each other's work. Alternately, ADEM has initiated the NPS News, a news bulletin detailing NPS-related projects and information throughout the state. This bulletin is available online from the Nonpoint Source Program. Submission of articles is encouraged.

Coordination and sharing of public outreach and educational materials could include working with other watershed organizations to divide up the creation of outreach materials as well as asking industry to participate by sharing desktop publishing and/or publications, website links, funding, and guest speakers. Invite the media to attend subbasin or basin-wide meetings. Join efforts, and send prepared press releases to the media detailing successes, in restoration and conservation projects, ongoing or new monitoring efforts and new alliances, and always, provide contact information. Collaborate on newsletters and websites. Sharing these tasks require less effort for an individual watershed group, and can result in distributing more information to a wider audience. In addition, it is much more efficient to have one larger website with quality information than multiple websites that a user must jump back and forth between.

Become familiar with the studies and plans produced by other watershed groups. They may be helpful to you. For example, the types and percentages of land uses occurring in the Chattahoochee River Basin in Alabama are the same as for the entire River Basin including Alabama, Georgia, and Florida. Thus, materials produced by groups in other states may be useful and apply to management of this subbasin in Alabama. It may also be beneficial to enter into partnerships with other watershed groups where each group focuses on different types of issues and then shares the resulting information.

Watersheds recognize no political boundaries but watershed associations may have to in order to secure funds or political support. Nevertheless, by joining forces and coordinating efforts with watershed groups across state lines within a subbasin (or even within the basin), watershed groups can coordinate planning, restoration and conservation projects that will benefit the River as a whole. It is recommended that additional grant monies be secured and utilized to foster the establishment and participation in these regional watershed groups.

GOAL 11: *Develop a framework in the subbasin 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 Chattahoochee 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, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Promote participation and membership in the subbasin committee and establish watershed groups or action teams for key subwatersheds.				
ACWP, ADEM, watershed groups, ARA, AWW	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, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups

Best Management Practices to Address the Strategies of Goal 11:

An effective framework from which to implement the components of this Plan requires the establishment of, and active participation in, regional watershed and subwatershed groups. It is from these groups that members will be obtained to staff the task-specific action groups required by the Plan. Bolstering or establishing regional watershed groups entails first identifying the most amenable target group, educating them, and then recruiting them for active membership in regional and subwatershed groups. Such a target audience consists of individuals who tend to participate in community activities and events, and who will require relatively little effort to educate and incorporate. Educational efforts should then be focused on informing them of the benefits and functions provided by a healthy watershed and clean water, the potential and current threats facing these resources, and the management options and opportunities available to protect them. Educational venues can include providing educational flyers in public locations; holding talks at schools, universities and non-profit meetings; posting notices in nonprofit and local publications; issuing press releases; and working with ADEM to issue public service announcements.

Coincident with such outreach efforts is the promotion of the Basin Management Plan (once approved) at all appropriate opportunities including during urban and regional planning meetings, existing watershed and other non-profit group meetings, and during newly formed watershed and subwatershed meetings. Also, it is important to coordinate with federal, state, and local agencies across state lines to promote the plan and to identify funding opportunities. More information on funding options is provided in Chapter 8.

At the outset, strong leadership will need to be identified, likely from within the Lower Middle Chattahoochee River Subbasin Stakeholder Committee, to direct and organize the formation of watershed groups or action teams. However, once working groups are established and an organizational structure is put into place, it is anticipated that momentum will be gained such that each group will be able to work independently towards accomplishing their respective tasks. More detailed information on plan implementation including recommended organizational structure, and information and educational outreach is covered in Section 5.6. and 5.7, respectively.

5.6 Management Strategies for Common Water Quality Concerns

In addition to the specific, action-oriented strategies listed above, a general list of watershed management strategies is provided (Table 5-9), which was adapted from the Tallapoosa River Basin Management Plan (CH2MHILL, 2005). The list is organized according to water quality or biological concerns. It may serve as a general guide for stakeholders searching for strategies to address common water quality concerns and to help form issue-specific action plans and projects.

Table 5-9. Strategies for Addressing Common Water Quality Concerns

Water Quality or Biological Concern	Management Strategies
Nutrient enrichment	Encourage the use of buffers around streambanks.
	Advocate the banning of detergents containing phosphates or taxing products with phosphates. Use education to encourage the use of phosphate-free products.
	Use federally funded cost share programs (*e.g.,* EQIP, WHiP) to help landowners use BMPs (waste management for animal waste).
	Employ education about septic system maintenance (Septic Tank Workshop for homeowners).
	Advocate for regular/periodic inspections of septic systems.
	Search for funding for the installation of alternative waste management systems.
	Encourage septic system installers to attend onsite wastewater training.

Water Quality or Biological Concern	Management Strategies
Nutrient enrichment (cont.)	Promote education for septic dischargers/haulers (certification required). Use CEUs as incentives to haulers. Encourage the use of proper city planning and development and low impact development (*e.g.*, decrease impervious surfaces, protection of green spaces) by engaging county officials and staff in NEMO training. Encourage incentives for developers (fast-track permit approval) that use low impact development. Encourage/promote recycling and reuse – promote biosolids reuse and water recycling through land application. Encourage the use of environmental impact fees on businesses that leave abandoned buildings. Educate point sources about funding to correct issues (WWTP, WWTP lagoons). Educate golf course owners by distributing BMP manuals, encourage course management workshops, and promote use of natural design (natural areas). Encourage homeowners to reuse gray water. Study phosphorus loads from clear-cut areas. Use education to encourage land objectives that would promote lighter cuts.
Pathogen contamination	Encourage the use of buffers around streambanks. Use federally funded cost share programs to help landowners use BMPs (waste management for animal waste). Employ education about septic system maintenance (Septic Tank Workshop for homeowners). Advocate for regular/periodic inspections of septic systems. Search for funding for the installation of alternative waste management systems. Encourage septic system installers to attend onsite wastewater training. Promote education for septic dischargers (certification required). Support AWW program–encourage the expansion of the program so that monitoring sites are located on all creeks in the subbasin. Promote and support the NRCS EQIP program.

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Pathogen contamination (cont.)	Apply for Section 319 grant funds where applicable.
Soil loss/Sedimentation	Promote registered forester program. Report failing forestry BMPs using the SFI "Inconsistent Practices" form and reporting system. Encourage the use of buffers around streambanks. Use federally-funded cost share programs to help landowners use BMPs (waste management for animal waste). Encourage county engineers to use and maintain proper BMPs for construction of dirt roads; sponsor the ADEM dirt road workshop. Report failing BMPs and other problems to ALDOT/County engineer representative. Initiate open space preservation or environmentally sensitive development initiatives.
Low dissolved oxygen	Support AWW program–encourage the expansion of the program to monitoring all creeks in the subbasin by recruiting volunteer monitors from community groups, schools and businesses.
Habitat alteration	Encourage use of conservation easements–land trusts. Report failing road BMPs/other development-related problems to ALDOT/County engineer representative. Promote AL Forestry Commission education programs. Encourage forest landowners to participate in the Forestry Commission registered forester programs. Encourage the use of buffers around streambanks. Encourage landowners to participate in US Fish & Wildlife habitat management programs, especially for imperiled species.
pH	Promote water quality training for master gardeners, other volunteer groups, and developers/contractors through advertisement. Promote incentive-based fertilizer education.
Pesticides	Educate golf course owners by distributing BMP manuals, encourage course management workshops, promote use of natural design (natural areas).

WATER QUALITY OR BIOLOGICAL CONCERN	**MANAGEMENT STRATEGIES**
Pesticides (cont.)	Organize a Household and Agricultural Hazardous Waste Collection day. Educate general public and significant users (*e.g.*, ALDOT, Alabama Power) with seminars and flyers.
Litter/Illegal Dumping	Promote annual creek cleanups (Earth or Rivers Day). Identify litter hot spots (research where it is coming from), report results to ADEM and local sheriff. Educate adults and contractors about illegal dumping and litter through anti-litter campaigns – *see* Information and Education component of this Plan. Encourage enforcement of county prima facie litter law. Advocate the use of bottles and cans deposits. Explore adoption of countywide mandatory garbage collection. Implement the Adopt-A-Highway Program.

5.7 Plan Implementation

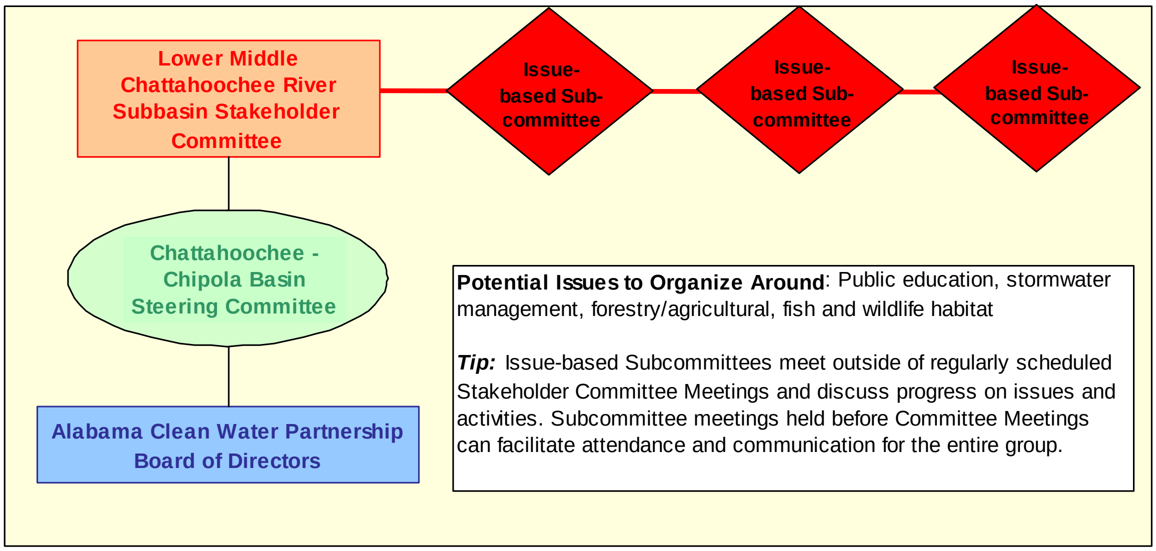
Successful water quality management projects require organizational structure and support to successfully plan projects, monitor resource conditions, and implement initiatives if required. It is a continuous process, and is generally long term.

5.7.1 Organizational Structure

ACWP Subbasin Stakeholder Committees are tasked with the responsibility to oversee the development and implementation of their respective parts of the Plan. However, organizationally, a further division of labor must occur so that the Subbasin Committee is not overwhelmed with the diversity of issues and strategies.

One possible step toward implementing this Plan might be that the Subbasin Stakeholder Committee organizes issue-based sub-committees to tackle specific issues or specific creeks/subwatersheds. Figure 5-4 illustrates this organizational structure in the context of the basin- and state-wide organizational layers. Each “issue-based sub-committee” could form around a priority issue or creek, would develop and implement a short-term action plan based on the issues and strategies discussed in this Plan. The sub-committee would report back to the greater Committee, who would be responsible for gathering technical and financial resources, when needed. This approach allows the Subbasin Stakeholder Committee the opportunity to focus resources and energies to achieve results in the short-term on a manageable scale.

Figure 5-4. Proposed Organizational Structure for Stakeholder Committee



5.8 Information and Education Component

Raising public awareness about water quality and watershed protection is vital to successful outreach. Because of this, providing informational and educational programs may be the most important component of this Basin Management Plan. It is important to educate the public on the importance of clean water and to inform them of their ability to effect positive change within their watershed. It is an ongoing process because the population within the watershed is dynamic, but the effort is well worth the time. The USEPA provides an excellent guide for conducting outreach activities, titled "*Getting in Step: A Guide for Conducting Watershed Outreach Campaigns*" (USEPA, 2003).

5.8.1 Current Education and Outreach Efforts

There are several organizations that actively educate the public about water resources (quality and quantity) and environmental issues in the subbasin. These groups target a broad audience but often develop programs for localities with a specific interest.

Alabama Clean Water Partnership – With three subbasin stakeholder committees formed for the Chattahoochee River Basin, the ACWP is active on many watershed management fronts including basin management planning, education and outreach, and the development of public/private partnerships in the name of sustainable water resource management.

Alabama Rivers Alliance – Through its Watershed Outreach Project the ARA is developing local leaders and stewards for sustainable watershed management through education and outreach.

Alabama Water Watch – Through its highly successful citizen water quality monitoring program, AWW trains citizens to be water scientists and involve themselves in local environmental management.

Middle Chattahoochee Water Coalition – The Middle Chattahoochee Water Coalition is a public/private partnership formed to champion equitable, optimal use and good stewardship of the water resources of the ACF Basin with focus on the middle and lower Chattahoochee River.

Working with these organizations, partnering with local schools, and building on current efforts, this Plan proposes an Information and Education program consisting of six steps:

Step 1: Define Information and Education goals and objectives.

Step 2: Identify and analyze the target audiences.

Step 3: Create the messages for each audience.

Step 4: Package the message to various audiences.

Step 5: Deliver the messages.

Step 6: Evaluate the Information and Education program.

As the Subbasin Stakeholder Committee or a designated Sub-Committee takes on this information and education program, it should be customized to reflect their goals, concerns and ideas.

Step 1: Information and Education Goals and Objectives

A primary goal for watershed associations is to promote watershed and community stewardship through resource education and outreach. Below are specific watershed management objectives related to informing and educating the public. Some objectives are broader than others. In some cases, it may be necessary to raise awareness about a water quality issue. In others, a water quality issue may be commonly recognized; therefore, the goal may be to educated people about what to do about it. As plan implementation proceeds, and information and education objectives are met, the plan should be updated to reflect progress and to identify new challenges. Possible objectives include:

- Increase public awareness about the link between water quality and watershed management.
- Increase public awareness about the most threatened creeks in the subbasin.
- Educate landowners in selected subwatersheds regarding available financial and technical assistance programs.

- Educate county officials and department staff regarding stormwater management and the protection of water quality.

Step 2: Target Audiences

The key to effectiveness in implementing an information and education campaign is to identify the target audiences. Examples of target audiences based on watershed issues and/or management objectives are provided in Table 5-10.

Table 5-10. Potential Target Audiences Based on Watershed Issue and/or Management Objective

ISSUE / MANAGEMENT OBJECTIVE	POTENTIAL TARGET AUDIENCE
General watershed education	School children and their parents; church congregations; fair and festival audiences
Stormwater management	County officials; County transportation and/or public works staff; developers/ homebuilders
Agricultural Best Management Practices (Available techniques and financial resources)	Farmers; soil conservation district members; property owners
Forestry Best Management Practices (Available techniques and financial resources)	Forest landowners; logging companies

Step 3: Create the Messages for each Audience

An effective message carries a lot of power. Environmental and watershed education can be relatively complex so it is important to tailor the message in a way most appropriate to the target audience. There are many, free-of-charge resources to assist with creating a powerful message for watershed issues. Take advantage of existing messages from the ACWP and others. For instance, the ACWP has brochures about the Subbasin Stakeholder Committees as well as popular campaigns/messages that it uses for public service ads that consist of a message and eye-catching posters (visit the ACWP website <www.cleanwaterparnership.org> to view the posters). Several examples of campaign messages from ACWP are proved below:

"When Your Pet Goes On the Lawn, Remember It Doesn't Just Go On the Lawn" When our pets leave those little surprises, rain washes all of that pet waste and bacteria into our storm drains. And then pollutes our waterways. So what to do? Simple. Dispose of it properly (preferable in the toilet). Then that little surprise gets treated like it should.

"When You're Fertilizing the Lawn, Remember You Aren't Just Fertilizing the Lawn" You fertilize the lawn. Then it rains. The rain washes the fertilizer along the curb into the storm drain, and directly into our lakes, streams and bays. This causes algae to grow,

which uses up oxygen that fish need to survive. So if you fertilize, please follow directions and use sparingly.

"When Your Car's Leaking Oil On the Street, Remember It's Not Just Leaking Oil On the Street" Leaking oil goes from car to street and is washed from the street into the storm drain and into our lakes, streams and bays. Now imagine the number of cars in the area and you can imagine the amount of oil that finds its way from leaky gaskets into our water. So please, fix oil leaks.

"When You're Washing Your Car in the Driveway, Remember You're Not Just Washing Your Car in the Driveway" All the soap, scum, and oily grit runs along the curb, then into the storm drain and directly into our lakes, streams, and bays and that causes pollution which is unhealthy for fish. So how do you avoid the whole mess? Easy. Wash your car on the grass or gravel instead of the street. Or better yet, take it to a car wash where the water gets treated and recycled.

Step 4: Package the Message to Various Audiences

Once the message has been crafted, it must be packaged for the audiences. There are several approaches to packaging a watershed message:

- Work with the media
- Develop effective print materials
- Hold events (*e.g.*, canoe/kayak trips; water monitoring workshops; stream clean-ups; Groundwater Festivals)
- Leverage existing information and education programs/resources (*i.e.*, “piggyback” on existing efforts and programs).

Step 5: Deliver the Message

Money is typically the limiting factor, so it is important to figure out how to cost-effectively reach the audience. Here are several common delivery techniques:

- Mailing lists
- Phone calls
- Interviews
- Focus groups
- Presentations to boards, commissions, trade groups, neighborhood associations, library groups, garden clubs, etc.
- Demonstrations; guided tours

Step 6: Evaluation of Information and Education Campaign

Before embarking on any facet of an information and education campaign it is critical to define the "measures of success" used to determine if it has met its information and education goals. Indicators or milestones are an excellent way to establish – from the beginning – how success will be measured. Indicators must be clear, realistic, and practical. For an outreach campaign, a group may consider *programmatic* or *social* indicators such as those listed in Table 5-11.

Table 5-11. Indicators of Success for Information and Education Campaigns

TYPE OF INDICATOR	EXAMPLE INDICATOR	METHOD OF MEASUREMENT
Programmatic	Number of brochures mailed	Mailing lists
Programmatic	Number of participants	Attendance lists
Social	Number of follow-up phone calls	Phone records
Social	Increased awareness of watershed issues	Pre- and post- surveys, interviews, focus groups
Social	Number of landowners requesting assistance for management practice installation	Phone records, site visits
Social	Number of landowners aware of technical and financial assistance for watershed management measures	Pre- and post- surveys, interviews

5.9 References

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Appendix 5A – Rare and State Protected Plant and Animal Species of the Lower Middle Chattahoochee River Subbasin

Alabama and Georgia maintain Natural Heritage Programs and databases that keep track of the ecological resources or biodiversity of each state. These inventories contain records of rare and endangered natural communities, plants, and animals. In addition, each state has a system under which plant and animal species receive state protection.

The Georgia Natural Heritage Program data center provides rare species and natural community data for species protected by Georgia's Wildflower Preservation Act and Georgia's Endangered Wildlife Act, as well as for species protected under the U.S. Endangered Species Act. They also track rare and imperiled non-listed species. To receive more information on Georgia's state protected species, refer to Georgia's Department of Natural Resources' webpage <http://georgiawildlife.dnr.state.ga.us/content/displaycontent.asp?txtDocument=89&txtPage=1>.

The Alabama Natural Heritage Program (ALNHP) provides the best available scientific information on the biological diversity of Alabama to guide conservation action and promote sound stewardship practices. It was established by The Nature Conservancy in 1989 as one of a network of such programs. For a fee, this database can be queried for location information on rare, threatened and state protected plant and animal species, and natural communities. Searches can be done by USGS Quadrangle, Legal Township, Range & Section(s), County(ies), or species. For more information, and to order a location search, refer to the ALNHP's website at <http://www.alnhp.org/track_2006.pdf>.

In addition, Alabama state law awards protections to a list of nongame species via the Nongame Species Regulation (Section 220-2-.92, page 79-82) and the Invertebrate Species Regulation (Section 220-2-.98, pages 77-78) of the *Alabama Regulations for 2005-2006 on Game, Fish, and Fur Bearing Animals*. Copies of these regulations may be obtained from the Division of Wildlife & Freshwater Fisheries, Alabama Department of Conservation & Natural Resources, 64 North Union Street, Montgomery, AL 36104. A digital version of these regulations is available online at <http://www.dcnr.state.al.us/hunting/regulations/regbook2005-2006-final.pdf>.

The Nongame Species Regulation (Section 220-2-.92, page 79-82) is available online at: <http://www.dcnr.state.al.us/watchable-wildlife/regulations/nongame.cfm>. The current list of Alabama species protected under state law is provided as Table 5A-1.

Table 5A-1. Wildlife Species Protected by the State of Alabama According to the Nongame Species Regulation

	COMMON NAME*	SCIENTIFIC NAME
Fish		
	Cavefish, Alabama	*Speoplatyrhinus poulsoni*
	Cavefish, Southern	*Typhlichthys subterraneusls*
	Chub, Spotfin	*Cyprinella monacha*
	Darter, Boulder	*Etheostoma wapiti*
	Darter, Coldwater	*Etheostoma ditrema*
	Darter, Crystal	*Crystallaria asprella*
	Darter, Goldline	*Percina aurolineata*
	Darter, Holiday	*Etheostoma brevirostrum*
	Darter, Lollipop	*Etheostoma neopterum*
	Darter, Slackwater	*Etheostoma boschungi*
	Darter, Snail	*Percina tanasi*
	Darter, Tuscumbia	*Etheostoma tuscumbia*
	Darter, Vermilion	*Etheostoma chermocki*
	Darter, Watercress	*Etheostoma nuchale*
	Madtom, Frecklebelly	*Noturus munitus*
	Sculpin, Pygmy	*Cottus paulus*
	Shad Alabama	*Alosa alabamae*
	Shiner, Blue	*Cyprinella caerulea*
	Shiner, Cahaba	*Notropis cahabae*
	Shiner, Palezone	*Notropis albizonatus*
	Sunfish, Spring Pygmy	*Elassoma alabamae*
	Sturgeon, Alabama Shovelnose	*Scaphirvnchus suttkusi*
	Sturgeon, Gulf	*Acipenser oxyrhynchus desotoi*
Amphibian		
	Frog, Dusky Gopher*	*Rana capito sevosa*
	Hellbender, Eastern	*Cryptobranchus alleganiensis alleganiensis*
	Salamander, Flatwoods	*Ambystoma cingulatum*
	Salamander, Green	*Aneides aeneus*
	Salamander, Red Hills	*Phaeognathus hubrichti*
	Salamander, Seal (of Coastal Plain origin)	*Desmognathus monticola*
	Salamander, Tennessee Cave	*Gyrinophilus palleucus*
	Treefrog, Pine Barrens	*Hyla andersonii*
Reptile		
	Coachwhip, Eastern	*Masticophis flagellum flagellum*
	Sawback, Black-knobbed	*Graptemys nigrinoda*
	Snake, Black Pine	*Pituophis melanoleucus lodingi*
	Snake, Eastern Indigo	*Drymarchon corais couperi*
	Snake, Florida Pine	*Pituophis melanoleucus mugitus*
	Snake, Gulf Salt Marsh	*Nerodia fasciata clarkii*

	COMMON NAME*	SCIENTIFIC NAME
	Snake, Southern Hognose*	*Heterodon simus*
	Terrapin, Mississippi Diamondback	*Malaclemys terrapin pileata*
	Tortoise, Gopher*	*Gopherus polyphemus*
	Turtle, Alabama Map	*Graptemys pulchra*
	Turtle, Alabama Red-bellied	*Pseudemys alabamensis*
	Turtle, Alligator Snapping*	*Macroclemys temminckii*
	Turtle, Barbour's Map*	*Graptemys barbouri*
	Turtle, Escambia Bay Ma	*Graptemys ernsti*
Bird		
	Crane, Mississippi Sandhill	*Grus canadensis pulla*
	Dove, Common Ground	*Columbina passerina*
	Eagle, Bald*	*Haliaeetus leucocephalus*
	Eagle, Golden	*Aguila chrysaetos*
	Egret, Reddish	*Egretta rufescens*
	Falcon, Peregrine	*Falco peregrinus*
	Hawk, Cooper's	*Accipiter cooperi*
	Merlin	*Falco columbarius*
	Osprey	*Pandion haliaetus*
	Oystercatcher, American	*Haematopus palliatus*
	Pelican, American White	*Pelecanus erthrorhynchos*
	Plover, Piping	*Charadrius melodus*
	Plover, Snowy	*Charadrius alexandrinus*
	Plover, Wilson’s	*Charadrius wilsonia*
	Stork, Wood	*Mycteria americana*
	Tern, Gull-billed	*Sterna nilotica*
	Warbler, Bachman's	*Vermivora bachmani*
	Woodpecker, Red-cockaded*	*Picoides borealis*
	Wren, Bewick's	*Thryomanes bewickii*
Mammal		
	Bat, Gray Myotis	*Myotis grisescens*
	Bat, Indiana	*Myotis sodalis*
	Bat, Rafinesque's Big-eared	*Corynorhinus rafinesquii*
	Bat, Southeastern	*Myotis austroriparius*
	Gopher, Southeastern Pocket	*Geomys pinetis*
	Mouse, Alabama Beach	*Peromyscus polionotus ammobates*
	Mouse, Meadow Jumping	*Zapus hudsonius*
	Mouse, Perdido Key Beach	*Peromyscus polionotus trissylepsis*
	Weasel, Long-tailed	*Mustela frenata*
* Species also identified on the NatureServe List for the Lower Middle Chattahoochee River Subbasin (HUC 03130003) with a global status of imperiled (G2) or vulnerable to extirpation/extinction (G3), or a federal listing status under US ESA as endangered (LE) or threatened (LT).		

Source (ACDNR, 2006)

Together, Alabama's and Georgia's natural heritage programs, like many other natural heritage programs, are linked through an organization called NatureServe. NatureServe is a non-profit conservation organization that has partnered with international conservation organizations and natural heritage inventories. An abundance of information about the plants and animals, native and exotic, can be found online via NatureServe, which can be queried by ecological community, plant and animal species, county, and HUC 8 watershed codes. Table 5A-2 lists the species identified by NatureServe within the Lower Middle Chattahoochee River Subbasin (HUC 03130003) subbasin that have either a critically imperiled, imperiled, or vulnerable to extirpation/extinction status or have a status designation according to the U.S. Endangered Species Act.

Table 5A-2. Results of NatureServe Data Query for Lower Middle Chattahoochee River Subbasin (HUC 03130003)

SCIENTIFIC NAME COMMON NAME	STATUS* NATURESERVE	 US ESA	U.S. DISTRIBUTION
Mollusks			
Alasmidonta triangulata Southern Elktoe	G1Q		AL, FL, GA
Elliptio arctata Delicate Spike	G2G3Q		AL, FL, GA, MS, SC, TN
Elliptio fraterna Brother Spike	G1		AL, GA, SC
Elliptio purpurella Inflated Spike	G2		AL, GA
Elliptoideus sloatianus Purple Bankclimber	G2	LT	AL, FL, GA
Hamiota subangulata Shinyrayed Pocketbook	G2	LE	AL, FL, GA
Lasmigona subviridis Green Floater	G3		AL, DC, GA, KY, MD, NC, NJ, NY, PA, SC, TN, VA, WV
Medionidus penicillatus Gulf Moccasinshell	G1G2	LE	AL, FL, GA
Pleurobema pyriforme Oval Pigtoe	G2	LE	AL, FL, GA
Quincuncina infucata Sculptured Pigtoe	G3		AL, FL, GA
Strophitus subvexus Southern Creekmussel	G3		AL, FL, GA, LA, MS, SC, TX
Fish			
Cyprinella callitaenia Bluestripe Shiner	G2G3		AL, FL, GA
Notropis hypsilepis Highscale Shiner	G3		AL, GA
Pteronotropis euryzonus Broadstripe Shiner	G3		AL, GA

SCIENTIFIC NAME COMMON NAME	STATUS* NATURESERVE	US ESA	U.S. DISTRIBUTION
Moxostoma sp. 1 Apalachicola Redhorse	G3		AL, FL, GA
Ameiurus serracanthus Spotted Bullhead	G3		AL, FL, GA
Amphibians			
Rana capito Carolina Gopher Frog	G3		AL, FL, GA, NC, SC, TN
Ambystoma tigrinum Tiger Salamander	G5	PS	AL, AR, AZ, CO, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MD, MI, MN, MO, MS, MT, NC, ND, NE, NJ, NM, NN, NV, NY, OH, OK, OR, PA, SC, SD, TN, TX, UT, VA, WA, WI, WY
Desmognathus apalachicolae Apalachicola Dusky Salamander	G3G4		AL, FL, GA
Plethodon websteri Webster's Salamander	G3		AL, GA, LA, MS, SC
Reptiles			
Macrochelys temminckii Alligator Snapping Turtle	G3G4		AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MO, MS, OK, TN, TX
Graptemys barbouri Barbour's Map Turtle	G2		AL, FL, GA
Gopherus polyphemus Gopher Tortoise	G3	PS:LT	AL, FL, GA, LA, MS, SC
Eumeces egregius Mole Skink	G5	PS	AL, FL, GA
Heterodon simus Southern Hog-nosed Snake	G2		AL, FL, GA, MS, NC, SC
Birds			
Haliaeetus leucocephalus Bald Eagle	G5	PS:LT,PDL	AK, AL, AR, AZ, CA, CO, CT, DC, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NN, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY
Picoides borealis Red-cockaded Woodpecker	G3	LE	AL, AR, FL, GA, KY, LA, MD, MO, MS, NC, OK, SC, TN, TX, VA

Scientific Name / Common Name	Status* NatureServe	US ESA	U.S. Distribution
Aimophila aestivalis Bachman's Sparrow	G3		AL, AR, DC, FL, GA, IL, IN, KY, LA, MD, MO, MS, NC, OH, OK, PA, SC, TN, TX, VA, WV
Plants			
Aesculus parviflora Small-flowered Buckeye	G3		AL, DC, GA, NJ, PA, SC
Arabis georgiana Georgia Rockcress	G1	C	AL, GA
Astragalus michauxii Sandhills Milk-vetch	G3		AL, FL, GA, NC, SC
Brickellia cordifolia Flyr's Brickell-bush	G2G3		AL, FL, GA
Carex impressinervia Impressed-nerved Sedge	G1G2		AL, MS, NC, SC
Cirsium virginianum Virginia Thistle	G3		DE, FL, GA, NC, NJ, SC, VA
Croomia pauciflora Croomia	G3		AL, FL, GA, LA
Croton elliottii Elliott's Croton	G2G3		AL, FL, GA, SC
Helianthus smithii Smith's Sunflower	G2Q		AL, GA, TN
Hexastylis shuttleworthii var. harperi Harper's Heartleaf	G4T3		AL, GA, MS
Lobelia boykinii Boykin's Lobelia	G2G3		AL, DE, FL, GA, MS, NC, NJ, SC
Macbridea caroliniana Carolina Birds-in-a-nest	G2G3		AL, FL, GA, NC, SC
Matelea baldwyniana Baldwin's Milkvine	G3		AL, AR, FL, MO, OK
Myriophyllum laxum Piedmont Water-milfoil	G3		AL, FL, GA, MS, NC, SC, VA
Panax quinquefolius American Ginseng	G3G4		AL, AR, CT, DC, DE, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, VA, VT, WI, WV
Phaseolus polystachios var. sinuatus Sandhill Bean	G5T3?		AL, FL, GA, MS, NC, SC
Pinguicula primuliflora Southern Butterwort	G3G4		AL, FL, GA, MS

Scientific Name / Common Name	Status* NatureServe	US ESA	U.S. Distribution
Quercus arkansana Arkansas Oak	G3		AL, AR, FL, GA, LA, TX
Rhexia aristosa Awned Meadowbeauty	G3		AL, DE, GA, NC, NJ, SC
Rhododendron prunifolium Plumleaf Azalea	G3		AL, GA
Rudbeckia auriculata Eared Coneflower	G2		AL, FL, GA
Sarracenia rubra Sweet Pitcherplant	G4	PS	AL, FL, GA, MS, NC, SC
Schisandra glabra Bay Starvine	G3		AL, AR, FL, GA, KY, LA, MS, NC, SC, TN
Schoenoplectus etuberculatus Canby's Bulrush	G3G4		AL, DE, FL, GA, LA, MD, MO, MS, NC, RI, SC, TX, VA
Silene polypetala Fringed Campion	G2	LE	FL, GA
Stylisma pickeringii var. pickeringii Pickering's Morning-glory	G4T3		AL, GA, NC, NJ, SC
Tridens carolinianus Carolina Fluffgrass	G3G4		AL, FL, GA, LA, MS, NC, SC
Trillium decipiens Mimic Trillium	G3		AL, FL, GA
Trillium reliquum Confederate Trillium	G3	LE	AL, GA, SC
Utricularia floridana Florida Bladderwort	G3G5		AL, FL, GA, NC, SC
Warea sessilifolia Sessile-leaved Warea	G2G4		AL, FL, GA

Status*: **NatureServe** G = Global, across entire range; T=subspecies/variety with different status than species as a whole.

1=critically imperiled; 2 = imperiled; 3= vulnerable to extirpation/extintion;4 = apparently secure; 5 = widespread, abundant and secure

US ESA: US Endangered Species Act, LE = listed endangered; LT= listed threatened; C= candidate; PS:LT = proposed threatened because of similarity of appearance; SAT: listed threatened because of similarity of appearance; PDL = proposed for listing

Source: NatureServe, 2006

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NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.0 NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. Accessed: November 14, 2006.

6.0 LOWER CHATTAHOOCHEE SUBBASIN

6.1 Introduction

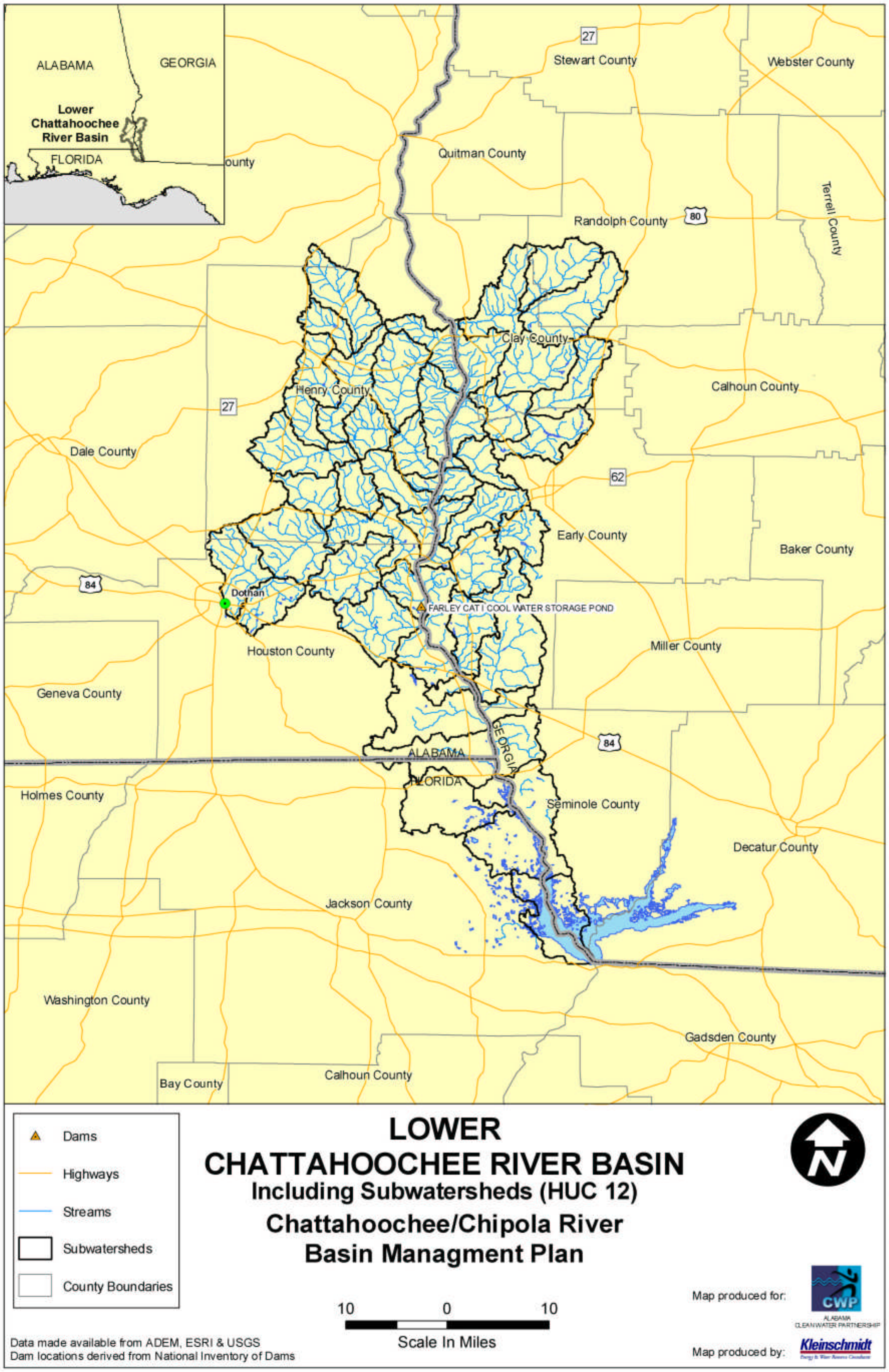
The Lower Chattahoochee River subbasin is the southernmost section of the Chattahoochee River Basin in Alabama. This section begins below Walter F. George Dam and concludes at the confluence with the Flint River where the two rivers form Lake Seminole behind Woodruff Lock and Dam on the Florida-Georgia border. The entire subbasin covers a total area of 1,180 square miles (755,200 acres). Less than one-half (504 square miles; 322,560 acres) lies within Alabama covering portions of Barbour, Henry, and Houston counties. The Alabama communities of Abbeville, Haleburg, Columbia and Gordon are all located within the Lower Subbasin, as is a portion of Dothan.

The subbasin contains 19 tributaries flowing to the Chattahoochee River and one reservoir. Entire lengths or segments of these tributaries flow through Alabama within the Lower Chattahoochee River Subbasin (Table 6-1 and Figure 6-1).

Table 6-1. Alabama Tributaries (HUC 12) to the Lower Chattahoochee River Subbasin

Upper Abbie Creek	Upper Omusee Creek
Little Abbie Creek	Middle Omusee Creek
Middle Abbie Creek	Lower Omusee Creek
Lower Abbie Creek	Peterman Creek
Bryans Creek	Sandy Creek
Cedar Creek	Skippers Creek
Foster Creek	Spivey Mill Creek
Golf Creek	Stevenson Creek
Hurricane Creek	Ward Creek
McRay Mill Creek	

Figure 6-1. Lower Chattahoochee River Subbasin



One dam is positioned on the mainstem of the Chattahoochee in the Lower Subbasin. George W. Andrews Lock and Dam creates Lake Columbia, which is located near Columbia, Alabama some 46.5 miles upstream from the mouth of the Chattahoochee River. The lake, know as George W. Andrews in Georgia, is narrow and acts more like a river running 28.6 miles in length. This stretch of the river is relatively low in gradient as it occupies the Coastal Plain physiographic province.

6.2 Existing Water Quality and Biological Information

Alabama's biannual §303(d) List of Impaired Waters identifies creeks, lakes, and rivers that do not meet state water quality standards. On a five year rotational basis, ADEM completes a river basin monitoring assessment to identify streams that are not completely meeting water quality standards for their use classification, which is Fish and Wildlife in this subbasin. The streams to be tested are identified through past assessments and impairments, complaints, and stakeholder identification of problem areas. For those creeks with sufficient data to assess, ADEM (2006) has identified one tributary within the subbasin that does not meet water quality standards for its use classification. The Poplar Spring Branch to the Omussee Creek has been documented with lower than expected pH and no longer supports the fish and wildlife habitat expected for the area.[28] Industrial discharges are listed as the source of this water quality problem.

6.2.1 Priority Subwatersheds

ADEM's Nonpoint Source Screening Assessments were primary sources of water quality monitoring for this Planning effort (ADEM, 2002; ADEM, 2006). These studies provide the most useful scientific analyses of the basin because they are current (*i.e.*, completed every 5 years) and completed according to USEPA-approved water quality standards. Subwatersheds, based on the 11-digit hydrologic unit code, are the focus of the current ADEM assessments although that will change in the future.[29] This scale was used for this Planning effort because it is the smallest scale for which data is available. Based on assessment results, ADEM assigns *nonpoint source impairment potential* and *nonpoint source priority status* to creeks with water quality and/or habitat impacts warranting greater concern and need of investigation.

Physical, chemical and biological assessments were conducted for several subwatersheds in the subbasin. Nonpoint source pollution impairment potential was assigned to subwatersheds based on surrounding land uses and pollution evidence detected by

[28] These statements are based on the *Final 2004 §303(d)* list of impaired waters. There currently is a Draft *2006 §303(d)* list under review by USEPA. Until the 2006 list is approved, the 2004 list is considered the current final document. Both documents can be viewed at <http://www.adem.state.al.us/waterdivision/WQuality/303d/WQ303d.htm>.

[29] There are some limits to using the Rotational Screening Assessment reports in this Plan. ADEM (2002; 2006) water quality and biological assessments at subwatershed (11-digit HUC) scale, which was abandoned in 2005 for the 10-digit HUC and 12-digit HUC delineations. Currently, the standard scale for watershed planning is nationally recognized at the HUC 12 sub-watershed scale. It is expected that ADEM will utilize the HUC 12 delineations for the next rotational basin assessment in 2009.

monitoring. Assessments of aquatic habitat and macroinvertebrate populations concluded in a determination of "priority" status for the subwatershed.

Six subwatersheds were selected for priority consideration (Table 6-2). A subwatershed is recommended for priority status if, during the assessment, it receives a rating of "fair" or "poor" for the stream's benthic macroinvertebrate (BMI) or fish community (ADEM, 2002; ADEM, 2006). NPS pollution potential was rated based on SWCD watershed (land use) assessments. Table 6-2 provides the NPS rating and the land use with the greatest *potential* for the causing the impairment.

Table 6-2. Priority Sub-watersheds within the Lower Chattahoochee Subbasin

Year[a]	11-digit Hydrologic Unit Code (HUC)			Waterbody	Station[b]	Screening Assessment Results			NPS ratings of "moderate" or "high" based on 1998 SWCD sub-watershed assessments[c]
						Habitat[d]	*WMB-EPT[e]*	*Fish*	
1999	0313	0004	020	Bennett Mill Cr.	BMCH-1	Excellent	Fair	Poor	Cropland runoff, pasture runoff, silviculture
1999	0313	0004	020	McRae Cr.	MMCH-1	Excellent	Fair	Not Assessed	Cropland runoff, pasture runoff, silviculture
2004	0313	0004	040	Abbie Cr.	ABBH-5	Good	Fair	Not Assessed	Mining, Sedimentation, Forestry, Row Crops
2004	0313	0004	040	Sandy Cr.	SNCH-1	Good	Fair	Not Assessed	Mining, Sedimentation, Forestry, Row Crops
2004	0313	0004	040	Ward Cr.	WRDH-1	Good	Fair	Not Assessed	Mining, Sedimentation, Forestry, Row Crops
2004	0313	0004	100	Bryans Cr.	BRYH-1	Excellent	Fair	Not Assessed	Pasture Runoff, Animal Husbandry, Aquaculture, Row Crops, Urban

Source: (ADEM, 2002; 2006)

a Indicates the year of the monitoring results.
b The station name is a code assigned by ADEM for the basin screening assessments.
c The Alabama Soil and Water Conservation Districts conducted land use evaluations of Alabama’s subwatersheds in 1998. The potential for nonpoint source (NPS) pollution within individual subwatersheds was assessed based on existing land uses. Watersheds where land uses associated with high or moderate potential for NPS were prevalent were identified and the land use indicated.
d This column includes the results of ADEM’s habitat evaluations.
e “WMB-EPT” is an abbreviation for “Wadeable Multi-habitat Bioassessments - Ephemeroptera, Plecoptera, Trichoptera” that describes the results of biological assessments of streams according to the sum of the number of families within the orders Ephemeroptera, Plecoptera and Trichoptera – all orders of macroinvertebrates commonly found in freshwater streams.

6.2.2 Permitted Discharges and Stormwater Sources

Approximately 97 National Pollution Discharge Elimination System (NPDES) permits were active in the Lower Chattahoochee River Basin as of April 2006. These permits cover industrial discharges, sewage treatment plants, mining operations, construction sites and concentrated animal feeding operations (CAFOs). Multiple stormwater/construction permits were issued for Abbie Creek (13) and Omussee Creek (25). Permitted CAFOs (poultry farms) were reported in the Abbie Creek (2 permits) and Omussee Creek (3 permits). Omussee Creek is also the receiving water for the City of Dothan's wastewater treatment facility. Permits without specific location information were not included in this assessment.

6.2.3 Fish Tissue Surveys and Consumption Advisories

ADEM Field Operations conducts annual fish tissue sample surveys in lakes and rivers across the state to monitor environmental health and to safeguard public health. The fish tissues are analyzed for the presence of toxic substances, and results serve as the basis for the ADPH's Fish Consumption Advisories. For 2005, no advisories for fish consumption were issued by Alabama that pertain to the Lower Chattahoochee River Subbasin. However, GDNR, which conducts the same type of monitoring for the State of Georgia, posted several advisories for the basin, two of which include the reservoirs of the Lower Chattahoochee subbasin.

In 2005, Georgia issued fish consumption advisories for the waters of the Lower Chattahoochee River subbasin, specifically for Lake Andrews. The consumption of largemouth bass caught in Lake Andrews is restricted to one meal per week for fish over 12 inches in length due to mercury. Mercury normally accumulates in river and lake sediments. From there it works its way through the food chain to fish. The presence of these chemicals typically indicates historical, and not necessarily current, water pollution issues.

6.2.4 Reservoir Studies

There are no existing water quality studies for reservoirs in the Lower Chattahoochee Subbasin.

6.2.5 Rare, Threatened and Endangered Resources

The health of aquatic life in the subbasin is a measure of the health of the watershed. Fish and wildlife, especially the diversity of fishes, amphibians, and invertebrates living in the waters of the subbasin, rely on clean water and functional wetlands as their habitat. When these resources are compromised, fish and wildlife populations can be threatened.

The Southeastern United States is considered a hotbed of biological diversity. The Lower Chattahoochee River Subbasin is a part of the greater ACF River Basin, which is recognized for its great and unique biodiversity.

The waters of the basin provide habitat for 122 fish species, 29 mussel species and 30 crayfish species (USFWS, 2006). However, due to the long history of industrialization of the river, many of these species are thought to be at risk for extinction. Rare plant and animal resources of the Lower Chattahoochee Subbasin are tracked and/or protected by several sources including natural heritage programs, and state and federal laws. Appendix 6A provides a description of the programs that monitor rare species for this subbasin and the state laws that protect them. Also listed in Appendix A are the wildlife species of the Lower Chattahoochee Subbasin that are protected by Alabama state law (Table 6A-1) or have been identified by NatureServe (the Natural Heritage Database) as imperiled or vulnerable to extinction/extirpation (Table 6A-2).

Seven species are currently listed as federally threatened or endangered in the two counties of the Lower Chattahoochee Subbasin (Table 6-3). Although not all the species are aquatic, all do rely on water resources of the subbasin. Activities that would lead to water quality impacts would most likely lead to aquatic habitat impacts for these creatures. Because water quality and aquatic habitat are inextricably linked, the water quality objectives of this Plan tend to overlap with the management objectives for these species.

Table 6-3. Federally Threatened and Endangered Species in the Lower Chattahoochee River Subbasin

HENRY COUNTY
T - Bald eagle (*Haliaeetus leucocephalus*)
E - Wood stork (*Mycteria americana*)
E - Relict trillium (*Trillium reliquum*)
HOUSTON COUNTY
T - Bald eagle (*Haliaeetus leucocephalus*)
T - Flatwoods salamander (*Ambystoma cingulatum*) (P)
E - Gulf moccasinshell (*Medionidus penicillatus*)
E - Oval pigtoe (*Pleurobema pyriforme*)
Notes: Bald eagles (*Haliaeetus leucocephalus*) may occur in any county, if suitable habitat exists. Codes: Federal Status: E – Endangered; T – Threatened

Source: USFWS, 2005

On June 6, 2006, the USFWS published its intention to designate critical habitat for seven (7) species of freshwater mussels in several drainages to the Gulf of Mexico including the ACF River Basin.[30,31] All of these mussels are considered endemic to the ACF River Basin. There are no proposed critical habitat designations within the Lower Chattahoochee River Subbasin despite the general belief that at least two of these species (Oval pigtoe and Gulf moccasinshell) can still be found in the subbasin (USFWS, 2006a; USFWS, 2006b).

6.3 Stakeholder Issues of Concern

Sometimes water quality problems are identified by citizens and brought to the attention of agency staff for further examination. Issues may be anecdotal in the sense that they describe a perceived water quality problem or watershed management issue without thorough scientific investigation. However, this citizen input, or stakeholder input, is valuable in assisting in the identification of potentially impaired or at risk waters and helps guide future assessment and remedial action.

In support of this Basin Management Plan, issues of concern were collected from stakeholders during public ACWP Steering Committee Meetings and Subbasin Stakeholder Workshops. The stakeholder meeting was held on Thursday, January 19, 2006 in Dothan, Alabama and was attended by stakeholders from the Lower Chattahoochee River subbasin and the Chipola River Basin. Meeting participants raised water quality concerns they thought were important for managing this subbasin. Although no specific waterbodies were identified in association with these concerns, general areas of the subbasin were identified (*i.e.,* "creeks in and around the City of Dothan") (Table 6-4).

[30] 50 CFR Part 17. Federal Register, Volume 71, No. 108, Tuesday, June 6, 2006. pp. 32746 – 32796. On March 16, 1998 (63 FR 12664), the USFWS listed the 7 species of freshwater mussels under the ESA and declared that the assignment of critical habitat was not prudent because designation does not afford additional, cost-effective protections compared to other conservation actions. However, the USFWS went ahead with the designation because the Center for Biological Diversity filed a lawsuit in the U.S. District Court for the Northern District of Georgia (Civil Action No. 1:04 CV–0729–GET) on March 15, 2004, alleging that USFWS violated the ESA by failing to designate critical habitat for the seven mussels.

[31] "Critical habitat" has a specific definition within the Endangered Species Act. It refers to specific geographic areas that have habitat characteristics essential for the conservation of a threatened or endangered species, and which may require special management and protection. 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 who play a part in managing listed species found on their property.

Table 6-4. Water Quality Issues of Concern Identified by Stakeholders in the Lower Chattahoochee River Subbasin

Loss of freshwater wetlands from new commercial and residential development in and around the City of Dothan.
Poor stormwater management associated with new road construction and development in and around the City of Dothan.
Lack of awareness of water quality protection in the subbasin.
Lack of response by environmental agencies in the subbasin to citizen concerns.

Stakeholders also reviewed a list of nonpoint source pollution issues common in Alabama, and identify issues from the list they thought were relevant to the subbasin. Table 6-5 lists the most common nonpoint source issues stakeholders generally recognized as issues in the subbasin.

Table 6-5. Common Nonpoint Source Issues Recognized by Stakeholders as Potential Problems in the Lower Chattahoochee River Subbasin

Nonpoint source pollution from agricultural activities - cropland, pastureland, and animal husbandry
• livestock access to streams • nutrient runoff from pasture and cropland • livestock overgrazing and soil erosion/sediment loading from pasture and cropland • gully erosion • animal waste management impacts (poultry farms in the subbasin) • pesticides and pathogens runoff from cropland
Nonpoint source pollution from forestry
• soil erosion and sediment loading from harvested forestland • soil erosion and sediment loading from logging roads • gully erosion on hillsides on harvested forestland
Nonpoint source pollution from roads, road banks, and new road construction
• soil erosion and sedimentation from dirt roads and road banks (especially new and/or unpaved roads) • gully erosion
Nonpoint source pollution from urban and residential areas
• septic tank failures leading to nutrient loading and pathogen pollution • soil erosion and sediment loading from new road construction • soil erosion and sediment loading from urban land development • lack of stormwater management in urban areas (*e.g.,* City of Dothan)
Nonpoint source pollution from mining activities
• sediment loading from sand and gravel pits • mining and excavation impacts on surface waters
Wetlands and fish and wildlife habitat loss
• wetland and aquatic habitat destruction due to road construction and land development (*e.g.,* City of Dothan) • habitat impacts from increased sedimentation • loss of fish and imperiled mussels species • loss of stream buffers
Impacts from river use and other recreational uses
• Litter from boats • Stormwater runoff at boat ramps

6.4 Water Quality and Watershed Management Goals

The goals and strategies that address water quality involve restoration, protection, and education projects or tasks focused on attaining a specific goal. Table 6-6 provides proposed management goals for each concern and issue identified.

Table 6-6. Lower Chattahoochee River Subbasin Basin Management Goals

Goal 1: *Reduce nonpoint source pollution from agricultural activities – cropland, pastureland, and animal husbandry*	**Goal 5:** *Reduce nonpoint source pollution from urban and residential areas*
• livestock access to streams, and stream bank erosion • nutrient runoff from pasture and cropland • sediments from pasture and cropland • gully erosion and erosion from critical areas • animal waste management impacts • livestock overgrazing of pastureland • pesticides, bacteria and pathogens in surface waters	• nutrient and pathogen loading due to improperly maintained or failing septic systems and sewage treatment facilities • soil erosion from new road construction • soil erosion and sediment loading from urban development, including land clearing, construction activities, and impervious surfaces • stormwater runoff – bacteria and toxics
Goal 2: *Reduce nonpoint pollution from forestry*	**Goal 6:** *Reduce nonpoint source pollution from mining activities*
• erosion and sediment loading resulting from harvested forestlands • erosion and sediment loading from logging roads • gully erosion on hillsides from harvested forestland	• sediment loading from sand and gravel pits • mining and excavation impacts on surface waters
Goal 3: *Track resource trends through water quality monitoring in the subbasin to measure progress in restoration and protection efforts, fill in data gaps, and identify new resource concerns and issues*	**Goal 7:** *Protect and restore aquatic habitat and aquatic species diversity*
• limited water quality monitoring within the watershed • limited baseline data for many creeks in the subbasin	• wetland and aquatic habitat destruction due to road construction and land development • loss of fish and mussel species diversity • eutrophication of reservoirs • loss of stream buffers
Goal 4: *Reduce nonpoint source pollution from roads, road banks, and new road construction*	**Goal 8:** *Improve shoreline and recreation management on the Chattahoochee*
• soil erosion from roads and road banks (especially new and/or unpaved roads) • gully erosion	• erosion from boating traffic • dumping trash from boats • boat ramp litter problems • oil, gas and sewage discharges from boats • introduction of invasive aquatic species

Additional goals that are not directly related to specific water quality management issues but are essential to basin management are also identified. These goals are:

<u>GOAL 9</u>:	Promote watershed and community stewardship through resource education, outreach and the promotion of volunteer opportunities throughout the watershed.

<u>GOAL 10</u>:	Promote watershed management technology transfer across industries and across state lines of Alabama, Georgia and Florida. Coordinate watershed assessment, planning, restoration and conservation efforts between subbasin and basin stakeholders in all three states.

<u>GOAL 11</u>:	Develop a framework in the subbasin to implement the projects and tasks in this Plan.

These goals are critical to the implementation and success of this river basin plan. In the following pages, each goal is addressed individually, and strategies are established to achieve the goal. If there is a specific creek/subwatershed associated with an issue, either by ADEM or stakeholders, then the name of the creek is included.

6.5 Implementation Strategies to Achieve Water Quality and Watershed Management Goals

Targeted subwatersheds should be prioritized for action in order to address water quality management concerns that are most critical in a given watershed. 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. For each strategy, specifics are provided regarding:

- agencies or groups that are integral to implementing 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.

The following is a list of organizations and their associated acronyms is provided as a key for the tables to follow. With each watershed management strategy, agencies and organizations are identified that would be the most likely lead or participant in implementing the strategy.

AAGC	Alabama Association of General Contractors
ABBA	Alabama Bridge Builders Association
ACES	Alabama Cooperative Extension System
ACOE	United States Army Corps of Engineers
ACWP	Alabama Clean Water Partnership
ADAI	Alabama Department of Agriculture and Industry
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
ADPH	Alabama Department of Public Health
AFA	Alabama Forestry Association
AFC	Alabama Forestry Commission
AFPA	American Forest and Paper Association
ALC	Alabama Loggers Council
ALFA	Alabama Farmers Federation
AMI	Alabama Mining Institute
ALNEMO	Alabama Nonpoint 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
APEA	Alabama Poultry and Egg Association
APPC	Alabama Pulp and Paper Council
ARA	Alabama Rivers Alliance
ARBA	Alabama Road Builders Association
ASTA	Alabama Septic Tank Association
ATA	Alabama Turfgrass Association
AWF	Alabama Wildlife Federation
AWW	Alabama Water Watch
AWWA	Alabama Water Watch Association
CRP	Chipola River Partnership
FFA	Future Farmers of America
FLDEP	Florida Department of Environmental Protection
FS	United States Forest Service
FSA	Farm Services Agency
GDNR	Georgia Department of Natural Resources
GA EPD	Georgia Environmental Protection Division
GPC	Georgia Power Company
GSA	Geological Survey of Alabama
HBAA	Home Builders Association of Alabama
HOBOs	Home Owners and Boat Owners Associations
MPD	Marine Police Division
NRCS	Natural Resources Conservation Service
SFI	Sustainable Forestry Initiative
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
UMERC	Auburn University Marine Extension Resource Center
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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

Issues and Concerns in the Subbasin:

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

Targeted Creeks: Bennett Mill Creek, McRae Creek, Abbie Creek, Sandy Creek, Ward Creek, Bryans Creek.

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP[a]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
Implement streambank fencing and identify alternate water sources for excluded cattle and other grazing animals. Implement streambank restoration projects.				
Landowners; NRCS, SWCD, SWCC, AWF ALFA	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, ALFA	Medium priority, continuous, long term	Medium to high; private/ public	Quarterly for BMP condition	Acres of implemented BMPs
Implement pastureland BMPs to reduce sediment and nutrient loading to surface waters.				
Landowners; NRCS, SWCD, SWCC, ACES, ALFA	High priority, continuous, long term	Medium to high; private/ public	Quarterly for BMP condition	Acres of pastureland implemented BMPs

LEAD AGENCY OR GROUP[a]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
Implement effective agricultural waste management systems.				
Landowners; NRCS, SWCD, SWCC, ACES, ALFA	Medium 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, ALFA, APEA	High priority, continuous, long term	Medium; private/ public	Quarterly for erosion effectiveness	Number of acres in which BMP has been implemented
Establish goals in each subwatershed, where needed, for the voluntary implementation of agricultural BMPs.				
Farming Community, FSA, NRCS, SWCD, SWCC, ALFA	Medium 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, ALFA	Medium 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, ALFA	Medium 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, ALFA	Medium priority, continuous, long term	Low to Medium; private/ public	Annual progress reports	Number of outreach events and number of groups and youth engaged

LEAD AGENCY OR GROUP[a]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
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, ALFA	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

a. Lists responsible parties/primary actors.
b. 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).
c. 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.
d. Captures the monitoring need and sets a frequency.
e. Performance indicator(s) are those measures or metrics that will indicate the degree of success in implementing the strategy.

Best Management Practices to Address the Strategies of Goal 1:

The strategies to address concerns and issues related to agricultural land use lie primarily in the implementation of BMPs focused on cropland, pastureland, streambank fencing and streambank buffers, animal waste management systems, and erosion control for gullies and critical areas. Goals and strategies that education, outreach, and recognition compliment these efforts and help to support continued implementation of the BMPs. Several 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 stop water flow and store it or guide 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 along with the provision of an alternate water source.

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.	

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.	

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 and/or spreading 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.	

There are many agricultural BMPs available to farmers and landowners today. A good review of agricultural BMPs is provided by Alabama A&M and Auburn University through their Alabama Cooperative Extension System (Hairston, *et. al.*, 2001). It describes the types of BMPs used to control nonpoint pollution in agriculture and also discusses how to select the appropriate BMP. USDA NRCS and SWCD provide technical and financial assistance for willing program participants. Several documents provide good reviews of agricultural BMPs, including the Alabama SWCC's "*Protecting Water Quality on Alabama's Farms*"; the ACES's and NRCS's "*Nutrient Management Planning for Animal Feeding Operations*".

GOAL 2: *Reduce nonpoint source pollution from forestry activities.*

Issues and Concerns in the Subbasin:

- Erosion and sediment loading from harvested forestland
- Erosion and sediment loading from logging roads
- Gully erosion on hillsides from harvested forestland

Targeted Creeks: Bennett Mill Creek, McRae Creek, Abbie Creek, Sandy Creek, Ward Creek

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, GPC, SWCD, ACES, ALFA, SFI	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 road banks to reduce sediment and nutrient loading to surface waters.				
Landowners; AFA, AFC, APPC, ALC, SWCD, ACES, county engineers, stakeholders, ALFA, SFI	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, ALFA, SFI	High 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, GPC, SWCD, SWCC, AFA, AFC, ALC, ACES, ACWP, ALFA, SFI	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

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Educate forest landowners concerning the importance of BMPs in reducing nonpoint source pollution associated with timber management.				
Landowners; AFC, AFA, APPC, ALC, ACES, ACWP, ALFA, SFI	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
Initiate and/or continue education and outreach programs with students involved in forestry activities.				
AFC, AFA, APPC, FFA, 4H, schools, SWCS, SWCD, NRCS, ACWP, ALFA	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, SFI	High 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, GPC, SFI	High priority, continuous, long term	Low; private/ public	Annual progress reports	Number of outreach efforts or events completed; number of funding sources identified

<u>Best Management Practices to Address the Strategies of Goal 2:</u>

The continued implementation of forestry BMPs within the river basin is important to reducing the sediment and nutrient loading from forested land. These BMP implementation strategies are focused on commercially forested land, in-use and abandoned logging roads, and areas of gully and critical area sediment erosion. The protection of streams, streambanks, and riparian wetlands is also crucial to enhancing aquatic systems health in the basin. The establishment and maintenance of stream buffers and wetlands in forested areas can be accomplished through stringent incorporation of forestry BMPs.

Numerous forestry BMPs are being implemented throughout Alabama that can be applied to the Chattahoochee-Chipola 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 "*Alabama's Best Management Practices for Forestry*" (Alabama Forestry Commission, 1993) and "*Georgia's Best Management Practices for Forestry*" (Georgia Forestry Commission (GFC), 1999). These documents 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. An additional resource is the Sustainable Forestry Initiative (SFI). The SFI is a comprehensive system of principles, objectives and performance measures developed by professional foresters, conservationists and scientists, which combines sustainable forestry practices with long-term protection of wildlife, plants, soil and water quality.

Strategies supportive of, and essential to, forestry BMP implementation efforts include promotion of BMP use through education, outreach, and recognition. Currently, there are several active programs run by various entities that can be used to encourage responsible forestry management. For example, information on SFI methods and BMP implementation are available through the American Tree Farm System, Alabama Loggers Council, and various specific Sustainable Forestry Initiative programs. Some groups are already active in workshops and the distribution of educational materials, including educational efforts with youth. Also, the TREASURE Forest program provides a significant mechanism for BMP promotion and stewardship recognition. For more information regarding these groups or programs and the many technical resources they provide, refer to the following websites:

- Sustainable Forestry Initiative (SFI®) Program <http://www.aboutsfi.org/core.asp>
- American Tree Farm System <http://www.treefarmsystem.org/>
- Alabama Loggers Council <http://www.alaforestry.org>
- Alabama Forestry Commission <http://www.forestry.state.al.us/>
- TREASURE Forest program <http://www.atfa.net/>

The following are additional key BMPs that address forestry:

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.

Streamside Management Zones

Streamside Management Zones (SMZs) are protective buffer strips immediately adjacent to waterways where soils, organic matter and vegetation are managed to protect the physical, chemical and biological integrity of surface waters adjacent to and downstream from forestry operations (AFC, 1999). Trees and other vegetation in the SMZ provide shade that buffers water temperatures, woody debris vital to the aquatic ecosystem, natural filtration of *sediment* and other *pollutants* (nutrients and pesticides), and travel corridors and habitat for wildlife (GFC, 1999). Management activities may occur within a SMZ provided that the disturbance to soil or ground cover is minimized. Water quality objectives should prevent movement of soil or other potential *pollutants* from within the SMZ into the watercourse and protect stream bank integrity (GFC, 1999).

Among the practices that should be avoided in SMZs are the following (GFC, 1999).

- Cutting trees.
- Constructing unnecessary access roads and main skid trails.
- Significant soil compaction and rutting by harvesting.
- Removal of ground cover or understory vegetation.
- Felling trees or leaving logging debris in streambeds.
- Servicing or refueling equipment.
- Mechanical site preparation and site preparation burning.
- Mechanical tree planting.
- Broadcast application of pesticides or fertilizers.
- Handling, mixing, or storing toxic or hazardous materials lubricants, solvents, pesticides, or fertilizers).

There is no uniform formula to determine the appropriate width of a SMZ; however, they must *always* be wide enough to maintain water quality standards. In general, the steeper the slope and more erosive the soil, the wider the SMZ should be. In no cases should SMZ be less than 35 feet however, they may be as wide as 100 feet or more if the slope perpendicular to the streambank is steep (>40%) or the soils are highly erosive. Both Alabama and Georgia provide guidance on determining the appropriate BMPs for protecting waterways in areas subject to forestry and silvicultural activities (see AFC, 1999; GFC, 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.

Streambank Stabilization

Streambank erosion is the wearing-away of soil and rock that forms 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 addition of impervious (nonporous) surfaces in the watershed, including roof tops, pavement, etc. 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.

GOAL 3: *Track resource trends through water quality monitoring in the subbasin to measure progress in restoration and protection efforts, fill in data gaps, and identify new resource concerns and issues.*

<u>Issues and Concerns in the Subbasin</u>:

- limited baseline data set for many creeks in the subbasin
- limited water quality monitoring within the watershed

Targeted Creeks: Poplar Spring Branch/Omussee Creek, Bennett Mill Creek, McRae Creek, Abbie Creek, Sandy Creek, Ward Creek, Bryans Creek

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Build on the baseline of water quality and biological integrity of the 19 creeks (HUC 12) in the subbasin by expanding citizen monitoring program in the subbasin.				
AWW, ACWP, ADEM, universities, schools, ARA, AWW	High priority, continuous, long term	Low; private/ public	Monthly physical and chemical data collection; annual progress reports	Measures of turbidity, dissolved oxygen, temperature, chlorophyll a, nutrients
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.				
ACWP, ADEM, watershed groups, ARA, AWW, universities, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of sites monitored; percent of creek miles monitored
Expand biological monitoring to regularly assess aquatic integrity of the priority creeks with existing baseline information and those with imperiled aquatic species.				
AWW, universities, ACWP, ADEM, USFWS, GDNR, GSA, USGS	Medium priority, continuous, long term	Medium; public /private	Quarterly monitoring	Species richness, composition, tolerance; habitat quality

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Target monitoring to §303(d) streams (if present) and other priority subwatersheds to track management progress over time. Document trends in water quality.				
AWW, ACWP, USGA, GSA	High priority, continuous, long term	Low; private/ public	Monthly physical and chemical data collection.	Measurements of turbidity, dissolved oxygen, temperature, chlorophyll a, nutrients
Monitor impervious surface cover/land use on watershed basis.				
Universities, counties, ACWP, USGS, GSA, SWCC, ACES, ADEM	Medium priority, continuous, long term	Medium; private/ public	Annual GIS layer update (based on aerial photography or field surveys)	Impervious surface cover over time (as percentage of subwatershed)
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.				
ACWP, ADEM, AWW, watershed groups, ARA	High priority, continuous, long term	Low; public	Annual implementation progress reports	Number of plan implementation projects supported by monitoring data

Best Management Practices to Address the Strategies of Goal 3:

Monitoring plans are developed to track resource conditions over time. Monitoring should focus on "metrics" or measurable "indicators" such as fecal coliform bacteria concentrations or total suspended solids (TSS). Typically, a watershed group sets targets for the desired conditions of a water body then performs long term monitoring to track selected metrics. Discrepancies between existing and desired resource conditions, as measured by the metrics, are identified along with their probable cause and a plan is established and implemented to address the discrepancies. Monitoring is a long term task and should continue throughout the implementation of any initiative to track its success. This information ultimately functions as a report of progress (or lack thereof) and should inform future planning and management decisions.

Federal and state agencies, universities, and citizen volunteers monitor the water resources of the subbasin. Water quality data is collected primarily by ADEM, Alabama Water Watch groups, and entities, such as utilities, industries, and interest groups that hold permits for wastewater discharges in the subbasin. Collectively, these groups generate the water quality data for the creeks of the subbasin.

ADEM is responsible for the lion's share of water and natural resource monitoring in the subbasin [and throughout Alabama]. Six programs make up ADEM's regular monitoring effort: Nonpoint Source Assessment Program; Point Source Assessment Program; Ecoregion Reference Assessment Program; Upland Alamap Monitoring and Assessment Program; Clean Water Act §303(d) Support Assessment/Monitoring Program; and Fixed Ambient Trend Monitoring Program.

Alabama Water Watch works with many citizen monitoring groups throughout the state. However, there are no active volunteer water quality monitoring groups in this subbasin. Historically, the Omussee Creek Group monitored several locations throughout the subbasin (Table 6-7). Additional information about this group is provided in the *Citizen Guide to Alabama Rivers, Chattahoochee and Coastal Plain Streams* (Hartup & Deutsch, 2003).

Table 6-7. Alabama Water Watch Groups in the Lower Chattahoochee River Subbasin

GROUP ABBREVIATION	GROUP NAME	DATE ESTABLISHED	WATERBODY MONITORED	LAST DATA COLLECTION DATE	ACTIVE
OMUSEE	Omusee Creek Group	2/23/1998	Bentwood Springs White Branch Spivey Mill Creek Cedar Branch Omusee Creek Poplar Springs Branch Beaver Creek Branch Stevenson Branch	8/25/1999	No

Source: AWW, 2006

Water quality monitoring is an important component in determining whether goals are being achieved. While the performance indicators listed in this Plan are important measures for determining implementation success, restoration success is measured by field 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 strategic monitoring sites are being assessed.

As BMPs are 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 be necessary to monitor a large number of sites in a subwatershed where BMPs are implemented before water quality improvements can be observed in field data. Monitoring commitments should be established over the long-term, targeting specific watersheds included in monitoring plans.

Biological monitoring and land use assessments (*e.g.*, determining impervious surface cover) can be labor intensive and require specialized knowledge and skills. Monitoring has become more complicated as USEPA has implemented tighter quality assurance protocols for sampling (if it is to be used by the states for documenting water conditions). Thus, some monitoring strategies are better left to the universities to complete since volunteers can not be expected to handle all of the monitoring responsibilities required. Further, ADEM and USEPA will only accept ADEM monitoring results for the purposes of listing or delisting an impaired stream.

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

Issues and Concerns in the Subbasin:

- soil erosion and sedimentation from roads and road banks (especially new and/or unpaved roads)
- gully erosion

Targeted Creeks and Watersheds: Bryans Creek and Creeks in and around the City of Dothan (Upper Omusee Creek, Golf Creek, Middle Omusee Creek, Spivey Mill Creek, Stevenson Creek, Hurricane Creek, Lower Omusee Creek)

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, roadside ditches, and road banks that reduce erosion and protect water quality. Address gullies that have developed from improper road drainage.				
County engineers, public works departments, local governments, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	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 road banks 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, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	Medium priority, continuous, long term	Medium; public	Annual report on improvements	Miles of paved roads where road bank improvements have been made
Implement recommended construction practices for new roadways and road banks, 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, ALDOT, home builders associations, HBAA, SWCD, NRCS, AGC, ARBA, ABBA	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

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Identify and rank unpaved roads in the subwatersheds that contribute most to sediment loading to surface waters.				
County engineers, public works departments, local governments, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	Medium priority, continuous, long term	Low; public	Periodic updates on ranking of needs in subwatersheds	Percent of unpaved roadways in watershed
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, ALDOT, SWCD, NRCS, AGC, ARBA, ABBA	Medium priority, continuous, long term	Low; private/ public	Annual progress reports	Number of outreach efforts, workshops, or educational projects completed; number of groups engaged

Best Management Practices to Address the Strategies of Goal 4:

Unpaved roads, road improvement projects and eroding road banks are commonly recognized sources of nonpoint pollution, especially due to soil loss and sedimentation. The implementation of BMPs and recommended maintenance practices for unpaved roads are the solutions for reducing this load. The Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority (2000) published an excellent guide for improving unpaved roads and reducing their environmental impacts. This guide, titled *"Recommended Practices Manual – A Guideline for Maintenance and Service of Unpaved Roads"*, is available at: <http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/ResourceMat/unpavedtxtonly.pdf>.

Important urban watershed protection principles include "better site design", which is an approach to residential and commercial development that uses innovative site planning techniques to reduce the amount of impervious cover and stormwater runoff. It aims to accomplish three goals at every development site 1) reduce the amount of impervious cover, 2) increase natural lands set aside for conservation, and 3) use pervious areas for more effective stormwater treatment. A handbook detailing better site design principals has been published by the Center for Watershed Protection (CWP,1998). The CWP provides a slideshow on their website that outlines some specific techniques for applying watershed management tools and highlights key choices a watershed manager should consider when applying them <http://www.stormwatercenter.net/Slideshows/8tools%20for%20smrc/sld001.htm>. The CWP also maintains the Stormwater Manager's Resource Center website <http://www.stormwatercenter.net/>, which is targeted towards *"stormwater practitioners, local government officials and others that need technical assistance on stormwater management issues"*. It provides a good overview of better site design techniques including alternative pavers, alternative turnarounds, open space design, green parking, and narrower residential streets.

Educational outreach and workshops are fundamental to promoting the implementation of these BMPs and practices. ADEM and ALDOT play an important role in working with the development community including the Home Builders Association of Alabama, and other homebuilders and construction companies. Coordination with county engineers and governments is an important component of this outreach.

Road Bank Ditch Design and Maintenance

Efficient disposal of runoff from roads helps preserve roadbed and banks. Well-vegetated ditches act to slow, control, and filter runoff. This provides an opportunity for sediments to settle-out before runoff enters surface waters. Ideally, "turn-outs" (intermittent discharge points also called "tail ditches") will help maintain stable velocity and proper flow capacity within the road ditches by timely discharging of water. This helps 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 grow with time and continue down-cutting until resistant material is reached, expanding 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 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.

Unpaved Road Design and Maintenance

If not properly designed and maintained unpaved roads can contribute heavily to water quality problems. The most important factor in proper road management is managing runoff, or drainage. Priority should be given during road development to nonstructural BMPs that minimize the creation of new runoff, limit erosion, and protect the health of waterways. Examples of nonstructural BMPs include maintaining natural buffers and drainage ways that are stable and well-vegetated. Natural vegetation will help infiltrate runoff, reduce the velocity of the runoff, and help remove sediments in the runoff. Also, the creation of steep slopes should be avoided unless effective stabilization methods are employed. Surface water that is not effectively conveyed from the road surface to a drainage channel can result in deterioration of the road surface and leads to various erosion problems, thus, proper road construction and maintenance is essential. General road surface principles include preserving and maintaining a proper road crown for good drainage, keeping the road surface tight and impervious, and performing regular drainage maintenance and grading. Appropriately installed and maintained ditches, culverts, bank stabilization methods, and outlet structures that reduce water velocity are also required to ensure adequate drainage for unpaved roads.

GOAL 5: *Reduce nonpoint source pollution from urban and residential areas.*

Issues and Concerns in the Subbasin:

- nutrient and pathogen loading due to improperly maintained or failing septic systems and sewage treatment facilities
- soil erosion from new road construction
- soil erosion and sediment loading from urban development, including land clearing, construction activities, and impervious surfaces
- stormwater runoff – bacteria and toxins

Targeted Creeks: Bryans Creek and Creeks in and around the City of Dothan (Upper Omusee Creek, Golf Creek, Middle Omusee Creek, Spivey Mill Creek, Stevenson Creek, Hurricane Creek, Lower Omusee Creek)

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Work with municipalities to implement urban BMPs and environmentally friendly stormwater management policies and ordinances to reduce stormwater runoff and promote infiltration areas such as wetlands, buffers, and bioretention basins. 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	Medium 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
Work with cities to 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, ALNEMO, AAGC	Medium priority, continuous, long-term	Medium to high, private/ public	Annual report on progress	Number of urban BMP demonstration projects and tours
Encourage responsible site design for new residential and commercial construction.				
Local governments, ADEM, USACOE, SWCD, HBAA, ALNEMO, SWS, ACWP, ACES	High priority, continuous, long-term	Low to medium, public	Annual report on progress	Number of new developments with low impact development techniques.

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote outreach with commercial landscapers about ways to reduce nutrient pollution in surface runoff and ground water infiltration from fertilization.				
Commercial landscapers, ANLA, ATA, ACES, ADEM, NRCS, SWCD, ACWP, ALFA	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, ALNEMO, 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, ACWP, ALNEMO	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/low impact development techniques on their sites.				
Developers, county planners, municipalities, stormwater permit holders, home builders associations, building and industry associations, HBAA, SWCD, NRCS, ACWP, AAGC, ADEM, ACES	Medium priority, continuous, long term	Low; private/ public	Annual report on progress	Number of developers and contractors recognized
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, HBAA	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

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Identify areas with significant impacts such as overflows, failures, and nutrient loading, from onsite sewage disposal systems (OSDSs) . Promote improvements 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 identified/ 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 location, installation, operation, and maintenance through OSDS workshops.				
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

<u>Best Management Practices to Address the Strategies for Goal 5:</u>

As urban centers expand, the effects of increased development on surface and ground waters also need to be considered. Sediments, nutrients, pathogens, and toxics can enter surface and ground waters through storm water runoff that originates from construction sites, business developments, and residential communities. Reductions in contaminant loading can be made on several fronts to deal with nutrient, bacteria, sedimentation, and solid waste pollution typical of urban areas (Table 6-8).

Table 6-8. Management Options for Addressing Water Pollution in Urban Areas

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	

Source: CH2MHILL, 2005

Because urban development can have such severe effects on water quality, environmentally sensitive or low-impact development is essential in protecting and enhancing hydrologic systems in urban areas. Low Impact Development (LID) is a new, comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds. LID practices aim to reduce floods in developed areas, reduce storm water storage requirements, improve water quality of runoff, and help maintain and restore fish habitat. When implemented properly, LID allows for developmental growth with minimal environmental effects. More information on LID is available on the USEPA website at <http://www.epa.gov/nps/lid/>.

To reduce the quantity and improve the quality of stormwater runoff, stormwater management BMPs and management protocols should be pursued. Stormwater pollution is likely to occur when construction and development companies are not diligent during land clearing, road building, and construction work, thus, education regarding BMPs implementation and enforcement of their use is essential. Where feasible, innovative stormwater management approaches such as the use of constructed and natural wetlands for water treatment can be implemented. Finally, the incorporation of pervious surfaces during new construction should be also fostered as well as retrofitting of existing impervious surfaces.

Many of these measures are promoted on an industry-wide basis by the Home Builders Association of Alabama. They offer a Qualified Credentialed Inspection Program Certification (QCIP) to their membership that identifies the builder as possessing a working knowledge of environmental BMPs for the development process. More information on QCIP can be found online at HBAA's website <http://www.hbaa.org/pdf/qci_brochure.pdf>.

The nutrient and pathogen loading from improperly functioning onsite sewage disposal systems (OSDS) can have severe impacts on surface waters. Volunteer bacteriological water monitoring (trained through AWW) can help to identify areas of failing or leaking systems. If problems are detected, watershed groups can work with the local health departments to identify areas with significant impacts from overflows or failures. Watershed groups can also promote education of homeowners on regular pumpouts of septic tanks, and nutrient and bacteriological problems from leaking and failing onsite systems through educational workshops and materials.

Improvements to these identified OSDSs can be pursued through monitoring, education and outreach, and incentives. Alternative onsite sewage treatment system demonstration projects may be needed in some instances, especially in areas of dense development, poor soil drainage, and areas adjacent to sensitive water resources.

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 that is transported through small diameter sewer lines to a local treatment facility. Treatment using a decentralized wastewater system is typically accomplished by using effective attached growth biological processes that treats the effluent on-site. The treated effluent is dispersed or reused via in-ground methods. If properly managed (sited, designed, maintained), decentralized systems are capable of treating wastewater to a high level of quality. 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 underground injection control (UIC) permits for systems with capacities greater than 10,000 gpd and by ADPH for systems of lesser capacities. More information on proper management and community planning for decentralized wastewater systems is provided on USEPA’s website at <www.epa.gov/owm/onsite>.

The basis of the education and outreach strategies involves demonstration projects and workshops that educate citizens, landowners, and the building and industrial community of the need to incorporate BMPs and green initiatives. Educating the construction and development industry in proper utilization of BMPs in land clearing, road building, and construction work would facilitate responsible development. To foster a proactive environment and encourage coordination among entities, public recognition of builders that incorporate initiatives beyond measures required by law, perhaps by the Clean Water Partnership and watershed organizations, may be worth considering. Additional outreach opportunities include educating landscapers on the impacts on nutrient loading in surface and ground water from improper fertilization, and instructing homeowners on environmentally friendly solutions to address hazardous waste disposal, water conservation, lawn care and fertilization, and septic system maintenance. Coordination with municipal and county engineers, planners, and governments is also an important component of this outreach.

Excellent reference materials and technical assistance regarding nonpoint source pollution, and implementation of urban and stormwater BMPs are available from various agencies and entities. Documents that provide guidance on minimizing sediment and water quality impacts from urban development include the following:

- Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas. Published by Alabama SWCC June 2003. Available at <http://www.swcc.state.al.us/erosion_handbook.htm>.

- "How To" Guide for Stormwater and Urban Watershed Management. Published May, 2000 by Troy State University. Available at <http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/ResourceMat/StrmwtrPhaseIIMan.pdf>.

- Best Management Practices Manual published by the City of Knoxville, TN. Available at <http://www.ci.knoxville.tn.us/engineering/bmp_manual/>.

There are also a number of programs and cooperative efforts among various entities aimed at providing education regarding the impact of land use on water resources. They include the following:

- Business Partners for Clean Water (BPCW)

  BPCW is a cooperative effort between local businesses, ADEM, and ACWP designed to give businesses the information they need to comply with water quality laws and to recognize businesses that take voluntary steps to protect local streams and lakes. ADEM provides educational information regarding NPS pollution and water quality management to specific business sectors, such as construction, landscaping, automotive, building maintenance, and food-related businesses. Information and technical assistance is tailored to educate each business sector on NPS pollution, their unique contributions to it, and solutions for reducing those contributions. In return, businesses are formally recognized as being environmentally friendly if they prepare a simple pollution prevention plan that is approved by their city, in conjunction with ADEM. An informative brochure is available at <http://www.adem.state.al.us/Education%20Div/TakeAction/Brochures/BPCW.pdf>.

- Alabama Nonpoint source Education for Municipal Officials (ALNEMO)

  ALNEMO (Nonpoint source Education for Municipal Officials) is a program for educating elected and volunteer municipal officials about the impacts of land use on water quality and about the options available for managing those impacts. ALNEMO uses geographic information system (GIS) and remote sensing technology as educational tools in its promotion of environmentally sound land use planning efforts, and is focused on local land use decision makers as the primary target audience (Alabama State Water Program, 2006). More information on ALNEMO can be found at <http://www.aces.edu/waterquality/nemo/intro.htm>.

  Among the valuable educational resources provided by this program and website are comprehensive documents regarding natural resource based planning, Green Site Designs, and structural best management practices and restoration. These documents describe a watershed approach to site planning, that examines new ways to reduce pollutant loads and protect aquatic resources through non-structural and structural practices and improved construction site planning. They provide insight into the importance of imperviousness, watershed-based zoning, concentration of development, headwater streams, stream buffers, green parking lots, and other land planning topics. The NEMO National Site, found at <http://nemo.uconn.edu/>, is a useful resource with examples of how other states are working with local officials on issues of nonpoint source pollution.

Raingardens are a type of landscaping used to treat stormwater before it reaches local waters. When it rains, pollutants like oil, pet waste, clay, and excess pesticides may wash into our streams, rivers, and lakes. These pollutants can harm aquatic life and make our waters less desirable for activities like swimming, fishing, and boating. Rain gardens are shaped like bowls in order to catch stormwater for mini-processing. More information on constructing raingardens can be found at <http://www.raingarden.org/>.

Several demonstration projects were constructed at locations around Alexander City, Alabama. The demonstration rain gardens were the result of collaboration among the Middle Tallapoosa Clean Water Partnership, City of Alexander City, AU Landscape Architecture Department and Alabama Cooperative Extension System. The gardens can be viewed at <http://www.aces.edu/waterquality/nemo/alex.htm>.

- Center for Watershed Protection (CWP)

  The CWP is a non-profit corporation that provides local governments, activists, and watershed organizations around the country with the technical tools for protecting the nation's streams, lakes and rivers. The Center has developed and disseminated a multi-disciplinary strategy to watershed protection that encompasses watershed planning, restoration, research and training; stormwater management; better site design; and education and outreach. More information can be obtained at <http://www.cwp.org/mission.htm>.

- Smart Growth

  Smart Growth is a design principle for land use planners to combat the issues that go along with the increasing urban sprawl. Smart Growth not only deals with environmental issues, but also targets concerns such as community quality of life, economics, design, health, housing and transportation. Like NEMO, Smart Growth principles include natural resource based planning and protection. More information on Smart growth can be found at <http://www.SmartGrowth.com>.

- Alabama Clean Water Partnership (ACWP)

  The ACWP is a coalition of public and private individuals, companies, organizations and governing bodies working together to protect and preserve water resources and aquatic ecosystems throughout the state. The purpose of the ACWP is to bring together representatives of these groups to coordinate their individual efforts, share information and plan more effectively for protection and preservation. Their website is located at <http://www.cleanwaterpartnership.org/>.

- "National Management Measures to Control Nonpoint Source Pollution from Urban Sources" Guidance Document
  In January 2006, the USEPA distributed this "*technical guidance and reference document for use by State, territory, and authorized tribal managers as well as the public to implement NPS management programs in urban settings*." It *"contains information on the best available, economically achievable means of reducing nonpoint source pollution that can result from activities in urban areas."* It also "*provides background information about NPS pollution related to urban areas and activities, assessing and addressing water quality related problems on a watershed level, and up-to-date technical information about how to reduce urban NPS pollution."* Copies of this guidance document are available at the National Center for Environmental Publications (1-800-490-9198 or at <http://www.epa.gov/ncepihom/>. Request Publication #EPA 841-B-05-004.

GOAL 6:	*Reduce nonpoint source pollution from mining activities*
	Issues and Concerns in the Subbasin: • sediment loading from sand and gravel pits • mining and excavation impacts on surface waters
Targeted Creeks: Abbie Creek, Sandy Creek, Ward Creek	

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote 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, ADIR	High 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

Best Management Practices to Address the Strategies of Goal 6:

Resource extraction is a nonpoint source category, as defined by the USEPA, as it can contribute to the degradation of surface waters. Identified by ADEM in surface water assessments as a potential source of sediment in the subbasin, resource extraction includes sand and gravel mining. Contamination of streams can occur from sand and gravel mining at times of heavy or sustained rainfall, mining too close to streams, and from the gravel washing processes. Good management practices should be followed in order to keep nonpoint source pollution at a minimum. In Alabama, runoff from surface mining activities are regulated and enforced through the permitting and inspection process by ADEM.

The Alabama Department of Industrial Relations (ADIR) is responsible for surface mining of non-fuel relation minerals**.** This program ensures that lands mined for non-fuel minerals are reclaimed in accordance with state law. Examples of non-fuel minerals that are currently mined in this basin include sand, gravel, and bauxite. ADIR issues mining permits, ensures that mine sites are properly bonded for reclamation purposes, and makes periodic inspections.

GOAL 7: *Protect and restore aquatic habitat and aquatic species diversity.*

Issues and Concerns in the Subbasin:

- wetland and aquatic habitat destruction due to road construction and land development
- loss of fish and mussel species diversity
- eutrophication of reservoirs
- loss of stream buffers

Targeted Creeks: Creeks in and around the City of Dothan, Upper Omusee Creek, Golf Creek, Middle Omusee Creek, Spivey Mill Creek, Stevenson Creek, Hurricane Creek, Lower Omusee Creek

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Identify subwatersheds and stream segments with habitats of exceptional quality and high aquatic species diversity, and target parcels for acquisition or conservation projects.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, FLDEP, GSA, GDNR, TNC, Forever Wild, Land Trust Organizations	High priority, continuous, long term	Medium; public	Biennial report of rankings and priorities	Basinwide prioritizations of stream segments and habitats, supported by participants
Identify the specific causes for the loss of fish and mussel species diversity in targeted stream segments, and prioritize restoration and BMP projects to reduce those land use impacts.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, FLDEP, GSA, GDNR, USACOE, TNC	High priority, continuous, long term	Medium; public	Biennial report of targeted streams, causes for diversity losses, and restoration and BMP projects	Basinwide prioritizations of targeted streams and projects, supported by participants

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Implement habitat restoration and BMP projects that will target specific causes for the loss of fish and mussel species diversity in the priority stream. Identify funding programs and mechanisms that support these projects.				
USFWS, ANHP, ADCNR, SWCD, NRCS, ADEM, AWF, TNC, ACWP, FLDEP, GSA, GDNR, USACOE, ACWP, TNC	High priority, continuous, long term	High; public/ private	Annual report of restoration and protection progress; monitoring of fish and mussel species	Acres of habitat protected; acres of habitat restored; increases in species diversity metrics
Pursue habitat protection initiatives through acquisition and easement mechanisms, utilizing grant and assistance programs for these purposes. These mechanisms include Environmental Quality Incentives Program (EQIP), Wetlands Reserve Program (WRP), Conservation Reserve Program (WHIP), Forever Wild and Partners for Wildlife (USFWS).				
USFWS, ANHP, ADCNR, SWCD, NRCS, Forever Wild, Land Trusts, TNC	High priority, continuous, long term	High to medium; public/ private	Annual report of habitat protection progress	Acres of habitat protected

<u>Best Management Practices to Address the Strategies of Goal 7:</u>

Alabama's diversity of freshwater mussels is greater than anywhere else in the world with some of this diversity present in the Lower Chattahoochee subbasin. Losses in species diversity and of rare and endangered species have been attributed to aquatic habitat alterations, including flow modifications from dams and navigation projects, river channel dredging and channelization, sand and gravel mining, the loss of riparian buffers, access of livestock to streams, and other nonpoint sediment sources.

Habitat restoration and 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* and the recovery plan for federally listed mussel species that occur in the subbasin (USFWS, 2003), and will be coordinated with the ADCNR's and GDNR's wildlife conservation plans, for consistency.

GOAL 8:	*Improve shoreline recreation management on the Chattahoochee*
	Issues and Concerns in the Subbasin: • erosion from boating traffic • dumping trash from boats • boat ramp litter problems • oil, gas, and sewage discharges from boats • introduction of invasive aquatic species
Targeted Creeks: None identified.	

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Work with the ADCNR, ADEM, the Alabama Marine Police Division, the U.S. Coast Guard, and watershed groups to reduce pollution from recreational boaters by increasing awareness of Alabama's Clean Waters Initiative.				
ADCNR, ADEM, USCG, USACOE, MPD, ACWP, HOBOS, and marina operators, AUMERC, watershed groups	Medium priority, continuous, long term	Low; public	Annual progress reports	Reduction in complaints
Work with the ADCNR, USACOE, the Alabama Marine Police Division, GDNR, and FLDEP to identify the probable causes of and solutions for shoreline erosion.				
ADCNR, ADEM, USCG, USACOE, MPD, ACWP, HOBOS, and marina operators, ADEM, Clean Marina Program, and watershed groups	Medium priority, continuous, long term	Low; public	Annual progress reports	Reduction in complaints

Best Management Practices to Address the Strategies for Goal 8:

There is a regulatory framework that addresses management of lakefront shorelines, boater behavior, and NPS pollution originating from boating. Watershed associations can play a key role in supporting these regulations by promoting education of boaters, shoreline residents, and commercial entities utilizing the shoreline (*e.g.*, marinas) regarding the impacts of their actions, ways to avoid or mitigate the effects of those actions, and existing regulations.

A formalized strategy to address these concerns can be established via a committee or working group, with representation of those with concerns and those that can address them. Critical first steps to devising a comprehensive management strategy are to 1) better define the problems or issues, and 2) identify their likely sources. For example, many factors can contribute to shoreline erosion – wakes from recreational boats are only one factor. Other factors may include topography, soil type, fetch, vegetation cover, water level fluctuations, current river load, commercial boat traffic, and existing shoreline uses. It is important to identify the primary cause(s) of shoreline erosion prior to expending valuable resources to address the issue.

Boater-generated impacts to water quality can be grouped into four general categories: toxic metals, oil and gasoline, solid waste and debris, and bacteria and nutrients. Toxic metals can originate from anti-fouling paints used on boat hulls; oil and gasoline are generally from boat operation and maintenance activities; solid waste and debris can come from intentional and unintentional overboard disposal of material; and the source of bacteria and nutrients can come from improper direct sewage disposal from boats. Boat traffic (including personal watercraft) through shallow-water areas and in near shore areas at wake-producing speeds can also result in resuspension of bottom sediment, uprooted submerged aquatic vegetation, eroded shorelines, and harm to some animals. Again, proper identification of the source is a key component of developing a plan to adequately address the issue.

Once the issues are defined and their sources identified, watershed associations are encouraged to learn the regulatory framework that is currently in place for addressing these issues, and identify methods to supplement and/or promote knowledge of them.

Boating Regulations

The Alabama Marine Police Division is responsible for promoting responsible use of resources on Alabama's waterways, including enforcement, education and community activities. In Alabama, boaters are prohibited from operating vessels in violation of any established speed zone or in a reckless manner.

In Georgia, the Department of Natural Resources Law Enforcement has responsibility for enforcement of boating regulations. In Georgia, state boating regulations restrict vessels to idle speed within 100 feet of shoreline next to a residence, public park, public beach, public swimming area, marina, restaurant, or other public use area.

Toxic Material Regulations

USEPA regulations address the proper use and disposal of toxic materials used by recreational boaters.

Sewage Disposal Regulations

Alabama's Clean Boating Act addresses direct sewage discharges from recreational boats. ADEM provides informational brochures on the Act, which authorizes inspections of marine sanitary devices and requires all marinas with boat customers that use marine sanitary devices with holding tanks to install a boat sewage pump-out system.

Shoreline Management

Although not a recreational issue, shoreline management and development activity may also contribute to shoreline erosion. The USACOE is the agency responsible for managing shoreline development in connection with private use of public lands by landowners adjacent to its lakes. Such development typically includes boat docks, utility lines, walkways, *etc.*, and may also include shoreline erosion control measures such as seawalls. GPC is responsible for managing and permitting similar developments at its hydroelectric projects. Information on shoreline management for GPC's hydroelectric projects can be obtained from GPC's Land Management Office (1-888-472-5253). Both the USACOE and GPC support responsible shoreline development and provide information on acceptable development methods designed to minimize shoreline erosion.

Shoreline Erosion

With respect to shoreline erosion, watershed associations can work collaboratively with boats and anglers, shoreline homeowners, commercial operators such as marinas, Alabama Marine Police, USACOE, Georgia Power and the U.S. Coast Guard, to identify and address problems and problem areas. Stakeholder concerns have centered on boat traffic on Lake Harding and at boat ramps. Watershed groups can petition state agencies for the creation of no-wake zones in waters adjacent to eroding shorelines, and can support state educational efforts by providing additional access to state-provided boater education materials. Watershed groups may also arrange for agency staff to participate in public speaking engagements in an effort to distribute additional educational information regarding the forces of wave action on shorelines.

Water Quality Education

Watershed associations can focus on education and outreach efforts to promote awareness of existing regulations, to promote environmental awareness, and to promote voluntary use of BMPs and responsible behavior by public users. To address direct discharges from boats, ADEM provides informational brochures on the Alabama Clean Vessel Act (CVA). The act authorizes inspections of marine sanitary devices and requires all marinas with boat customers that use marine sanitary devices with holding tanks to install a boat sewage pump-out system. The use and expansion of pump-out facilities by boaters should be promoted, and can be aided by funding from Alabama's CVA Program. Since 1993, the CVA program has awarded more than $500,000 to marinas to install boat sewage pumpout stations. Eligible marinas can get reimbursed for 75% of the investment of a station by applying to the Alabama Department of Environmental Management. More information regarding Alabama's Clean Vessel Act Program can be obtained from the ADCNR website <http://www.outdooralabama.com/boating/clean-waters/>.

Alabama-Mississippi Clean Marina Program

There are several programs that address direct discharges from boats. Marina operators can become part of the Alabama-Mississippi Clean Marina Program (AUMERC) which recognizes marinas that promote sewage pumpouts, fuel spill controls, solid waste management, vessel cleaning and repair, and stormwater management and erosion control. Sewage pumpout and expansion of pump-out facilities for boaters can also be promoted, and can be aided by funding from the CVA program. More information can be found at <http://www.masgc.org/cleanmarinas>.

Proper fish cleaning/disposal

GOAL 9: *Promote watershed and community stewardship through resource education, outreach and the promotion of volunteer opportunities throughout the watershed.*

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote participation and membership in the subbasin committee and establish watershed groups or action teams for key subwatersheds.				
ACWP, ADEM, watershed groups, ARA, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Promote the implementation of the Chattahoochee 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).				
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, SWCDS, AFA, Legacy	Medium priority, continuous, long term	Low; public	Annual progress reports	Number of educational programs and schools involved
Promote river clean-ups throughout the subbasin.				
ACWP, ADEM, watershed groups, ARA, AWW, APCO, USACOE	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, AWW, news outlets	High priority, continuous, long term	Low; public	Annual progress reports	Number of events and publicized mechanisms utilized for promotion

Best Management Practices to Address the Strategies of Goal 9:

The successful implementation of this Basin Management 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 should be made to increase watershed stakeholder involvement in organized watershed associations. Regional and subwatershed organizations that are functionally active are an immediate need.

Later in this chapter, a more-detailed Information and Education component is discussed to lay the groundwork for implementing a watershed outreach campaign. Financial strategies are discussed in Chapter 8. It is recommended that additional grant monies be secured and utilized to foster the establishment and participation in these regional watershed groups. Strong leadership should be identified and efforts should be focused from the beginning to develop momentum for implementing the plan.

GOAL 10: *Promote watershed management technology transfer across industries and across state lines of Alabama, Georgia, and Florida. Coordinate watershed assessment, planning, restoration and conservation efforts between subbasin and basin stakeholders in all three states.*

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote watershed management technology transfer across industries, and promote the integration of watershed management techniques in restoration projects.				
ACWP, ADEM, agencies/organizations representing land use industries, watershed groups, ADCNR, SWCD, NRCS	High priority, continuous, long term	Low; public	Annual progress reports on transfer and integration efforts	Number of meetings and workshops, number of participants, number of industries represented
Coordinate watershed planning, restoration, and conservation projects between Alabama, Florida, and Georgia, recognizing hydrologic connections and impacts on restoration success.				
ACWP, ADEM, ADCNR, CRP, watershed groups, SWCD, USFWS, FLDEP, GADNR, FS, TNC, ANHP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated projects
Promote the coordination of water quality and biological monitoring between Alabama, Georgia and Florida, particularly with respect to impaired lakes and streams.				
ADEM, ACWP, CRP, FLDEP, GA EPD, GDNR, watershed groups, USGS, GSA, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated monitoring programs

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote the coordination of Clean Water Act Section 303(d) TMDL activities between Alabama, Georgia and Florida on streams where impairment impacts cross the state line. Joint TMDL development should be considered in this river basin.				
ADEM, FLDEP, GA EPD, GDNR, USEPA, watershed groups, ACWP, CRP, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on coordination efforts	Number of coordination meetings and workshops, number of coordinated monitoring programs
Promote and publicize the coordination efforts between Alabama, Georgia and Florida on the Chattahoochee River Basin. Develop web-based and printed media coverage, and utilize the news media, to promote these coordinated efforts at restoration and conservation.				
ACWP, ADEM, CRP, FLDEP, GA EPD, watershed groups, AWW, news outlets, FDEP	Medium priority, continuous, long term	Low; public	Annual progress reports on promotion efforts	Number of events and publicized mechanisms utilized for promotion

<u>Best Management Practices to Address the Strategies of Goal 10:</u>

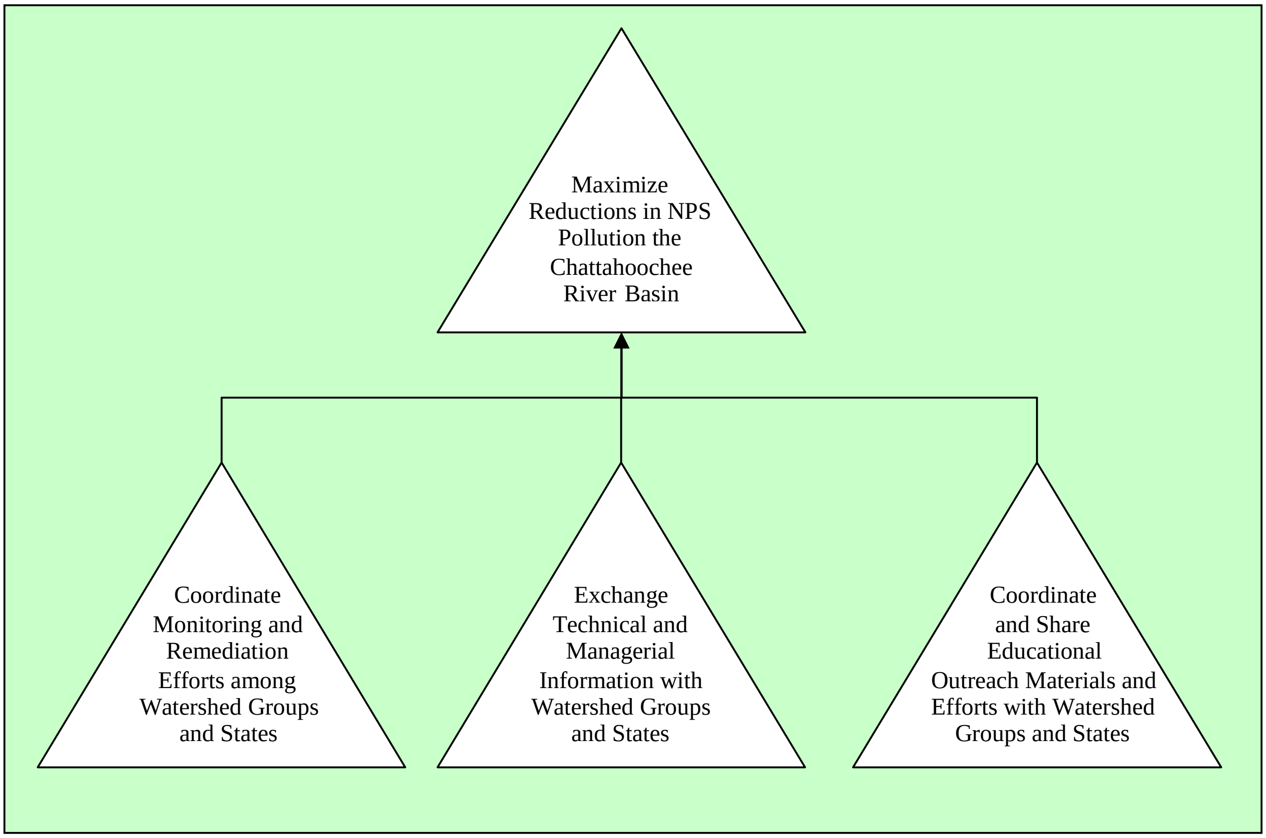
The successful implementation of this River Basin Management Plan is directly dependent on the involvement and commitment of watershed stakeholders and all the agencies and organizations identified in this Plan. The first two strategies listed above are critical for moving this Plan forward to implementation.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

Stakeholder-based watershed management groups often compete against each other in securing scarce grant monies that are used to support public education, water quality monitoring, and mitigation for reducing nonpoint source pollution. One of the best ways to increase the efficiency of these efforts is through sharing of management technologies and efforts across stateliness and among watershed management groups. Collaboration between groups will result in efficient use of scarce resources (*e.g.*, grant monies), greater economies of scale (*e.g.*, sharing public education materials), and quick transfer of new information – all of which can supercede political boundaries.

The strategies for achieving this goal can be consolidated into three primary efforts that include:

- coordination of monitoring and remediation efforts;
- exchange of technical and managerial information; and
- coordination and sharing of public outreach and educational material.

Figure 6-2. Coordination of Effort and Resources Can Increase Efficient Use of Scarce Resources



Success will be dependent on each watershed association's ability to communicate and foster an atmosphere of communal effort between and within associations and industry. Methods of coordinating and managing monitoring and remediation efforts can include development of a common database for tracking basin-wide monitoring efforts; cooperative planning among watershed groups in securing grant monies for monitoring and remediation; and sharing of lessons learned, information sources, and material resources for remediation projects.

The exchange of technical and managerial information between watershed management groups and industries can be facilitated in a variety of ways. For example, watershed groups and industries within a subbasin or within a basin can establish periodic meetings or conferences, with an established agenda designed to share new information. If this effort is too costly, it may be possible to "tag along" at another organization's conference, and establish your own subbasin meeting on the side. At these meetings, establish subcommittees to address and work out ways for joint TMDL development and monitoring. Another example is to encourage participation from universities and colleges. These institutions tend to have access to new technologies that may be beneficial to watershed groups and industry. They also have a ready source of potential staff and volunteers for research projects for which grants can be obtained. Further, their information is shared in a forum that reaches a much broader audience than the individuals within a watershed group, and therefore, can bring a broader range of information and experience to the table. A third method for exchanging information between groups and industry is to collaborate on newsletters and/or websites at the subbasin or basin level to create a clearing house for information. This results in a sharing of information among a broader geographic audience, allowing groups to capitalize on each other's work. Alternately, ADEM has initiated the NPS News, a news bulletin detailing NPS-related projects and information throughout the state. This bulletin is available online from the Nonpoint Source Program. Submission of articles is encouraged.

Coordination and sharing of public outreach and educational materials could include working with other watershed organizations to divide up the creation of outreach materials as well as asking industry to participate by sharing desktop publishing and/or publications, website links, funding, and guest speakers. Invite the media to attend subbasin or basin-wide meetings. Join efforts, and send prepared press releases to the media detailing successes, in restoration and conservation projects, ongoing or new monitoring efforts and new alliances, and always, provide contact information. Collaborate on newsletters and websites. Sharing these tasks require less effort for an individual watershed group, and can result in distributing more information to a wider audience. In addition, it is much more efficient to have one larger website with quality information than multiple websites that a user must jump back and forth between.

Familiarity with the studies and plans produced by other watershed groups may also be helpful. For example, the types and percentages of land uses occurring in the Chattahoochee River Basin in Alabama are the same as for the entire river basin including Alabama, Georgia, and Florida. Thus, materials produced by groups in other states may be useful and may apply to management of this subbasin in Alabama. It may also be beneficial to enter into partnerships with other watershed groups where each group focuses on different types of issues and then shares the resulting information.

Though watersheds respect no political boundaries, it is important that watershed associations obtain local government input and buy-in to implement a watershed plan. Local governments may be able to help with securing funds and political support, acquiring or giving access to property needed for projects or surveys, and adopting rules and ordinances regarding resource conservation. In addition,, by joining forces and coordinating efforts with watershed groups across state and county lines within a subbasin (or even within the basin), watershed groups can coordinate better planning, restoration and conservation projects that will benefit the river as a whole. This also fosters better utilization of resources, both financially and technically.

GOAL 11: *Develop a framework in the subbasin 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 Chattahoochee 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, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Promote participation and membership in the subbasin committee and establish watershed groups or action teams for key subwatersheds.				
ACWP, ADEM, watershed groups, ARA, AWW	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, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups

<u>Best Management Practices to Address the Strategies of Goal 11:</u>

An effective framework from which to implement the components of this Plan requires the establishment of, and active participation in, a strong subwatershed group. It is from this group that members will be obtained to staff the task-specific action groups required by the Plan. New stakeholders should continually be identified and educated regarding the assorted watershed issues. Educational efforts should be focused on informing stakeholders of the benefits and functions provided by a healthy watershed and clean water, the potential and current threats facing these resources, and the management options and opportunities available to protect them. Educational venues can include providing educational flyers in public locations and at local events; giving presentations at schools, universities and non-profit meetings; posting notices in nonprofit and local publications; holding educational workshops targeting a specific audience; and issuing public service announcements through local media.

Coincident with such outreach efforts is the promotion of the Basin Management Plan (once approved) at all appropriate opportunities including during urban and regional planning meetings, existing watershed and other non-profit group meetings, and during newly formed watershed and subwatershed meetings. Also, it is important to coordinate with federal, state, and local agencies across state lines to promote the plan and to identify funding opportunities. More information on funding options is provided in Chapter 8.

Strong leadership will need to be provided by the Lower Chattahoochee River Subbasin Stakeholder Committee, to direct and organize the formation of subcommittees or action teams targeting a specific issue. Once working groups are established it is anticipated that momentum will be gained such that each group will be able to work independently towards accomplishing their respective tasks. More detailed information on plan implementation including recommended organizational structure, and information and educational outreach is covered in Section 6.7.

6.6 Management Strategies for Common Water Quality Concerns

In addition to the specific, action-oriented strategies listed above, a general list of watershed management strategies is provided in Table 6-9. The list is organized according to water quality or biological concerns, and is intended to be used reference during the formation of issue-specific action plans and projects aimed at addressing specific water quality concerns. The contents of this table were adapted from recommendations made by the Tallapoosa River Basin Management Plan stakeholders (CH2MHILL, 2005).

Table 6-9. Strategies for Addressing Common Water Quality Concerns

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Nutrient enrichment	Encourage the use of buffers around streambanks.
	Advocate the banning of detergents containing phosphates or taxing products with phosphates. Use education to encourage the use of phosphate-free products.
	Use federally funded cost share programs (*e.g.*, EQIP, WHiP) to help landowners use BMPs (waste management for animal waste).
	Employ education about septic system maintenance (Homeowners Workshop for homeowners).
	Advocate for regular/periodic inspections of septic systems.
	Search for funding for the installation of alternative waste management systems.
	Encourage septic system installers to attend onsite wastewater training.
	Promote education for septic dischargers/haulers (certification required). Use CEUs as incentives to haulers.

Water Quality or Biological Concern	Management Strategies
Nutrient enrichment (cont.)	Encourage the use of proper city planning and development and low impact development (*e.g.*, decrease impervious surfaces, protection of green spaces) by engaging county officials and staff in NEMO training. Encourage incentives for developers (fast-track permit approval) that use low impact development. Encourage/promote recycling and reuse – promote biosolids reuse and water recycling through land application. Encourage the use of environmental impact fees on businesses that leave abandoned buildings. Educate point sources about funding to correct issues (WWTP, WWTP lagoons). Educate golf course owners by distributing BMP manuals, encourage course management workshops, and promote use of natural design (natural areas). Encourage homeowners to reuse gray water. Study phosphorus loads from clear-cut areas. Use education to encourage land objectives that would promote lighter cuts.
Pathogen contamination	Encourage the use of buffers around streambanks. Use federally-funded cost share programs to help landowners use BMPs (waste management for animal waste). Employ education about septic system maintenance (Septic Tank Workshop for homeowners). Advocate for regular/periodic inspections of septic systems. Search for funding for the installation of alternative waste management systems. Encourage septic system installers to attend onsite wastewater training. Promote education for septic dischargers (certification required). Support AWW program–encourage the expansion of the program so that monitoring sites are located on all creeks in the subbasin. Promote and support the NRCS EQIP program. Apply for Section 319 grant funds where applicable.

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Soil loss/Sedimentation	Promote registered forester program. Report failing forestry BMPs using the SFI "Inconsistent Practices" form and reporting system. Encourage the use of buffers around streambanks. Use federally-funded cost share programs to help landowners use BMPs (waste management for animal waste). Encourage county engineers to use and maintain proper BMPs for construction of dirt roads; sponsor the ADEM dirt road workshop. Report failing BMPs and other problems to ALDOT/County engineer representative. Initiate open space preservation or environmentally sensitive development initiatives.
Low dissolved oxygen	Support AWW program–encourage the expansion of the program to monitoring all creeks in the subbasin by recruiting volunteer monitors from community groups, schools and businesses.
Habitat alteration	Encourage use of conservation easements–land trusts. Report failing road BMPs/other development-related problems to ALDOT/County engineer representative. Promote AL Forestry Commission education programs. Encourage forest landowners to participate in the Forestry Commission registered forester programs. Encourage the use of buffers around streambanks. Encourage landowners to participate in US Fish & Wildlife habitat management programs, especially for imperiled species.
pH	Promote water quality training for master gardeners, other volunteer groups, and developers/contractors through advertisement. Promote incentive-based fertilizer education.
Pesticides	Educate golf course owners by distributing BMP manuals, encourage course management workshops, promote use of natural design (natural areas).

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Pesticides (cont.)	Organize a Household and Agricultural Hazardous Waste Collection day. Educate general public and significant users (e.g., ALDOT, Alabama Power) with seminars and flyers.
Litter/Illegal Dumping	Promote annual creek cleanups (Earth or Rivers Day). Identify litter hot spots (research where it is coming from), report results to ADEM and local sheriff. Educate adults and contractors about illegal dumping and litter through anti-litter campaigns – *see* Information and Education component of this Plan. Encourage enforcement of county prima facie litter law. Advocate the use of bottles and cans deposits. Explore adoption of countywide mandatory garbage collection. Implement the Adopt-A-Highway Program.

6.7 Plan Implementation

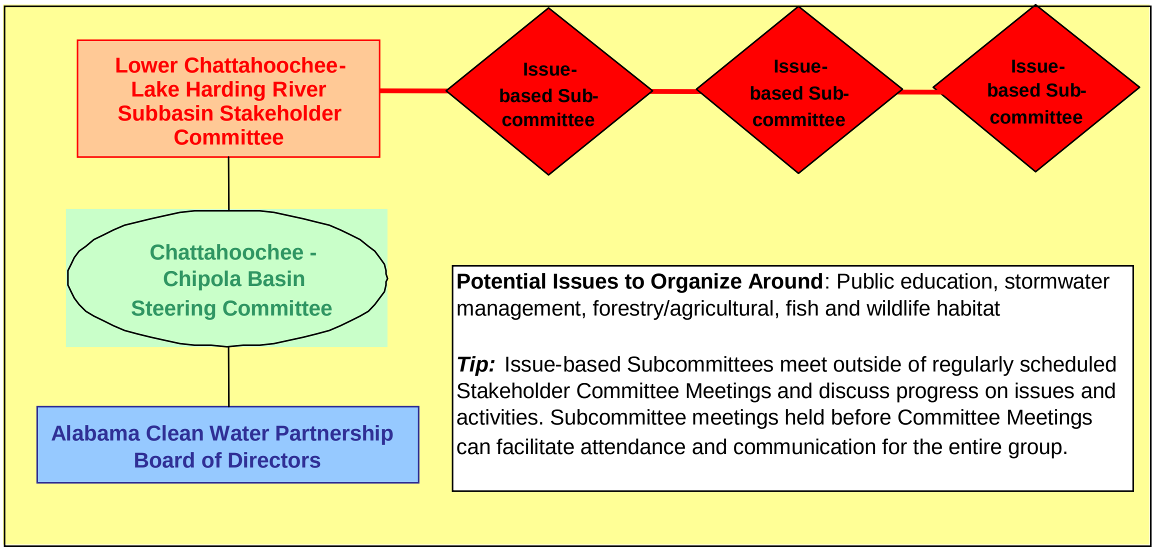
Successful water quality management projects require organizational structure and support to successfully plan projects, monitor resource conditions, and implement initiatives if required. It is a continuous process, and is generally long term.

6.7.1 Organizational Structure

ACWP Subbasin Stakeholder Committees are tasked with the responsibility to oversee the development and implementation of their respective parts of the Plan. However, organizationally, a further division of labor must occur so that the Subbasin Committee is not overwhelmed with the diversity of issues and strategies.

One possible step toward implementing this Plan might be that the Subbasin Stakeholder Committee organizes issue-based sub-committees to tackle specific issues or specific creeks/subwatersheds. Figure 6-2 illustrates this organizational structure in the context of the basin and state-wide organizational layers. Each “issue-based sub-committee” could form around a priority issue or creek to develop and implement a short-term action plan based on the issues and strategies discussed in this Plan. The Sub-committee would report back to the greater Committee, who would be responsible for gathering technical and financial resources, when needed. This approach allows the Subbasin Stakeholder Committee the opportunity to focus resources and energies to achieve results in the short-term on a manageable scale.

Figure 6-3. Proposed Organizational Structure for Stakeholder Committes



6.8 Information and Education Component

Raising public awareness about water quality and watershed protection is vital to successful outreach. Because of this, providing informational and educational programs may be the most important component of this Basin Management Plan. It is important to educate the public on the importance of clean water and to inform them of their ability to effect positive change within their watershed. It is an ongoing process because the population within the watershed is dynamic, but the effort is well worth the time. The USEPA provides an excellent guide for conducting outreach activities, titled "*Getting in Step: A Guide for Conducting Watershed Outreach Campaigns*" (USEPA, 2003).

6.8.1 Current Education and Outreach Efforts

There are several organizations that actively educate the public about water resource (quality and quantity) and environmental issues in the subbasin. These groups target a broad audience but often develop programs for localities with a specific interest.

Alabama Clean Water Partnership – With three subbasin stakeholder committees formed for the Chattahoochee River Basin, the ACWP is active on many watershed management fronts including basin management planning, education and outreach, and the development of public/private partnerships in the name of sustainable water resource management.

Alabama Rivers Alliance – Through its Watershed Outreach Project the ARA is developing local leaders and stewards for sustainable watershed management through education and outreach.

Alabama Water Watch – Through its highly successful citizen water quality monitoring program, AWW trains citizens to be water scientists and involve themselves in local environmental management. There is one active monitoring group in the Upper Middle Chattahoochee Subbasin.

Chattahoochee Riverkeeper – Originating from the Upper Chattahoochee River Basin in Georgia, this non-governmental river stewardship organization is active in educating governmental agencies, industry, businesses and the general public. Historically, their emphasis was in Georgia.

Middle Chattahoochee Water Coalition – The Middle Chattahoochee Water Coalition is a public/private partnership formed to champion equitable, optimal use and good stewardship of the water resources of the ACF Basin with focus on the middle and lower Chattahoochee River.

Oxbow Meadows Environmental Learning Center – Oxbow Meadows is an outreach program of Columbus State University, in association with the Columbus Water Works, which offers a wide range of environmental education programs.

Working with these organizations, partnering with local schools, and building on current efforts, this Plan proposes an Information and Education program consisting of six steps:

Step 1: Define Information and Education goals and objectives.

Step 2: Identify and analyze the target audiences.

Step 3: Create the messages for each audience.

Step 4: Package the message to various audiences.

Step 5: Deliver the messages.

Step 6: Evaluate the Information and Education program.

As the Subbasin Stakeholder Committee or a designated Sub-Committee takes on this Information and Education program, it should be customized to reflect their goals, concerns and ideas.

Step 1: Information and Education Goals and Objectives

A primary goal for watershed associations is to promote watershed and community stewardship through resource education and outreach. The following are specific watershed management objectives related to informing and educating the public. Some of these objectives are broader than the others. In some cases, it may be necessary to raise awareness about a water quality issue. In other cases, a water quality issue may be commonly recognized; therefore, the goal may be to educate people about possible remedies. As plan implementation proceeds and Information and Education objectives are met, the plan will have to be updated to reflect progress and to identify new challenges. Possible objectives include:

- Increase public awareness about the link between water quality and watershed management.
- Increase public awareness about the most threatened creeks in the subbasin.
- Educate landowners in selected subwatersheds regarding available financial and technical assistance programs.
- Educate county officials and department staff regarding stormwater management and the protection of water quality.

Step 2: Target Audiences

The challenge in implementing an Information and Education campaign is to identify the target audience. Examples of target audiences based on watershed issues and/or management objectives are provided in Table 6-10.

Table 6-10. Potential Target Audiences Based on Watershed Issue and/or Management Objective

ISSUE / MANAGEMENT OBJECTIVE	POTENTIAL TARGET AUDIENCE
General watershed education	School children and their parents; church congregations; fair and festival audiences
Stormwater management	County officials; County transportation and/or public works staff; developers/homebuilders
Agricultural Best Management Practices (Available techniques and financial resources)	Farmers; soil conservation district members; property owners
Forestry Best Management Practices (Available techniques and financial resources)	Forest landowners; logging companies

Step 3: Create the Messages for each Audience

An effective message carries a lot of power. Environmental and watershed education can be complex, so it is important to tailor the message in a way most appropriate to the target audience. There are many, free-of-charge resources to assist with creating a powerful message for watershed issues. For instance, the ACWP has brochures about the Subbasin Stakeholder Committees as well as popular campaigns/messages to use for public service advertisements that consist of a message and eye-catching posters (visit the ACWP website – <www.cleanwaterparnership.org> – to view the posters). Examples of campaign messages from ACWP follow:

"When Your Pet Goes On the Lawn, Remember It Doesn't Just Go On the Lawn" When our pets leave those little surprises, rain washes all of that pet waste and bacteria into our storm drains. And then pollutes our waterways. So what to do? Simple. Dispose of it properly (preferable in the toilet). Then that little surprise gets treated like it should.

"When You're Fertilizing the Lawn, Remember You Aren't Just Fertilizing the Lawn" You fertilize the lawn. Then it rains. The rain washes the fertilizer along the curb into the storm drain, and directly into our lakes, streams and bays. This causes algae to grow, which uses up oxygen that fish need to survive. So if you fertilize, please follow directions and use sparingly.

"When Your Car's Leaking Oil On the Street, Remember It's Not Just Leaking Oil On the Street" Leaking oil goes from car to street and is washed from the street into the storm drain and into our lakes, streams and bays. Now imagine the number of cars in the area and you can imagine the amount of oil that finds its way from leaky gaskets into our water. So please, fix oil leaks.

"When You're Washing Your Car in the Driveway, Remember You're Not Just Washing Your Car in the Driveway" All the soap, scum, and oily grit flows along the curb and into a storm drain, winding up in our lakes, streams, and bays. And that causes pollution which is unhealthy for fish. So how do you avoid the whole mess? Easy. Wash your car on the grass or gravel instead of the street. Or better yet, take it to a car wash where the water gets treated and recycled.

Step 4: Package the Message to Various Audiences

Once the message has been crafted, it must be packaged for the audiences. There are several approaches to packaging a watershed message:

- Work with the media
- Develop effective print materials
- Hold events (*i.e.*, canoe/kayak trips, water monitoring workshops, stream clean-ups, groundwater festivals)
- Leverage existing information and education programs/resources (*e.g.*, “piggyback” on existing efforts and programs).

Step 5: Deliver the Message

Money is typically the limiting factor, so it is important to figure out how to cost-effectively reach the audience. Here are several common delivery techniques:

- Mailing lists
- Phone calls

- Interviews
- Focus groups
- Presentations to boards, commissions, trade groups, neighborhood associations, library groups, garden clubs, etc.
- Demonstrations; guided tours

Step 6: Evaluation of Information and Education Campaign

Before embarking on any facet of an information and education campaign it is critical to define the "measures of success" to be used in determining whether Information and Education goals have been met. Indicators or milestones are an excellent way to establish – from the beginning – how success will be measured. Indicators must be clear, realistic, and practical. For an outreach campaign, a group may consider *programmatic* or *social* indicators such as those listed in Table 6-11.

Table 6-11. Indicators of Success for Information and Education Campaigns

TYPE OF INDICATOR	EXAMPLE INDICATOR	METHOD OF MEASUREMENT
Programmatic	Number of brochures mailed	Mailing lists
Programmatic	Number of participants	Attendance lists
Social	Number of follow-up phone calls	Phone records
Social	Increased awareness of watershed issues	Pre- and post- surveys, interviews, focus groups
Social	Number of landowners requesting assistance for management practice installation	Phone records, site visits
Social	Number of landowners aware of technical and financial assistance for watershed management measures	Pre- and post- surveys, interviews

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Appendix 6A – Rare and State Protected Plant and Animal Species of the Lower Chattahoochee River Subbasin

Alabama and Georgia maintain Natural Heritage Programs and databases that keep track of the ecological resources or biodiversity of each state. These inventories contain records of rare and endangered natural communities, plants, and animals. In addition, each state has a system under which plant and animal species receive state protection.

The Georgia Natural Heritage Program data center provides rare species and natural community data for species protected by Georgia's Wildflower Preservation Act and Georgia's Endangered Wildlife Act, as well as for species protected under the U.S. Endangered Species Act. They also track rare and imperiled non-listed species. To receive more information on Georgia's state protected species, refer to Georgia's Department of Natural Resources' webpage <http://georgiawildlife.dnr.state.ga.us/content/displaycontent.asp?txtDocument=89&txtPage=1>.

The Alabama Natural Heritage Program (ALNHP) provides the best available scientific information on the biological diversity of Alabama to guide conservation action and promote sound stewardship practices. It was established by The Nature Conservancy in 1989 as one of a network of such programs. For a fee, this database can be queried for location information on rare, threatened and state protected plant and animal species, and natural communities. Searches can be done by USGS Quadrangle, Legal Township, Range & Section(s), County(ies), or species. For more information, and to order a location search, refer to the ALNHP's website at <http://www.alnhp.org/track_2006.pdf>.

In addition, Alabama state law awards protections to a list of nongame species via the Nongame Species Regulation (Section 220-2-.92, page 79-82) and the Invertebrate Species Regulation (Section 220-2-.98, pages 77-78) of the *Alabama Regulations for 2005-2006 on Game, Fish, and Fur Bearing Animals*. Copies of these regulations may be obtained from the Division of Wildlife & Freshwater Fisheries, Alabama Department of Conservation & Natural Resources, 64 North Union Street, Montgomery, AL 36104. A digital version of these regulations is available online at <http://www.dcnr.state.al.us/hunting/regulations/regbook2005-2006-final.pdf>.

The Nongame Species Regulation (Section 220-2-.92, page 79-82) is available online at: <http://www.dcnr.state.al.us/watchable-wildlife/regulations/nongame.cfm>. The current list of Alabama species protected under state law is provided as Table 6A-1.

Table 6A-1. Wildlife Species Protected by the State of Alabama According to the Nongame Species Regulation

	COMMON NAME*	SCIENTIFIC NAME
Fish		
	Cavefish, Alabama	*Speoplatyrhinus poulsoni*
	Cavefish, Southern	*Typhlichthys subterraneusls*
	Chub, Spotfin	*Cyprinella monacha*
	Darter, Boulder	*Etheostoma wapiti*
	Darter, Coldwater	*Etheostoma ditrema*
	Darter, Crystal	*Crystallaria asprella*
	Darter, Goldline	*Percina aurolineata*
	Darter, Holiday	*Etheostoma brevirostrum*
	Darter, Lollipop	*Etheostoma neopterum*
	Darter, Slackwater	*Etheostoma boschungi*
	Darter, Snail	*Percina tanasi*
	Darter, Tuscumbia	*Etheostoma tuscumbia*
	Darter, Vermilion	*Etheostoma chermocki*
	Darter, Watercress	*Etheostoma nuchale*
	Madtom, Frecklebelly	*Noturus munitus*
	Sculpin, Pygmy	*Cottus paulus*
	Shad Alabama	*Alosa alabamae*
	Shiner, Blue	*Cyprinella caerulea*
	Shiner, Cahaba	*Notropis cahabae*
	Shiner, Palezone	*Notropis albizonatus*
	Sunfish, Spring Pygmy	*Elassoma alabamae*
	Sturgeon, Alabama Shovelnose	*Scaphirvnchus suttkusi*
	Sturgeon, Gulf	*Acipenser oxyrhynchus desotoi*
Amphibian		
	Frog, Dusky Gopher*	*Rana capito sevosa*
	Hellbender, Eastern	*Cryptobranchus alleganiensis alleganiensis*
	Salamander, Flatwoods	*Ambystoma cingulatum*
	Salamander, Green	*Aneides aeneus*
	Salamander, Red Hills	*Phaeognathus hubrichti*
	Salamander, Seal (of Coastal Plain origin)	*Desmognathus monticola*
	Salamander, Tennessee Cave	*Gyrinophilus palleucus*
	Treefrog, Pine Barrens	*Hyla andersonii*
Reptile		
	Coachwhip, Eastern	*Masticophis flagellum flagellum*
	Sawback, Black-knobbed	*Graptemys nigrinoda*
	Snake, Black Pine	*Pituophis melanoleucus lodingi*
	Snake, Eastern Indigo	*Drymarchon corais couperi*
	Snake, Florida Pine	*Pituophis melanoleucus mugitus*
	Snake, Gulf Salt Marsh	*Nerodia fasciata clarkii*

	COMMON NAME*	SCIENTIFIC NAME
	Snake, Southern Hognose*	*Heterodon simus*
	Terrapin, Mississippi Diamondback	*Malaclemys terrapin pileata*
	Tortoise, Gopher*	*Gopherus polyphemus*
	Turtle, Alabama Map	*Graptemys pulchra*
	Turtle, Alabama Red-bellied	*Pseudemys alabamensis*
	Turtle, Alligator Snapping*	*Macroclemys temminckii*
	Turtle, Barbour's Map*	*Graptemys barbouri*
	Turtle, Escambia Bay Ma	*Graptemys ernsti*
Bird		
	Crane, Mississippi Sandhill	*Grus canadensis pulla*
	Dove, Common Ground	*Columbina passerina*
	Eagle, Bald*	*Haliaeetus leucocephalus*
	Eagle, Golden	*Aguila chrysaetos*
	Egret, Reddish	*Egretta rufescens*
	Falcon, Peregrine	*Falco peregrinus*
	Hawk, Cooper's	*Accipiter cooperi*
	Merlin	*Falco columbarius*
	Osprey	*Pandion haliaetus*
	Oystercatcher, American	*Haematopus palliatus*
	Pelican, American White	*Pelecanus erthrorhynchos*
	Plover, Piping	*Charadrius melodus*
	Plover, Snowy	*Charadrius alexandrinus*
	Plover, Wilson’s	*Charadrius wilsonia*
	Stork, Wood	*Mycteria americana*
	Tern, Gull-billed	*Sterna nilotica*
	Warbler, Bachman's	*Vermivora bachmani*
	Woodpecker, Red-cockaded*	*Picoides borealis*
	Wren, Bewick's	*Thryomanes bewickii*
Mammal		
	Bat, Gray Myotis	*Myotis grisescens*
	Bat, Indiana	*Myotis sodalis*
	Bat, Rafinesque's Big-eared	*Corynorhinus rafinesquii*
	Bat, Southeastern	*Myotis austroriparius*
	Gopher, Southeastern Pocket	*Geomys pinetis*
	Mouse, Alabama Beach	*Peromyscus polionotus ammobates*
	Mouse, Meadow Jumping	*Zapus hudsonius*
	Mouse, Perdido Key Beach	*Peromyscus polionotus trissylepsis*
	Weasel, Long-tailed	*Mustela frenata*

* Species also identified on the NatureServe List for the Lower Chattahoochee River Subbasin (HUC 03130004) with a global status of imperiled (G2) or vulnerable to extirpation/extinction (G3), or a federal listing status under US ESA as endangered (LE) or threatened (LT).

Source (ACDNR, 2006)

Together, Alabama's and Georgia's natural heritage programs, like many other natural heritage programs, are linked through an organization called NatureServe. NatureServe is a non-profit conservation organization that has partnered with international conservation organizations and natural heritage inventories. An abundance of information about the plants and animals, native and exotic, can be found online via NatureServe, which can be queried by ecological community, plant and animal species, county, and HUC 8 watershed codes. Table 6A-2 lists the species identified by NatureServe within the Lower Chattahoochee River Subbasin (HUC 03130004) subbasin that have either a critically imperiled, imperiled, or vulnerable to extirpation/extinction status or have a status designation according to the U.S. Endangered Species Act.

Table 6A-2. Results of NatureServe Data Query for Lower Chattahoochee River Subbasin (HUC 03130004)

SCIENTIFIC NAME / COMMON NAME	STATUS* NATURESERVE	STATUS* US ESA	U.S. DISTRIBUTION
Mollusks			
Alasmidonta triangulata Southern Elktoe	G1Q		AL, FL, GA
Elliptio arctata Delicate Spike	G2G3Q		AL, FL, GA, MS, SC, TN
Elliptio fraterna Brother Spike	G1		AL, GA, SC
Elliptio purpurella Inflated Spike	G2		AL, GA
Elliptoideus sloatianus Purple Bankclimber	G2	LT	AL, FL, GA
Hamiota subangulata Shinyrayed Pocketbook	G2	LE	AL, FL, GA
Lasmigona subviridis Green Floater	G3		AL, DC, GA, KY, MD, NC, NJ, NY, PA, SC, TN, VA, WV
Medionidus penicillatus Gulf Moccasinshell	G1G2	LE	AL, FL, GA
Pleurobema pyriforme Oval Pigtoe	G2	LE	AL, FL, GA
Quincuncina infucata Sculptured Pigtoe	G3		AL, FL, GA
Strophitus subvexus Southern Creekmussel	G3		AL, FL, GA, LA, MS, SC, TX
Fish			
Cyprinella callitaenia Bluestripe Shiner	G2G3		AL, FL, GA
Notropis hypsilepis Highscale Shiner	G3		AL, GA
Pteronotropis euryzonus Broadstripe Shiner	G3		AL, GA

Scientific Name Common Name	Status* NatureServe	 US ESA	U.S. Distribution
Moxostoma sp. 1 Apalachicola Redhorse	G3		AL, FL, GA
Ameiurus serracanthus Spotted Bullhead	G3		AL, FL, GA
Amphibians			
Rana capito Carolina Gopher Frog	G3		AL, FL, GA, NC, SC, TN
Ambystoma tigrinum Tiger Salamander	G5	PS	AL, AR, AZ, CO, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MD, MI, MN, MO, MS, MT, NC, ND, NE, NJ, NM, NN, NV, NY, OH, OK, OR, PA, SC, SD, TN, TX, UT, VA, WA, WI, WY
Desmognathus apalachicolae Apalachicola Dusky Salamander	G3G4		AL, FL, GA
Plethodon websteri Webster's Salamander	G3		AL, GA, LA, MS, SC
Reptiles			
Macrochelys temminckii Alligator Snapping Turtle	G3G4		AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MO, MS, OK, TN, TX
Graptemys barbouri Barbour's Map Turtle	G2		AL, FL, GA
Gopherus polyphemus Gopher Tortoise	G3	PS:LT	AL, FL, GA, LA, MS, SC
Eumeces egregius Mole Skink	G5	PS	AL, FL, GA
Heterodon simus Southern Hog-nosed Snake	G2		AL, FL, GA, MS, NC, SC
Birds			
Haliaeetus leucocephalus Bald Eagle	G5	PS:LT,PDL	AK, AL, AR, AZ, CA, CO, CT, DC, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NN, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY
Picoides borealis Red-cockaded Woodpecker	G3	LE	AL, AR, FL, GA, KY, LA, MD, MO, MS, NC, OK, SC, TN, TX, VA

Scientific Name Common Name	Status* NatureServe	US ESA	U.S. Distribution
Aimophila aestivalis Bachman's Sparrow	G3		AL, AR, DC, FL, GA, IL, IN, KY, LA, MD, MO, MS, NC, OH, OK, PA, SC, TN, TX, VA, WV
Plants			
Aesculus parviflora Small-flowered Buckeye	G3		AL, DC, GA, NJ, PA, SC
Arabis georgiana Georgia Rockcress	G1	C	AL, GA
Astragalus michauxii Sandhills Milk-vetch	G3		AL, FL, GA, NC, SC
Brickellia cordifolia Flyr's Brickell-bush	G2G3		AL, FL, GA
Carex impressinervia Impressed-nerved Sedge	G1G2		AL, MS, NC, SC
Cirsium virginianum Virginia Thistle	G3		DE, FL, GA, NC, NJ, SC, VA
Croomia pauciflora Croomia	G3		AL, FL, GA, LA
Croton elliottii Elliott's Croton	G2G3		AL, FL, GA, SC
Helianthus smithii Smith's Sunflower	G2Q		AL, GA, TN
Hexastylis shuttleworthii var. harperi Harper's Heartleaf	G4T3		AL, GA, MS
Lobelia boykinii Boykin's Lobelia	G2G3		AL, DE, FL, GA, MS, NC, NJ, SC
Macbridea caroliniana Carolina Birds-in-a-nest	G2G3		AL, FL, GA, NC, SC
Matelea baldwyniana Baldwin's Milkvine	G3		AL, AR, FL, MO, OK
Myriophyllum laxum Piedmont Water-milfoil	G3		AL, FL, GA, MS, NC, SC, VA
Panax quinquefolius American Ginseng	G3G4		AL, AR, CT, DC, DE, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, VA, VT, WI, WV
Phaseolus polystachios var. sinuatus Sandhill Bean	G5T3?		AL, FL, GA, MS, NC, SC

SCIENTIFIC NAME COMMON NAME	STATUS* NATURESERVE	 US ESA	U.S. DISTRIBUTION
Pinguicula primuliflora Southern Butterwort	G3G4		AL, FL, GA, MS
Quercus arkansana Arkansas Oak	G3		AL, AR, FL, GA, LA, TX
Rhexia aristosa Awned Meadowbeauty	G3		AL, DE, GA, NC, NJ, SC
Rhododendron prunifolium Plumleaf Azalea	G3		AL, GA
Rudbeckia auriculata Eared Coneflower	G2		AL, FL, GA
Sarracenia rubra Sweet Pitcherplant	G4	PS	AL, FL, GA, MS, NC, SC
Schisandra glabra Bay Starvine	G3		AL, AR, FL, GA, KY, LA, MS, NC, SC, TN
Schoenoplectus etuberculatus Canby's Bulrush	G3G4		AL, DE, FL, GA, LA, MD, MO, MS, NC, RI, SC, TX, VA
Silene polypetala Fringed Campion	G2	LE	FL, GA
Stylisma pickeringii var. pickeringii Pickering's Morning-glory	G4T3		AL, GA, NC, NJ, SC
Tridens carolinianus Carolina Fluffgrass	G3G4		AL, FL, GA, LA, MS, NC, SC
Trillium decipiens Mimic Trillium	G3		AL, FL, GA
Trillium reliquum Confederate Trillium	G3	LE	AL, GA, SC
Utricularia floridana Florida Bladderwort	G3G5		AL, FL, GA, NC, SC
Warea sessilifolia Sessile-leaved Warea	G2G4		AL, FL, GA
Status*: NatureServe G = Global, across entire range; T=subspecies/variety with different status than species as a whole.			
1=critically imperiled; 2 = imperiled; 3= vulnerable to extirpation/extintion;4 = apparently secure; 5 = widespread, abundant and secure			
US ESA: US Endangered Species Act, LE = listed endangered; LT= listed threatened; C= candidate; PS:LT = proposed threatened because of similarity of appearance; SAT: listed threatened because of similarity of appearance; PDL = proposed for listing			

Source: NatureServe, 2006

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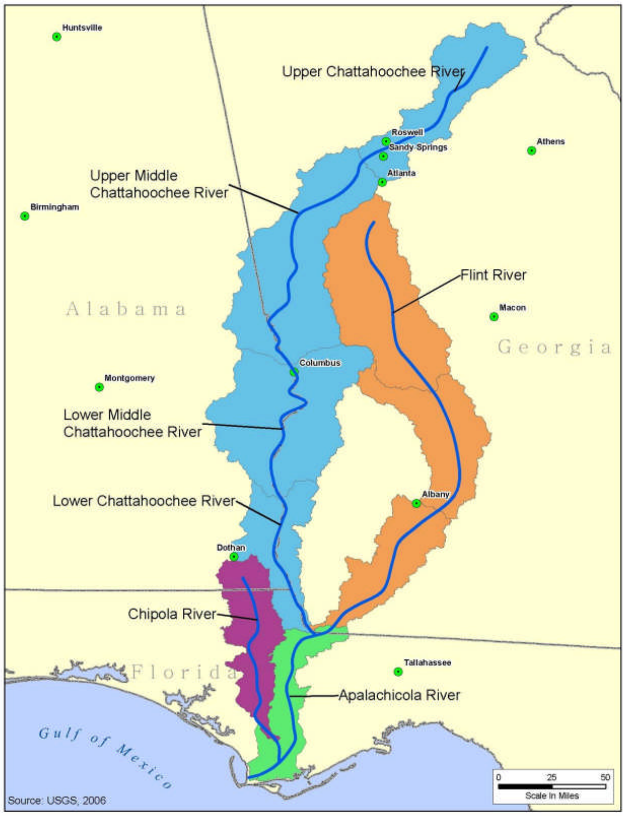
NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.0 NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. Accessed: November 14, 2006.

7.0 CHIPOLA RIVER BASIN

The portion of the Chipola River Basin within Alabama is small compared to the rest of the basin, which passes through the Florida Panhandle into Apalachicola Bay and the Gulf of Mexico. Although technically, the river proper is formed in the state of Florida, the headwaters of the Chipola River begin in Alabama. The Chipola River is a sensitive and important part of the system that feeds one of the most productive shrimping and oyster habitats in the United States, and is part of the greater ACF River Basin (Figure 7-1).

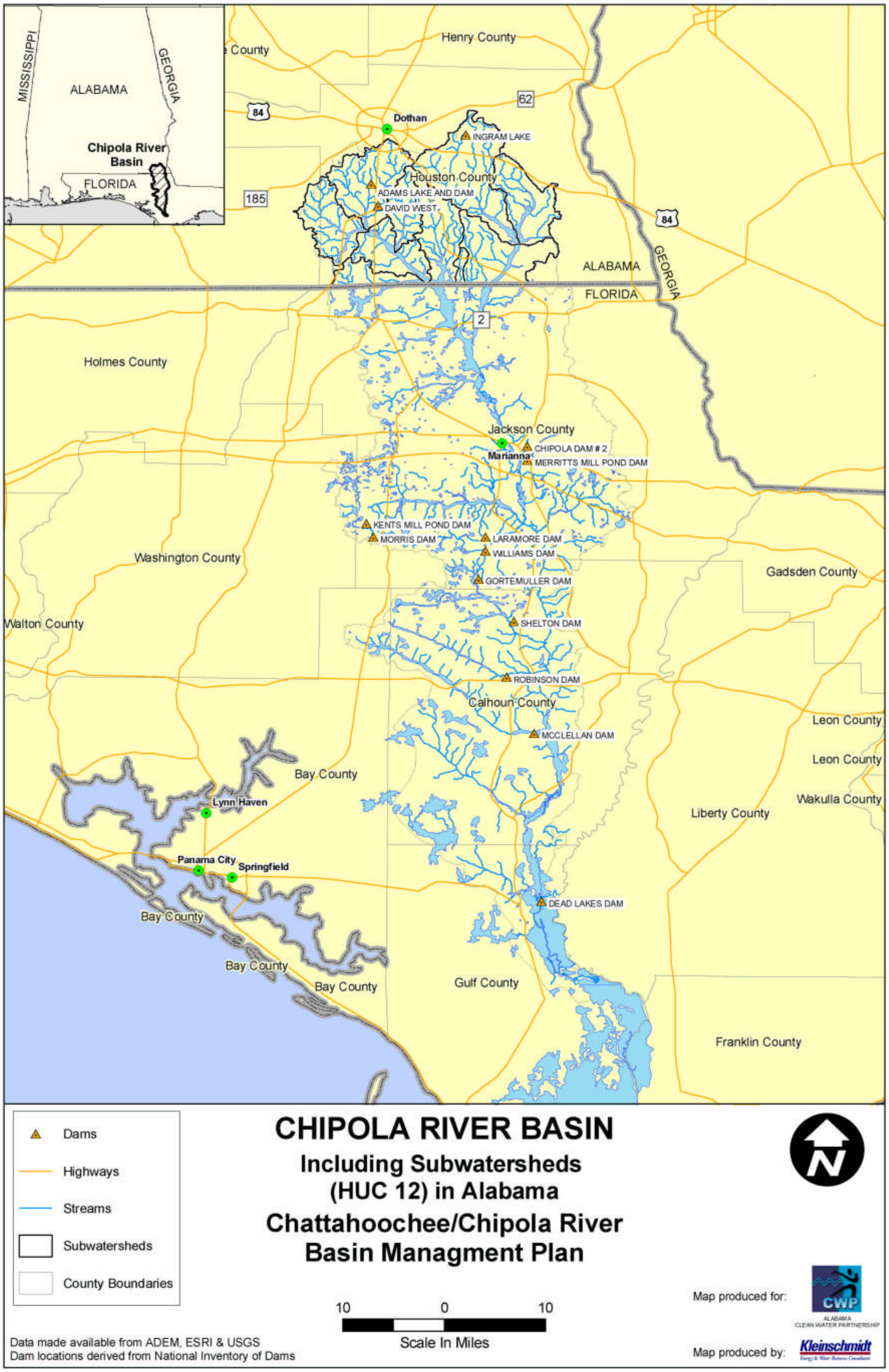
Figure 7-1. Chipola River Location



The Chipola River is spring-fed and emerges out of the Marianna Lowlands of Southeastern Alabama in Houston County, south of Dothan (Figure 7-2). A small portion of the river basin also includes the eastern edge of Geneva County in Alabama. The Alabama communities of Ashford, Cottonwood, Rehobeth, Avon, Madrid and Taylor are all located within this basin, as is a portion of Dothan. Two large creeks – Big Creek and Cowarts Creek – constitute the major tributaries of the Chipola in Alabama. Except for these tributaries, the Chipola is fed mostly by groundwater (Pratt, 1996). In Florida, the river "disappears" underground for a short distance near Marianna, Florida, and flows underground through predominantly limestone geology until it surfaces again within the limestone highlands, merges with the Apalachicola River, and empties onto the coastal plain and into the Gulf of Mexico (Pratt, 1996).

The Chipola River is the third largest tributary to the Apalachicola River besides the Chattahoochee and Flint Rivers. The total area of its basin is approximately 1,280 square miles within Alabama and Florida. The Alabama portion of the Chipola River Basin is 259 square miles, which is approximately 20 percent of the entire drainage (USACOE, 1998). The remaining 80 percent (1,021 square miles) in Florida, constitutes over half of the Apalachicola River Basin (FLDEP, 2002).

Figure 7-2. Chipola River Basin Map



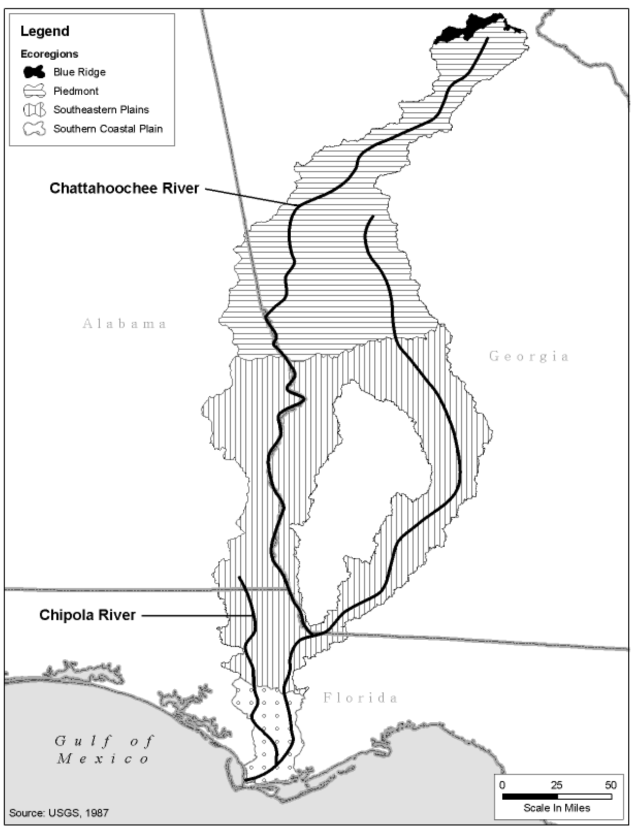
The Chipola River headwaters provide recreational opportunities and economic services to the communities of Southeastern Alabama and the surrounding region. To some, the headwaters provide enjoyment and rest - as a fishing hole, swimming area or place to float. To others, it is an industrial asset - an aqueduct to be used to carry away waste or to withdraw water. These beneficial uses, as well as many less-obvious ones, underscore the importance of the Chipola River headwaters and the importance of managing it appropriately.

7.1 Physical Characteristics

7.1.1 Ecological Resources of the Chipola River Basin

In Alabama, the Chipola River flows through the Dougherty Plain Ecoregion.[32] The Dougherty Plain, south of Dothan, is mostly flat to gently rolling and influenced by the near-surface limestone (Figure 7-3).

Figure 7-3. Eco-regions of the Chipola River Basin



The karst topography along the Alabama-Florida border contains sinkholes, springs, and fewer streams in the flatter part of the plain. The soil is sandy and relatively flat and lends itself to the land cover primarily consisting of cropland and pasture, with some small areas of mixed forest (ADCNR, 2005; GADNR, 2001). Crops such as peanuts and pecans are common, and cotton production has increased dramatically in recent years. Natural forest cover consists of longleaf pine, red oaks, and hickories. Many shallow, flat-bottomed depressions are scattered throughout the region, caused by solution of the underlying limestone.

The wetter, poorly drained depressions contain blackgum, sweetgum, water oak, and a few pines and cypress. Many of the limesink ponds and marshes act as biological oases in the

[32] According to EPA, ecoregions, "…denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources (Griffith, *et al.*, 2001, pg. 1)." 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 a hierarchal classification system that corresponds to the spatial scale of the ecoregion (*i.e.*, I being the coarsest and IV more refined).

mostly agricultural landscape (ADCNR, 2005; GADNR, 2001).

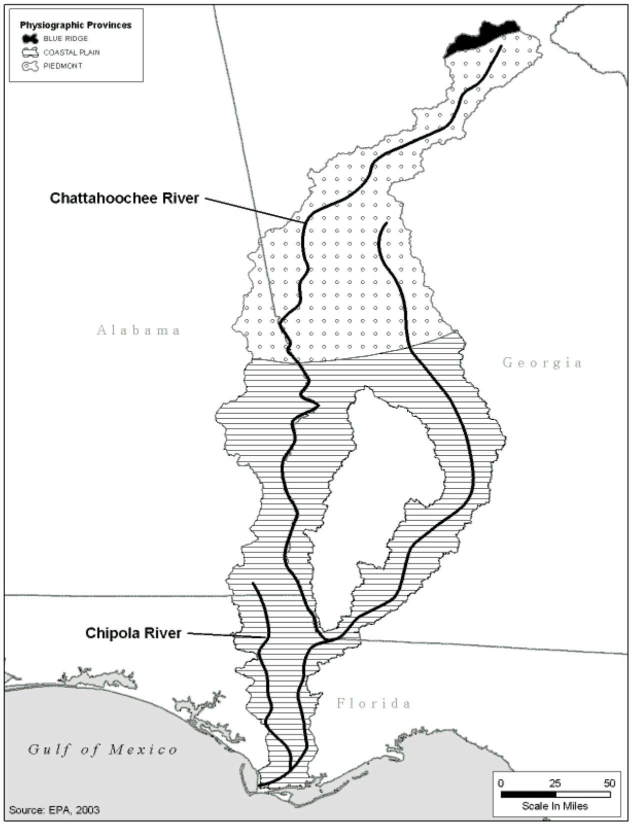
The Chipola River and its watershed are generally thought of as places of unique biological character, especially for aquatic or water-dependent species and habitats. The general trend toward greater biodiversity and ecological sensitivity is from north to south so that the ecological resources of the lower Chipola (Florida) and the Apalachicola are more highly regarded (Smith, *et al.*, 2002). However, this popular thought could be an indication of data gaps concerning the ecology of the Chipola River Basin in Alabama compared to the rest of the basin downstream. In Alabama, Big Creek and the Chipola River watersheds are thought to contain some of the last representative floodplain forests and swamps in the state and region (ADCNR, 2005).

7.1.2 Physiography and Geology

The Chipola River Basin lies entirely in the Coastal Plain Physiographic Province (Figure 7-4). This province consists of several distinct districts; two of which occur in the Chipola River Basin in Alabama, the Dougherty Plain and Marianna Lowlands. Both the Marianna Lowlands and Dougherty Plain are characterized by limestone outcroppings and karst[33] topography, which gives the Florida portion of the Chipola River Basin many notable caves and sinkholes. The topography of this basin in Alabama is relatively flat.

[33] Karst topography is a landscape marked by sinkholes, caves, disappearing streams, and springs due to the predominance of highly soluble limestone.

Figure 7-4. Physiographic Provinces of the ACF River Basin



7.1.3 Soils

In Alabama, the soils of the Chipola River Basin are of marine origin and consist of sand, loam and clay. The Dothan soil group is found in the most abundance and is commonly associated with prime farmland[34] in the region (Burns, 2002). In general, the loamy-sands of the basin make them suitable for row crops, pasture and orchards, which are all present.

7.1.4 Climate

Given its small geographic extent, the Alabama portion of the Chipola River Basin experiences very little variation in climate (Burns, 2002). The basin has a warm, humid temperate climate with average annual rainfall of 56 inches per year. Of this annual total, 36.4 inches, or about 64 percent, usually falls in March through October, which is also the growing season for most crops in the region. The heaviest 1-day rainfall during the period of record was 9.08 inches at Headland on July 6, 1994. Thunderstorms occur on

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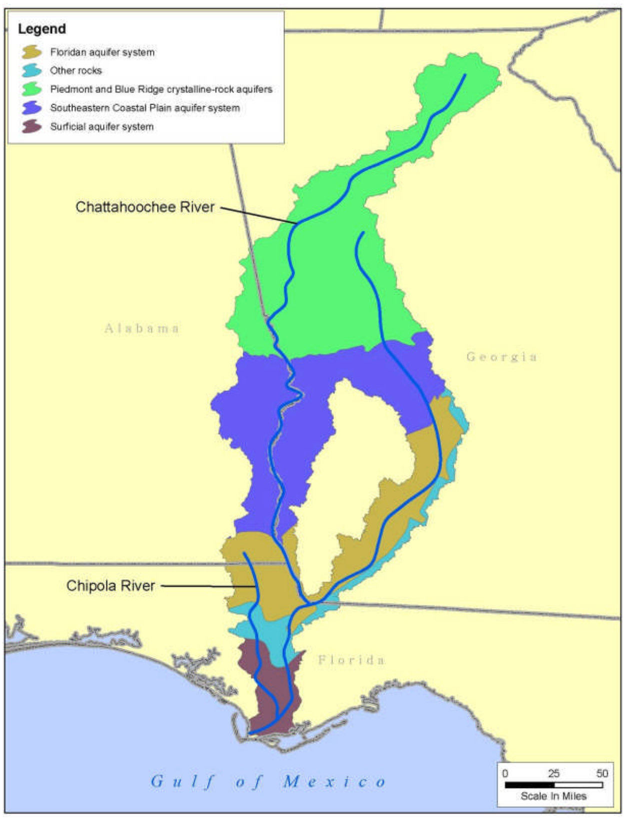
[34] Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas.

about 82 days each year and are most common between June and August. The average relative humidity in mid-afternoon ranges from about 45 percent in April to about 60 percent in July and August. Humidity is higher at night, and the average at dawn is about 90 percent in most months. The sun shines about 62 percent of the time in summer and about 50 percent in winter. The prevailing wind is from the south (Burns, 2002).

7.2 Ground Water

The basin's groundwater consists of two main parts: a surficial layer and the Floridan aquifer. The surficial water table is the uppermost, unconfined layer. Its depth and extent are dictated mostly by seasonal precipitation. Under it lays a minor intermediate system of groundwater bounded by semi-confined beds of sediments, typically made of clay and silt. Beneath this intermediate layer exists a large groundwater reservoir referred to as the Floridan aquifer (Figure 7-5).

Figure 7-5. Aquifers of the ACF River Basin



Perhaps one of the most productive aquifers in the world, the Floridan aquifer system underlies about 100,000 square miles in Florida, southern Alabama, southern Georgia, and southern South Carolina (Marella and Berndt, 2005; USGS, 2004). The Floridan aquifer system consists of a thick sequence of carbonate rocks that are of Tertiary age and are hydraulically connected (USGS, 2004). The Ocala Limestone is one of the thickest and most productive formations that crops out in this physiographic province (Dougherty Plain). This limestone gives the basin its karst topography that is riddled with sinkholes. Also due to the predominance of limestone, groundwater flows through the irregular cracks and fractures in the rock, which means that the aquifer's transmissivity (*e.g.*, ability for it to flow) varies greatly (USGS, 2004).

Groundwater plays a significant role in the hydrology of the Chipola River and its tributaries. The sediments and limestone geology of the coastal plain result in a strong connection between surface water and ground water (Floridan Aquifer), which easily interact with each other *(e.g.,* ground water discharges to streams and streams discharge to ground water). The repercussions of this relationship are that the water quality impairments of surface water can lead to contamination of ground water, by nutrients or chemicals (Torak, *et al.*, 1996). This is particularly important due to the fact that the Florida Aquifer is the primary source of water for nearly 10 million people and supports agriculture, industry, and tourism throughout most of the region (Marella and Berndt, 2005). In Houston County, AL, domestic supplies withdraw 6.17 million gallons per day (MGD) from the Florida Aquifer, which is the county's principal source of water (Marella and Berndt, 2005).

7.3 Surface Water

Within Alabama, the Chipola River Basin is made up of two major watersheds – Big Creek and Cowarts Creek – and six smaller, sub-watersheds (Table 7-1). Big Creek and Cowarts Creek join south of the Alabama-Florida border and flow together as the Chipola River from there on. In Florida, the Chipola River has 25 major tributaries with drainage areas over 10 square miles. An additional 12 tributaries have watersheds over 20 square miles. They include Marshall Creek, Dry Branch, Hays Spring Run, Muddy Branch, Merritts Mill Pond, Dry Creek, Rocky Creek, Juniper Creek, Sweetwater Creek, Stone Mill Creek, Dead Lake, and Tenmile Creek. Three primary springs are identified in the basin: Mill Pond Spring, Baltzell or Bosel Spring, and Blue Hole Spring (FLDEP, 2002).

Table 7-1. Alabama Tributaries (HUC 12) to the Chipola River Basin

Upper Cowarts Creek	Double Bridges Creek
Rocky Creek	Big Creek-Five Points
Lower Cowarts Creek	Buck Creek
Chipola (Cypress) Creek	Spring Creek
Big Creek-Big Branch	Pittman Bay

There are only three dams located in the Chipola River Basin in Alabama according to the National Inventory of Dams (USACOE, 2006). All are relatively small, privately owned dams located on tributaries to the Chipola River (Table 7-2). The lower Chipola (Florida) is impounded by old levees of the Apalachicola River, which form Dead Lake – the largest lake in the entire basin. The dam built in the 1960s to enhance this impoundment was removed in 1988. Near the town of Wewahitchka, the Chipola Cutoff, a once-natural diversion, now channels about 25 percent of the Apalachicola's flow westward to the Chipola River. The water rejoins the Apalachicola River about 15 miles downstream at the confluence of the Apalachicola and Chipola Rivers (FLDEP, 2002).

Table 7-2. Dams on the Chipola River Basin in Alabama

PROJECT NAME AND LOCATION	OWNER/YEAR COMPLETED	TOTAL RESERVOIR STORAGE (AC-FT)
Adams Dam Tributary to Limestone Creek	Private/1958	62
David West Tributary to Cypress Creek	Private/1969	68
Ingram Lake Cowarts Creek	Private/1945	73

USGS does not maintain permanent stream gages in the Alabama portion of the Chipola River Basin. Current streamflow and river stage data are collected by gages located within Florida, on the Chipola and Apalachicola Rivers. These data can be reviewed online through the USGS's Water Resources Science website for current and historical data on stream flow (cubic feet per second) and median flows.[35]

7.3.1 Water Quality

Generally speaking, the connection between land use and water quality is well-known and in some cases in the Chipola Basin, there is enough water quality monitoring data as evidence of the connection. Otherwise, there is not enough data to conclude that a particular land use is causing a water quality problem. In these cases, more monitoring is required to guide management decisions.

Water quality data for the Chipola River Basin is available from state and federal sources (Table 7-3). Some information deals more with the entire ACF River Basin, and some focuses on the Chipola River in Florida. In any case, these sources constitute the bulk of the available water quality data for the Alabama portion of the Chipola River Basin. Federal sources include USACOE, USGS and the USFWS. On the state level, ADEM and FLDEP keep historic and current data pertaining to the river basin. Other sources consulted during this process include Alabama Water Watch (AWW), NatureServe, and the Florida Natural Areas Inventory (FNAI).

35 <http://waterdata.usgs.gov/fl/nwis/rt>

Table 7-3. Inventory of Water Quality and Biological Data for the Chipola River Basin

SOURCE	STUDY PERIOD	PROJECT/REPORT SUBJECT	DATA TYPE
ADPH	2005	Fish Consumption Advisories for Alabama (ADPH, 2005)	Fish, public health
FLDOH	2005	Fish Consumption Advisory, Quarterly Report (FLDOH, 2005)	Fish, public health
ADEM	2002 - 2003	Alabama's 2004 Integrated Water Quality & Assessment (§305(b) Report) Report to the US Congress (ADEM, 2005b)	Chemical, physical, habitat, biological
FLDEP	2002	Group 2 Basin Status Report, Apalachicola-Chipola (FLDEP, 2002)	Chemical, physical, habitat, biological
ADEM	1999 - 2000	§303(d) Water Body Monitoring Project (ADEM, 2000b)	Chemical, habitat, biological
USACOE	1998	Draft EIS for Water Allocation for the Apalachicola-Chattahoochee-Flint (ACF) River Basin (USACOE, 1998)	Chemical, physical, habitat, biological
ADEM	1997 – 2000	Alabama Monitoring and Assessment Program (ALAMAP) (ADEM, 2000c)	Chemical, physical, habitat
USGS	1992 -1995	Water Quality in the Apalachicola-Chattahoochee-Flint (ACF) River Basin Study (Frick, *et al.*, 1998).	Chemical, physical, biological
ADEM	1992 - 2000	Ecoregional reference site data (ADEM, 2000a)	Chemical, physical, biological/habitat

Alabama's biannual §303(d) List of Impaired Waters identifies creeks, lakes, and rivers that do not meet state water quality standards. On a five year rotational basis, ADEM completes a river basin monitoring assessment to identify streams that are not completely meeting water quality standards for their use classification, which is Fish and Wildlife in this subbasin. The streams to be tested are identified through past assessments and impairments, complaints, and stakeholder identification of problem areas. For those creeks with sufficient data to assess, ADEM (2006) has identified one tributary within the Chipola River Basin in Alabama that does not meet water quality standards for its use classification. Cypress Creek, a tributary of Limestone Creek and Big Creek, contains excessive nutrients/organic enrichment and low dissolved oxygen.[36] Potential sources of this water quality problem are thought to be polluted stormwater from urbanized and

[36] These statements are based on the *Final 2004 §303(d)* list of impaired waters. There currently is a Draft *2006 §303(d)* list under review by USEPA. Until the 2006 list is approved, the 2004 list is considered the current final document. Both documents can be viewed at <http://www.adem.state.al.us/waterdivision/WQuality/303d/WQ303d.htm>.

industrial areas, and wastewater discharges. Cypress Creek runs through the urbanized area of the City of Dothan, Alabama.

The fact that there is one creek in the basin is an indication that, generally, there are few confirmed water quality problems at this time. However, it does not necessarily mean that every creek in the basin meets state standards and use classifications. In fact, many of these creeks have not been monitored and/or evaluated to the point that scientifically defensible water quality or biological data are available.

7.3.2 Priority Subwatersheds

ADEM's Nonpoint Source Screening Assessments were primary sources of water quality information for this Planning effort (ADEM, 2002; ADEM, 2006). These studies provide the most useful scientific analyses of the basin because they are current (*i.e.*, completed every 5 years) and completed according to USEPA-approved water quality standards. Subwatersheds, based on the 11-digit hydrologic unit code (HUC), are the focus of the current ADEM assessments although that will change in the future.[37] This scale was used for this Planning effort because it is the smallest scale for which data is available. Based on assessment results, ADEM assigns *nonpoint source impairment potential* and *nonpoint source priority status* to creeks with water quality and/or habitat impacts warranting greater concern and need of investigation.

Physical, chemical and biological assessments were conducted the two major watersheds in the basin (Big Creek and Cowarts Creek). Nonpoint source pollution impairment potential was assigned to one subwatershed based on surrounding land uses and pollution evidence detected by monitoring. Assessments of aquatic habitat and macroinvertebrate populations concluded in a determination of "priority" status for the subwatershed.

One subwatershed was selected for priority consideration. A subwatershed is recommended for priority status if the assessment rating was determined to be "fair" or "poor" for the stream's benthic macroinvertebrate (BMI) or fish community (ADEM, 2002; ADEM 2006). NSP potential was rated by ADEM based on SWCD watershed (land use) assessments. Table 7-4 provides the NPS rating and the land use with the greatest *potential* for the causing the impairment.

[37] There are some limits to using the Rotational Screening Assessment reports in this Plan. ADEM (2002; 2006) conducted water quality and biological assessments at subwatershed (11-digit HUC) scale, which was abandoned in 2005 for the 10-digit HUC and 12-digit HUC delineations. Currently, the standard scale for watershed planning is nationally recognized at the HUC 12 sub-watershed scale. It is expected that ADEM will utilize the HUC 12 delineations for the next rotational basin assessment in 2009.

Table 7-4. Priority Subwatersheds within the Chipola River Basin in Alabama

Year[a]	11-Digit Hydrologic Unit Code (HUC)	Waterbody	303(d)/ TMDL[b]	Station[c]	Screening Assessment Results			NPS Ratings of "Moderate" or "High" Based on 1998 SWCD Sub-Watershed Assessments[d]
					Habitat[e]	*Benthic Macro-Invertebratres*[f]	*Fish*	
2004	03130012010	Cowarts Creek	No	CWTH-1	Good	Fair	Not Assessed	Animal Husbandry, Aquaculture, Row Crops, Pasture Runoff, Urban

Source: ADEM, 2002; 2006

a Indicates the year of the monitoring results.

b Indicates whether the waterbody is part of the 303(d) List of Impaired Waters or is subject to the development of a Total Maximum Daily Load.

c The station name is a code assigned by ADEM for the basin screening assessments.

d The Alabama Soil and Water Conservation Districts conducted land use evaluations of Alabama's subwatersheds in 1998. The potential for nonpoint source (NPS) pollution within individual subwatersheds was assessed based on existing land uses. Watersheds where land uses associated with high or moderate potential for NPS were prevalent were identified and the land use indicated.

e This column includes the results of ADEM's habitat evaluations.

f "WMB-EPT" is an abbreviation for "Wadeable Multi-habitat Bioassessments - Ephemeroptera, Plecoptera, Trichoptera" that describes the results of biological assessments of streams according to the sum of the number of families within the orders Ephemeroptera, Plecoptera and Trichoptera – all orders of macroinvertebrates commonly found in freshwater streams.

7.3.3 Permitted Discharges and Stormwater Sources

Approximately 39 National Pollution Discharge Elimination System (NPDES) permits were active in Alabama portions of the Chipola River Basin as of April 2006. These permits cover industrial discharges, sewage treatment plants, mining operations, construction sites, and concentrated animal feeding operations (CAFOs). The number of permits issued within a watershed provides some indication of current land use activities and reflects potential water quality stressors within the watershed. For example, 14 of the 19 stormwater/construction permits were issued within Big Creek watershed. Cypress Creek, an impaired stream, also has several registered discharges associated with it, which accounts, in part, for its impaired status. Permits without specific location information were not included in this assessment.

7.3.4 Fish Tissue Surveys and Consumption Advisories

ADEM Field Operations conducts annual fish tissue sample surveys in lakes and rivers across the state to monitor environmental health and to safeguard public health. The fish tissues are analyzed for the presence of toxic substances, and results serve as the basis for the Alabama Department of Public Health’s Fish Consumption Advisories. No advisories were issued by Alabama in 2005 that pertain to the Chipola River Basin.

7.3.5 Reservoir Studies

There are no reservoirs on the Alabama headwaters of the Chipola River Basin.

7.4 Protected Species

The waters of the basin provide habitat for 122 fish species, 29 mussel species and 30 crayfish species (USFWS, 2006). However, due to the long history of industrialization of the river, many of these species are thought to be at risk for extinction. Rare plant and animal resources of the Lower Chattahoochee Subbasin are tracked and/or protected by several sources including natural heritage programs, and state and federal laws. Appendix 6A provides a description of the programs that monitor rare species for this subbasin and the state laws that protect them. Also listed in Appendix A are the wildlife species of the Lower Chattahoochee Subbasin that are protected by Alabama state law (Table 7A-1) or have been identified by NatureServe (the Natural Heritage Database) as imperiled or vulnerable to extinction/extirpation (Table 7A-2).

Federally listed species in the counties of the Chipola River Basin in Alabama number seven (7). Table 7-5 identifies the species listed as federally threatened or endangered by the USFWS Daphne, Alabama office as of November 18, 2006.

Table 7-5. Federally Listed Threatened and Endangered Species and Candidate Species in the Chipola River Basin

GENEVA*
T – Gulf sturgeon (*Acipenser oxyrinchus desotoi*)
E – Red-cockaded woodpecker (*Picoides borealis*)
E – Gentian pinkroot (*Spigelia gentianoides* var. Gentianoides)
HOUSTON
T – Bald eagle (*Haliaeetus leucocephalus*)
T – Flatwoods salamander (*Ambystoma cingulatum*) (P)
E – Gulf moccasinshell (*Medionidus penicillatus*)
E – Oval pigtoe (*Pleurobema pyriforme*)
*Only a small portion of Geneva County overlaps with the basin.
Notes: Bald eagles, red-cockaded woodpeckers and American peregrine falcons may occur in any county, if suitable habitat exists.
Key to codes on list: E – Endangered, T – Threatened, (P) – Possible Occurrence.

Source: USFWS, 2006a

In addition to these few species occurring within the basin in Alabama, it is well-known what important occurrences exist downstream. According to the FLDEP, the Chipola River Basin (Florida) contains several federally threatened and endangered species, including six mussels, (Chipola slabshell (*Elliptio chipolaensis*); fat three-ridge (*Amblema neislerii*); Gulf moccasinshell (*Medionidus pencillatus*); oval pigtoe (*Pleurobema pyriforme*); purple bankclimber (*Elliptoideus sloatianus*); and shinyrayed pocketbook (*Lampsilis subangulata*)); one reptile, American alligator (*Alligator mississippiensis*); and two plants, gentian pinkroot (*Spigelia gentianoides*); and Godfrey's [violet] butterwort (*Pinguicula ionantha*).

American Alligator

7.4.1 Critical Habitat for Freshwater Mussels

On June 6, 2006, the USFWS published its intention to designate critical habitat for 7 species of freshwater mussels in several drainages to the Gulf of Mexico including the ACF River Basin (Figure 7-6).[38,39] All of these mussels are considered endemic to the ACF River Basin. This proposed designation is one facet of the USFWS' comprehensive recovery plan to preserve the remaining mussel habitat and to restore habitat and populations where feasible (USFWS, 2003). Chipola River is part of proposed critical habitat Unit 2[40] for the mussels listed as endangered including the fat threeridge, shinyrayed pocketbook, Gulf moccasinshell, Ochlockonee moccasinshell, and oval pigtoe. Two mussel species are considered *threatened*: Chipola slabshell and purple bankclimber. Historically, the fat threeridge, shinyrayed pocketbook, Gulf moccasinshell, oval pigtoe, and Chipola slabshell were found in the mainstem and tributaries of the Chipola River Basin (USFWS, 2003). In Alabama, these mussel species are thought to be now extirpated from the creeks flowing into the Chipola River mainstem with the exception of a small stretch of Big Creek (from Double Bridges Creek to the Alabama-Florida state line) in Houston County. USFWS included this part of Houston County in Unit 2 of the proposed critical habitat designation (USFWS, 2003). The tributaries and mainstem of the Chipola River below the state line are also proposed for critical habitat designation for these species. The recovery plan consists of many similar objectives to this Basin Management Plan, which are incorporated into the management goals and recommendations detailed at the conclusion of this chapter.

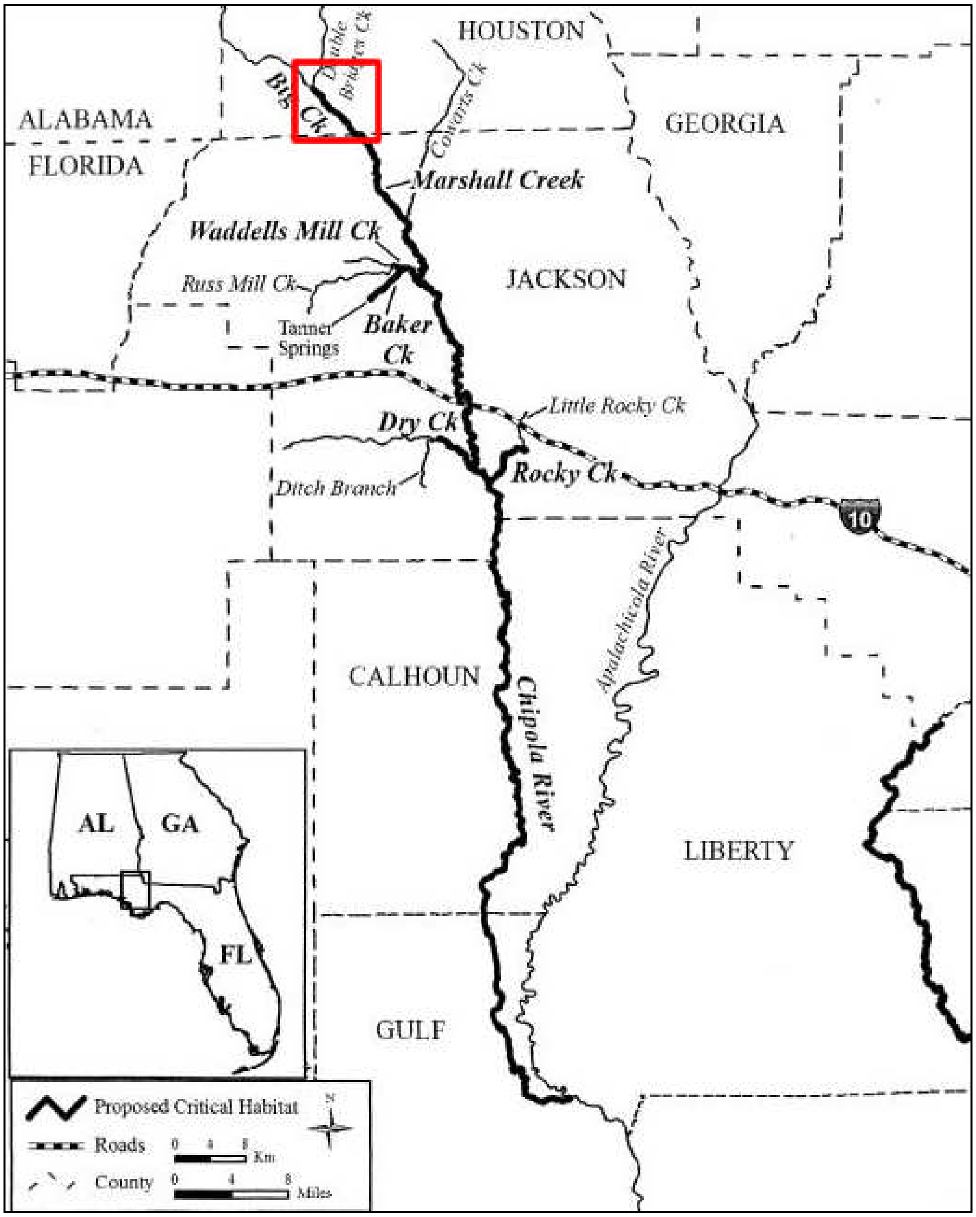
Chipola slabshell

[38] 50 CFR Part 17. Federal Register, Volume 71, No. 108, Tuesday, June 6, 2006. pp. 32746 – 32796. On March 16, 1998 (63 FR 12664), the USFWS listed the 7 species of freshwater mussels under the ESA and declared that the assignment of critical habitat was not prudent because designation does not afford additional, cost-effective protections compared to other conservation actions. However, the USFWS went ahead with the designation because the Center for Biological Diversity filed a lawsuit in the U.S. District Court for the Northern District of Georgia (Civil Action No. 1:04 CV–0729–GET) on March 15, 2004, alleging that USFWS violated the ESA by failing to designate critical habitat for the seven mussels.

[39] "Critical habitat" has a specific definition within the Endangered Species Act. It refers to specific geographic areas that have habitat characteristics essential for the conservation of a threatened or endangered species, and which may require special management and protection. 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 who play a part in managing listed species found on their property.

[40] Unit 2 includes the mainstem of the Chipola River, and six of its tributaries beginning from its confluence with the Apalachicola River in Florida and terminating upstream to its confluence with Double Bridges Creek in Houston County, Alabama. Its total stream length is 190.0 km (118.1 mi.).

Figure 7-6. Proposed Critical Habitat Unit 2 for Freshwater Mussels in the Chipola River Basin



Source: USFWS, 2006b

7.5 Cultural History of the Basin

The Chipola River, Big Creek, and Cowarts Creek in Alabama were not developed into major waterways like the Apalachicola, Chattahoochee, and Flint Rivers. Undoubtedly, humans dating back to the first Americans used the waters of the basin for transportation, political boundaries, water supply, food supply and recreation, but little investment was expended on turning the Chipola into a primary navigational system like its larger counterparts. In fact, the one major dam on the Chipola River near Wewahitchka, Florida that created Dead Lake was removed in 1988 by the Northwestern Florida Water Management District (NWFWMD) (FLDEP, 2002).

We do know that this region of Southeastern Alabama experienced meteoric economic development in the mid-19th Century, primarily due to cotton farming and the commerce developed around its trade. Lynn Willoughby (1999) writes, "(t)he triangle of land between the Flint and Chattahoochee Rivers in Georgia and the Chipola and Apalachicola Rivers in Florida and Alabama was prime cotton land. By 1850, there were 185,000 people living in the river valley, and a majority of them made their living growing or trading cotton" (pg. 70).

7.5.1 Socio-demographics

Today, the economy and culture of the Chipola River Basin in Alabama is one and the same with those of Houston County, Alabama (Table 7-6). The Chipola River Basin (Alabama) fits almost entirely within Houston County with the exception of its western edge, which crosses over into Geneva County. Dothan, the metropolitan center of Houston County, is the largest population center in the region 2004 population of 62,000. One of the City of Dothan's wastewater treatment facilities (Cypress Creek Treatment Facility) discharges to Cypress Creek, a tributary of the Chipola River.

Table 7-6. Population Data and Median Income for the Alabama Counties in the Chipola River Basin

County	Estimated 2004 Total Population (Major City Pop.)	2000 Total Population	Percent Population Change, 2000-2004	Percent Population Change, 1990-2000	Median Household Income (1999)
Houston	92,947 (Dothan = 62,000)	88,787	4.7%	9.2%	$34,431
Geneva*	25,599	25,764	-0.6%	9.0%	$26,448
State	*4,530,182*	*4,447,100*	*1.9%*	*10.1%*	*$34,135*

*A very small portion of Geneva County falls within the basin.

Source: U.S. Census Bureau, 2006

7.5.2 Land Use

Of its 259 square miles, 35 percent of the Chipola River Basin in Alabama is forested, 35 percent is dedicated to row crops, 18 percent to pasture, 10 percent to urban land uses, and one (1) percent is surface water (ADEM, 2002). Further detail on these land uses are provided in Table 7-7 which quantifies the acres of potentially harvestable forestland in Alabama portion of the Chipola.

Agricultural statistics of this nature are not available for the Chipola River Basin in Alabama. However an overview of agricultural and forestry data for Houston and Geneva Counties illustrate the relative volume of these predominant land use activities (Table 7.8). Land use activities, especially the *intensity* of the land use (*i.e.*, number of animals per acre of pasture, number of acres in row crops versus pasture, pounds of animal manure produced), are related to water quality impairments. Furthermore, trends in land use provide an indication of potential water quality concerns. For example, it has been noted that the total acreage used for cultivated crops and pasture has been decreasing slightly for several years. The current trend is toward the conversion of marginal cropland to forestland (Burns, 2002).

Table 7-7. Area of Timberland by County and Class for the Alabama Counties of the Chipola River Basin

County	Ownership Class						Nonindustrial Private	
	All Classes	National Forest	Misc. Federal	State	County and Municipal	Forest Industry	Corporate	Individual
	Thousands of Acres							
Geneva	203.6	-	-	6.2	-	6.2	-	191.2
Houston	166.1	-	5.3	-	-	-	12.0	148.8

Source: Hartsell and Brown, 2002

Table 7-8. Agricultural Statistics for the Alabama Counties of the Chattahoochee River Basin

County	2004 Cash Receipts				Census of Agriculture 2002				
	Crops (x$1000)	Livestock & Poultry	Forest Products	Total Farm & Forestry	No. of Farms	Land in Farms (Acres)	Avg. Farm Size (Acres)	Primary Agricultural Products	Highest and Notable State Rankings and Ranked Products (2004)
GENEVA	22,273	95,308	2,634	137,195	998	227,324	228	Peanuts, corn, soybeans, wheat, cattle, dairy, poultry, eggs	3rd, Milk; 4th, Peanuts; 8th, Wheat; 9th, All Cattle; 10th Corn
HOUSTON	37,363	14,855	2,646	66,958	700	188,413	269	Peanuts, corn, cattle, poultry, wheat, cotton, soybeans, hay	1st, Peanuts; 4th, Wheat; 6th, Cotton; 9th, Soybeans

Source: National Agricultural Statistics Service, 2005

7.6 Stakeholder Issues of Concern

Sometimes water quality problems are identified by citizens, and brought to the attention of agency staff for further examination. Some issues may be anecdotal in the sense that they describe a perceived water quality problem or watershed management issue without thorough scientific investigation. However, this citizen input, or stakeholder input, is invaluable in assisting the identification of potentially impaired or at risk waters and it often helps to guide future management activities and remedial action where it is most needed.

In support of this Basin Management Plan, issues of concern were collected from stakeholders during public ACWP Subbasin Steering Committee Meetings and Subbasin Stakeholder Workshops. Stakeholders identified issues relating to water quality, land use, environmental management, and politics. Some stakeholders also provided suggestions about how to proceed with watershed management for the basin. Other stakeholders identified specific water quality impacts or sources of those impacts.

The stakeholder meeting was held on Thursday, January 19, 2006 in Dothan, Alabama. Stakeholders from the Lower Chattahoochee River subbasin and the Chipola River Basin participated in this meeting. Meeting participants raised several water quality concerns they thought were important for managing this subbasin. No specific waterbodies were identified in association with these concerns, however general areas of the subbasin were mentioned (*i.e.*, “creeks in and around the City of Dothan”) (Table 7-9). In addition, stakeholders were asked to review a list of nonpoint sources of pollution common in Alabama and indicate which they felt were water quality concerns in the basin. Table 7-10 lists the most common nonpoint source issues stakeholders generally recognized as problems.

Table 7-9. Water Quality Concerns as Identified by Stakeholders in the Alabama Portions of the Chipola River Basin

Loss of freshwater wetlands from new commercial and residential development in and around the City of Dothan.
Poor stormwater management associated with new road construction and development in and around the City of Dothan.
Lack of awareness of water quality protection in the basin.
Lack of response by environmental agencies in the basin to citizen concerns.

Table 7-10. Common Nonpoint Source Issues Recognized by Stakeholders as Potential Problems in the Chipola River Basin

Nonpoint source pollution from agricultural activities - cropland, pastureland, and animal husbandry
• livestock access to streams • nutrient runoff from pasture and cropland • livestock overgrazing and soil erosion and sediment loading from pasture and cropland • gully erosion • animal waste management impacts (poultry farms in the basin) • pesticides and pathogens runoff from cropland
Nonpoint source pollution from roads, roadbanks, and new road construction
• soil erosion and sedimentation from roads and roadbanks (especially new and/or unpaved roads) • gully erosion
Nonpoint source pollution from urban and residential areas
• septic tank failures leading to nutrient loading and pathogen pollution soil erosion and sediment loading from new road construction • soil erosion and sediment loading from urban land development • lack of stormwater management in the basin's urban areas (*e.g.*, City of Dothan)
Wetlands and fish and wildlife habitat loss
• wetland and aquatic habitat destruction due to road construction and land development (*e.g.*, City of Dothan) • habitat impacts from increased sedimentation • loss of fish and mussels species • loss of stream buffers

7.7 Water Quality and Watershed Management Goals

Water quality goals strategies involve restoration, protection, and education projects. Table 7-11 provides proposed management goals for water quality concerns and issues identified for the Chipola River Basin in Alabama.

Table 7-11. Chipola River Basin Management Goals

Goal 1: *Reduce nonpoint source pollution from agricultural activities – cropland, pastureland, and animal husbandry*	**Goal 4:** *Reduce nonpoint source pollution from roads, road banks, and new road construction*
• livestock access to streams, and stream bank erosion • nutrient runoff from pasture and cropland • sediments from pasture and cropland • gully erosion and erosion from critical areas • animal waste management impacts • livestock overgrazing of pastureland • pesticides, bacteria and pathogens in surface waters	• soil erosion from roads and road banks (especially new and/or unpaved roads) • gully erosion
Goal 2: *Reduce nonpoint pollution from aquaculture operations*	**Goal 5:** *Reduce nonpoint source pollution from urban and residential areas*
• management of effluent quality from ponds	• nutrient and pathogen loading due to improperly maintained or failing septic systems and sewage treatment facilities • soil erosion from new road construction • soil erosion and sediment loading from urban development, including land clearing, construction activities, and impervious surfaces • stormwater runoff – bacteria and toxics
Goal 3: *Track resource trends through water quality monitoring in the subbasin to measure progress in restoration and protection efforts, fill in data gaps, and identify new resource concerns and issues*	**Goal 6:** *Protect and restore aquatic habitat and aquatic species diversity*
• limited water quality monitoring within the watershed • limited baseline data for many creeks in the subbasin	• wetland and aquatic habitat destruction due to road construction and land development • loss of fish and mussel species diversity • eutrophication of reservoirs • loss of stream buffers

Additional goals that are not directly related to specific water quality management issues but are essential to basin management are also identified. These goals are:

GOAL 7:	Promote watershed and community stewardship through resource education, outreach and the promotion of volunteer opportunities throughout the watershed.

GOAL 8:	Promote watershed management technology transfer across industries and between state lines of Alabama and Florida. Coordinate watershed assessment, planning, restoration and conservation efforts between subbasin and basin stakeholders in the two states.

GOAL 9:	Develop a framework in the subbasin to implement the projects and tasks in this Plan.

These goals are critical to the implementation and success of this river basin plan. In the following pages, each goal is addressed individually, and strategies are established to achieve the goal are discussed. If there is a specific creek/subwatershed associated with an issue, either by ADEM or stakeholders, then the name of the creek/watershed is included.

7.8 Implementation Strategies to Achieve Water Quality and Watershed Management Goals

Targeted subwatersheds should be prioritized for action in order to address water quality management concerns that are most critical in a given watershed. Strategies for achieving management goals are provided below, with specifics regarding:

- 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.

The following list of organizations and their associated acronyms is provided as a key for the tables to follow. With each watershed management strategy, agencies and organizations are identified that would be the most likely lead or participant in implementing the strategy.

AAGC	Alabama Association of General Contractors
ACES	Alabama Cooperative Extension System
ACOE	United States Army Corps of Engineers
ACWP	Alabama Clean Water Partnership
ADAI	Alabama Department of Agriculture and Industry
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
ADPH	Alabama Department of Public Health
AMI	Alabama Mining Institute
ALNEMO	Alabama Nonpoint 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
ARA	Alabama Rivers Alliance
ASTA	Alabama Septic Tank Association
ATA	Alabama Turfgrass Association
AWF	Alabama Wildlife Federation
AWW	Alabama Water Watch
CRP	Chipola River Partnership
FFA	Future Farmers of America
FFWCC	Florida Fish and Wildlife Conservation Committee
FLDEP	Florida Department of Environmental Protection
FS	United States Forest Service
FSA	Farm Services Agency
GSA	Geological Survey of Alabama
HBAA	Home Builders Association of Alabama
HOBOs	Home Owners and Boat Owners Associations
MPD	Marine Police Division
NRCS	Natural Resources Conservation Service
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
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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

Issues and Concerns in the Basin:

- livestock access to streams, and streambank erosion
- nutrient runoff from pasture and cropland
- livestock overgrazing and soil erosion sediment loading from pasture and cropland
- gully erosion and other erosion
- animal waste management impacts
- pesticides and pathogens in surface waters

Targeted Creeks: Cowarts Creek

Recommended Strategies to Achieve the Goal

LEAD AGENCY OR GROUP[a]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
Implement streambank fencing and identify alternate water sources for excluded cattle and other grazing animals. Implement streambank 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	Medium priority, continuous, long term	Medium to high; private/ public	Quarterly for BMP condition	Acres of cropland 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	Acres of pastureland BMPs

Lead Agency or Group[a]	Timeframe[b]	Level of Funding[c]	Monitoring Need[d]	Performance Indicator[e]
Implement effective agricultural waste management systems.				
Landowners; NRCS, SWCD, SWCC, ACES	Medium 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
Establish goals in each subwatershed, where needed, for the voluntary implementation of agricultural BMPs.				
Farming Community, FSA, NRCS, SWCD, SWCC	Medium 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	Medium 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	Medium 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

LEAD AGENCY OR GROUP[a]	TIMEFRAME[b]	LEVEL OF FUNDING[c]	MONITORING NEED[d]	PERFORMANCE INDICATOR[e]
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

a. Lists responsible parties/primary actors.
b. 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).
c. 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.
d. Captures the monitoring need and sets a frequency.
e. Performance indicator(s) are those measures or metrics that will indicate the degree of success in implementing the strategy.

Best Management Practices to Address the Strategies for Goal 1:

The strategies to address concerns and issues related to agricultural land use lie primarily in the implementation of BMPs focused on cropland, pastureland, streambank fencing and buffers, animal waste management systems, and erosion control for gullies and critical areas. Goals and strategies that include education, outreach, and recognition compliment these efforts and help to support continued implementation of the BMPs. 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 stop water flow and store it or guide 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 along with the provision of an alternate water source.	

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.

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.

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 and/or spreading 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.

There are many agricultural BMPs available to farmers and landowners today. A good review of agricultural BMPs is provided by Alabama A&M and Auburn University through their Alabama Cooperative Extension System (Hairston, *et al.*, 2001). It describes the types of BMPs used to control nonpoint pollution in agriculture and also discusses how to select the appropriate BMP. USDA NRCS and SWCD provide technical and financial assistance for willing program participants. Several documents provide good reviews of agricultural BMPs, including the Alabama SWCC's "*Protecting Water Quality on Alabama's Farms*"; the ACES's and NRCS's "*Nutrient Management Planning for Animal Feeding Operations*".

GOAL 2:	*Reduce nonpoint source pollution from aquaculture operations.*
	Issues and Concerns in the Basin: • management of effluent quality from ponds
Targeted Creeks: None Identified	

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

Best Management Practices to Address the Strategies for Goal 2:

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 concerns, 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 essential to BMP implementation efforts are education, outreach, and recognition. Workshops and the distribution of educational materials are key efforts. Methods of recognition, and possible certification for outstanding stewardship should be developed for aquaculture operations. Although a specific program aimed at aquaculture operations does not currently exist, one could be developed that follows the general model of the Treasure Forest Program, and could even "piggy back" on the existing forest program through coordination with the Alabama Forestry Commission.

The Treasure Forest Program is a voluntary program that seeks to promote sound and sustainable, multiple-use forest management. It encourages landowners to use their forests wisely to meet their own needs while at the same time protecting and enhancing the environment. This management ethic is encouraged through both education and recognition. Education is provided through information and on-the-ground technical assistance from the member agencies and groups of the Alabama Forestry Planning Committee. In addition, landowners may receive public recognition for outstanding stewardship by earning the Treasure Forest Award. Specific criteria and objectives are used to judge whether an applicant qualifies for the award based on their commitment to the Treasure Forest ethic and their physical management of the land. Treasure Forest Award recipients receive a numbered and signed Treasure Forest certificate and a Treasure Forest sign to display on the property. Further, they receive the distinction of being titled a Treasure Forest landowner, which represent good stewardship of the land and protection and/or enhancement of the multiple values of the forest. Because this program has been so well-received by the public and has displayed such success since its inception in 1974, it would provide a solid starting point for development of a similar plan for aquaculture operations. Both the AFC and the ACES would be ideal partners in creating a certification process. Mary Baltikauski of the Geneva County ACES office expressed considerable enthusiasm and interest on the part of ACES in helping with such an effort (personnel communication, December 15, 2006).

Recognizing the importance of environmental stewardship and aquacultural practices, 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 BMPs for Alabama Channel Catfish Farming. Several agencies including AU, ADEM, and the Natural Resources Conservation Service (NRCS), worked with the ACP in developing the BMPs. The final version was published in a report in 2003 (Boyd *et al.*, 2003). The recommended BMPs, which consist of series of 21 documents that cover various aspects of aquaculture, were published by Auburn University and the NRCS in a series titled "*Alabama Aquaculture Best Management Practices*". A representative list of BMPs recommended for aquaculture is provided in Table 7-12. The BMPs have been widely implemented within the state in an effort to minimize potential environmental impacts from catfish production. The full series (BMPs G01-G21) can be accessed on the web at <http://efotg.nrcs.usda.gov/references/public/AL/INDEX.pdf>.

Table 7-12. Recommended Aquaculture BMPs

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

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 increase 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 3:	*Track resource trends in the basin to measure progress in restoration and protection efforts, fill in data gaps, and identify new resource concerns and issues.*

Issues and Concerns in the Basin:

- limited baseline data sets for many creeks in the subbasin
- limited water quality monitoring within the watershed

Targeted Creeks: Cypress and Cowarts Creek

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Build on the baseline of water quality and biological integrity of the 10 creeks (HUC 12) in the subbasin by expanding citizen monitoring program in the subbasin.				
AWW, ACWP, ADEM, universities, schools, ARA	High priority, continuous, long term	Low; private/ public	Monthly physical and chemical data collection; annual progress reports	Measures of turbidity, dissolved oxygen, temperature, chlorophyll a, nutrients
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.				
ACWP, ADEM, watershed groups, ARA, AWW, universities	High priority, continuous, long term	Low; public	Annual progress reports	Number of sites monitored; percent of creek miles monitored
Target monitoring to §303(d) streams (if present) and other priority subwatersheds to track management progress over time. Document trends in water quality.				
AWW, ACWP	High priority, continuous, long term	Low; private/ public	Monthly physical and chemical data collection.	Measures of turbidity, dissolved oxygen, temperature, chlorophyll a, nutrients

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Monitor impervious surface cover/land use on watershed basis.				
Universities, counties, ACWP	Medium priority, continuous, long term	Medium; private/ public	Annual GIS layer update (based on aerial photography or field surveys)	Impervious surface cover over time (as percentage of subwatershed)
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.				
ACWP, ADEM, AWW, watershed groups, ARA	High priority, continuous, long term	Low; public	Annual implementation progress reports	Number of plan implementation projects supported by monitoring data

Best Management Practices to Address the Strategies for Goal 3:

Monitoring plans are developed to track resource conditions over time. Monitoring should focus on "metrics" or measurable "indicators" such as fecal coliform bacteria concentrations or total suspended solids (TSS). Typically, a watershed group sets targets for the desired conditions of a water body then performs long term monitoring to track selected metrics. Discrepancies between existing and desired resource conditions, as measured by the metrics, are identified along with their probable cause and a plan is established and implemented to address the discrepancies. Monitoring is a long term task and should continue throughout the implementation of any initiative to track its success. This information ultimately functions as a report of progress (or lack thereof) and should inform future planning and management decisions.

Federal and state agencies, universities, and citizen volunteers monitor the water resources of the basin. Water quality data is collected primarily by ADEM, Alabama Water Watch groups and many private interests that hold permits for wastewater discharges in the subbasin. Collectively, these groups generate the only water quality data for the creeks of the basin in Alabama.

ADEM is responsible for the lion's share of water and natural resource monitoring in the basin (and throughout Alabama). Six programs make up ADEM's regular monitoring effort: Nonpoint Source Assessment Program; Point Source Assessment Program; Ecoregion Reference Assessment Program; Upland Alamap Monitoring and Assessment Program; Clean Water Act §303(d) Support Assessment/Monitoring Program; and Fixed Ambient Trend Monitoring Program.

Alabama Water Watch (AWW) works with many citizen monitoring groups throughout the state. However, there are no active monitoring groups in this basin in Alabama. Additional information about AWW and the Chipola River is provided in *Citizen Guide to Alabama Rivers, Chattahoochee and Coastal Plain Streams* (Hartup and Deutsch, 2003).

Water quality monitoring is an important component in determining whether goals are being achieved. While the performance indicators listed in this Plan are important measures for determining implementation success, restoration success is measured by field 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 strategic monitoring sites are being assessed.

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 be necessary to monitor a large 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, targeting specific watersheds in monitoring plans.

Biological monitoring and land use assessments (*e.g.*, determining impervious surface cover) can be labor intensive and require specialized knowledge and skills. Monitoring has become more complicated as USEPA has implemented tighter quality assurance protocols for sampling (if it is to be used by the states for documenting water conditions). Thus, some monitoring strategies are better left to the universities to complete since volunteers can not be expected to handle all of the monitoring responsibilities required. Further, ADEM and USEPA will only accept ADEM monitoring results for the purposes of listing or delisting an impaired stream.

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 4: *Reduce nonpoint source pollution from roads, road banks, and new road construction.*

Issues and Concerns in the Basin:

- soil erosion and sedimentation from roads and road banks (especially new and/or unpaved roads)
- gully erosion

Targeted Creeks: Cowarts Creek, Cypress Creek

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 and road banks to reduce erosion and protect water quality. Address gullies that have developed from improper road drainage.				
County engineers, public works departments, local governments, ALDOT, 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 road banks 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, ALDOT, SWCD, NRCS	Medium priority, continuous, long term	Medium; public	Annual report on improvements	Miles of paved roads where road bank improvements have been made
Implement recommended construction practices for new roadways and road banks, 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, ALDOT, 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

Lead Agency or Group	Timeframe	Level of Funding	Monitoring Need	Performance Indicator
Identify and rank unpaved roads in the subwatersheds that contribute most to sediment loading to surface waters.				
County engineers, public works departments, local governments, ALDOT, SWCD, NRCS	Medium priority, continuous, long term	Low; public	Periodic updates on ranking of needs in subwatersheds	Percent of unpaved roadways ranked in the watershed
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, ALDOT, 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

Best Management Practices to Address the Strategies for Goal 4:

Unpaved roads, road improvement projects and road banks are commonly recognized as sources of nonpoint pollution, due especially to soil loss/sedimentation. The implementation of BMPs and recommended maintenance practices for unpaved roads are the solutions for reducing this load. The Choctawhatchee, Pea, and Yellow Rivers Watershed Management Authority (2000) 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*", published in February 2000, and available at: <http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/ResourceMat/unpavedtxtonly.pdf>.

Important watershed protection tools include "better site design", which is an approach to residential and commercial development that uses innovative site planning techniques to reduce the amount of impervious cover and stormwater runoff. Its aims at accomplishing three goals at every development site 1) reduce the amount of impervious cover, 2) increase natural lands set aside for conservation, and 3) use pervious areas for more effective stormwater treatment. A handbook detailing "better site" design principals has been published by the Center for Watershed Protection (CWP) (1998). CWP also provides a slideshow at their website that describes the principals detailed in their text. It outlines some specific techniques for applying watershed management tools and highlights key choices a watershed manager should consider when applying them. The slideshow can be viewed at <http://www.stormwatercenter.net/Slideshows/8tools%20for%20smrc/sld001.htm>. Another useful resource is the Stormwater Manager's Resource Center website at <http://www.stormwatercenter.net/>. This site provides a good overview of "better site design" techniques including alternative pavers, alternative turnarounds, open space design, green parking, and narrower residential streets.

Educational outreach and workshops are key to promoting the implementation of these BMPs and practices. ADEM and ALDOT play an important role in working with the development community, such as the Home Builders Association of Alabama, and other homebuilders and construction companies. Coordination with county engineers and governments is an important component of this outreach.

Road Bank Ditch Design and Maintenance	
Efficient disposal of runoff from roads helps preserve roadbed and banks. Well-vegetated ditches act to slow, control, and filter runoff. This provides an opportunity for sediments to settle-out before runoff enters surface waters. Ideally, "turn-outs" (intermittent discharge points also called "tail ditches") will help maintain stable velocity and proper flow capacity within the road ditches by timely discharging of water. This helps 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 grow with time and continue down-cutting until resistant material is reached, expanding 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 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.	

Unpaved Road Design and Maintenance

If not properly designed and maintained unpaved roads can contribute heavily to water quality problems. The most important factor in proper road management is managing runoff, or drainage. Priority should be given during road development to nonstructural BMPs that minimize the creation of new runoff, limit erosion, and protect the health of waterways. Examples of nonstructural BMPs include maintaining natural buffers and drainage ways that are stable and well-vegetated. Natural vegetation will help infiltrate runoff, reduce the velocity of the runoff, and help remove sediments in the runoff. Also, the creation of steep slopes should be avoided unless effective stabilization methods are employed. Surface water that is not effectively conveyed from the road surface to a drainage channel can result in deterioration of the road surface and leads to various erosion problems, thus, proper road construction and maintenance is essential. General road surface principles include preserving and maintaining a proper road crown for good drainage, keeping the road surface tight and impervious, and performing regular drainage maintenance and grading. Appropriately installed and maintained ditches, culverts, bank stabilization methods, and outlet structures that reduce water velocity are also required to ensure adequate drainage for unpaved roads.

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 and sediment loading from urban development, including land clearing and construction activities
- lack of stormwater management in urban areas

Targeted Creeks: Cowarts Creek, Cypress Creek

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	Medium 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, ALNEMO, 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, USACOE, 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
Encourage responsible site design for new residential and commercial construction.				
Local governments, ADEM, USACOE, SWCD, HBAA, ALNEMO, SWS	High priority, continuous, long-term	Low to medium, public	Annual report on progress	Number of new developments with low impact development techniques.
Implement recommended construction practices for new roadways and road banks, 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, ALDOT, 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 landscapers 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, ALNEMO, 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

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Recognize developers and contractors who are participating in the Clean Water Partnership and have implemented effective BMPs/low impact development techniques 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
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 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

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Educate homeowners and businesses on proper septic tank location, 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

Best Management Practices to Address the Strategies for Goal 5:

As urban centers expand, the effects of increased development on surface and ground waters also need to be considered. Sediments, nutrients, pathogens, and toxics can enter surface and ground waters through storm water runoff that originates from construction sites, business developments, and residential communities. Reductions in contaminant loading can be made on several fronts to deal with nutrient, bacteria, sedimentation, and solid waste pollution typical of urban areas (Table 7-13).

Table 7-13. Management Options for Addressing Water Pollution in Urban Areas

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	

Source: CH2MHILL, 2005

Because urban development can have such severe effects on water quality, environmentally sensitive or low-impact development is essential in protecting and enhancing hydrologic systems in urban areas. Low Impact Development (LID) is a new, comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds. LID practices aim to reduce floods in developed areas, reduce storm water storage requirements, improve water quality of runoff, and help maintain and restore fish habitat. When implemented properly, LID allows for developmental growth with minimal environmental effects. More information on LID is available at EPA's website <http://www.epa.gov/nps/lid/>.

To reduce the quantity and improve the quality of stormwater runoff, stormwater management BMPs and management protocols should be pursued. Stormwater pollution is likely to occur when construction and development companies are not diligent during land clearing, road building, and construction work, thus, education regarding BMPs implementation and enforcement of their use is essential. Where feasible, innovative stormwater management approaches such as the use of constructed and natural wetlands for water treatment can be implemented. Finally, the incorporation of pervious surfaces during new construction should be fostered along with the retrofitting of existing impervious surfaces.

Many of these measures are 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 that identifies the builder as possessing a working knowledge of environmental BMPs for the development process. More information on QCIP can be found online at HBAA's website <http://www.hbaa.org/pdf/qci_brochure.pdf>.

The nutrient and pathogen loading from improperly functioning onsite sewage disposal systems (OSDS) can have severe impacts on surface waters. Volunteer bacteriological water monitoring (trained through AWW) can help to identify areas of failing or leaking systems. If problems are detected, watershed groups can work with the local health departments to identify areas with significant impacts from overflows or failures. Watershed groups can also promote education of homeowners on regular pumpouts of septic tanks, and nutrient and bacteriological problems from leaking and failing onsite systems through educational workshops and materials. Improvements to these identified OSDSs can be pursued through monitoring, education and outreach, and incentives. Alternative onsite sewage treatment system demonstration projects may be needed in some instances, especially in areas of dense development, poor soil drainage, and areas adjacent to sensitive water resources.

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 that is transported through small diameter sewer lines to a local treatment facility. Treatment using a decentralized wastewater system is typically accomplished by using effective attached growth biological processes that treats the effluent on-site. The treated effluent is dispersed or reused via in-ground methods. If properly managed (sited, designed, maintained), decentralized systems are capable of treating wastewater to a high level of quality. 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 underground injection control (UIC) permits for systems with capacities greater than 10,000 gpd and by ADPH for systems of lesser capacities. More information on proper management and community planning for decentralized wastewater systems is provided by USEPA at <www.epa.gov/owm/onsite>.

The basis of the education and outreach strategies involves demonstration projects and workshops that educate citizens, landowners, and the building and industrial community of the need to incorporate BMPs and green initiatives. Educating the construction and development industry in proper utilization of BMPs in land clearing, road building, and construction work would facilitate responsible development. To foster a proactive environment and encourage coordination among entities, public recognition of builders that incorporate initiatives beyond measures required by law, perhaps by the Clean Water Partnership and watershed organizations, may be worth considering. Additional outreach opportunities include educating landscapers on the impacts on nutrient loading in surface and ground water from improper fertilization, and instructing homeowners on environmentally friendly solutions to address hazardous waste disposal, water conservation, lawn care and fertilization, and septic system maintenance. Coordination with municipal and county engineers, planners, and governments is also an important component of this outreach.

Excellent reference materials and technical assistance regarding nonpoint source pollution, and implementation of urban and stormwater BMPs are available from various agencies and entities. Documents that provide guidance on minimizing sediment and water quality impacts from urban development include the following:

- Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas. Published by Alabama SWCC June 2003. Available at <http://www.swcc.state.al.us/erosion_handbook.htm>.

- How to Guide for Stormwater and Urban Watershed Management. Published May, 2000 by Troy State University. Available at <http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/ResourceMat/StrmwtrPhaseIIMan.pdf>.

- Best Management Practices Manual published by the City of Knoxville, TN. Available at <http://www.ci.knoxville.tn.us/engineering/bmp_manual/>.

There are also a number of programs and cooperative efforts among various entities aimed at providing education regarding the impact of land use on water resources. They include the following:

- Business Partners for Clean Water (BPCW)

  BPCW is a cooperative effort between local businesses, ADEM, and ACWP designed to give businesses the information they need to comply with water quality laws and to recognize businesses that take voluntary steps to protect local streams and lakes. ADEM provides education information regarding NPS pollution and water quality management to specific business sectors, such as construction, landscaping, automotive, building maintenance, and food-related businesses. Information and technical assistance is tailored to educate each business sector on NPS pollution, their unique contributions to it, and solutions for reducing those contributions. In return, businesses are formally recognized as being environmentally friendly if they prepare a simple pollution prevention plan that is approved by their city, in conjunction with ADEM. An informative brochure is available at <http://www.adem.state.al.us/Education%20Div/TakeAction/Brochures/BPCW.pdf>.

- Alabama NEMO Alabama Department of Environmental Management

  The NEMO Program (Nonpoint source Education for Municipal Officials) is a process for educating professional and volunteer municipal officials about the impacts of land use on water quality and about the options available for managing those impacts. NEMO uses geographic information system (GIS) and remote sensing technology as educational tools, in its promotion of environmentally sound land use planning efforts, which is focused on local land use decision makers as the primary target audience. This program can be found at <http://www.aces.edu/waterquality/nemo/intro.htm#NEMO>.

  Among the valuable educational resources provided by this Program and website, are comprehensive documents regarding natural resource based planning, Green site designs, and structural best management practices and restoration. These documents describe a watershed approach to site planning, that examine new ways to reduce pollutant loads and protect aquatic resources through non-structural and structural practices and improved construction site planning. They provide insight into the importance of imperviousness, watershed-based zoning, the concentration of development, headwater streams, stream buffers, green parking lots, and other land planning topics. The NEMO National Site, found at <http://nemo.uconn.edu/>, is a useful resource with examples of how other states are working with local officials on issues of nonpoint source pollution.

- Center for Watershed Protection (CWP)

  The CWP is a non-profit corporation that provides local governments, activists, and watershed organizations around the country with the technical tools for protecting the nation's streams, lakes and rivers. The Center has developed and disseminated a multi-disciplinary strategy to watershed protection that encompasses watershed planning, restoration, research and training; stormwater management; better site design; and education and outreach. More information can be obtained at <http://www.cwp.org/mission.htm>.

- Alabama Clean Water Partnership (ACWP)

  The ACWP is a coalition of public and private individuals, companies, organizations and governing bodies working together to protect and preserve water resources and aquatic ecosystems throughout the state. The purpose of the ACWP is to bring together representatives of these groups to coordinate their individual efforts, share information and plan more effectively for protection and preservation. Their website is located at <http://www.cleanwaterpartnership.org/>.

- Raingarden Design

  Raingardens are a type of landscaping used to treat stormwater before it reaches local waters. When it rains, pollutants like oil, pet waste, clay, and excess pesticides may wash into our streams, rivers, and lakes. These pollutants can harm aquatic life and make our waters less desirable for activities like swimming, fishing, and boating. Rain gardens are shaped like bowls in order to catch stormwater for mini-processing. More information on constructing raingardens can be found at <http://www.raingarden.org/>.

Several demonstration projects were constructed at locations around Alexander City, Alabama. The demonstration rain gardens were the result of collaboration among the Middle Tallapoosa Clean Water Partnership, City of Alexander City, AU Landscape Architecture Department and Alabama Cooperative Extension System. The gardens can be viewed at <http://www.aces.edu/waterquality/nemo/alex.htm>.

GOAL 6:	*Protect and restore aquatic habitat and aquatic species diversity.*

Issues and Concerns in the Basin:

- wetland and aquatic habitat destruction due to road construction and land development
- loss of stream buffers

Targeted Creeks: Big Creek (from Double Bridge Creek to the AL-FL state line)

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Identify subwatersheds and stream segments with habitats of exceptional quality and high aquatic species diversity, and target parcels for acquisition or conservation projects.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, FLDEP, FFWCC,GSA	High priority, continuous, long term	Medium; public	Biennial report of rankings and priorities	Basinwide prioritizations of stream segments and habitats, supported by participants
Identify the specific causes for the loss of fish and mussel species diversity in targeted stream segments, and prioritize restoration and BMP projects to reduce those land use impacts.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, FLDEP, FFWCC, GSA, USACOE	High priority, continuous, long term	Medium; public	Biennial report of targeted streams, causes for diversity losses, and restoration and BMP projects	Basinwide prioritizations of targeted streams and projects, supported by participants
Coordinate efforts between Alabama and Florida, and with federal agencies, to manage critical habitat for rare and endangered fish and mussel species. Develop special land use guidelines for the designated critical habitats areas for species protection through coordinated state and federal efforts.				
USFWS, ADCNR, ADEM, SWCD, NRCS, ACWP, ANHP, FLDEP, FFWCC, GSA, USACOE	High priority, continuous, long term	Medium; public	Biennial report of critical habitats and proposed land use regulations	Basinwide support by participants for the report; progress in implementation of land use regulations

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Implement habitat restoration and BMP projects that will target specific causes for the loss of fish and mussel species diversity in the priority stream. Identify funding programs and mechanisms that support these projects.				
USFWS, ANHP, ADCNR, SWCD, NRCS, ADEM, AWF, TNC, ACWP, FLDEP, FFWCC, GSA, USACOE	High priority, continuous, long term	High; public/ private	Annual report of restoration and protection progress; monitoring of fish and mussel species	Acres of habitat protected; acres of habitat restored; increases in species diversity metrics
Pursue habitat protection initiatives through acquisition and easement mechanisms, utilizing grant and assistance programs for these purposes. These mechanisms include Environmental Quality Incentives Program (EQIP), Wetlands Reserve Program (WRP), Conservation Reserve Program (WHIP), Forever Wild and Partners for Wildlife (FWS).				
USFWS, ANHP, ADCNR, SWCD, NRCS, Forever Wild, Land Trusts,	High priority, continuous, long term	High to medium; public/ private	Annual report of habitat protection progress	Acres of habitat protected

<u>Best Management Practices to Address the Strategies for Goal 6</u>:

Alabama's diversity of freshwater mussels is greater than anywhere else in the world and some of this diversity is represented in this basin. Losses in species diversity and in rare and endangered species have been attributed to aquatic habitat alterations, including flow modifications from dams and navigation projects, river channel dredging and channelization, sand and gravel mining, the loss of riparian buffers, access of livestock to streams, and other nonpoint sediment sources.

Habitat restoration and 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* and the recovery plan and proposed critical habitat designations for the federally-listed mussel species that occur in the Chipola River Basin (USFWS, 2003; USFWS, 2006b). These efforts will be coordinated with the ADCNR's and FFWCC's wildlife conservation plans, for consistency.

GOAL 7: *Promote watershed and community stewardship through resource education and outreach and the promotion of volunteer opportunities throughout the watershed.*

Recommended Strategies to Achieve the Goal:

LEAD AGENCY OR GROUP	TIMEFRAME	LEVEL OF FUNDING	MONITORING NEED	PERFORMANCE INDICATOR
Promote participation and membership in the subbasin committee and establish watershed groups or action teams for key subwatersheds.				
ACWP, ADEM, watershed groups, ARA, AWW, CRP	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Promote the implementation of the Chipola 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).				
ACWP, ADEM, watershed groups, CRP	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, CRP, schools	Medium priority, continuous, long term	Low; public	Annual progress reports	Number of educational programs and schools involved
Promote river clean-ups throughout the subbasin.				
ACWP, ADEM, watershed groups, ARA, AWW, SWCD, APPC, CRP, USACOE	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, CRP, ARA, AWW, news outlets	High priority, continuous, long term	Low; public	Annual progress reports	Number of events and publicized mechanisms utilized for promotion

Best Management Practies to Address the Stratigies for Goal 7:

The successful implementation of this Basin Management 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 increase involvement of watershed stakeholders in organized watershed associations. Regional and subwatershed organizations that are functionally active are an immediate need.

Later in this chapter, a more-detailed Information and Education component is discussed to lay the groundwork for implementing a watershed outreach campaign. Financial strategies are discussed in Chapter 8. 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 and efforts will need to be focused from the beginning to develop momentum for implementing the plan.

GOAL 8: *Promote watershed management technology transfer across industries and across state lines of Alabama and Florida. Coordinate watershed assessment, planning, restoration and conservation efforts between subbasin and basin stakeholders in both states.*

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">Promote watershed management technology transfer across industries, and promote the integration of watershed management techniques in restoration projects.</td></tr>
<tr><td>ACWP, ADEM, agencies/organizations representing land use industries, watershed groups, ADCNR, SWCD, NRCS</td><td>High priority, continuous, long term</td><td>Low; public</td><td>Annual progress reports on transfer and integration efforts</td><td>Number of meetings and workshops, number of participants, number of industries represented</td></tr>
<tr><td colspan="5">Coordinate watershed planning, restoration, and conservation projects between Alabama and Florida recognizing hydrologic connections and impacts on restoration success.</td></tr>
<tr><td>ACWP, ADEM, ADCNR, CRP, watershed groups, SWCD, USFWS, FLDEP, FS, TNC, ANHP</td><td>Medium priority, continuous, long term</td><td>Low; public</td><td>Annual progress reports on coordination efforts</td><td>Number of coordination meetings and workshops, number of coordinated projects</td></tr>
<tr><td colspan="5">Coordinate water quality and biological monitoring between Alabama and Florida, particularly with respect to impaired lakes and streams.</td></tr>
<tr><td>ADEM, ACWP, CRP, FLDEP, FFWCC, watershed groups, USGS, GSA</td><td>Medium priority, continuous, long term</td><td>Low; public</td><td>Annual progress reports on coordination efforts</td><td>Number of coordination meetings and workshops, number of coordinated monitoring programs</td></tr>
<tr><td colspan="5">Coordinate Clean Water Act Section 303(d) TMDL activities between Alabama and Florida on streams where impairment impacts cross the state line. Joint TMDL development should be considered in this river basin.</td></tr>
<tr><td>ADEM, FLDEP, USEPA, watershed groups, ACWP, CRP</td><td>Medium priority, continuous, long term</td><td>Low; public</td><td>Annual progress reports on coordination efforts</td><td>Number of coordination meetings and workshops, number of coordinated monitoring programs</td></tr>
</table>

Lead Agency or Group	**Timeframe**	**Level of Funding**	**Monitoring Need**	**Performance Indicator**
Promote and publicize the coordination efforts between Alabama and Florida on the Chipola. Develop web-based and printed media coverage, and utilize the news media, to promote these coordinated efforts at restoration and conservation.				
ACWP, ADEM, CRP, FLDEP, watershed groups, ARA, AWW, news outlets	Medium priority, continuous, long term	Low; public	Annual progress reports on promotion efforts	Number of events and publicized mechanisms utilized for promotion

Best Management Practies to Address the Stratigies for Goal 8:

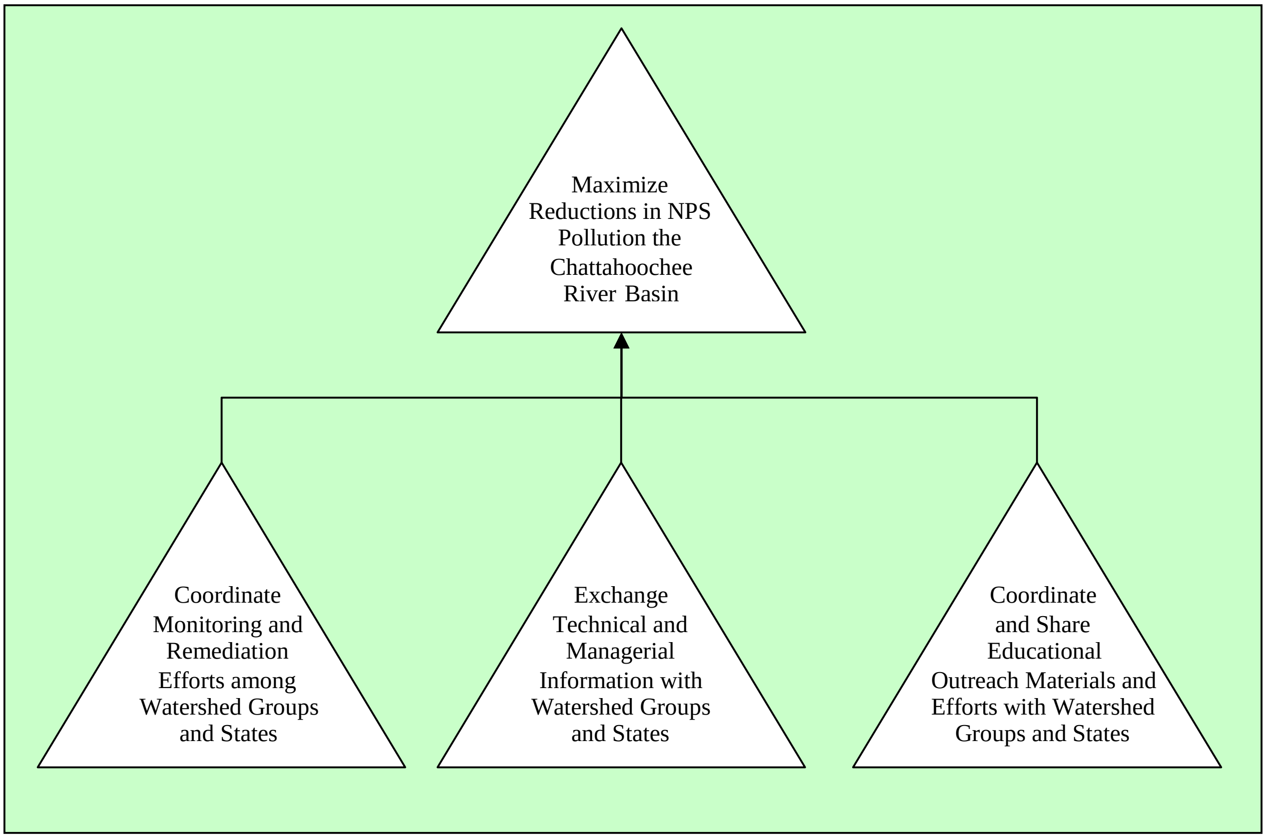
The successful implementation of this River Basin Management Plan is directly dependent on the involvement and commitment of watershed stakeholders and all the agencies and organizations identified in this Plan. The first two strategies listed above are critical for moving this Plan forward to implementation.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

Stakeholder-based watershed management groups often compete against each other in securing scarce grant monies that are used to support public education, water quality monitoring, and mitigation for reducing nonpoint source pollution. One of the best ways to increase the efficiency of these efforts is through sharing of management technologies and efforts across stateliness and among watershed management groups. Collaboration between groups will result in efficient use of scarce resources (*e.g.*, grant monies), greater economies of scale (*e.g.*, sharing public education materials), and quick transfer of new information – all of which can supercede political boundaries.

The strategies for achieving this goal can be consolidated into three primary efforts that include (Figure 7-7):

- coordination of monitoring and remediation efforts;
- exchange of technical and managerial information; and
- coordination and sharing of public outreach and educational material.

Figure 7-7. Coordination of Effort and Resources Can Increase Efficient Use of Scarce Resources



Success will be dependent on each watershed association's ability to communicate and foster an atmosphere of communal effort between and within associations and industry. Methods of coordinating and managing monitoring and remediation efforts can include development of a common database for tracking basin-wide monitoring efforts; cooperative planning among watershed groups in securing grant monies for monitoring and remediation; and sharing of lessons learned, information sources, and material resources for remediation projects.

The exchange of technical and managerial information between watershed management groups and industries can be facilitated in a variety of ways. For example, watershed groups and industries within a subbasin or within a basin can establish periodic meetings or conferences, with an established agenda designed to share new information. If this effort is too costly, it may be possible to "tag along" at another organization's conference, and establish your own subbasin meeting on the side. At these meetings, establish subcommittees to address and work out ways for joint TMDL development and monitoring. Another example is to encourage participation from universities and colleges. These institutions tend to have access to new technologies that may be beneficial to watershed groups and industry. They also have a ready source of potential staff and volunteers for research projects for which grants can be obtained. Further, their information is shared in a forum that reaches a much broader audience than the individuals within a watershed group, and therefore, can bring a broader range of information and experience to the table. A third method for exchanging information between groups and industry is to collaborate on newsletters and/or websites at the subbasin or basin level to create a clearing house for information. This results in a sharing of information among a broader geographic audience, allowing groups to capitalize on each other's work. Alternately, ADEM has initiated the NPS News, a news bulletin detailing NPS-related projects and information throughout the state. This bulletin is available online from the Nonpoint Source Program. Submission of articles is encouraged.

Coordination and sharing of public outreach and educational materials could include working with other watershed organizations to divide up the creation of outreach materials as well as asking industry to participate by sharing desktop publishing and/or publications, website links, funding, and guest speakers. Invite the media to attend subbasin or basin-wide meetings. Join efforts, and send prepared press releases to the media detailing successes, in restoration and conservation projects, ongoing or new monitoring efforts and new alliances, and always, provide contact information. Collaborate on newsletters and websites. Sharing these tasks require less effort for an individual watershed group, and can result in distributing more information to a wider audience. In addition, it is much more efficient to have one larger website with quality information than multiple websites that a user must jump back and forth between.

Familiarity with the studies and plans produced by other watershed groups may also be helpful. For example, the types and percentages of land uses occurring in the Chattahoochee River Basin in Alabama are the same as for the entire river basin including Alabama, Georgia, and Florida. Thus, materials produced by groups in other states may be useful and may apply to management of this subbasin in Alabama. It may also be beneficial to enter into partnerships with other watershed groups where each group focuses on different types of issues and then shares the resulting information.

Though watersheds respect no political boundaries, it is important that watershed associations obtain local government input and buy-in to implement a watershed plan. Local governments may be able to help with securing funds and political support, acquiring or giving access to property needed for projects or surveys, and adopting rules and ordinances regarding resource conservation. In addition,, by joining forces and coordinating efforts with watershed groups across state and county lines within a subbasin (or even within the basin), watershed groups can coordinate better planning, restoration and conservation projects that will benefit the river as a whole. This also fosters better utilization of resources, both financially and technically.

GOAL 9: *Develop a framework in the subbasin 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 Chipola 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, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups
Promote participation and membership in the subbasin committee and establish watershed groups or action teams for key subwatersheds.				
ACWP, ADEM, watershed groups, ARA, AWW	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, AWW	High priority, continuous, long term	Low; public	Annual progress reports	Number of members or participants; number of watershed groups

<u>Best Management Practies to Address the Stratigies for Goal 9</u>:

An effective framework from which to implement the components of this Plan requires the establishment of, and active participation in, regional watershed and subwatershed groups. It is from these groups that members will be obtained to staff the task-specific action groups required by the Plan. Bolstering or establishing regional watershed groups entails first identifying the most amenable target group, educating them, and then recruiting them for active membership in regional and subwatershed groups. Such a target audience consists of individuals who tend to participate in community activities and events, and who will require relatively little effort to educate and incorporate. Educational efforts should then be focused on informing them of the benefits and functions provided by a healthy watershed and clean water, the potential and current threats facing these resources, and the management options and opportunities available to protect them. Educational venues can include providing educational flyers in public locations; holding talks at schools, universities and non-profit meetings; posting notices in nonprofit and local publications; issuing press releases; and working with ADEM to issue public service announcements.

Coincident with such outreach efforts is the promotion of the Basin Management Plan (once approved) at all appropriate opportunities including during urban and regional planning meetings, existing watershed and other non-profit group meetings, and during newly formed watershed and subwatershed meetings. Also, it is important to coordinate with federal, state, and local agencies across state lines to promote the Plan and to identify funding opportunities. More information on funding options is provided in Chapter 8.

At the outset, strong leadership will need to be identified, likely from within the Lower Chattahoochee Subbasin Stakeholder Committee, to direct and organize the formation of watershed groups or action teams. However, once working groups are established and an organizational structure is put into place, it is anticipated that momentum will be gained such that each group will be able to work independently towards accomplishing their respective tasks. More detailed information on plan implementation including recommended organizational structure, and information and educational outreach is covered in Sections 7.10 and 7.11, respectively.

7.9 Management Strategies for Common Water Quality Concerns

In addition to the specific, action-oriented strategies listed above, a general list of watershed management strategies is provided in Table 7-14. The list is organized according to water quality or biological concerns, and is intended to be used as a reference during the development of issue-specific action plans and projects. The contents of this table were adapted from recommendations made by the Tallapoosa River Basin Management Plan stakeholders (CH2MHILL, 2005).

Table 7-14. Strategies for Addressing Common Water Quality Concerns

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Nutrient enrichment	Encourage the use of buffers around streambanks.
	Advocate the banning of detergents containing phosphates or taxing products with phosphates. Use education to encourage the use of phosphate-free products.
	Use federally funded cost share programs (*e.g.,* EQIP, WHiP) to help landowners use BMPs (waste management for animal waste).
	Employ education about septic system maintenance (Septic Tank Workshop for homeowners).
	Advocate for regular/periodic inspections of septic systems.
	Search for funding for the installation of alternative waste management systems.
	Encourage septic system installers to attend onsite wastewater training.

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Nutrient enrichment (cont.)	Promote education for septic dischargers/haulers (certification required). Use CEUs as incentives to haulers. Encourage the use of proper city planning and development and low impact development (*e.g.*, decrease impervious surfaces, protection of green spaces) by engaging county officials and staff in NEMO training. Encourage incentives for developers (fast-track permit approval) that use low impact development. Encourage/promote recycling and reuse – promote biosolids reuse and water recycling through land application. Encourage the use of environmental impact fees on businesses that leave abandoned buildings. Educate point sources about funding to correct issues (WWTP, WWTP lagoons). Educate golf course owners by distributing BMP manuals, encourage course management workshops, and promote use of natural design (natural areas). Encourage homeowners to reuse gray water. Study phosphorus loads from clear-cut areas. Use education to encourage land objectives that would promote lighter cuts.
Pathogen contamination	Encourage the use of buffers around streambanks. Use federally funded cost share programs to help landowners use BMPs (waste management for animal waste). Employ education about septic system maintenance (Septic Tank Workshop for homeowners). Advocate for regular/periodic inspections of septic systems. Search for funding for the installation of alternative waste management systems. Encourage septic system installers to attend onsite wastewater training. Promote education for septic dischargers (certification required). Support AWW program–encourage the expansion of the program so that monitoring sites are located on all creeks in the subbasin.

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Pathogen contamination (cont.)	Promote and support the NRCS EQIP program. Apply for Section 319 grant funds where applicable.
Soil loss/Sedimentation	Promote registered forester program. Report failing forestry BMPs using the SFI "Inconsistent Practices" form and reporting system. Encourage the use of buffers around streambanks. Use federally-funded cost share programs to help landowners use BMPs (waste management for animal waste). Encourage county engineers to use and maintain proper BMPs for construction of dirt roads; sponsor the ADEM dirt road workshop. Report failing BMPs and other problems to ALDOT/County engineer representative. Initiate open space preservation or environmentally sensitive development initiatives.
Low dissolved oxygen	Support AWW program–encourage the expansion of the program to monitoring all creeks in the subbasin by recruiting volunteer monitors from community groups, schools and businesses.
Habitat alteration	Encourage use of conservation easements – land trusts. Report failing road BMPs/other development-related problems to ALDOT/County engineer representative. Promote AL Forestry Commission education programs. Encourage forest landowners to participate in the Forestry Commission registered forester programs. Encourage the use of buffers around streambanks. Encourage landowners to participate in US Fish & Wildlife habitat management programs, especially for imperiled species.
pH	Promote water quality training for master gardeners, other volunteer groups, and developers/contractors through advertisement. Promote incentive-based fertilizer education.

WATER QUALITY OR BIOLOGICAL CONCERN	MANAGEMENT STRATEGIES
Pesticides	Educate golf course owners by distributing BMP manuals, encourage course management workshops, promote use of natural design (natural areas). Organize a Household and Agricultural Hazardous Waste Collection day. Educate general public and significant users (*e.g.*, ALDOT; Alabama Power) with seminars and flyers.
Litter/Illegal Dumping	Promote annual creek cleanups (Earth or Rivers Day). Identify litter hot spots (research where it is coming from), report results to ADEM and local sheriff. Educate adults and contractors about illegal dumping and litter through anti-litter campaigns – *see* Information and Education component of this Plan. Encourage enforcement of county prima facie litter law. Advocate the use of bottles and cans deposits. Explore adoption of countywide mandatory garbage collection. Implement the Adopt-a-highway program.

7.10 Plan Implementation

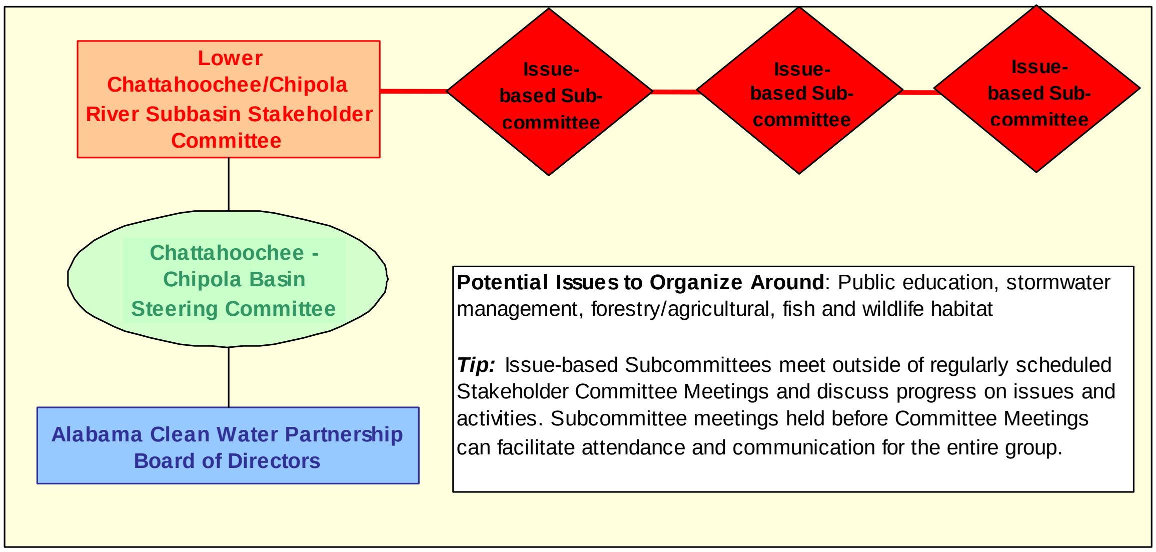
Successful water quality management projects require organizational structure and support to successfully plan projects, monitor resource conditions, and implement initiatives when required. It is a continuous process, and is generally long-term.

7.10.1 Organizational Structure

ACWP Subbasin Stakeholder Committees are tasked with the responsibility to oversee the development and implementation of their respective parts of the Plan. However, organizationally, a further division of labor may occur so that the Subbasin Committee is not overwhelmed with the diversity of issues and strategies.

One possible step toward implementing this Plan is for the Subbasin Stakeholder Committee to organize “issue-based sub-committees” to tackle specific issues or specific creeks/subwatersheds. Figure 7-8 illustrates this organizational structure in the context of the basin- and state-wide organizational layers. Each “issue-based sub-committee” could form around a priority issue or creek, and develop and implement a short-term action plan based on the strategies discussed in this Plan. The Subcommittee would report back to the greater Committee, who would be responsible for gathering technical and financial resources, when needed. This approach allows the Subbasin Stakeholder Committee the opportunity to focus resources and energies to achieve results in the short-term on a manageable scale.

Figure 7-8. Proposed Organizational Structure for Stakeholder Committees



7.11 Information and Education Component

Raising public awareness about water quality and watershed protection is vital to successful outreach. Because of this, providing informational and educational programs may be the most important component of this Basin Management Plan. It is important to educate the public on the importance of clean water and to inform them of their ability to effect positive change within their watershed. It is an ongoing process because the population within the watershed is dynamic, but the effort is well worth the time. The USEPA provides an excellent guide for conducting outreach activities, titled "*Getting in Step: A Guide for Conducting Watershed Outreach Campaigns*" (USEPA, 2003).

7.11.1 Current Education and Outreach Efforts

There are several organizations that actively educate the public about water resources (quality and quantity) and environmental issues in the Basin. These groups target a broad audience but often develop programs for localities with a specific interest.

Alabama Clean Water Partnership – With one subbasin subcommittee organized to attend to the Chipola River Basin and a statewide network in place, the ACWP is active on many watershed management fronts including basin management planning, education and outreach, and the development of public/private partnerships in the name of sustainable water resource management.

Alabama Rivers Alliance – Through its Watershed Outreach Project the Rivers ARA is developing local leaders and stewards for sustainable watershed management through education and outreach.

Alabama Water Watch – Through its highly successful citizen water quality monitoring program, AWW trains citizens to be water scientists and involve themselves in local environmental management.

Chipola River Partnership (FL) – The Chipola River Partnership <http://chipolariverpartnership.4t.com/index.html>assesses, identifies, implements, and monitors goals and objectives approved by individual landowners to produce comprehensive river and watershed management plans that protect socioeconomic and environmental interests.

Working with these organizations, partnering with local schools, and building on current efforts, this Plan proposes an Information and Education program consisting of six steps:

Step 1: Define Information and Education goals and objectives.

Step 2: Identify and analyze the target audiences.

Step 3: Create the messages for each audience.

Step 4: Package the message to various audiences.

Step 5: Deliver the messages.

Step 6: Evaluate the Information and Education program.

As the Subbasin Stakeholder Committee or a designated Subcommittee takes on this Information and Education program, it should be customized to reflect their goals, concerns and ideas.

Step 1: Information and Education Goals and Objectives

A primary goal for watershed associations is to promote watershed and community stewardship through resource education and outreach. Below are specific watershed management objectives related to informing and educating the public. Some objectives are broader than others. In some cases, it may be necessary to raise awareness about a water quality issue. In others, a water quality issue may be commonly recognized and therefore the goal may be to educated people about potential remedies. As plan implementation proceeds and Information and Education objectives are met, the Plan will have to be updated to reflect progress and to identify new challenges. Possible objectives include:

- Increase public awareness about the link between water quality and watershed management.
- Increase public awareness about the most threatened creeks in the subbasin.
- Educate landowners in selected subwatersheds about available financial and technical assistance programs.

- Educate county officials and department staff about stormwater management and the protection of water quality.

Step 2: Target Audiences

The challenge in implementing an Information and Education campaign is to identify the target audiences. Examples of target audiences based on watershed issues and/or management objectives are provided in Table 7-15.

Table 7-15. Potential Target Audiences Based on Watershed Issue and/or Management Objective

Issue / Management Objective	Potential Target Audience
General watershed education	School children and their parents; church congregations; fair and festival audiences
Stormwater management	County officials; County transportation and/or public works staff; developers/homebuilders
Agricultural Best Management Practices (Available techniques and financial resources)	Farmers; soil conservation district members; property owners
Forestry Best Management Practices (Available techniques and financial resources)	Forest landowners; logging companies

Step 3: Create the Messages for each Audience

An effective message carries a lot of power. Environmental and watershed education can be relatively complex so it is important to tailor the message in a way most appropriate to the target audience. There are many, free-of-charge resources to assist with creating a powerful message for watershed issues. For instance, the ACWP has brochures about the Subbasin Stakeholder Committee as well as popular campaigns/messages that it uses for public service advertisements that consist of a message and eye-catching posters (visit the ACWP website <www.cleanwaterparnership.org> to view the posters). Examples of campaign messages from ACWP follow:

"When Your Pet Goes On the Lawn, Remember It Doesn't Just Go On the Lawn" When our pets leave those little surprises, rain washes all of that pet waste and bacteria into our storm drains. And then pollutes our waterways. So what to do? Simple. Dispose of it properly (preferable in the toilet). Then that little surprise gets treated like it should.

"When You're Fertilizing the Lawn, Remember You Aren't Just Fertilizing the Lawn" You fertilize the lawn. Then it rains. The rain washes the fertilizer along the curb into the storm drain, and directly into our lakes, streams and bays. This causes algae to grow,

which uses up oxygen that fish need to survive. So if you fertilize, please follow directions and use sparingly.

"When Your Car's Leaking Oil On the Street, Remember It's Not Just Leaking Oil On the Street" Leaking oil goes from car to street and is washed from the street into the storm drain and into our lakes, streams and bays. Now imagine the number of cars in the area and you can imagine the amount of oil that finds its way from leaky gaskets into our water. So please, fix oil leaks.

"When You're Washing Your Car in the Driveway, Remember You're Not Just Washing Your Car in the Driveway" All the soap, scum, and oily grit runs along the curb. Then into the storm drain and directly into our lakes, streams, and bays. And that causes pollution which is unhealthy for fish. So how do you avoid the whole mess? Easy. Wash your car on the grass or gravel instead of the street. Or better yet, take it to a car wash where the water gets treated and recycled.

Step 4: Package the Message to Various Audiences

Once the message has been crafted, it must be packaged for the audiences. There are several approaches to packaging a watershed message:

- Work with the media
- Develop effective print materials
- Hold events (*i.e.*, canoe/kayak trips, water monitoring festivals, stream clean-ups, Groundwater Festivals)
- Leverage existing information and education programs/resources (*e.g.*, “piggyback” on existing efforts and programs).

Step 5: Deliver the Message

Money is typically the limiting factor, so it is important to figure out how to cost-effectively reach the audience. Here are several common delivery techniques:

- Mailing lists
- Phone calls
- Interviews
- Focus groups
- Presentations to boards, commissions, trade groups, neighborhood associations, library groups, garden clubs, etc.
- Demonstrations; guided tours

Step 6: Evaluation of Information and Education Campaign

Before embarking on any facet of an information and education campaign it is critical to define the “measures of success” the group will use to determine if it has met its information and education goals. Indicators or milestones are an excellent way to establish – from the beginning – how success will be measured. Indicators must be clear, realistic, and practical. For an outreach campaign, a group may consider *programmatic* or *social* indicators such as those listed in Table 7-16.

Table 7-16. Indicators of Success for Information and Education Campaign

Type of Indicator	Example Indicator	Method of Measurement
Programmatic	Number of brochures mailed	Mailing lists
Programmatic	Number of participants	Attendance lists
Social	Number of follow-up phone calls	Phone records
Social	Increased awareness of watershed issues	Pre- and post- surveys, interviews, focus groups
Social	Number of landowners requesting assistance for management practice installation	Phone records, site visits
Social	Number of landowners aware of technical and financial assistance for watershed management measures	Pre- and post- surveys, interviews

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Appendix 7A – Rare and State Protected Plant and Animal Species of the Chipola River Basin

The states of Florida and Alabama each maintain Natural Heritage programs and databases that keep track of the ecological resources or biodiversity of each state. These inventories contain records of rare and endangered natural communities, plants, and animals. In addition, each state has a system under which plant and animal species receive state protection.

The Florida Fish and Wildlife Conservation Commission (FWC) maintains the state list of animals designated as endangered, threatened, or species of special concern, in accordance with Rules 68A-27.003, 68A-27.004, and 68A-27.005, respectively, Florida Administrative Code (F.A.C.) <http://fac.dos.state.fl.us/>. The state lists of plants, which are designated endangered, threatened, and commercially exploited, and administered and maintained by the Florida Department of Agriculture and Consumer Services (DOACS) via Chapter 5B-40, F.A.C. This lists of plants can be obtained at <http://www.doacs.state.fl.us/~pi/index.html>. In addition, access to a list of sites that offer speciment data related to Florida species and the Florida Environments Online (FEOL) database which covers the literature related to Florida species and ecosystems is available from <http://palmm.fcla.edu/lfnh/>.

The Alabama Natural Heritage Program (ALNHP) provides the best available scientific information on the biological diversity of Alabama to guide conservation action and promote sound stewardship practices. It was established by The Nature Conservancy in 1989 as one of a network of such programs. For a fee, this database can be queried for location information on rare, threatened and state protected plant and animal species, and natural communities. Searches can be done by USGS Quadrangle, Legal Township, Range & Section(s), County(ies), or species. For more information, and to order a location search, refer to the ALNHP's website at <http://www.alnhp.org/track_2006.pdf>.

In addition, Alabama state law awards protections to a list of nongame species via the Nongame Species Regulation (Section 220-2-.92, page 79-82) and the Invertebrate Species Regulation (Section 220-2-.98, pages 77-78) of the *Alabama Regulations for 2005-2006 on Game, Fish, and Fur Bearing Animals*. Copies of these regulations may be obtained from the Division of Wildlife & Freshwater Fisheries, Alabama Department of Conservation & Natural Resources, 64 North Union Street, Montgomery, AL 36104. A digital version of these regulations is available online at <http://www.dcnr.state.al.us/hunting/regulations/regbook2005-2006-final.pdf>.

The Nongame Species Regulation (Section 220-2-.92, page 79-82) is available online at: <http://www.dcnr.state.al.us/watchable-wildlife/regulations/nongame.cfm>. The current list of Alabama species protected under state law is provided as Table 7A-1.

Table 7A-1. Wildlife Species Protected by the State of Alabama According to the Nongame Species Regulation

	COMMON NAME*	SCIENTIFIC NAME
Fish		
	Cavefish, Alabama	*Speoplatyrhinus poulsoni*
	Cavefish, Southern	*Typhlichthys subterraneusls*
	Chub, Spotfin	*Cyprinella monacha*
	Darter, Boulder	*Etheostoma wapiti*
	Darter, Coldwater	*Etheostoma ditrema*
	Darter, Crystal	*Crystallaria asprella*
	Darter, Goldline	*Percina aurolineata*
	Darter, Holiday	*Etheostoma brevirostrum*
	Darter, Lollipop	*Etheostoma neopterum*
	Darter, Slackwater	*Etheostoma boschungi*
	Darter, Snail	*Percina tanasi*
	Darter, Tuscumbia	*Etheostoma tuscumbia*
	Darter, Vermilion	*Etheostoma chermocki*
	Darter, Watercress	*Etheostoma nuchale*
	Madtom, Frecklebelly	*Noturus munitus*
	Sculpin, Pygmy	*Cottus paulus*
	Shad Alabama	*Alosa alabamae*
	Shiner, Blue	*Cyprinella caerulea*
	Shiner, Cahaba	*Notropis cahabae*
	Shiner, Palezone	*Notropis albizonatus*
	Sunfish, Spring Pygmy	*Elassoma alabamae*
	Sturgeon, Alabama Shovelnose	*Scaphirvnchus suttkusi*
	Sturgeon, Gulf	*Acipenser oxyrhynchus desotoi*
Amphibian		
	Frog, Dusky Gopher*	*Rana capito sevosa*
	Hellbender, Eastern	*Cryptobranchus alleganiensis alleganiensis*
	Salamander, Flatwoods	*Ambystoma cingulatum*
	Salamander, Green	*Aneides aeneus*
	Salamander, Red Hills	*Phaeognathus hubrichti*
	Salamander, Seal (of Coastal Plain origin)	*Desmognathus monticola*
	Salamander, Tennessee Cave	*Gyrinophilus palleucus*
	Treefrog, Pine Barrens	*Hyla andersonii*
Reptile		
	Coachwhip, Eastern	*Masticophis flagellum flagellum*
	Sawback, Black-knobbed	*Graptemys nigrinoda*
	Snake, Black Pine	*Pituophis melanoleucus lodingi*
	Snake, Eastern Indigo	*Drymarchon corais couperi*
	Snake, Florida Pine	*Pituophis melanoleucus mugitus*
	Snake, Gulf Salt Marsh	*Nerodia fasciata clarkii*

	COMMON NAME*	SCIENTIFIC NAME
	Snake, Southern Hognose*	*Heterodon simus*
	Terrapin, Mississippi Diamondback	*Malaclemys terrapin pileata*
	Tortoise, Gopher*	*Gopherus polyphemus*
	Turtle, Alabama Map	*Graptemys pulchra*
	Turtle, Alabama Red-bellied	*Pseudemys alabamensis*
	Turtle, Alligator Snapping*	*Macroclemys temminckii*
	Turtle, Barbour's Map*	*Graptemys barbouri*
	Turtle, Escambia Bay Ma	*Graptemys ernsti*
Bird		
	Crane, Mississippi Sandhill	*Grus canadensis pulla*
	Dove, Common Ground	*Columbina passerina*
	Eagle, Bald*	*Haliaeetus leucocephalus*
	Eagle, Golden	*Aguila chrysaetos*
	Egret, Reddish	*Egretta rufescens*
	Falcon, Peregrine	*Falco peregrinus*
	Hawk, Cooper's	*Accipiter cooperi*
	Merlin	*Falco columbarius*
	Osprey	*Pandion haliaetus*
	Oystercatcher, American	*Haematopus palliatus*
	Pelican, American White	*Pelecanus erthrorhynchos*
	Plover, Piping	*Charadrius melodus*
	Plover, Snowy	*Charadrius alexandrinus*
	Plover, Wilson’s	*Charadrius wilsonia*
	Stork, Wood	*Mycteria americana*
	Tern, Gull-billed	*Sterna nilotica*
	Warbler, Bachman's	*Vermivora bachmani*
	Woodpecker, Red-cockaded*	*Picoides borealis*
	Wren, Bewick's	*Thryomanes bewickii*
Mammal		
	Bat, Gray Myotis	*Myotis grisescens*
	Bat, Indiana	*Myotis sodalis*
	Bat, Rafinesque's Big-eared	*Corynorhinus rafinesquii*
	Bat, Southeastern	*Myotis austroriparius*
	Gopher, Southeastern Pocket	*Geomys pinetis*
	Mouse, Alabama Beach	*Peromyscus polionotus ammobates*
	Mouse, Meadow Jumping	*Zapus hudsonius*
	Mouse, Perdido Key Beach	*Peromyscus polionotus trissylepsis*
	Weasel, Long-tailed	*Mustela frenata*
* Species also identified on the NatureServe List for the Chipola River Basin (HUC 03130012) with a global status of imperiled (G2) or vulnerable to extirpation/extinction (G3), or a federal listing status under US ESA as endangered (LE) or threatened (LT).		

Source: ACDNR, 2006

Together, the natural geritage programs of Alabama and Florida, like many other natural heritage programs, are linked through an organization called NatureServe. NatureServe is a non-profit conservation organization that has partnered with international conservation organizations and natural heritage inventories. An abundance of information about the plants and animals, native and exotic, can be found online via NatureServe, which can be queried by ecological community, plant and animal species, county, and HUC 8 watershed codes. Table 7A-2 lists the species identified by NatureServe within the Chipola River Basin (HUC 03130012) subbasin that have either a critically imperiled, imperiled, or vulnerable to extirpation/extinction status or have a status designation according to the U.S. Endangered Species Act.

Table 7A-2. Results of NatureServe Data Query for Chipola River Basin (HUC 03130012)

Scientific Name Common Name	Status* NatureServe	 US ESA	U.S. Distribution
Mollusks			
Alasmidonta triangulata Southern Elktoe	G1Q		AL, FL, GA
Elliptio arctata Delicate Spike	G2G3Q		AL, FL, GA, MS, SC, TN
Elliptio fraterna Brother Spike	G1		AL, GA, SC
Elliptio purpurella Inflated Spike	G2		AL, GA
Elliptoideus sloatianus Purple Bankclimber	G2	LT	AL, FL, GA
Hamiota subangulata Shinyrayed Pocketbook	G2	LE	AL, FL, GA
Lasmigona subviridis Green Floater	G3		AL, DC, GA, KY, MD, NC, NJ, NY, PA, SC, TN, VA, WV
Medionidus penicillatus Gulf Moccasinshell	G1G2	LE	AL, FL, GA
Pleurobema pyriforme Oval Pigtoe	G2	LE	AL, FL, GA
Quincuncina infucata Sculptured Pigtoe	G3		AL, FL, GA
Strophitus subvexus Southern Creekmussel	G3		AL, FL, GA, LA, MS, SC, TX
Fish			
Cyprinella callitaenia Bluestripe Shiner	G2G3		AL, FL, GA
Notropis hypsilepis Highscale Shiner	G3		AL, GA
Pteronotropis euryzonus Broadstripe Shiner	G3		AL, GA
Moxostoma sp. 1 Apalachicola Redhorse	G3		AL, FL, GA

SCIENTIFIC NAME COMMON NAME	STATUS* NATURESERVE	STATUS* US ESA	U.S. DISTRIBUTION
Ameiurus serracanthus Spotted Bullhead	G3		AL, FL, GA
Amphibians			
Rana capito Carolina Gopher Frog	G3		AL, FL, GA, NC, SC, TN
Ambystoma tigrinum Tiger Salamander	G5	PS	AL, AR, AZ, CO, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MD, MI, MN, MO, MS, MT, NC, ND, NE, NJ, NM, NN, NV, NY, OH, OK, OR, PA, SC, SD, TN, TX, UT, VA, WA, WI, WY
Desmognathus apalachicolae Apalachicola Dusky Salamander	G3G4		AL, FL, GA
Plethodon websteri Webster's Salamander	G3		AL, GA, LA, MS, SC
Reptiles			
Macrochelys temminckii Alligator Snapping Turtle	G3G4		AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MO, MS, OK, TN, TX
Graptemys barbouri Barbour's Map Turtle	G2		AL, FL, GA
Gopherus polyphemus Gopher Tortoise	G3	PS:LT	AL, FL, GA, LA, MS, SC
Eumeces egregius Mole Skink	G5	PS	AL, FL, GA
Heterodon simus Southern Hog-nosed Snake	G2		AL, FL, GA, MS, NC, SC
Birds			
Haliaeetus leucocephalus Bald Eagle	G5	PS:LT,PDL	AK, AL, AR, AZ, CA, CO, CT, DC, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NN, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY
Picoides borealis Red-cockaded Woodpecker	G3	LE	AL, AR, FL, GA, KY, LA, MD, MO, MS, NC, OK, SC, TN, TX, VA

Scientific Name / Common Name	Status* NatureServe	Status* US ESA	U.S. Distribution
Aimophila aestivalis Bachman's Sparrow	G3		AL, AR, DC, FL, GA, IL, IN, KY, LA, MD, MO, MS, NC, OH, OK, PA, SC, TN, TX, VA, WV
Plants			
Aesculus parviflora Small-flowered Buckeye	G3		AL, DC, GA, NJ, PA, SC
Arabis georgiana Georgia Rockcress	G1	C	AL, GA
Astragalus michauxii Sandhills Milk-vetch	G3		AL, FL, GA, NC, SC
Brickellia cordifolia Flyr's Brickell-bush	G2G3		AL, FL, GA
Carex impressinervia Impressed-nerved Sedge	G1G2		AL, MS, NC, SC
Cirsium virginianum Virginia Thistle	G3		DE, FL, GA, NC, NJ, SC, VA
Croomia pauciflora Croomia	G3		AL, FL, GA, LA
Croton elliottii Elliott's Croton	G2G3		AL, FL, GA, SC
Helianthus smithii Smith's Sunflower	G2Q		AL, GA, TN
Hexastylis shuttleworthii var. harperi Harper's Heartleaf	G4T3		AL, GA, MS
Lobelia boykinii Boykin's Lobelia	G2G3		AL, DE, FL, GA, MS, NC, NJ, SC
Macbridea caroliniana Carolina Birds-in-a-nest	G2G3		AL, FL, GA, NC, SC
Matelea baldwyniana Baldwin's Milkvine	G3		AL, AR, FL, MO, OK
Myriophyllum laxum Piedmont Water-milfoil	G3		AL, FL, GA, MS, NC, SC, VA
Panax quinquefolius American Ginseng	G3G4		AL, AR, CT, DC, DE, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, VA, VT, WI, WV
Phaseolus polystachios var. sinuatus Sandhill Bean	G5T3?		AL, FL, GA, MS, NC, SC

SCIENTIFIC NAME / COMMON NAME	STATUS* NATURESERVE	US ESA	U.S. DISTRIBUTION
Pinguicula primuliflora Southern Butterwort	G3G4		AL, FL, GA, MS
Quercus arkansana Arkansas Oak	G3		AL, AR, FL, GA, LA, TX
Rhexia aristosa Awned Meadowbeauty	G3		AL, DE, GA, NC, NJ, SC
Rhododendron prunifolium Plumleaf Azalea	G3		AL, GA
Rudbeckia auriculata Eared Coneflower	G2		AL, FL, GA
Sarracenia rubra Sweet Pitcherplant	G4	PS	AL, FL, GA, MS, NC, SC
Schisandra glabra Bay Starvine	G3		AL, AR, FL, GA, KY, LA, MS, NC, SC, TN
Schoenoplectus etuberculatus Canby's Bulrush	G3G4		AL, DE, FL, GA, LA, MD, MO, MS, NC, RI, SC, TX, VA
Silene polypetala Fringed Campion	G2	LE	FL, GA
Stylisma pickeringii var. pickeringii Pickering's Morning-glory	G4T3		AL, GA, NC, NJ, SC
Tridens carolinianus Carolina Fluffgrass	G3G4		AL, FL, GA, LA, MS, NC, SC
Trillium decipiens Mimic Trillium	G3		AL, FL, GA
Trillium reliquum Confederate Trillium	G3	LE	AL, GA, SC
Utricularia floridana Florida Bladderwort	G3G5		AL, FL, GA, NC, SC
Warea sessilifolia Sessile-leaved Warea	G2G4		AL, FL, GA
Status*: NatureServe G = Global, across entire range; T=subspecies/variety with different status than species as a whole.			
1=critically imperiled; 2 = imperiled; 3= vulnerable to extirpation/extintion;4 = apparently secure; 5 = widespread, abundant and secure			
US ESA: US Endangered Species Act, LE = listed endangered; LT= listed threatened; C= candidate; PS:LT = proposed threatened because of similarity of appearance; SAT: listed threatened because of similarity of appearance; PDL = proposed for listing			

Source: NatureServe, 2006

Literature Cited

Alabama Department of Conservation and Natural Resources. 2005. Outdoor Alabama. Non Game Species Protected by Alabama Regulations. Available online at

<http://www.outdooralabama.com/watchable-wildlife/regulations/nongame-species.cfm>. Accessed online November 14, 2006.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.0 NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. Accessed: November 14, 2006.

8.0 FUNDING OPTIONS

8.1 Introduction

To effectively protect the Chattahoochee-Chipola River Basin, funding must be generated to support the measures recommended in this Basin Management Plan. Though securing funding is a challenging task for stakeholders, diverse sources of funding are available for watershed management and protection activities. Following are several important factors to be considered prior to searching for and acquiring funding:

- *Strength in numbers* – Coalitions and partnerships stand a better chance of locating funding sources and acquiring funding. Several groups standing behind common goals are more powerful and…*more influential.*

- *Prepare for competition* – Most funding sources require an application to be submitted as part of a competitive award process. It is critical that stakeholders be strategic about where, when and how they apply for financial assistance. For example, it is advantageous to approach a funding source that has specific interests in the watershed or region. *Do your homework* to make sure that your goals and those of the potential funder are matched.

- *Be multi-talented* – The watershed coalition or partnership should have members with a variety of backgrounds, interests, and professional experience. To acquire funding, it is important to show that the coalition/partnership has the vision, experience, capacity, and technical capability to get the project done.

- *Start somewhere* – It is easy for watershed groups, especially newly-formed ones, to be overwhelmed by the amount of work it takes to acquire funding and to manage and implement a grant. However, there is a beginning to the process and it usually takes shape by pursuing one or two funding opportunities.

- *Use what you already have (even though you might not know you have it)* – With a little creative thinking, watershed groups can identify and contact locally-based financial and technical resources. These “homegrown” resources can be used as leverage for more funding and support. For example, county officials and department staff (*e.g.,* public works, planning, transportation) have knowledge and access to information related to environmental management, as well as equipment and manpower that might be donated as “in kind” to the project. Local business and organizations (*e.g.,* churches, Boys and Girls Clubs, Girl Scouts of America) are usually willing to support projects that will benefit their community. In both instances, local politicians and businesses often have the “political capital” required to get projects moving.

- *Ask for free advice and in-kind services* – For example, if you need a video, ask the local television station for script and production assistance. If you need monitoring assistance, work with your local water department and your local school system. Keep in mind that that saying thank you in public will go a long way towards getting additional help. Also, no one gives money to a group without a plan for how to use it. Financial assistance can come from unusual places and innovative sources once the group has a solid plan.[41]

8.2 Where to Start looking for Watershed Project Funding

The Internet has made it possible to search, contact, and apply for hundreds of funding sources to implement projects identified in this Basin Management Plan. These sources include funding opportunities from federal, state, local, and private entities. To start the process, first identify four or five potential sources. Second, make sure that these sources are different types of sources so that you diversify your opportunities (*i.e.*, identify one federal, two state, and two private grant sources and apply to all).

In order to identify these initial opportunities in an efficient manner, the USEPA has developed a publication entitled *Guidebook of Financial Tools*, which is available for download at <www.epa.gov/efinpage/guidbkpdf.htm>. Developed by USEPA's Environmental Financial Advisory Board and the Agency's network of university-based Environmental Finance Centers, it is a helpful guide for identifying potential funding for environmental projects (USEPA, 2005).

The federal government, particularly the USEPA, offers several other easily-accessible guides to funding sources that can be accessed through the Internet. USEPA's *Catalog of Federal Funding Sources for Watershed Protection* <www.epa.gov/watershedfunding> is an interactive website that helps match watershed project needs with funding sources. For a far-reaching funding search, the federal government also maintains the *Catalog of Federal Domestic Assistance* <www.cfda.gov>, which provides access to the database of all federal programs available (USEPA, 2005).

The Environmental Finance Center (EFC) at Boise State University in Idaho is an excellent resource for watershed organizations of all sizes and missions. They perform direct financial services (*e.g.*, training) and have developed financial tools that can help stakeholders figure out what level of funding they may need and where to search for it. Some of the tools they developed are limited in scope to the Pacific Northwest. However, *Plan2Fund™* is readily accessible on-line. *Plan2Fund™* is a software package that can be downloaded from the EFC and installed (for free) on a local computer. The program helps organizations determine the amount of outside funding necessary to achieve the goals and objectives of their watershed management plan. The computer program asks the user to estimate implementation costs for their goals and objectives, evaluate local funding options, and identify gaps in funding. With the output from *Plan2Fund™*, users can then search EFC's Directory of Watershed Resources database for federal, state, and private funding sources based on identified funding needs. For more information, visit the EFC's "Services & Tools" <http://sspa.boisestate.edu/efc/services.htm>.

[41] This tip comes from a 1999 edition of Know Your Watershed, an information clearinghouse for watershed coordinators. Know Your Watershed is now available online at <http://www.ctic.purdue.edu/KYW/>.

Another online resource that watershed groups and stakeholders may access is available through the River Network <www.rivernetwork.org>. This membership organization serves the watershed organizations of the United States with technical and organizational assistance to achieve their goals. One of the many services they offer is a directory of organizations that fund watershed management projects. The *Directory of Funding Sources for Grassroots River and Watershed Conservation Groups* lists private, corporate, and federal funding sources available. The Directory can be accessed at <http://www2.rivernetwork.org/library/fra2002v9n2.htm >.

Some of the more popular sources of watershed funding are listed in Table 8-1. Keep in mind that funding levels and application opportunities are subject to change. Therefore, it is important to contact a representative from each agency or organization early in the process in order to better understand current opportunities and to receive guidance for accessing them.

It is also important to keep in mind that many of the public and private agencies have other resources besides money to offer. All of the federal and state agencies mentioned in this chapter and throughout the plan have experts on staff who can assist watershed groups with technical questions that will help scope a project. Private organizations and industries, and other local stakeholder groups are also valuable resources for financial and project management advice. When creating a budget for a watershed project, it never hurts to ask questions of agency or organization staff to refine your funding request or application.

Table 8-1. Watershed Management Funding Organizations and Opportunities

FUNDING SOURCE	PROGRAM DESCRIPTION	MATCH REQUIREMENT	ELIGIBILITY	CONTACT INFORMATION
FEDERAL				
Section 319	Clean Water Act nonpoint source implementation competitive grant program funding; education and outreach, technical assistance, BMP demonstration projects, water quality monitoring, and watershed protection projects. Administered by ADEM.	40% non-federal match	Phase I and II permitted areas and confined animal feeding operations generally not eligible.	Alabama Department of Environmental Management http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/WSNPSProgram.htm
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	Alabama Emergency Management Agency (AEMA) & Federal Emergency Management Agency (FEMA) http://ema.alabama.gov/
SAFETEA-LU	SAFETEA-LU authorizes the Federal surface transportation programs for highways, highway safety, and transit for the 5-year period 2005-2009. It 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	USDOT Federal Highway Administration http://www.fhwa.dot.gov/safetealu/ Alabama ALDOT Bureau of Transportation Planning http://www.dot.state.al.us/docs/Bureaus/Design/
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	NRCS – Alabama http://www.nrcs.usda.gov/programs/

Table 8-1 (cont.). Watershed Management Funding Organizations and Opportunities

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	Alabama Department of Economic and Community Affairs (ADECA) Office of Community Services 334-242-5100 www.adeca.state.al.us (See 'Grant Resources')
Direct Federal Funding	Supports projects of national significance.	NA	Open	State Representative or Senator
Direct State Funding	Supports projects of state significance.	NA	Open	Local Representative
GRANT PROGRAMS				
National Fish and Wildlife Foundation (NFWF)	Awards challenge grants for natural resource conservation projects.			National Fish and Wildlife Foundation - Home
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.			Natural Resources and Conservation Service (NRCS) – Alabama http://www.nrcs.usda.gov/programs/

Table 8-1 (cont.). Watershed Management Funding Organizations and Opportunities

FUNDING SOURCE	PROGRAM DESCRIPTION	MATCH REQUIREMENT	ELIGIBILITY	CONTACT INFORMATION
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://www.epa.gov/owow/watershed/funding.html
NOAA and National Fish and Wildlife: 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.nmfs.noaa.gov/habitat/restoration/projects_programs/crp/partners/nfwf.html
U.S. Fish and Wildlife Service (USFWS) 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 USFWS	http://www.fws.gov/endangered/grants/index.html
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.			www.rivernetwork.org

Table 8-1 (cont.). Watershed Management Funding Organizations and Opportunities

OTHER	EXPLANATION
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.
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 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.

Table 8-1 (cont.). Watershed Management Funding Organizations and Opportunities

OTHER	EXPLANATION
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 generate funds for promotion of tourism; and the gas tax, which generates revenues for transportation–related activities.
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.
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.

Table 8-1 (cont.). Watershed Management Funding Organizations and Opportunities

EMERGING OPPORTUNITIES FOR PROGRAM SUPPORT	EXPLANATION
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/>.
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, USACOE, 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	**EXPLANATION**
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.

[*] *Adapted from ACWP's Tallapoosa River Basin Management Plan (CH2MHILL, 2005). All hotlinks to the Internet were accessed on Thursday, May 11, 2006. Please note that web addresses are subject to change by their owner. Please contact the agency or organization directly to find out more.*

8.3 References

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