Chapter 9
Types and Sources of Pollution

In simplest terms, impaired waters are those that have high levels of pollution from one or more sources. And, at the most basic level, there are two sources of water pollution: point source pollution and nonpoint source pollution. For the most part, this plan deals only with nonpoint source pollution. The two sources, however, are not completely extricable and an examination of one source must include the impacts from and on the other source.

Point Source Pollution

Point source pollution enters waterways from discrete, identifiable locations that have been subject to regulation since the passage of the Clean Water Act in 1972. These types of discharges include municipal wastewater treatment plants and other businesses or industries that discharge treated waste effluent into waterways. These sources are regulated by the Alabama Department of Environmental Management (ADEM) through the allocation of waste loads between the users, or dischargers. In other words, ADEM allows an entity to discharge a specified amount of water back into the Coosa River after treatment has cleansed the water enough to meet the water quality requirements. ADEM regulates water discharges through the National Pollutant Discharge Elimination System (NPDES) permit system. The NPDES permit program was established under Section 402 of the Clean Water Act, which prohibits the unauthorized discharge of pollutants from a point source (pipe, ditch, well, etc.) to U.S. waters, including municipal, commercial, and industrial wastewater discharges and discharges from large animal feeding operations. The State of Alabama was authorized to implement its NPDES Permit Program in October 1979 and in June 1991 was authorized to implement a General Permits Program. Permittees must verify compliance with permit requirements by monitoring their effluent, maintaining records, and filing periodic reports.

The waste load allocation of permitted dischargers is calculated in such a manner as to maintain the water quality of the receiving stream. However, it is possible to fully allocate a stream segment so that no new point source discharges are allowed unless or until other permits are reissued with more stringent requirements to free up a portion of the waste load allocation for new users. As outlined in Part II: Water Uses in the Lower Coosa River Basin, there are 337 permitted dischargers in the Lower Coosa River Basin, of which eight are municipal water treatment systems, 22 are municipal wastewater treatment plants, 147 are industrial permits, 13 are mining operations, and 102 are storm water runoff permits, according to lists from the ADEM databases. The storm water permits are generally short term permits for construction sites and dirt pits. As such, the number of permits and their locations change rapidly. There are no permitted concentrated animal feeding operations (CAFO) in the Lower Coosa River Basin.

Even with point source dischargers being regulated to meet water quality standards, streams across the nation have failed to attain desired water quality levels. Therefore, attention has been turned to nonpoint sources of pollution.

Nonpoint Source Pollution

EPA defines nonpoint source pollution as pollution caused by sediments, nutrients and organic and toxic substances originating from land use activities and/or from the atmosphere, which are carried to receiving waters by runoff at a rate that exceeds natural levels. In other words, nonpoint source pollution comes from diffuse, intermittent or mobile sources. While the impact of each individual source is perceived by the public as being small, the cumulative effect is significant. That is why awareness needs to be created in all citizens. It is the collective, individual actions of residents in any given watershed that can have a significant impact on water quality. The effect on water quality is not only felt locally, but also by downstream users and ultimately in the bays and oceans that major river systems drain into.

Nonpoint source pollution remains the nation's largest source of water quality problems, not only impacting water quality, but ultimately cycling back to impact local economies. When local water quality is not maintained, the cost of treating water to meet drinking water standards increases. Likewise, as local waters become more degraded, the standards for point source dischargers are increased and additional treatment processes must be added before effluent can be returned to local streams. In both cases, the increased cost of treating water to make it potable or treating discharges to meet local stream water quality standards, the cost is ultimately passed on to the consumers or the citizens of the watershed.

The originators of nonpoint source pollution are the residents of the watershed and their actions on the land surrounding the water bodies. This type of pollution is widespread because it can occur any time activities occur on the land that disturbs the land or water. Agriculture, forestry, grazing, septic systems, recreational boating, urban runoff, construction, physical changes to stream channels, and habitat degradation are all potential sources of nonpoint source pollution. Careless or uninformed household or business management also contributes to nonpoint source pollution problems. According to EPA's *Nonpoint Source Pointers Factsheets*, the most common nonpoint source pollutants are sediment and nutrients. These wash into water bodies from agricultural land, small and medium-sized animal feeding operations, construction sites, and other areas of disturbance, if best management practices are not implemented. Other common nonpoint source pollutants include pesticides, pathogens (bacteria and viruses), salts, oil, grease, toxic chemicals, and heavy metals. The Alabama Nonpoint Source Education for Municipal Officials Program offers the following brief explanation of the causes and effects of the major types of pollutants carried by runoff:

Pathogens: Pathogens are disease-causing microorganisms, such as bacteria and viruses, that come from the fecal waste of humans and animals. Exposure to pathogens, either from direct contact with water or through ingestion of contaminated raw shellfish, can cause a variety of illnesses. Because of this, beaches and shellfish beds are closed to the public when testing reveals significant pathogen levels. Pathogens wash off the land from wild animal, farm animal, and pet waste, and can also enter our waterways from improperly functioning septic tanks, leaky sewer lines and boat sanitary disposal systems.[1]

Nutrients: Nutrients are compounds that stimulate plant growth, like nitrogen and phosphorous. Under normal conditions, nutrients are beneficial and necessary, but in high concentration, they can become an environmental threat. Nitrogen contamination of drinking water can cause health problems, including "blue baby" syndrome. Over-fertilization of ponds, bays and lakes by nutrients can lead to massive algal blooms, the decay of which can create odors and rob the waters of life-sustaining dissolved oxygen. Nutrients in polluted runoff can come from agricultural fertilizers, failing septic systems, home lawn care products, and yard and animal wastes. The two most common types of nutrients are phosphorous and nitrogen. Major sources of phosphorous reaching water bodies are runoff from failing septic systems, fertilizers, leaves, animal waste and urban runoff.[1]

Sediment**:** Sand, dirt and gravel eroded by runoff often end up in stream beds, ponds or shallow coastal areas, where they can alter stream flow and decrease the availability of healthy aquatic habitat. Poorly designed construction sites, agricultural fields, unpaved roadways and eroding road banks, and suburban gardens can be major sources of sediment when appropriate best management practices have not been installed.[1]

Toxic Contaminants**:** Toxic contaminants are substances that can harm the health of aquatic life and/or human beings. These contaminants are created by a wide variety of human practices and products, and include heavy metals, pesticides, and organic compounds like PCBs. Many toxins are very resistant to breakdown and tend to be passed through the food chain to be concentrated in top predators. Fish consumption health advisories are the result of concern over toxins. Oil, grease and gasoline from roadways, and chemicals used in homes, gardens, yards, and on farm corps, are also major sources of toxic contaminants.[1]

Debris**:** Trash is without doubt the simplest type of pollution to understand. It interferes with enjoyment of our water resources and, in the case of plastic and Styrofoam, can be a health threat to aquatic organisms. Typically this debris starts as street litter that is carried by runoff into our waterways.[1] Debris also includes illegal dumping of large unwanted household trash, such as tires, refrigerators and other appliances.

Thermal Pollution: Water temperature affects aquatic habitat even in the absence of other pollution. Fish and other species are sensitive to temperature and inhabit areas where the temperature falls within their preferred range. Cooler water also retains more oxygen. Two of the primary causes of thermal pollution are increases in the amount of pervious surfaces in a watershed (rooftops, paving) and the removal of trees, which provide shade, from streambanks.

Nonpoint source pollution can often be prevented or decreased with the application of best management practices, or BMPs. Best management practices are a combination of management, cultural, and structural practices that various industries and agencies determine to be the most effective and economical way of controlling runoff problems without disturbing the quality of the environment. Minimizing raindrop impact on the soil and reducing runoff and runoff velocities are three main objectives that are taken into consideration when saving endangered fields or land. Most industries and their industry-related agencies and associations have developed steps that can be taken to control runoff specific to their particular field, such as agricultural BMPs and silviculture BMPs.

Nonpoint Source Pollution in the Lower Coosa River Basin

During the first phase of education and awareness for the development of the Lower Coosa River Basin Management Plan, a survey was distributed to approximately 440 residents at a series of local government meetings between November 2003 and January 2004, which listed eight categories of nonpoint source pollution and asked respondents which categories are perceived to be the most common types of nonpoint source pollution and which are perceived to be the most harmful to water quality. The eight categories listed were urban runoff, agricultural runoff from crops, agricultural runoff from livestock and poultry, silviculture runoff, sedimentation, failing onsite septic systems, water-related recreational activities, and illegal dumping. Response to the survey, which had an approximate 10 percent response rate, showed that the majority of respondents, at 56.3 percent, felt that urban runoff was the most common type of nonpoint source runoff. Urban runoff was followed by agricultural runoff from crops and failing septic systems, each at 43.8 percent, illegal dumping at 34.4 percent, and by sedimentation and agricultural runoff from livestock and poultry, each at 31.3 percent. Respondents felt that of the eight categories listed, silviculture (timber cutting) and water-related recreational activities were the least common types of nonpoint source pollution.

In terms of having the most harmful impacts on water quality, respondents stated that urban runoff and failing onsite septic systems were the most harmful. In 1996, EPA produced a series of fact sheets, called *Nonpoint Source Pointers,* with each fact sheet focusing on a different type of nonpoint source pollution. The following explanation of the eight categories of nonpoint source pollution used in the citizen survey includes excerpts of information from those fact sheets. Although somewhat dated in terms of statistical analysis, the fact sheets remain a good nonpoint source primer for explanatory information and basic management actions.

Urban Runoff. Nonpoint source pollution from urban runoff occurs when water flows over urban surfaces into storm drains that empty into nearby creeks, streams and rivers. The porous and varied terrain of natural landscapes like forests, wetlands, and grasslands trap rainwater and/or snowmelt and allow it to slowly filter into the ground. Runoff tends to reach receiving waters gradually. In contrast, nonporous urban landscapes like roads, bridges, parking lots, and buildings don't let runoff slowly percolate into the ground. Water remains above the surface, accumulates, and runs off in large amounts.

Cities install storm sewer systems that quickly channel this runoff from roads and other impervious surfaces. Runoff gathers speed once it enters the storm sewer system. When it leaves the system and empties into a stream, large volumes of quickly flowing runoff erode streambanks, damage streamside vegetation, and widen stream channels. In turn, this will result in lower water depths during non-storm periods, higher than normal water levels during wet weather periods, increased sediment loads, and higher water temperatures. Native fish and other aquatic life sensitive to these changes cannot survive in streams severely impacted by urban runoff.[2]

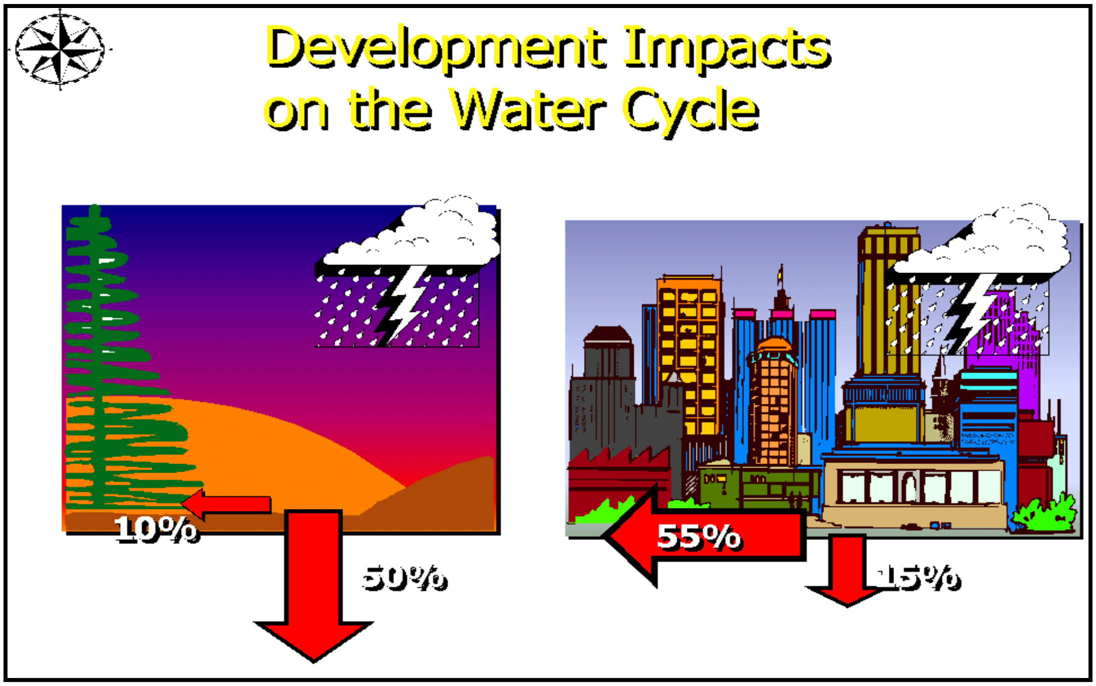
Figure 104:

Urban Runoff

Urbanization also increases the variety and amount of nonpoint source pollution. Sediment from development and new construction; oil, grease, and toxic chemicals from automobiles; nutrients and pesticides from turf management and gardening; viruses and bacteria from failing septic systems and pet waste; and heavy metals are examples of pollutants generated in urban areas. Sediments and solids constitute the largest volume of pollutant loads to receiving waters in urban areas. When runoff enters storm drains, it carries many of these pollutants with it. Increased pollutant loads can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe.[2]

Many urban streams have limited value for recreational use and wildlife habitat because of poor water quality resulting from nonpoint (street and land) runoff and thermal pollution. Many of the pollutants found in urban runoff come from roadways and parking lots. The Environmental Protection Agency has found an average of 1,400 pounds of loose material on each mile of roadways in urban areas. It was also determined that 78 percent of the loose material was located within six inches of the curb; the same area where stormwater runoff is collected and directed to storm inlets. Industrial areas have the highest amount. Contrary to land use intensity patterns, central business districts were found to have the lowest amounts of loose material.[2]

Figure 105:



Infiltration of stormwater on an undisturbed landscape is around 50 percent, while stormwater runoff is around 10 percent. When a landscape is hardened by *impervious surfaces* such as roads, roofs, and parking lots, approximately 55 percent of stormwater is lost to runoff and only around 15 percent infiltrates.

Source: Alabama Department of Environmental Management, Nonpoint Source Education for Municipal Officials. http://www.aces.edu/waterquality/nemo/intro.htm

EPA studies have determined that runoff quality is not just a function of rainfall intensity and depth, but is directly related to how the land is used. The primary problem in urban runoff, often exceeding USEPA standards, is heavy metals. The concentrations were often in excess of levels that could cause long term harm to animals and plants. In addition, concentrations of coliform bacteria occurring in runoff during storms often exceeded the levels permitted in drinking water.[2]

Streets, bridges, parking lots and rooftops are not the only source of nonpoint source pollution from urban runoff. Careless or uninformed household management is also a major contributor to urban runoff problems as people often forget about water pollution caused at the household level. Common causes of polluted urban runoff at the household level includes impervious surfaces such as driveways, rooftops and patios just as in urban centers, lawn and garden fertilizers, excessive lawn watering, pesticides, and improper disposal of household cleaners, grease, oil, paint, and other chemicals.[2]

Failing Septic Systems. One of the most significant causes of nonpoint source pollution at the household level is failing septic systems, in both urban and rural settings. Malfunctioning or overflowing septic systems release bacteria and nutrients into the water, contaminating nearby lakes, streams, and estuaries, and groundwater. Septic systems must be built in the right place. Trampling ground above the system compacts soil and can cause the systems pipes to collapse. Also, septic systems should be located away from trees because tree roots can crack pipes or obstruct the flow of wastewater through drain lines. Proper septic system management is also important, and a system should be inspected and emptied every 3 to 5 years. Household cleaners, grease, oil, plastics, and some food or paper products should not be flushed down drains. Over time chemicals can corrode septic system pipes and might not be completely removed during the filtration process. Chemicals poured down the drain can also interfere with the chemical and biological breakdown of the wastes in the septic tank.[2]

Figure 106:

Signs of Failing Septic Systems

Signs of failing septic systems can include sewage surfacing on the ground on or near drainfield or septic tanks and spongy ground on or near drainfield, as shown in this picture from Talladega County.

Source: Alabama Department of Public Health

In the 1999 Watershed Assessment of the watersheds in Coosa River basin, conducted by the Alabama Soil and Water Conservation Committee, it was estimated that there are 16,220 septic systems in the Lower Coosa River Basin, of which approximately 6.2 percent are failing. This is a low estimate and may be much higher because there were no septic system estimates made for Talladega County in the Watershed Assessment. For the most part, the density of septic tanks throughout the Lower Coosa River Basin is low. Those watersheds that have the highest number of septic systems are Yellowleaf Creek and Beeswax Creek, both of which are located in Shelby County. In the Beeswax Creek watershed, the density of septic systems is highest at .08 tanks per acre, or approximately 12 acres per septic tank. The watershed with the second highest proportion of septic systems is the Spring Creek watershed, which has .07 septic systems per acre or 14.5 acres per septic tank. Spring Creek is located just south of Beeswax Creek, also in Shelby County. The proximity of these two watersheds to the Coosa River and the other significant growth and development that is occurring in this area sends warning flags about the quality of the water in those watersheds.[3]

Illegal Dumping. Another nonpoint source pollution problem stemming from households is illegal dumping, which is the disposal of waste in an unpermitted area, such as a back area of a yard, a stream bank, or some other off-road area. Illegal dumping can also be the pouring of liquid wastes or disposing of trash down storm drains. It is often called "open dumping," "fly dumping" and "midnight dumping" because materials are often dumped in open areas, from vehicles along roadsides, and late at night. Illegally dumped wastes are primarily nonhazardous materials that are dumped to avoid paying disposal fees or expending the time and effort required for proper disposal. Illegally dumping wastes down storm drains and creating illegal dumps, however, can impair water quality. Runoff from dumpsites containing chemicals can contaminate wells and surface water used as sources of drinking water. Substances disposed of directly into storm drains can also lead to water quality impairment. In systems that flow directly to water bodies, those illegally disposed-of substances are introduced untreated to the natural environment.

Figure 107:

Illegal Dumping in the Lower Coosa River Basin

Illegal dumping can range from the tire found in a stream (top right) to full roadside dumps (below), both of which were found near Shirtee Creek in Talladega County. The bottom right photograph is of a car hidden in the trees near Hatchet Creek in Coosa County.

Source: Alabama Department of Public Health and Delaney Consultant Services, Inc.

Agricultural Runoff. There are approximately 275,131 acres of agricultural land in the Lower Coosa River Basin (22 percent of the total land area), representing a significant potential for water pollution from agricultural runoff if best management practices are not implemented. In general, agricultural activities that cause nonpoint source pollution include confined animal facilities, grazing, plowing, pesticide spraying, irrigation, fertilizing, planting, and harvesting. The major nonpoint source pollutants that result from these activities are sediment, nutrients, pathogens, pesticides, and salts. Agricultural activities also can damage habitat and stream channels.[2]

Sedimentation occurs when wind or water runoff carries soil particles from an area, such as a farm field, and transports them to a water body, such as a stream or lake. Excessive sedimentation clouds the water, which reduces the amount of sunlight reaching aquatic plants; covers fish spawning areas and food supplies; and clogs the gills of fish. In addition, other pollutants like phosphorus, pathogens, and heavy metals are often attached to the soil particles and wind up in the water bodies with the sediment. Nutrients such as phosphorus, nitrogen, and potassium in the form of fertilizers, manure, sludge, irrigation water, legumes, and crop residues are applied to enhance crop production. When applied in excess of plant needs, nutrients can wash into aquatic ecosystems where they can cause excessive plant growth, which reduces swimming and boating opportunities, creates a foul taste and odor in drinking water, and may cause fish kills.

Irrigation water is applied to supplement natural precipitation or to protect crops against freezing or wilting. Inefficient irrigation can cause water quality problems. In arid areas, for example, where rainwater does not carry residues deep into the soil, excessive irrigation can concentrate pesticides, nutrients, disease-carrying microorganisms, and salts-all of which impact water quality-in the top layer of soil.[2]

Pesticides, herbicides, and fungicides are used to kill pests and control the growth of weeds and fungus. These chemicals can enter and contaminate water through direct application, runoff, wind transport, and atmospheric deposition. They can kill fish and other wildlife, poison food sources, and destroy the habitat that animals use for protective cover.[2]

Overgrazing exposes soils, increases erosion, encourages invasion by undesirable plants, destroys fish habitat, and reduces the filtration of sediment necessary for building stream banks, wet meadows, and floodplains.[2]

Figure 108:

Cotton Harvesting

Source: Photo Courtesy of USDA NRCS.

By confining animals to areas or lots, farmers and ranchers can efficiently feed and maintain livestock. But these confined areas become major sources of animal waste. Runoff from poorly managed facilities can carry pathogens (bacteria and viruses), nutrients, and oxygen-demanding substances that create the potential for major water quality problems. Groundwater can also be contaminated by seepage.[2]

As of August 2003, there were no registered concentrated animal feeding operations that have been permitted in the Lower Coosa River Basin. The 1999 Watershed Assessments, conducted by the Alabama Soil and Water Conservation Committee and NRCS, shows that there are no poultry operations located within the basin, however, 6,681 broilers were reported in Talladega County in the *Alabama Agricultural Statistics, 2002*. (The exact location within Talladega County is unknown.) There are a limited number of cattle, swine and catfish farms present, as well. Only 259 of the total 31,535 cattle are dairy cattle. The watersheds with the highest amount of cattle are Walnut Creek with 7,700, and Tallaseehatchee Creek with 3,705 cattle. The amount of swine in the watershed is nearly negligible with 731 total. There are 2,154 acres of land/ponds in catfish production, with the highest amounts being located in the Tallaseehatchee Creek watershed, at 900 acres, distantly followed by Cedar Creek, at 300 acres.[3]

Figure 109:

Agricultural Animals by Lower Coosa River Watersheds, 1999

Watershed Name	# of Cattle in Watershed	# of Dairy Cows in Watershed	# of Swine in Watershed	# of Broilers in Watershed	# of Layers in Watershed	# of Catfish Acres in Watershed	Total Animals in Watershed
Tallaseehatchee Creek	3,705	250	330	0	0	900	5,185
Walthall Branch	1,200	0	0	0	0	0	1,200
Yellowleaf Creek	2,940	0	0	0	0	20	2,960
Kahatchee Creek	540	0	8	0	0	150	698
Beeswax Creek	2,000	0	0	0	0	0	2,000
Cedar Creek	1,080	0	80	0	0	300	1,460
Peckerwood Creek	660	0	8	0	0	170	838
Spring Creek	700	0	0	0	0	5	705
Buxahatchee Creek	1,150	0	0	0	0	12	1,162
Waxahatchee Creek	2,310	0	0	0	0	9	2,319
Upper Hatchet Creek	885	0	0	0	0	78	963
Socapatoy Creek	600	0	0	0	0	64	664
Middle Hatchet Creek	870	0	0	0	0	60	930
Weogufka Creek	2,460	0	55	0	0	200	2,715
Lower Hatchet Creek	0	0	0	0	0	90	90
Walnut Creek	7,700	0	0	0	0	20	7,720
Chestnut Creek	1,305	0	250	0	0	6	1,561
Weoka Creek	1,430	9	0	0	0	70	1,509
Pigeon Roost Creek	0	0	0	0	0	0	0
Taylor Creek	0	0	0	0	0	0	0
Total in All Watersheds	31,535	259	731	0	0	2,154	34,679

Source: Alabama Soil and Water Conservation Committee, Alabama Watershed Assessment, 1999. Watershed Statistics. http://www.swcc.state.al.us

Soil Erosion and Sedimentation. Soil erosion, within a stream channel is a natural process. A stream carries a specified amount of stream bed erosion or sediment. When the amount of sediment varies from the normal sediment load either aggradation or degradation occurs. Aggradation is when the amount of sediment in the stream exceeds the capacity to transport sediment. The excess sediment settles out and fills the channel with deposits. This decreases the sediment load to balance with the carrying capacity of the stream. Degradation is when the amount of sediment is lower than the carrying or sediment transport capacity of the stream. The scouring action of the flowing water picks up sediment by eroding the bed or stream banks to balance the carrying capacity of the stream.[2]

Although soil erosion is a natural process, it can be greatly accelerated when soil is disturbed by construction, urbanization, farming and forestry and best management practices are not implemented. Soil erosion is one of the major sources of nonpoint source pollution (sediment). As referenced in the discussion of landscape changes in the riparian zone, even events like a forest fire, a land cover change without a subsequent land use change, can increase soil erosion. The various types of erosion, whether individually or in combination, can result in sediment loads in streams being unnaturally high when compared to natural carrying capacity of the stream. As discussed in the channel changes section, the delivery of increased runoff to a stream will accelerate the speed of the water and cause channel changes. These changes include bank erosion and smoothing, eroding or incising of the streambed. These actions all increase the sediment load in the downstream waterways.[2]

Figure 110:

Sediment Runoff

Soil erosion and runoff from unpaved roads and bare lands results in a sedimentation buildup in stream beds as in these pictures taken in Shelby County.

Source: Photographs by Tracy P. Delaney, AICP. July 2003.

In the mid 1970's the former Soil Conservation Service (now NRCS, Natural Resources Conservation Service) began to inventory erosion and sediment conditions. NRCS also became more involved in controlling erosion in areas undergoing development as opposed to restricting their activities to traditional agricultural areas. As a result of these activities, NRCS is now able to provide soil erosion estimates for each watershed in the Lower Coosa River Basin. The most recent assessment was conducted in 1999, and shows that land use activities in the Lower Coosa River Basin produce more than 5.3 million tons of sediment each year. Approximately half of the total sediment comes from one category—developing urban lands, at more than 2.6 million tons annually. Distantly following developing urban lands is woodlands sediment, producing 510,775 tons per year. According to the 1999 assessment, watersheds producing the most total sediment per year are the Taylor Creek watershed, at 795,004 tons; the Beeswax Creek watershed, at 736,927 tons; and the Yellowleaf Creek watershed, at 697,195 tons. Together, these three watersheds produce over half of the sediment derived from developing urban lands, at more than 1.8 million tons per year. Located within the three watersheds are the municipalities of Chelsea, Columbiana, Harpersville, Pelham, Wetumpka and Wilsonville.[3]

Figure 111:

Annual Sediment Produced in Lower Coosa River Basin by Watershed, 1999

Watershed	Cropland Sediment (Tons)	Sand & Gravel Pits Sediment (Tons)	Mined Land Sediment (Tons)	Developing Urban Land Sediment (Tons)	Gullies Sediment (Tons)	Critical Areas Sediment (Tons)	Streambanks Sediment (Tons)	Dirtroads & Road banks Sediment (Tons)	Woodland Sediment (Tons)	Total (Tons)
Tallasseehatchee Creek	7,929	14,000	18,000	80,000	2,800	36,750	37,800	119,610	43,819	360,708
Walthall Creek	2,835	0	0	60,000	0	14,000	600	9,000	1,299	87,734
Yellowleaf Creek	14,175	16,450	12,060	456,000	0	157,500	840	15,000	25,170	697,195
Kahatachee Creek	1,329	14,000	9,000	64,000	17,500	24,000	58,000	2,508	2,565	192,902
Beeswax Creek	2,100	17,500	6,000	611,000	0	85,000	300	7,500	7,527	736,927
Cedar Creek	10,481	28,000	60,000	40,000	0	9,000	43,500	3,600	6,239	200,820
Peckerwood Creek	388	7,000	18,000	4,000	3,640	7,250	25,440	9,780	20,616	96,114
Spring creek	945	0	0	132,000	0	25,500	1,100	12,000	30,843	202,388
Buxahatchee Creek	3,555	15,750	45,000	169,500	51,800	21,500	5,750	24,000	21,724	358,579
Waxahatchee Creek	3,000	205,450	90,000	136,800	24,150	8,625	4,500	23,100	31,890	527,515
Upper Hatchet Creek	68	0	18	2,000	2,520	23,600	42,300	45,360	49,127	164,993
Socapatoy Creek	0	0	0	4,000	2,520	2,500	19,200	2,940	15,750	46,910
Middle Hatchet Creek	0	0	0	0	6,720	10,000	20,400	5,640	80,850	123,610
Weogufka Creek	878	1,400	900	80	12,740	10,375	48,600	9,780	2,726	87,479
Lower Hatchet Creek	0	0	0	400	840	500	3,600	4,020	51,600	60,960
Walnut Creek	27,338	22,750	0	24,000	29,400	6,750	17,000	45,000	54,000	226,238
Chestnut Creek	22,125	3,500	0	72,300	44,100	10,875	9,057	24,927	12,173	199,057
Weoka Creek	7,748	0	30	30,000	2,520	40,000	21,720	2,606	40,588	145,212
Pigeon Roost Creek	1,422	0	0	30,000	4,900	0	618	70	2,302	39,312
Taylor Creek	2,801	0	0	750,000	24,500	7,500	78	158	9,967	795,004
Total	109,117	345,800	259,008	2,666,080	230,650	501,225	360,403	366,599	510,775	5,349,657

Source: Alabama Soil and Water Conservation Committee, Alabama Watershed Assessment, 1999. Watershed Statistics. http://www.swcc.state.al.us

Silviculture. Nearly 500 million acres of forested lands are managed for the production of timber in the United States. Although only a very small percentage of this land is harvested each year, forestry activities can cause significant water quality problems if improperly managed. It is estimated that there is 977,965 acres of forested land in the Lower Coosa River Basin, which is between 77.82 percent and 81.48 percent of the total basin land area. Of the total forested land, approximately 40.58 percent is deciduous, or natural, forest. The remaining 59.42 percent is either mixed forest or evergreen forest, both of which are generally cultivated for timber production. As stated in Chapter 5, cash receipts for 2001 from forest products in Chilton, Coosa, Elmore, Shelby and Talladega Counties combined was almost $37 million.

Sources of nonpoint source pollution associated with forestry activities include removal of streamside vegetation, road construction, maintenance and use, timber harvesting, and mechanical preparation for the planting of trees. Road construction and road use are the primary sources of nonpoint source pollution on forested lands, contributing up to 90 percent of the total sediment from forestry operations. Harvesting trees in the area beside a stream can affect water quality by reducing the streambank shading that regulates water temperature and by removing vegetation that stabilizes the streambanks. These changes can harm aquatic life by limiting sources of food, shade, and shelter.[2] Limbs and other trimmings dumped into streams from harvesting operations can also foul the water by adding excessive organic matter and robbing it of oxygen.

Most detrimental effects of timber harvesting are related to the access and movement of vehicles and machinery, and the dragging and loading of trees or logs. These effects include soil disturbance, soil compaction, and direct disturbance of stream channels. Poor harvesting and transport techniques can increase sediment production by 10 to 20 times and disturb as much as 40 percent of the soil surface. In contrast, careful logging disturbs as little as 8 percent of the soil surface.[2]

Figure 112:

Logging Roads for Silviculture in the Lower Coosa River Basin

Photo Courtesy of Delaney Consultant Services, Inc. July 2003.

Water-Related Recreational Activities. There are three lakes in the Lower Coosa River Basin offering abundant opportunities for water-related recreational activities for both residents and visitors to the area. Most of these activities are boat-oriented. Individual boats and marinas usually release only small amounts of pollutants. Yet, when multiplied by thousands of boaters and marinas, they can cause distinct water quality problems in lakes, rivers, and coastal waters. The U.S. Environmental Protection Agency has identified the following potential environmental impacts from boating and marinas: high toxicity in the water; increased pollutant concentrations in aquatic organisms and sediments; increased erosion rates; increased nutrients, leading to an increase in algae and a decrease in oxygen (eutrophication); and high levels of pathogens. In addition, construction at marinas can lead to the physical destruction of sensitive ecosystems and bottom-dwelling aquatic communities.[2]

Water pollution from boating and marinas is linked to several sources. They include poorly flushed waterways, boat maintenance, discharge of sewage from boats, storm water runoff from marina parking lots, and the physical alteration of shoreline, wetlands, and aquatic habitat during the construction and operation of marinas. When caring for boats, a significant amount of solvent, paint, oil, and other pollutants potentially can seep into the groundwater or be washed directly into surface water. The chemicals and metals in antifouling paint can limit bottom growth. Many boat cleaners contain chlorine, ammonia, and phosphates -- substances that can harm plankton and fish. Small oil spills released from motors and refueling activities contain petroleum hydrocarbons that tend to attach to waterborne sediments. These persist in aquatic ecosystems and harm the bottom-dwelling organisms that are at the base of the aquatic food chain.[2]

Often underestimated or ignored by the public, the discharge of sewage and waste from boats, can degrade water quality (especially in marinas with high boat use). Fecal contamination from the improper disposal of human waste during boating can make water unsightly, unsuitable for recreation, and cause severe human health problems. Sewage discharged from boats also stimulates algae growth, which can reduce the available oxygen needed by fish and other organisms. Although fish parts are biodegradable, when many fish are gutted and cleaned in the same area on the same day, a water quality problem can result. Like raw sewage, excess fish waste can stimulate algae growth.[2]

As stated in Chapter 6, it is estimated that there are 8,718 boats registered to owners residing within the Lower Coosa River Basin. Since boats are registered in the owner's county of residence, this does not always reflect where the boat is most often used. This number does not take into account the high number of boats located at seasonal lake residences that are registered in counties other than Autauga, Chilton, Clay, Coosa, Elmore Shelby, or Talladega Counties. Nor does it take into account the number of boats used on the lakes on an occasional basis and are then trailered back to their home county. It is very possible that the number of boats actually in use on a regular basin in the Lower Coosa River Basin is two to three times higher than the conservative estimate of the 8,718 registered boats in the basin.

Last, poorly planned marinas can disrupt natural water circulation and cause shoreline soil erosion and habitat destruction. To reduce activities that cause nonpoint source pollution, marinas should be located and designed so that natural flushing regularly renews marina waters.[2] An inventory of the existing facilities on the three lakes in the basin shows that there were a total of 46 ramps, marinas, or fishing camps in operation as of 1999 with five former facilities being closed. Of the operational facilities, 14 are located on Lake Jordan; 13 are located on Lake Mitchell; and 19 are located on Lay Lake.(WWG) Refer to Figures 113, 114 and 115 for details on facilities that are available at each lake and where they are located.

All of the facilities except five have boat ramps providing access to the lakes and the Coosa River. Just under half of the facilities have fuel available; however, none of the facilities have diesel fuel. Marine repair is offered at four facilities: two on Lake Jordan and one each on Lay Lake and Lake Mitchell. Only two facilities, both located on Lake Jordan, offer pump out stations and restrooms are only available at eight of the facilities. There are six facilities that offer overnight docking and another 18 that have overnight facilities available in the way of motels, cabins or campgrounds. Other services and goods provided at some of the facilities include boat rental, boat hoists, bait and fishing supplies, miscellaneous supplies, food and beverages, restaurants and picnic areas.

Figure 113:

Lake Jordan Facilities																
Name of Facility or Area	**Pump Out Station**	**Boat Ramp**	**Fuel: Gas**	**Fuel: Diesel**	**Overnight Docking**	**Boat Rental**	**Boat Hoist**	**Marine Repair**	**Bait/Fishing Supplies**	**Food and Beverages**	**Restaurant**	**Restrooms**	**Picnic Area**	**Camping Facilities**	**Motel/Cabins**	**Monitor VH**
State Ramp		O											O			
Lake Jordan Marina	O	O	O		O		O	O		O		O	O			
State Ramp		O											O			
Bonner's Landing	O															
Holtville Recreation Area		O														
Blackwell's Fishing Lodge		O	O						O	O						
Joe's Fish Camp		O				O	O	O	O				O			
Ramp		O														
Lakeview Marina		O														
Ramp		O														
Ramp		O														
Log Cabin Beach		O							O	O			O	O		
Mama Jean's Fishing Camp		O							O				O	O		
Coosa Fishing Lodge									O	O			O	O		
Source: Geological Survey of Alabama, Alabama Waterways Guide. 1999																

Figure 114:

Lake Mitchell Facilities																
Name of Facility or Area	**Pump Out Station**	**Boat Ramp**	**Fuel: Gas**	**Fuel: Diesel**	**Overnight Docking**	**Boat Rental**	**Boat Hoist**	**Marine Repair**	**Bait/Fishing Supplies**	**Food and Beverages**	**Restaurant**	**Restrooms**	**Picnic Area**	**Camping Facilities**	**Motel/Cabins**	**Monitor VH**
State Ramp		O	O		O		O	O		O		O	O	O		
Cargyle Creek Marina		O	O			O										
Inman's Fishing Camp		O	O													
Chilton County Park		O											O	O		
Pokanatchee Lodging		O	O			O			O	O			O		O	
Lavada's Fishing Camp		O	O			O			O	O	O		O	O		
Seab & Sam's Fishing Camp		O	O			O			O	O				O		
Cedar Circle Fishing Camp		O	O							O			O	O		
Lay Field Marina		O	O						O	O						
State Launching Site		O														
Barrette's Fishing Camp		O	O			O			O	O			O	O	O	
Horse Stomp Campground														O		
Public Use Area																
Source: Geological Survey of Alabama, Alabama Waterways Guide. 1999																

Figure 115:

Lay Lake Facilities																
Name of Facility or Area	**Pump Out Station**	**Boat Ramp**	**Fuel: Gas**	**Fuel: Diesel**	**Overnight Docking**	**Boat Rental**	**Boat Hoist**	**Marine Repair**	**Bait/Fishing Supplies**	**Food and Beverages**	**Restaurant**	**Restrooms**	**Picnic Area**	**Camping Facilities**	**Motel/Cabins**	**Monitor VH**
Pineview Fish Camp		O	O			O			O	O			O	O		
Little Tom Fish Camp		O	O			O		O	O	O					O	
Layport Camp		O	O			O			O	O					O	
Waxahatchee Marina		O			O				O	O	O	O	O			
Joe White's Camp		O														
Shelby County Park		O											O			
La Coosa Marina		O	O						O	O		O	O	O		
Bozo's Fish Camp		O	O		O				O	O		O		O		
State Ramps		O														
Camp Okoma		O	O		O				O	O	O	O	O			
Cedar Creek Marina		O	O			O			O	O			O	O	O	
Paradise Point Marina		O	O						O	O		O	O			
Beeswax Bait and Grocery			O						O	O		O				
Ingram's Fishing Camp		O														
Smith's Camp		O			O								O			
Lakeshore Village		O														
Pop's Landing		O														
Glover's Point Park		O											O	O		
Kelly Spring Ramp		O														
Source: Geological Survey of Alabama, Alabama Waterways Guide. 1999																

Mining. Mining is both a point source and a nonpoint source of pollution. And, although only a small area of the land surface is disturbed by mining, the impacts of improperly managed sites on surface water are significant. One of the most vocalized concerns with mining is acid mine drainage (AMD) which is caused when water flows over or through sulfur-bearing materials forming solutions of net acidity. AMD comes mainly from abandoned coal mines and currently active mining. Of the thirteen mining operations in the Lower Coosa River Basin, all are mining operations for construction materials, such as rock, gravel, sand and fill dirt. Therefore, AMD is not the primary concern in this basin; instead, runoff and sedimentation is a much greater concern.

The most common form of physical pollution from mining is sediment. Surface mining creates large areas of disturbed land which are often highly erodible. During contour strip mining operations, the practice of placing overburden on the downslope side of an outcrop can result in excessive siltation in water courses. In the mining of sand and gravel, mines most often use a wet process and reuse their water. Contamination of streams can occur at times of heavy and/or sustained rain and occasional violations of suspended solids standards may be attributed to these facilities. While sand and gravel operations are permitted operations, i.e., point sources, and are supposed to be operating as a fairly closed system with no discharge, these operations are a potential source of nonpoint source pollution and good management practices should be followed in order to keep runoff to a minimum.

As seen in Figure 111, mined land is among the lowest contributors of sediment in the Lower Coosa River Basin at an estimate 259,008 tons per year, with only sediment from gullies being less. Of the 20 watersheds, 11 have mined land that contribute sediment to the basin. Those watersheds that produce the most sediment annually are Waxahatchee Creek, at 90,000 tons, Cedar Creek, at 60,000 tons, and Buxahatchee Creek, at 45,000 tons.

SWCC Priority Watersheds

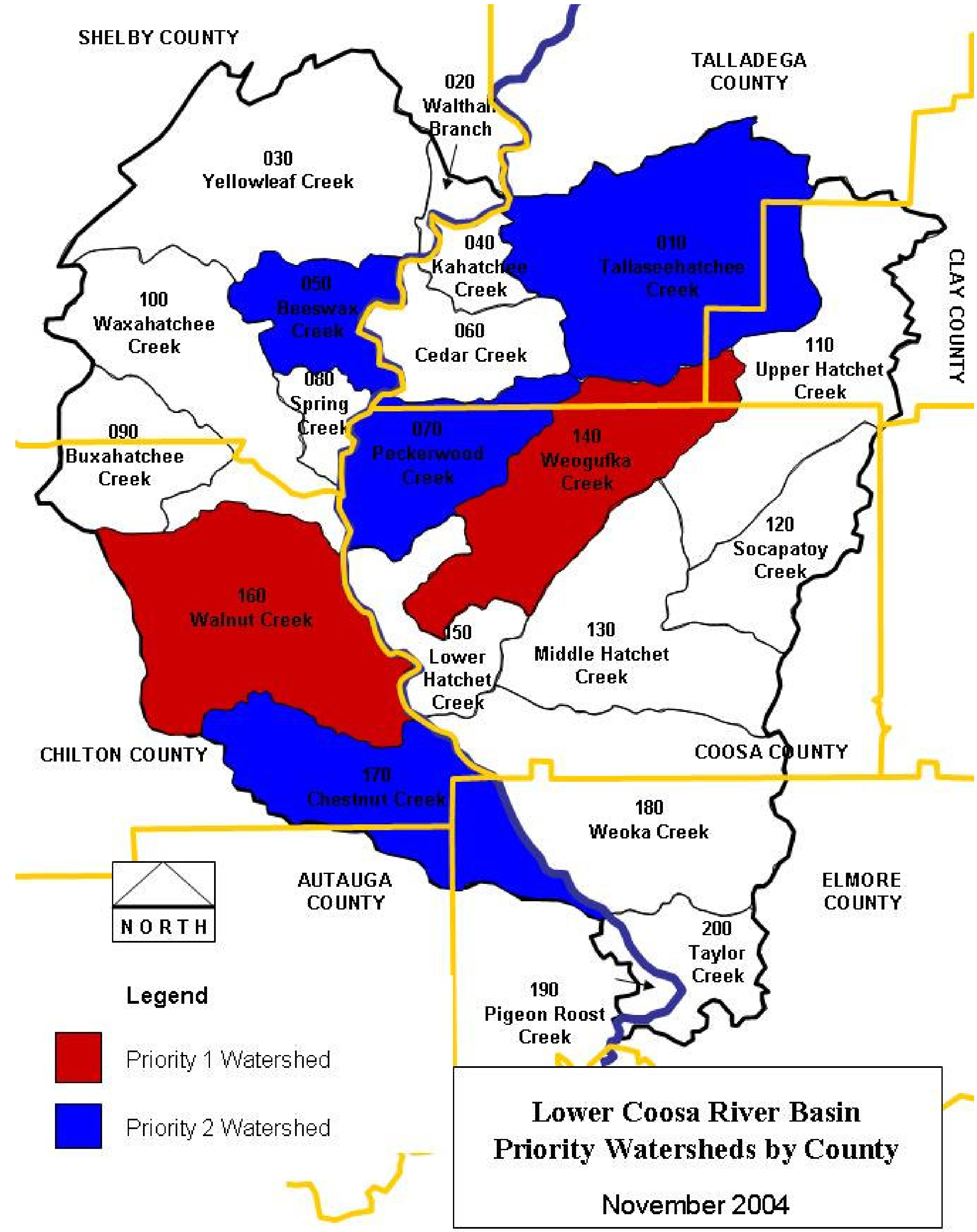
Much of the section in this chapter has been drawn from the basin assessments conducted in 1999 by the county Soil and Water Conservation Districts and compiled and published by the Alabama Soil and Water Conservation Committee. These agencies are part of the state branch of the federal Natural Resource and Conservation Service agency. As a result of the basin assessment process, each county identified priority watersheds in their respective counties. Since the Lower Coosa River Basin does not encompass all of any of the seven counties, not all counties have priority watersheds in the Lower Coosa River Basin. Those watersheds that are ranked as Priority 1 watersheds by counties are Walnut Creek in Chilton County and Weogufka Creek in Coosa County. Priority 2 watersheds are Beeswax Creek in Shelby County, Chestnut Creek in Chilton County, Peckerwood Creek in Coosa County and Tallaseehatchee Creek in Talladega County.

The basin assessments conducted by the Soil and Water Conservation Districts will be updated beginning in the Fall of 2005. Information from the 2005 assessment is expected to be more accurate due to a better understanding of expectations and uses of the final product and the use of technological innovations. In addition, it is expected that the 2005 basin assessments will include information at much smaller watershed levels.

Additionally, each of the watersheds statewide was assigned a rating for each of five sources of nonpoint source pollution: sediment, pesticides, animal wastes, domestic wastewater, and urban runoff. Ratings were based on the potential for pollution from each of five nonpoint sources based on activities on the land. Ratings were from one to five with five equal to the highest potential and one equal to the lowest potential. Figure 117 shows those watersheds that received a rating of “5” for in any one of the five nonpoint source pollution categories.[3]

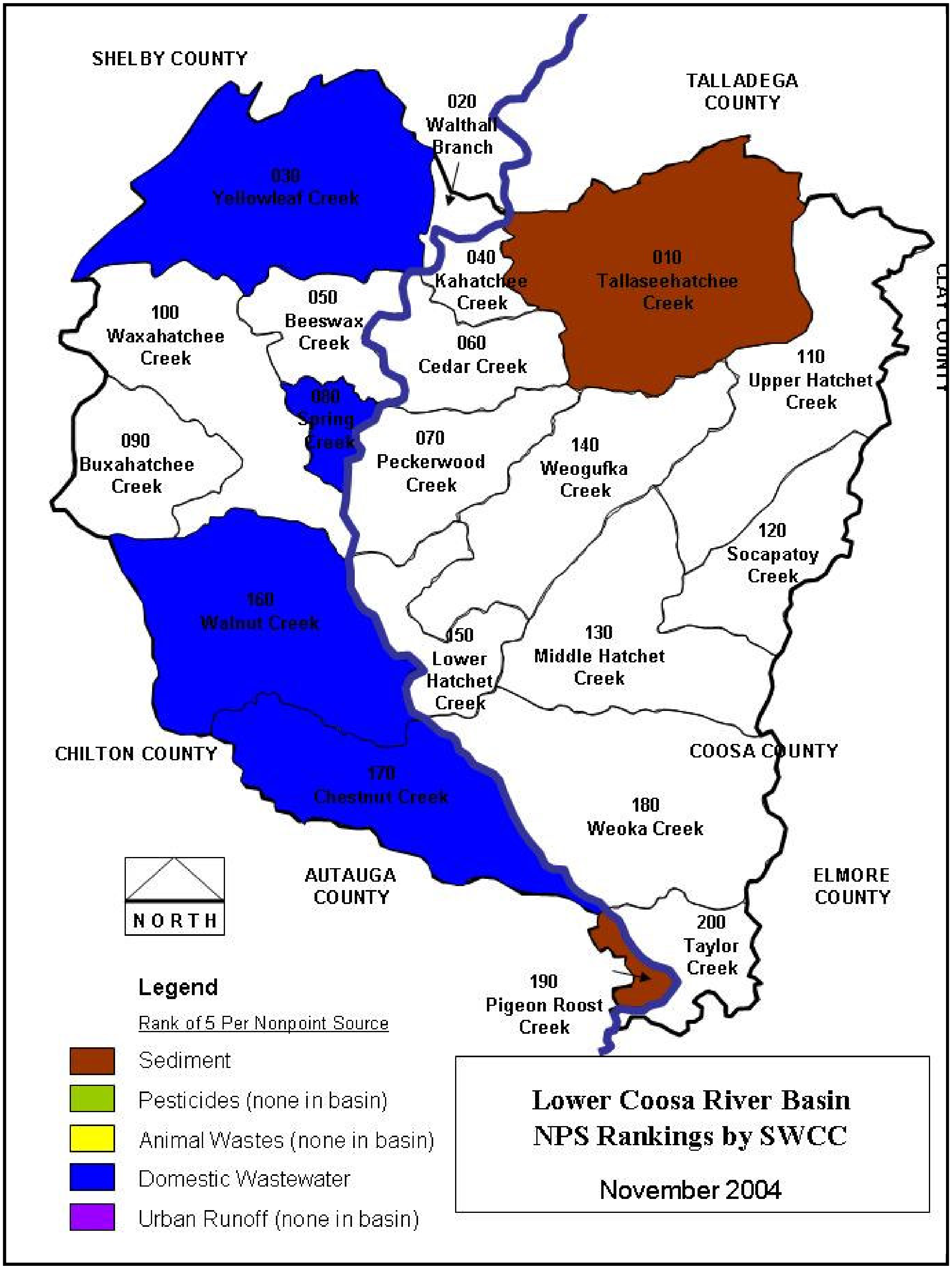
Six of the 20 watersheds received a rating of “5” in one of the nonpoint source pollution categories. For sediment, the watersheds in the basin with a rating of “5” are Tallaseehatchee Creek and Pigeon Roost Creek. Fore domestic wastewater, watersheds with a rating of “5” are Yellowleaf Creek, Spring Creek, Walnut Creek, and Chestnut Creek.[3]

Figure 116:



Source: Alabama Soil and Water Conservation Committee, Basin Assessments, 1999.

Figure 117:



Source: Alabama Soil and Water Conservation Committee, Basin Assessments, 1999.

Lake Eutrophication

Water quality in the streams and creeks in a watershed or basin also have an affect on the water quality in the lakes or reservoirs that are fed by the streams and creeks. The process by which water bodies become more productive through increased input of nutrients, primarily nitrogen and phosphorus, is known as eutrophication. Normally, increased plant (algae and/or macrophyte) productivity and biomass are considered part of the eutrophication process though nutrients can increase without an increase in plant growth if available light in the water column is limited by high concentrations of suspended solids. The classical trophic succession sequence that occurs in natural lakes is as follows:

Oligotrophy: nutrient-poor, biologically unproductive;
Mesotrophy: intermediate nutrient availability and productivity;
Eutrophy: nutrient-rich, highly productive;
Hypereutrophic: the extreme end of the eutrophic stage.[4]

Depending on the nature of the watershed however, eutrophication of natural lakes may take thousands of years or they may never become eutrophic. All of the waterbodies in the Lower Coosa River Basin are reservoirs rather than natural lakes. Trophic succession in reservoirs does not occur in the classical form as in natural lakes. After filling of the reservoir basin, trophic upsurge occurs, resulting in high productivity of algae and fish. The trophic upsurge is fueled by nutrient inputs from the watershed, leaching of nutrients from the flooded soils of the basin, and decomposition of terrestrial vegetation and litter. Eventually a trophic depression takes place with a decline in the productivity of algae and fish as these initially available nutrient sources decline. In time, a less productive but more stable trophic state is established. The trophic state that the reservoir eventually settles into (oligotrophic, mesotrophic, or eutrophic) is determined by the combination of the natural fertility of the watershed and the effects of the point and nonpoint sources of pollution within the watershed.[4]

The concern about eutrophication from a water quality standpoint is more likely due to cultural eutrophication. Cultural eutrophication can be defined as eutrophication brought about by the increase of nutrient, soil, and /or organic matter loads to a lake or reservoir as a result of anthropogenic activities. Activities that contribute to cultural eutrophication include mismanaged wastewater treatment discharges, agricultural and silvicultural activities, residential and urban development, and road building. Increased eutrophication in a waterbody occurring over a period of 10 to 50 years usually indicates cultural eutrophication.[4]

The effects of cultural eutrophication to a reservoir that is highly productive, or eutrophic, can lead to hypereutrophic conditions. Hypereutrophic conditions are characterized by the following:

a) dense algal populations;
b) low dissolved oxygen concentrations;
c) increased likelihood of fish kills; and,
d) interference with public water supply and recreational uses.

Regardless of whether a reservoir is oligotrophic, mesotrophic, or eutrophic, however, cultural eutrophication negatively affects biological communities of these waterbodies through sedimentation and changes in water quality variables such as dissolved oxygen, pH, water temperature, and light availability.

<u>Source Documents:</u>

1. Alabama Department of Environmental Management. Office of Education and Outreach. *NEMO Factsheet 2: Nonpoint Source Water Pollution*. Reprinted with permission of The University of Connecticut Cooperative Extension System. 1999. http://www.adem.state.al.us/Education%20Div/Nonpoint%20Program/WSNPSResMat.htm

2. Environmental Protection Agency. Office of Wetlands, Oceans and Watersheds. *Nonpoint Source Pointers* (Factsheets). 1996. http://www.epa.gov/OWOW/NPS/facts/

3. Alabama Soil and Water Conservation Committee, Alabama Watershed Assessment, 1999. Watershed Statistics. http://www.swcc.state.al.us

4. Environmental Indicators Section, Field Operations Division of the Alabama Department of Environmental Management. *Intensive Water Quality Survey of Coosa and Tallapoosa River Reservoirs: 1997*. March 24, 1999.