

6.0 BASIN MANAGEMENT NEEDS

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

A multi-faceted approach was taken to identify the natural resource needs in the basin. The cornerstone of this approach is focused on the issues and concerns voiced by the river basin stakeholders. Public workshops, described earlier in the plan, provided the venue to gather and summarize stakeholder views on basin issues and concerns.

The stakeholder input on needs and concerns was complemented by an analysis of existing information from three sources that were summaries by subwatersheds in the river basin. These additional information sources were:

- *Nonpoint source pollution impairment potential for subwatersheds*, as determined by the local Soil and Water Conservation Districts (1998) and by ADEM (2002). Information source: ADEM (2002).
- *Resource concerns in the subwatersheds*, as determined by the local Soil and Water Conservation Districts (1998). Information source: ADEM (2002).
- *Sediment loading estimates for the subwatersheds*, as provided by the local Soil and Water Conservation Districts (1998) and published by the Alabama Soil and Water Conservation Committee (www.swcc.state.al.us/watershedmenu.htm).

Information from all these sources was utilized to establish what the natural resource management needs are for the Alabama River Basin. These needs are described below, based on each of these information sources.

6.1 Stakeholder Concerns.

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

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

Upper Alabama – Catoma Creek Watershed, Wednesday, March 17, 2004 at 12:00 p.m. at the Montgomery County, Department of Health Auditorium, Montgomery, Alabama

Concerns and Issues:

- There are two creeks that are called, “Cypress Creek” – one flowing through Downtown Montgomery and one flowing through Lowndes County. Information regarding Brownsfield and groundwater issues of this downtown creek can be discovered at ADEM.
- Wetlands banking is an increasingly popular management strategy to protect water resources in Alabama. For more information about the Alabama Wetlands Mitigation Bank at the McLemore Family property see www.gmcnetwork.com.
- Catoma Creek information and its *Lessons Learned* will be mentioned in the Alabama River Basin Management Plan and joint Upper Alabama Sub-basin and Catoma Watershed stakeholder meetings will be held.
- ACOE water quality data is available and should be included in the Plan.
- Soil erosion and runoff from municipal roads and new road construction
- Severe soil erosion and sedimentation
- Water pollution by pathogenic bacteria
- Wetland and aquatic habitat destruction
- Polluted stormwater runoff with toxics, pathogenic bacteria

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

Concerns and Issues:

- Forestry and Nonpoint Source Pollution
 - Explore ways to enhance outreach efforts to non-company/“mom and pop” logging operations to increase knowledge and understanding of sustainable forestry practices.
 - For example, a stakeholder pointed out that Alabama River Woodland does not own woodlands; they pay logging companies and forest land owners for timber. They follow the SFI management principles and practices. They also follow a “3-strikes-and-you-are-out” Policy for timber harvesters whose practices are not consistent with SFI.
- Road construction and maintenance in the watershed is an issue. Specific items or areas of concern were mentioned and are listed below:
 - County and State Road Crews should be trained and supervised. Perhaps County Engineers could be trained in modern water quality BMPs for road work. As an incentive they may receive continuing education credits (CEUs).
 - Currently, it appears that the road crews do not adhere to BMPs for road work.
 - There is a need for BMP enforcement – is there a mechanism that could be used and improved?
 - Any system needs incentives for compliance.
- Mining and excavation operation impact water bodies.
 - It is perceived that the contractors (the people that dig) are the source of the problem.
 - Need for BMP training, implementation and monitoring/enforcement for this industry.
- *Water Fests* have been and are a great educational outlet and activity for local students and teachers.
- Illegal dumping of solid waste from watercraft on the Alabama and Tombigbee Rivers is a huge problem.
- Road crossings and boat ramps lead to stream and river bank erosion and they also tend to be areas where litter is dumped or left.
- Investigate technology transfer of BMP technology from one industry (forestry) to another (transportation).
- Road construction BMPs are needed – What program can be implemented?
- Who has jurisdiction over dumping of trash and waste from watercraft? *Answer:* U.S. Coast Guard, ADEM, state and municipal law enforcement authorities.
- Who has jurisdiction over river traffic? *Answer:* U.S. Coast Guard, ACOE, ADEM, state and municipal law enforcement authorities.

6.2 Nonpoint Source Pollution Impairment Potential for Subwatersheds.

Subwatershed impairment potential was determined by the local Soil and Water Conservation Districts (1998) and augmented with current construction stormwater authorizations by ADEM (2002). Impairment potential is a rating that provides an indication of the potential for current and future nonpoint pollution from various sources *without proper management*. Proper management, in this context, means that appropriate best management practices (BMPs) are implemented and maintained. The nonpoint source pollution impairment potential for each subwatershed in the Alabama River Basin is provided in **Appendix D**.

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

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

The findings for the Alabama River Basin, shown in **Figure 6.1-a**, show potential pollution impairments from forestry practices as the most common source in the Alabama River Basin. The impairment scores shown in **Figure 6-1** were derived by weighting the impairment potential ratings reported in ADEM (2002) by 3 for “high” (H) ratings and by 2 for “medium” (M) ratings for the subwatersheds.

Figure 6.1-a. Nonpoint source pollution potential in the Alabama River Basin. Percentages reflect the proportion of the total impairment score for the Alabama River Basin that is attributed to each rural land use impairment source.

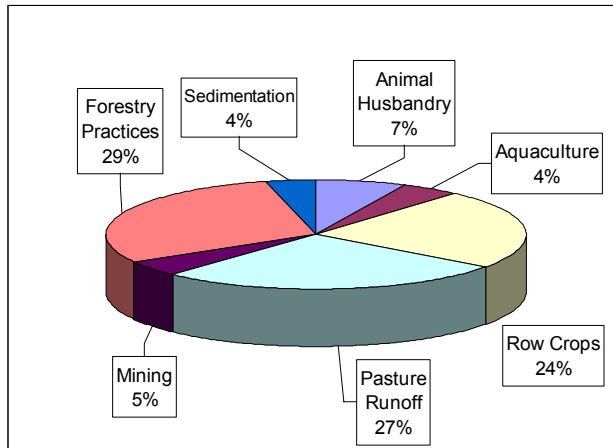


Figure 6.1-c. Nonpoint source pollution potential in the Middle Alabama River Basin. Percentages reflect the proportion of the total impairment score for the Middle Basin that is attributed to each rural land use impairment source.

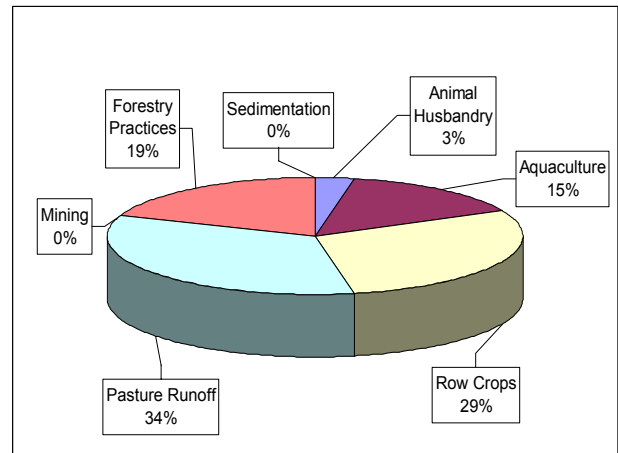


Figure 6.1-b. Nonpoint source pollution potential in the Upper Alabama River Basin. Percentages reflect the proportion of the total impairment score for the Upper Basin that is attributed to each rural land use impairment source.

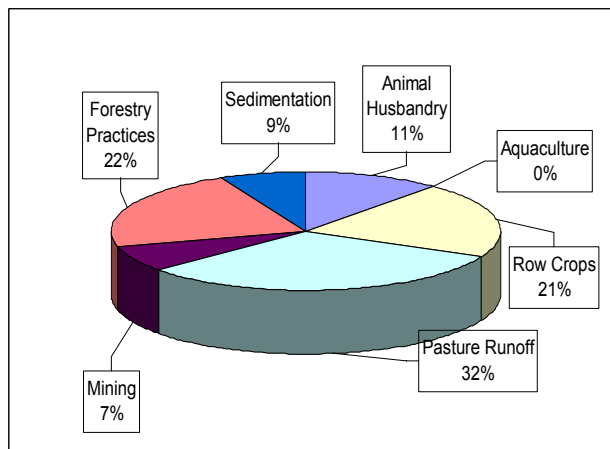
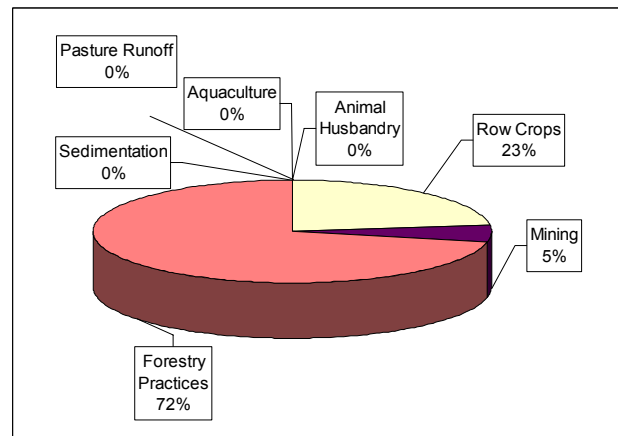


Figure 6.1-d. Nonpoint source pollution potential in the Lower Alabama River Basin. Percentages reflect the proportion of the total impairment score for the Lower Basin that is attributed to each rural land use impairment source.



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

In the Upper and Middle Alabama River basins, pasture runoff and row crops, along with forestry practices, were the primary sources of nonpoint pollution impairment (**Figure 6.1-b and 6.1-c**). Forestry practices were the dominant source of impairment (72%) in the Lower Alabama River Basin (**Figure 6.1-d**), with row crops a distant second source.

The five subwatersheds with the greatest NPS pollution impairment potential for each of the seven rural land use sources are shown in **Table 6.1**. The following subwatersheds were among the top five for multiple NPS impairment sources:

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

Table 6.1. Nonpoint source pollution potential in the Alabama River Basin and its three sub-basins. Percentages reflect the proportion of the total NPS impairment score for the basin attributable to each of the seven rural land use impairment sources. The top five subwatersheds were ordered within similar rating groups by subwatershed size.¹

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

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

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

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

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

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

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

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

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

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

6.3 Resource Concerns for Subwatersheds:

The local Soil and Water Conservation Districts provided data to ADEM (2002) on resource concerns in the subwatersheds of the Alabama River Basin. These resource concerns, identified by District staff with stakeholder input, fell into 16 categories:

Agricultural Land Use Concerns:

- Excessive erosion on cropland
- Gully erosion on agricultural land
- Poor soil condition on cropland
- Excessive animal waste applied to land
- Excessive sediment from cropland
- Inadequate animal waste management
- Livestock are overgrazing pastures
- Livestock have access to streams

Other Land Use Concerns:

- Road and roadbank erosion
- Excessive pesticides applied to land
- Excessive sediment from roads and roadbanks
- Excessive sediment from urban development
- Nutrients in surface waters
- Pesticides in surface waters
- Bacteria and other organisms in surface waters
- Low dissolved oxygen in surface waters

The resource concerns in the Alabama River Basin are summarized in **Table 6.2**. The most common resource concern across the subwatersheds of the Alabama River Basin was livestock access to streams, where it was cited as a significant concern in 80 percent of the subwatersheds. Road and roadbank erosion, along with excessive sediment from roads and roadbanks, were the second and third most frequent resource concerns, being cited in 75 percent and 66 percent of the subwatersheds respectively. Livestock overgrazing of pastures was also cited as a resource concern in the majority (over 50 percent) of the subwatersheds.

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

Table 6.2. Resource concerns in the Alabama River Basin and its three basin segments. Percentages reflect the number of subwatersheds in the basin in which the resource concern was considered significant. Source of data: ADEM (2002).

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

6.4 Sediment Loading Estimates

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

- Cropland
- Mined land
- Critical areas
- Stream banks
- Sand and gravel pits
- Developing urban land⁴⁴
- Gullies
- Dirt roads and road banks
- Woodlands

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

Sediment loading in the Alabama River Basin is estimated to come from developing urban land (20 percent), followed by sand and gravel pits (14 percent), dirt roads and roadbanks (13 percent), critical areas (13 percent), croplands (12 percent), and woodlands (11 percent). Sediment loading percentages for the Alabama River Basin and each of its three basin segments are shown in **Figure 6.2-a** through **6.2-d**.

Figure 6.2-a. Sediment loading estimates for the Alabama River Basin. Percentages reflect the proportion of the total sediment loading for the Alabama River Basin that is attributed to each source of sediment erosion.

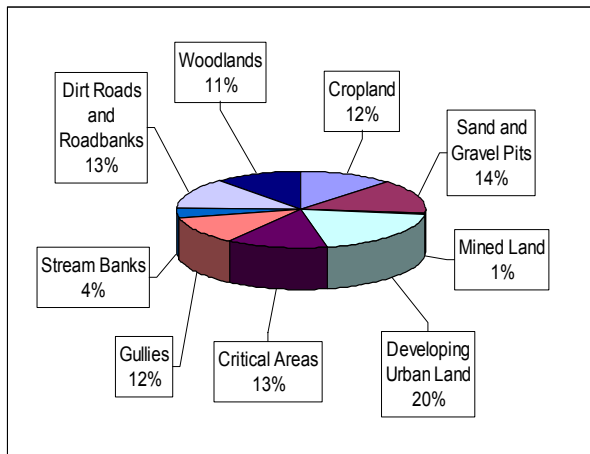


Figure 6.2-c. Sediment loading estimates for the Middle Alabama River Basin. Percentages reflect the proportion of the total sediment loading for the Middle Alabama River Basin that is attributed to each source of sediment erosion.

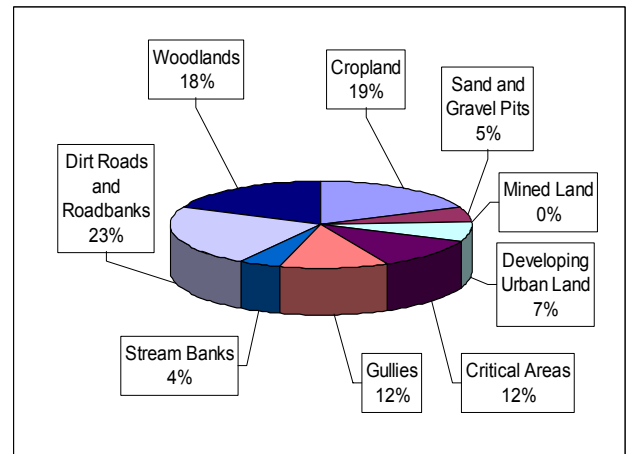


Figure 6.2-b. Sediment loading estimates for the Upper Alabama River Basin. Percentages reflect the proportion of the total sediment loading for the Upper Alabama River Basin that is attributed to each source of sediment erosion.

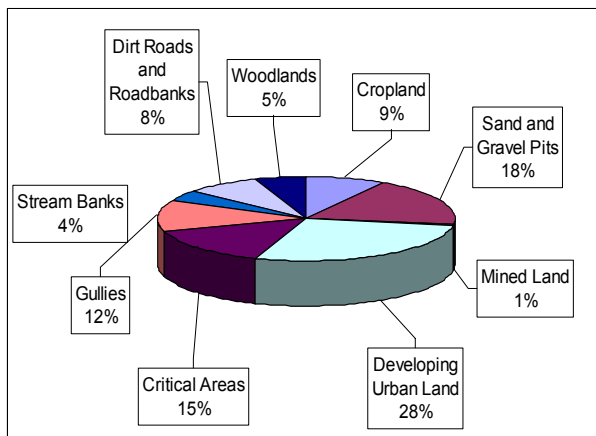
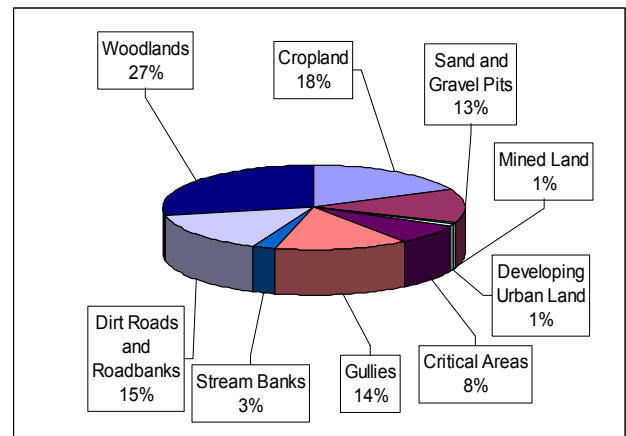


Figure 6.2-d. Sediment loading estimates for the Lower Alabama River Basin. Percentages reflect the proportion of the total sediment loading for the Lower Alabama River Basin that is attributed to each source of sediment erosion.



Developing urban land (28 percent) is the dominant source of sediment loading in the Upper Alabama River Basin, primarily from the Hudson Creek subwatershed, followed by sand and gravel pits (18 percent), critical areas (15 percent), and gullies (12 percent). In the Middle Alabama River Basin, dirt roads and roadbanks are estimated to provide the most sediment (23 percent), followed by cropland (19 percent) and woodlands (18 percent). In the Lower Alabama River Basin, woodlands are the dominant source of sediment (27 percent), followed by cropland (18 percent), dirt roads and roadbanks (15 percent), and sand and gravel pits (13 percent).

The five subwatersheds in the Alabama River Basin with the highest sediment loading for each of the nine sediment erosion sources are shown in **Table 6.3**. Six of the subwatersheds stand out as having significant annual sediment loading from specific erosion sources:

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

The subwatersheds with the highest total sediment loading estimates from all sources are shown in **Table 6.4**. The Hudson Creek subwatershed has the highest annual sediment loading from all erosion sources, but 91 percent of that sediment load comes from developing urban land. Lower Big Swamp Creek has the second highest total annual sediment loading from all erosion sources, with 77 percent of that total coming from the critical areas and gullies source areas. Further breakdowns can be derived from the sediment loading estimates for each of the subwatersheds, provided in **Appendix F**.

Table 6.3. Sediment loading from various sources in the Alabama River Basin and its three sub-basins¹.

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

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

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

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

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

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

Table 6.3. Sediment loading from various sources in the Alabama River Basin and its three sub-basins¹ (cont'd).

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

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

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

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

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

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

Table 6.4. Subwatersheds in the Alabama River Basin with the highest total sediment loading estimates from all erosion sources. Sediment loading estimates are in tons per year. Source of data: Alabama Soil and Water Conservation Districts, published by the SWCC.

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

6.5 Summary of Management Needs.

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

Primary Resource Management Concerns

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

These are the major resource issues in the Alabama River Basin. Other concerns discussed in earlier sections of this plan may be significant on a local or subwatershed scale, but are not widespread concerns across the river basin. These more localized concerns should not be ignored at the subwatershed management scale, and management efforts toward those concerns should be pursued as opportunities arise.

These primary resource management issues and concerns are the central focus for developing basin management recommendations. The assessments for all subwatersheds in the river basin in terms of nonpoint source impairment, resource concerns, and sediment loading are provided in **Appendices D through F**. Information on a subwatershed scale can also be found in the Surface Water Quality Screening Assessment of the Alabama River Basin, published by ADEM (2000).

6.6 Targeted Subwatersheds

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

These priority areas, referred to as Targeted Subwatersheds in this plan, are those subwatersheds identified by ADEM as priority subwatersheds in their Surface Water Quality Screening Assessment of the Alabama River Basin, published by ADEM (2000); those subwatersheds with a "high" potential for nonpoint source pollution impairment, as determined by the Soil and Water Conservation Districts and published by ADEM (2000), see **Appendix D**; or those subwatersheds with segments identified by ADEM as impaired on their 303(d) surface water impairment list. These targeted subwatersheds are shown in **Table 6.5**.

It should be emphasized that additional subwatersheds not included in **Table 6.5** may become Targeted Subwatersheds after additional assessment efforts. Possible subwatersheds requiring additional assessment include Lower Pintlalla Creek, Beaver Creek, and Upper Big Swamp Creek subwatersheds. These three subwatersheds all had high estimated sediment loading from nonpoint sources.

The primary nonpoint pollution causes and sources identified for the Targeted Subwatersheds are identified in **Table 6.5**. These sources and causes were captured in the bulleted list of "Primary Resource Management Concerns" on page 6-14.

Table 6.5. Target subwatersheds in the Alabama River Basin. These subwatersheds were identified as either having a high NPS Impairment Potential, being an ADEM Priority Subwatershed, or having a 303(d) impaired water in the subwatershed. Source of data: ADEM (2002).

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

6.7 Sediment Load Modeling of Targeted Subwatersheds

Some of the best management tools we have for addressing nonpoint source pollution problems are the implementation of land use specific Best Management Practices (BMPs). Over 93 percent of the land use in the Alabama River Basin is in forestry, pastureland, or cropland, with approximately 80 percent of the potential for nonpoint source pollution (without proper management) in the Alabama River Basin coming from these three land; **Figure 6.1-a**). It is well recognized that there are important benefits from implementing BMPs for these three land uses, particularly in reducing the loading of sediment, nitrogen, and phosphorus to surface waters.

As part of this basin management plan, a watershed model was used for the targeted subwatersheds in order to predict the benefits from implementing several BMPs for each land use. The Environmental Protection Agency (EPA) STEPL (Spreadsheet Tool for the Estimation of Pollutant Load) watershed model was utilized for each targeted subwatershed for estimating the loading of sediments, nitrogen, and phosphorus to surface waters from forested land, cropland, and pastureland. Details on the modeling approach are provided in **Appendix G**.

Modeling results for sediment loading using STEPL are shown in **Table 6.6**. The predicted sediment loads are compared to the 1998 estimated sediment loads made by the Soil and Water Conservation Districts (SWCD). Sediment loading from cropland, pastureland, and forested land was estimated using STEPL, while SWCD sediment load estimates were made in 1998 for cropland and forested land. In all but one case, the STEPL sediment loads for forested land were successfully calibrated to the 1998 SWCD load estimates⁴⁵. Sediment loads from cropland were successfully calibrated to the 1998 SWCD load estimates for 13 of the 17 targeted subwatersheds. The STEPL sediment load estimates were all lower than the 1998 SWCD load estimates for the four targeted subwatersheds that were not successfully calibrated for cropland. STEPL sediment load estimates were utilized as the baseline for subsequent modeling of sediment and nutrient load reductions with BMP implementation.

⁴⁵ A sediment load estimate for the Galbraith Mill Creek subwatershed for forested land (3,000 acres) was not made by the SWCD in 1998, while the 2005 STEPL model predicted 37 tons/year in sediment from forested land in this subwatershed.

Table 6.6. Sediment load estimates for targeted subwatersheds in the Alabama River Basin for cropland, pastureland, and forested land. Comparison of load estimates are made between those made by the Soil and Water Conservation Districts in 1998 and those derived from STEPL modeling as part of this plan.

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

Table 6.6. Sediment load estimates for targeted subwatersheds in the Alabama River Basin for cropland, pastureland, and forested land. Comparison of load estimates are made between those made by the Soil and Water Conservation Districts in 1998 and those derived from STEPL modeling as part of this plan (cont'd).

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

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

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

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

6.8 BMP Load Reductions for Targeted Subwatersheds

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

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

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