Swan Creek Watershed Management Plan

Prepared by

TOP OF ALABAMA REGIONAL COUNCIL OF GOVERNMENTS
TARCOG

Funded by

ADEM
Alabama Department of Environmental Management

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Swan Creek Watershed Table of Contents

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Executive Summary

The Swan Creek watershed is an approximate 55.2 square mile area with headwaters located in Limestone County, near the city of Athens, flowing southward for a length of 17.81 miles where it empties into the Wheeler Lake, part of the Tennessee River drainage basin. Swan Creek (HUC 06030002-390) has a length of impairment starting south of the city of Athens flowing in an expanse of 8.2 miles at its terminus with the Tennessee River.

In 1996, Swan Creek was first listed on Alabama's Clean Water Act Section 303(d) list of impaired waters. The 8.2-mile stretch of Swan Creek from immediately south of the city of Athens to its terminus with the Tennessee River was identified as being impaired by and both siltation and organic enrichment/low dissolved oxygen; at the time the source of the noted pollutants were noted as agricultural in nature. Total Maximum Daily Limits (TMDLs) for siltation, nutrients and organic enrichment/low dissolved oxygen were completed to target the impairments.

The Swan Creek Watershed was selected as a priority by the Alabama Department of Environmental Management (ADEM) for the development of a watershed management plan in 2015. Utilization of funds under Section 604(b) of the Clean Water Act were requested by the Top of Alabama Regional Council (TARCOG) of Governments and used in the development of this document. Since 1968, TARCOG has worked cooperatively with federal, state and local government agencies to develop water quality problem assessments, assist landowners with the implementation of "Best Management Practices" (BMPs), support municipal officials with pollution reduction and coordinate environmental education programs.

The following Swan Creek Watershed Management Plan was written to provide an avenue for restoring Swan Creek, to fully support its designated use. This document was developed cooperatively by the Limestone County Soil and Water Conservation District (LCSWCD), the USDA -Natural Resources Conservation Service (NCRS), the Limestone County Office of the Alabama Cooperative Extension System (ACES), ADEM, and with the assistance of multiple other local agencies. The Swan Creek Watershed Management Plan follows EPA's Section 319 watershed plan guidelines.

Estimated budget costs for implementation of this restoration plan are estimated to be $205,166.46 from Section 319 funding, with an additional $136,777.64.20 in non-federal match funding. Total costs for implementation are estimated to be a total of $341,944.10. Watershed partners, local advisory members and contacts, local government officials, and other stakeholders will be kept informed about this project through various education and outreach activities, including newsletters, newspaper articles, meetings and field visits.

Key funding to the project for implementation may be provided under Section 319 of the Clean Water Act. In order to be eligible for this funding the project must provide “An identification of the best management practices and measures which will be undertaken to reduce pollutant loadings” and identify “programs to achieve implementation of the best management practices.” To best accomplish this, the plan will follow the Section 319 EPA guidelines. These guidelines include the following key elements:

1. Identification of causes and sources for the pollution leading to the present impairment, as well as identifying potential pollution factors that should also be addressed.

2. Estimate of load reductions expected from the proposed management measures.

3. Description of management measures.

4. Sources and amounts of technical and financial assistance available.

5. Formulation of an information/education component.

6. Schedule for implementation of management measures.

7. A description of expected milestones.

8. Criteria that can be used to determine whether load reductions are being achieved over time.

9. A future monitoring component.

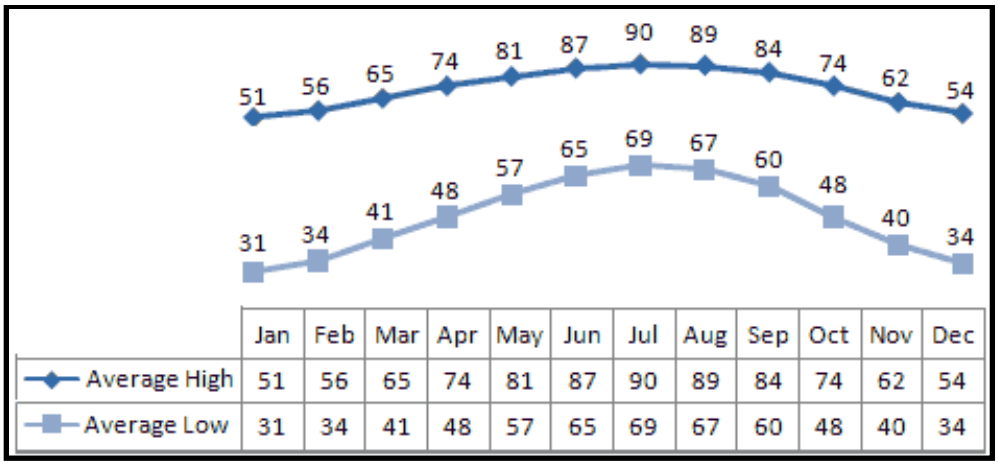
Hydrologic Unit Code
06030002-390
Swan Creek
Watershed Management Plan

Introduction: Swan Creek is located in Limestone County, Alabama within the Swan Creek Watershed of the Tennessee River Basin and is biologically diverse. Swan Creek first appeared on the 303(d) use impairment list in 1996 and had been on the list for siltation and organic enrichment/low dissolved oxygen. Currently, it has approved TMDL's for both with an impairment length of 8.2 miles. Although no cause for pathogen contamination was listed by ADEM/TVA in 1996/1998, a 2016 land use survey of the TMDL designated area has found row crop production and pasture lands to be the likely sources of impairment. The Swan Creek Watershed is approximately 55.2 square miles in total with moderate urban development in its drainage area. Major populated areas within the watershed include the city of Athens, Alabama.

Physical Description of the Swan Creek Watershed

Location: The Swan Creek Watershed is located in the north central portion of Limestone County north of the Lower Elk Reservoir. Swan Creek Watershed is approximately 55.2 square miles with the headwaters in northcentral Limestone County flowing southward 17.81 miles as it enters the Tennessee River north of Decatur, Alabama. This Swan Creek Watershed Management Plan will focus on the 8.2 mile portion of the impaired stream located within Limestone County (HUC06030002) that includes 46% of the total stream length.

Climate/Precipitation: The average annual rainfall in this area is 56-inches. Short periods of very dry or very wet weather are common. Dry conditions prevail from mid-summer to late fall, but severe droughts over long periods are unusual. The driest month is October, with a mean precipitation of 2.57 inches. January is the wettest month, with a mean precipitation of 5.70 inches. The length of the growing season is approximately 200 days, with the last killing frost occurring in April and the first occurring in October. The average highs during wintertime are approximately 50 degrees Fahrenheit with average lows around 31 degrees Fahrenheit. During the summer months, the average highs are typically close to 90 degrees Fahrenheit with average lows around 69 degrees Fahrenheit. The area experiences four distinct seasons.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High	51	56	65	74	81	87	90	89	84	74	62	54
Average Low	31	34	41	48	57	65	69	67	60	48	40	34

Figure 1: Climate Limestone County, AL

Geology: This region consists of both the Appalachian Plateau and the Interior Low Plateau. The upper part of the watershed consists of Limestone, Chert, and Stale and has the Fort Payne Chert Formation. The lower part of the watershed consists of the following rock types: Limestone and Chert. It also has a formation known as the Tuscumbia Limestone.

Physiographic Features: Over geologic time, roughly two-thirds of present-day Alabama was a shallow sea. Mountains have risen and nearly eroded away, and major rivers have changed course. The resulting physiographic diversity has been a major force behind the natural selection processes that have created new wildlife species, driven others to extinction, and isolated some populations (Mettee et al. 1996). Alabama's physiographic features are among the most diverse of the southeastern states. Major provinces are the Interior Plateau (or Highland Rim), Southwestern Appalachians (or Cumberland Plateau), Ridge and Valley, Piedmont, and East Gulf Coastal Plain. Each major province is further differentiated into subdivisions representing a variety of physical areas. The Swan Creek watershed is located in the Interior Plateau, specifically the Eastern Highland Rim.

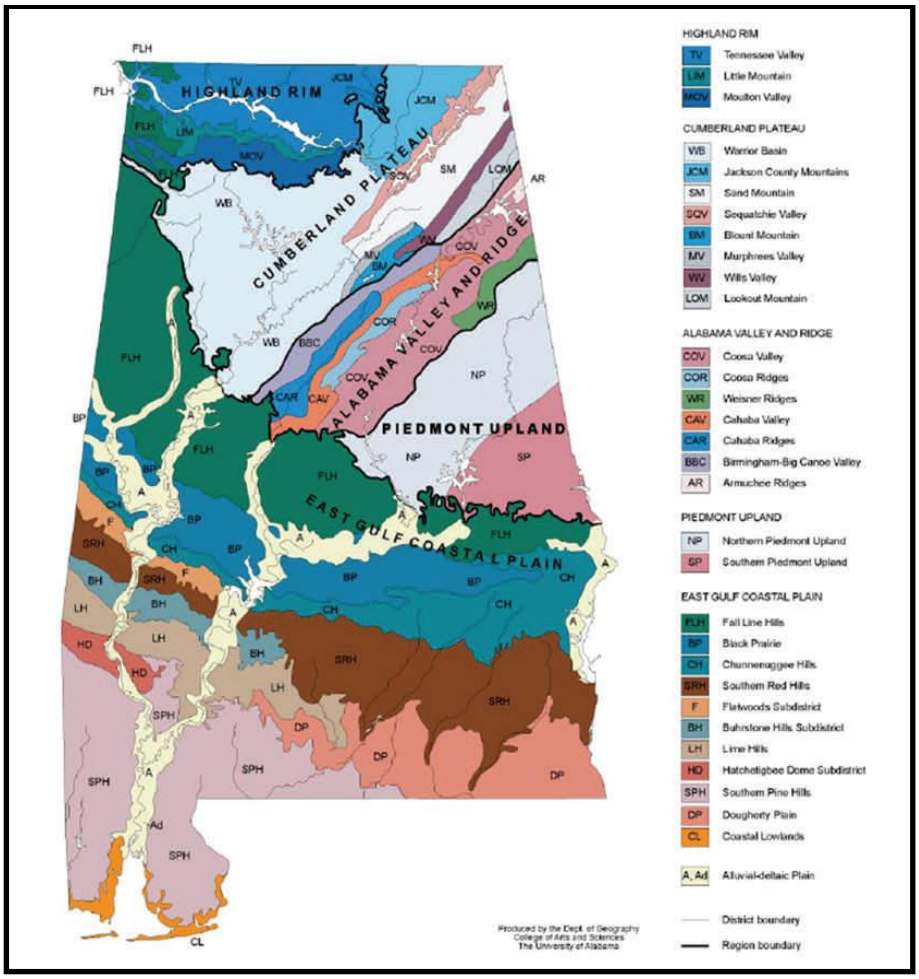


Figure 2: Physiographic Regions

Soils: Major soils on the upland areas occur in capability class and sub-class lie, Hie, and IVe. Predominant upland soils are: (1) Decatur silt loam, (2) Dickson silt loam, and (3) Dewey silt loam, and are briefly described as follows:

Upland Soils:

(1) Decatur - This series consists of level to strongly sloping soils of the limestone valleys. This soil has dark reddish brown silt loam to silty-clay loam surfaces and dark red clay subsoils. The regolith is old valley fill material and residuum from lime- stone. Slopes generally are from one to 10 percent but range to 25 percent.

(2) Dickson - Gently to moderately sloping broad ridges and plateau-like areas. Slopes range from 1 to 10 percent. The soil formed in two feet of a silty mantle underlain by residuum weathered from cherty and clayey limestone or old alluvium. Soils are moderately well drained with slow runoff and moderately slow permeability.

(3) Dewey - This series consists of deep, well drained soils on limestone uplands. These soils have a dark reddish brown silt-loam surface layer about six inches thick and a red to dark red clay subsoil. Slopes vary from two or 30 percent. Some areas are pitted with limestone sinks.

Soils in the flood plain are mainly silt loams in capability classes and subclass IIw, IIIw, and IVw. Flood plain soils by order of predominance are: (1) Lobeville cherty silt loam, (2) Lee silt loam, and (3) Ennis silt loam, and are briefly described as follows:

Flood Plain Soils:

(1) Lobeville - Lobeville soils are on bottom lands and in depressions. Slopes are commonly less than three percent. The soils formed in loamy alluvium washed from soils formed in material weathered from limestone, shale, sandstone, and loess. These soils are moderately well drained. Runoff is slow and permeability is moderate. Many low lying areas flood occasionally.

(2) Lee - This series consists of poorly drained strongly acid soils on nearly level bottomlands and in depressions. These soils have dark grayish brown cherty silt loam surface layers and gray mottled cherty silt loam sub-soils. Soils are severely limited in use because of frequent flooding.

(3) Ennis - This soil is found on bottom lands along creeks and streams. Slopes range from zero to two percent. Drainage is fair to good except for an occasional overflow. To a depth of about eight inches this soils is brown to yellowish brown friable silt loam. Parent material is limestone and cherty limestone.

Capability Class and Sub Classes:

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Subclass "e" soils are limited in use because of erosion hazard.

Subclass "w" soils are limited in use because of wetness or drainage problems.

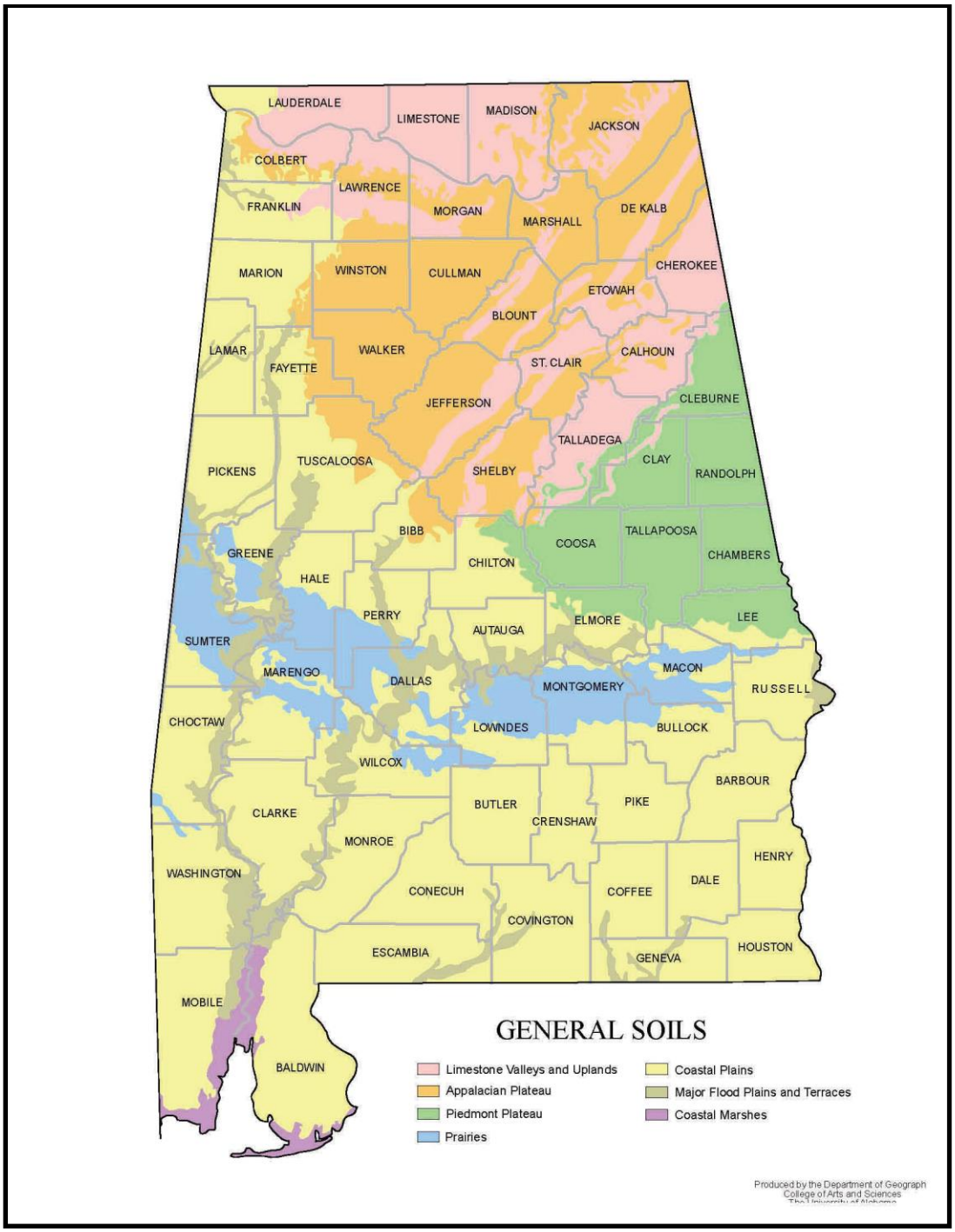
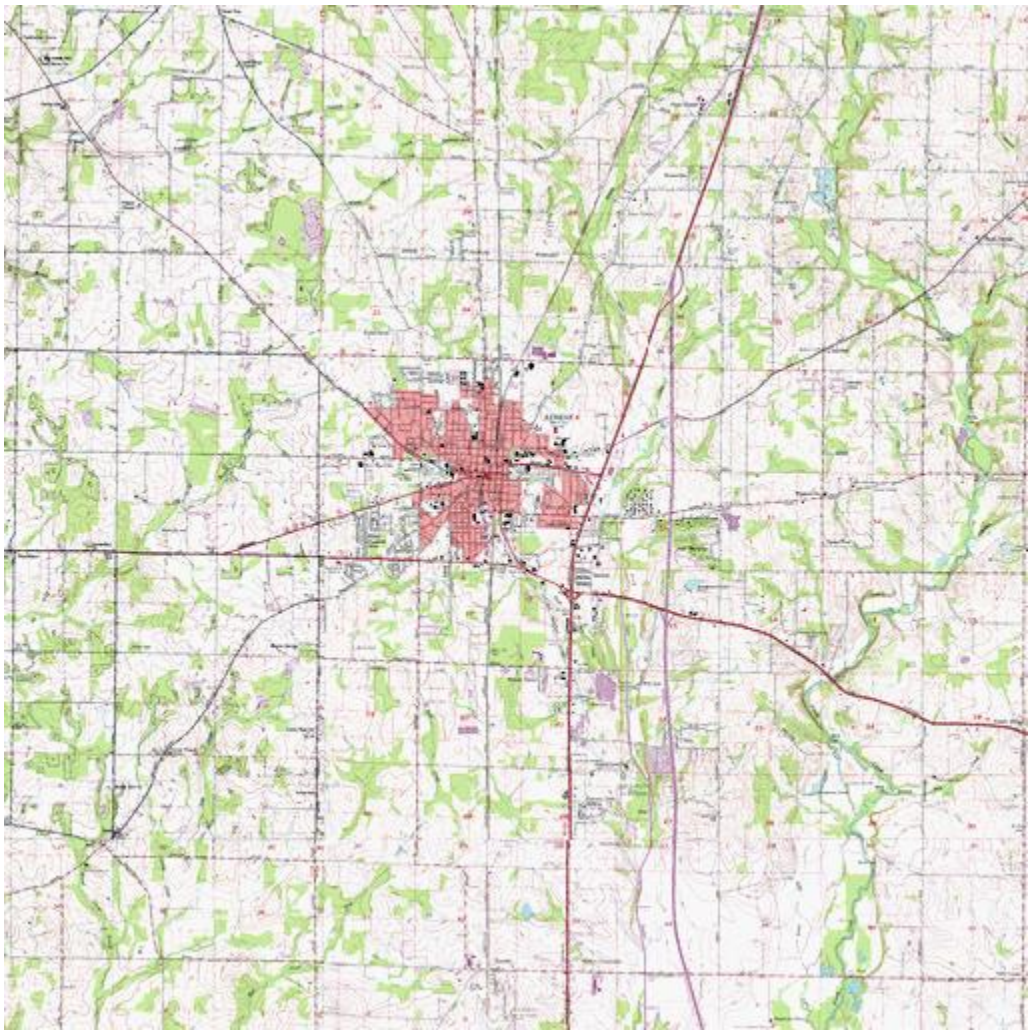


Figure 3: Soils for Swan Creek Watershed

Topography: The topography of the watershed consists of primarily from gently sloping to steep. The slope is consistent throughout the segment with an average slope of 13-feet. The Swan Creek is located at the latitude and longitude coordinates of 34.744609, -86.944117 at an elevation of approximately 170 feet. The topological map of Swan Creek is drawn on and part of the United States Geological Service (USGS) area map of the city of Athens.



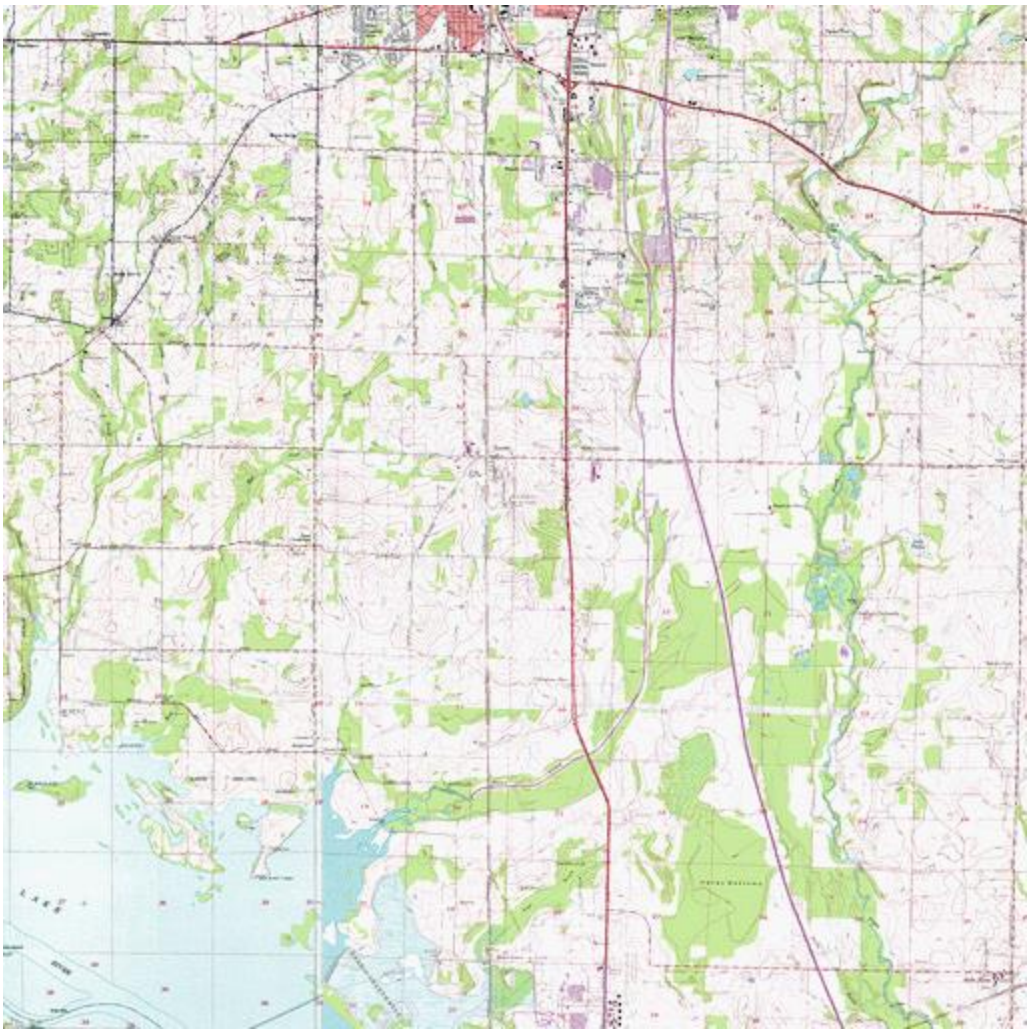


Figure 4: Topography Maps

Wetlands: Wetlands are areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Examples include swamps, marshes, bogs, wet meadows, and shoreline fringes. Limestone County is located in the Interior Plateau ecoregion. According to land use/land cover data compiled by the U.S. Geological Survey, wetlands comprise 0.70 percent of the total land use within this ecoregion (Drummond 2010). Wetlands in this region are typically associated with low-lying, poorly drained areas, or linear in feature and associated with the floodplain areas of streams, rivers, and the reservoir. Wetlands are relatively common along the margins of Wheeler Reservoir. Data analyzed for the 2004 Reservoir Operations Study indicated there were approximately 10,627-acres of wetlands located along the entire reservoir.

Sections 404 of the Clean Water Act forbids the unpermitted discharge of dredge or fill material into waters of the United States. Section 404 requires anyone seeking to 'fill' a wetland to first obtain a permit from the U.S. Army Corps of Engineers (COE). The COE §404 permits cannot be issued without water quality certification or a waiver of certification from ADEM.

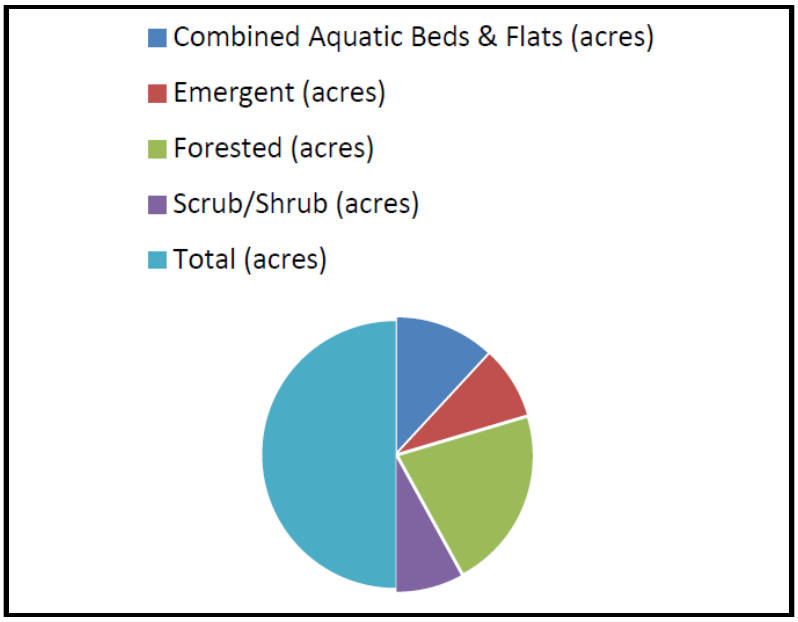


Figure 5: Wetland Types

Ecoregion: The Interior Plateau is also known as the Highland Rim and Chert Belt. Subdivisions include the Tennessee Valley, Western and Eastern Highland Rim, Outer Nashville Basin, and Little Mountain. Although not indicated, the portion of the Eastern Highland Rim lying south of Little Mountain is known as Moulton Valley. The ecoregion's geology is diverse, and is typically limestone at valley floors (around 500 feet elevation) and sandstone on ridges (to around 1000 feet). Cities include Huntsville, Florence, and Decatur. Most of the region is devoted to farming and industry, and compared with other regions, relatively little natural habitat remains. The entire region is drained by the Tennessee River, and springs and caves are numerous. Important streams include Cypress Creek, Limestone Creek, Swan Creek, and Elk River. Impoundments on the Tennessee River have virtually eliminated all free-flowing riverine habitats, and the river bears little resemblance to its former state. Forests are predominantly oak-hickory, with some acidic soils supporting Virginia and shortleaf pine. Significant wildlife species of the region include the Gray Myotis, Bewick's Wren, Northern Pine Snake, Hellbender, Spring Pygmy Sunfish, Tuscumbia Darter, Alabama Cavefish, White Wartyback, Rough Pigtoe, and Armored Rock Snail.

Swan Creek watershed is located in Eastern Highland Rim (71g). The Eastern Highland Rim is flatter and has less dissection than the Western Highland Rim (71f). Mississippian-age limestone, chert, shale, and dolomite predominate, and springs, sinks, and caves have formed by solution of the limestone. Cave and spring-associated fish fauna also typify the region. In the southern part of the region, streams flow down from the Pottsville Escarpment of ecoregion 68, cutting north across the Moulton Valley and through narrow valleys of Little Mountain (71j) to the impounded Tennessee River. Natural vegetation for the region is transitional between the oak-hickory type to the west and the mixed mesophytic forests of the Appalachian ecoregions to the east. Much of the original bottomland hardwood forest has been inundated by impoundments. The

flatter areas in the east and on both sides of the Tennessee River have deep, well-drained, reddish soils that are intensively farmed.

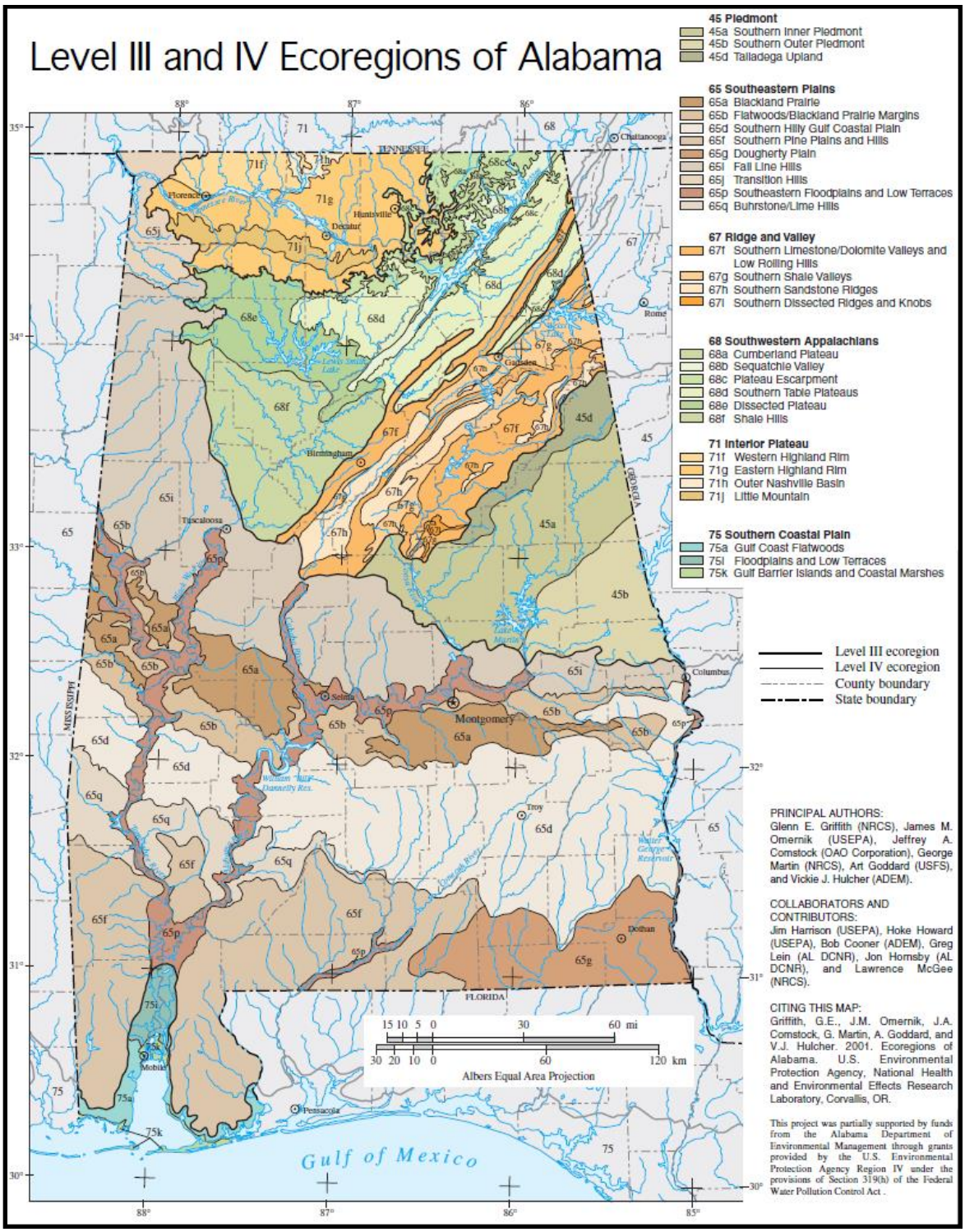


Figure 6: Swan Creek Ecoregion

Aquifers: Groundwater is a reliable source of water for many people in Alabama (roughly 44 percent of the population, Moore and Szabo, 1994), with several large cities and many smaller towns utilizing groundwater for water needs, particularly in south Alabama. Approximately seven inches of the state's 55 inches of annual rainfall enters the ground to become groundwater (GSA, 2001).

Fresh water in some areas of Alabama extends to 2,000 feet or more below land surface, however in a few areas, fresh water extends to only 150 feet below land surface (GSA, 2001).

The Aquifer Recharge Map shows the aquifer recharge areas for the water-bearing aquifers in the state of Alabama. The Aquifer Recharge Map shows the 17 water-bearing units within Alabama and the corresponding recharge areas for these aquifers. These water-bearing aquifers have characteristics that are controlled by various geologic factors, such as permeability, type, and structure of the rocks comprising the aquifer.

Two Geological Survey of Alabama investigations in Highland Rim karst terrain indicated that water moves underground through carbonate rocks at rates of 3,000 feet per day to 4,000 feet per hour. Large quantities of water may be found in these areas. However, short residence time may cause water-quality problems related to transport of surface contaminants.

Aquifer Recharge Areas of Alabama: The Mississippian aquifer system is roughly equivalent to the Tuscumbia-Fort Payne aquifer of Planert and Pritchett (1989) and to the combined Bangor, Hartselle, Monteagle, and Fort Payne- Tuscumbia aquifers of Moore (1998). The Mississippian aquifer system is found in the Cahaba, Birmingham-Big Canoe, Murphrees, and Coosa Valleys. Formations included in the Mississippian aquifer system are the Fort Payne Chert, Tuscumbia Limestone, Hartselle Sandstone, Bangor Limestone, and Monteagle Limestone of Mississippian age. The five formations listed are united in a single aquifer system for two reasons. First, they are not separated by impermeable strata on a regional scale; on lithologic grounds, they are inferred to contain a single interconnected ground water system. Second, further evidence for the unity of the Mississippian aquifer system is provided by ground-water level measurements, which define a single potentiometric surface in Area 4 for this group of aquifers. To illustrate the variability of the Fort Payne-Tuscumbia aquifer's potential, note the maximum yields for wells and springs, respectively, for the counties where the aquifer is used: Jefferson, 1,200 gpm and 0.2 mgd; and St. Clair, 250 gpm and 2.2 mgd (Planert and Pritchett, 1989).

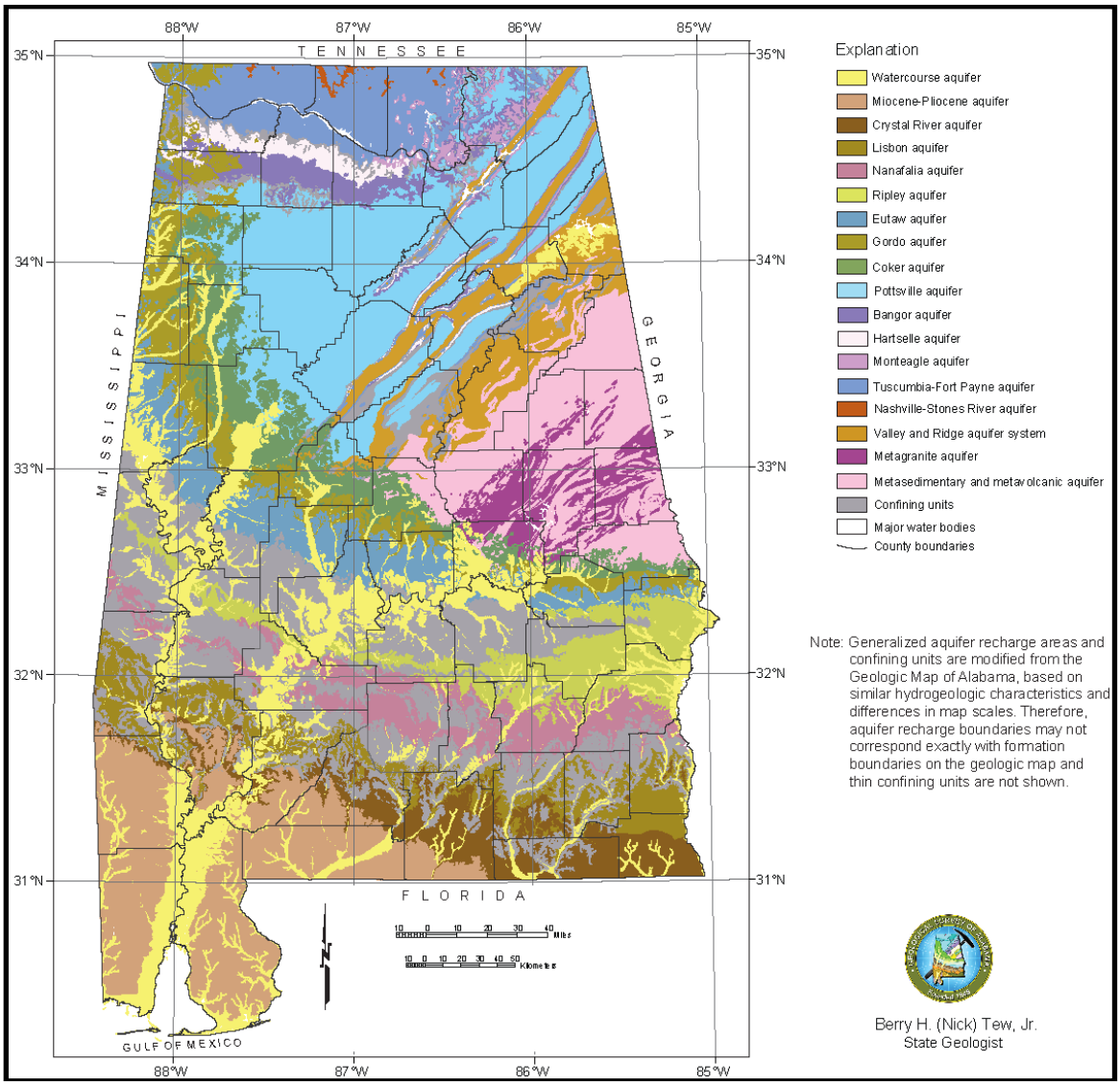


Figure 7: Aquifer Recharge Areas of Alabama

Biological Resources : This area supports mixed oak, hickory-pine, and oak hickory forests with Shortleaf Pine, Loblolly Pine, Virginia Pine, Sweetgum, Yellow-Poplar, Hickory, American Beech, Red Oak, and White Oak as the major over-story species. Dogwood and Redbud are the major midstory species. Japanese Honeysuckle, Greenbrier, Low Panicums, Bluestems, and Native Lespedezas are the major under-story species. Some of the major wildlife species in this area include: White-tailed deer, Fox, Bobcat, Raccoon, Skunk, Opossum, Mink, Rabbit, Gray Squirrel, Quail, and Mourning Dove.

Threatened and Endangered Species: The Federal Endangered Species Act of 1973 (Act) describes two categories of declining species of plants and animals that need the Act's protections – endangered species and threatened species – and provides these definitions:

Endangered - any species that is in danger of extinction throughout all or a significant portion of its range;

Threatened - any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
In simple terms

Endangered species are at the brink of extinction now.

Threatened species are likely to be at the brink in the near future.

All of the protections of the Act are provided to endangered species. Many, but not all, of those protections also are available to threatened species. However, the U.S. Fish and Wildlife Service (Service) has the authority to determine which protections should apply to each threatened species; in other words, we can select and fine tune the protections that best meet the species' recovery needs.

Threatened status benefits species and people in two situations: (1) it provides Federal protection before a species reaches the brink of extinction; and (2) in the case of species that were initially listed as endangered, threatened status also allows scaling back Federal protection as they recover and no longer need the maximum protections of the Act.

Limestone County is home to several species of rare, threatened, or endangered plants and animals including Gray Bat, Indiana Bat, Wood Stork, Slackwater Darter, Boulder Darter, Pink Mucket Mussel, Rough Pigtoe Mussel, Anthony’s Riversnail, Armored Snail, Cumberland Monkeyface, Slender Campeloma, Cracking Pearlymussel, and Ring Pink.

Hydrologic Unit Code 06030002 is home specifically to Gray Bat, Indiana Bat, Rough Pigotoe Mussel, Pink Mucket Mussel, Slender Campeloma (snail).

The Swan Creek project area (Limestone County) potentially contains the following threatened or endangered species as noted by the United States Fish and Wildlife Service:

Limestone County Threatened and Endangered Species

Group	Name	Population	Status	Recovery Plan Name	Recovery Plan Stage
Clams	Pink mucket (pearlymussel) (Lampsilis abrupta)	Entire	Endangered	Pink Mucket Pearly Mussel	Final
	Littlewing pearlymussel (Pegias fabula)	Entire	Endangered	Little Wing Pearly Mussel	Final
	Rough pigtoe (Pleurobema plenum)		Endangered	Rough Pigtoe Pearly Mussel	Final
	Spectaclecase (mussel) (Cumberlandia monodonta)		Endangered		
	Cracking pearlymussel (Hemistena lata)	Wherever found; Except where listed as Experimental Populations	Endangered	Cracking Pearly Mussel	Final
	Snuffbox mussel (Epioblasma triquetra)		Endangered		
	Sheepnose Mussel (Plethobasus cyphyus)		Endangered		
Fishes	Slackwater darter (Etheostoma boschungi)	Entire	Threatened	Slackwater Darter	Final
	Spring pygmy sunfish (Elassoma alabamae)		Threatened		
	Boulder darter (Etheostoma wapiti)	Entire	Endangered	Boulder Darter	Final
Mammals	Indiana bat (Myotis sodalis)	Entire	Endangered	Indiana Bat (Myotis sodalis) Draft Recovery Plan: First Revision	Draft Revision 1
	Gray bat (Myotis grisescens)	Entire	Endangered	Gray Bat	Final
	Northern Long-Eared Bat (Myotis septentrionalis)		Threatened		
Snails	Anthony's riversnail (Athearnia anthonyi)	Wherever found; Except where listed as Experimental Populations	Endangered	Anthony's Riversnail	Final
	Armored snail (Pyrgulopsis (=Marstonia) pachyta)	Entire	Endangered	Technical Draft Recovery Plan for the Armored Snail	Draft
	Slender campeloma (Campeloma decampi)	Entire	Endangered		

Data is taken from Natural Resources Conservation Services' GIS data and Threatened and Endangered Species of Alabama 4th Edition published by U.S. Fish and Wildlife Service (2008).

Hydrology: The Swan Creek Watershed encompasses approximately 30% of the Wheeler Lake watershed. Most of this area is in the Cumberland Plateau Section of the Appalachian Plateaus Province of the Appalachian Highlands.

This region is deeply dissected and consists mainly of a series of rather narrow valleys, steep escarpments, and broad plateaus that are underlain by consolidated bedrock. Elevation ranges from 700 to 1,000 feet. Valley floors are commonly about 100 to 400 feet below the adjacent plateau summits, but local relief may be as much as 1,200 feet (365 meters). The largest portion of Swan Creek has a riparian forest buffer ranging from 20 feet to 200 feet.

About 20% of the estimated withdrawals is from groundwater sources, and 80% is from surface water sources. In most years precipitation is adequate for crops and pasture. Droughts are short and infrequent. Streams, springs, and ponds provide water for livestock. Most streams flow intermittently and are often dry in summer and autumn, except after rainstorms. The surface water is suitable for almost all uses.

Deep wells provide an adequate supply of water for most domestic, municipal, and industrial uses. Good-quality ground water occurs in solution channels in limestone and dolomite and in fractures and partings along bedding planes in shale and sandstone bedrock layers. The ground water is very hard, and the median level of total dissolved solids is about 150 parts per million (milligrams per liter). This Paleozoic aquifer system is susceptible to contamination from surface sources because of the vertical fractures and the cavernous limestone and dolomite layers. The median level of nitrates, 1.3 parts per million (milligrams per liter), is about four times greater than the median level in any other aquifer in this area.

Current concerns involving water quality and soil quantity within the Swan Creek watershed include:

- Excessive Sediment from Cropland
- Excessive Sediment from Roads / Road banks

Farm Demographics: The economy of the area is heavily dependent on agriculture. Row crops represent the major farm enterprises of the region. The area is typified by large scale farm operations. The corn, cotton and soy bean industry, which produces is the major farm enterprise.

In Limestone County currently 1,230 farms exist according to the U.S. Agricultural Census of 2012 with an average size of 201 acres. According to the 2010 U.S. Census, Limestone County had a population of 82,782 with an average median income of $49,461.00.

Cultural Resources and History of Limestone County: Limestone County was created by an act of the Alabama Territorial General Assembly Feb. 6, 1818. It was formed from land comprising Elk County, then a part of the Mississippi Territory . The county was named for Limestone Creek, which flows through it and whose bed is made of hard limestone. The county encompasses approximately 559.94-square miles and is one of the smallest counties in the state. It lies west of Madison County, north of Morgan and Lawrence counties, east of Lauderdale County and south of the Tennessee State line. Limestone County consists of fertile agricultural land, scenic hills, and waterways that include the Elk River running through the western side, and the Tennessee River on the south. After the Cherokee Land Cession in 1806, new settlers began moving into the area now known as Limestone County. The Cherokee cession included much of Limestone County, land that was also claimed by the Chickasaw Tribe. Unaware they were venturing into Chickasaw territory; white settlers began to move west of the Congressional Reservation Line by 1808, leading to clashes between settlers, Indians, and soldiers.

These settlers became known as The Intruders and suffered both at the hands of the native tribe and at the hands of the U. S. government. The Intruders built cabins, planted crops, and settled in during the winter of 1808-9. The Chickasaw, known for their fierce fighting ability, did not look kindly at having settlers moving onto their land, and often made raids on unsuspecting residents. The Chickasaw obtained support from the U.S. government in forcing the settlers out of their territory. The soldiers dealt harshly with the settlers by destroying their cabins and crops. In 1809, soldiers stationed at Ft. Hampton removed 166 settlers from the Chickasaw territory, 93 of which were from the Simms Settlement. Some of these families included widows with children who fled to neighboring Giles County TN and Madison County Alabama. Land entries were made in N.E. Limestone County as early as 1809, and between 1809-1816, 11,001 acres of land were entered in the county.

In September 1816, after many years of fending off attacks from the Chickasaws and removal by the government, the settlers living west of the Congressional Reservation Line were finally allowed to stay. The Chickasaw Nation ceded to the United States all rights and titles to the lands on the north side of the Tennessee River as well as some land on the south side. Settlers flocked to Huntsville land office to buy the land they had cleared and on which they had established homes. By 1820, there were 10,069 people living in the county, 2,919 of which were slaves and 33 free persons of color. The population continued to increase due to the fertile soil that was conducive to growing cotton and other crops. By 1860, the population had increased to 15,306. Of that number, there were 7,215 whites and 8,085 slaves. The number of free persons of color had decreased to six.

In November 1819, Reuben Tillman, Thomas Redus, Jeremiah Tucker, Pollock and Samuel Hunley were elected to serve the county, and in 1820, the first of four county courthouses was erected. In May 1819, members were elected to the state constitutional convention. They were Nicholas Davis, Thomas Bibb and Beverly

Hughes. The same year William Wyatt Bibb was elected as governor of Alabama. Davis was elected as a state representative, and William R. King and John W. Walker were elected to the U.S. Senate.

The City of Athens became the county seat in 1819. Cambridge, located 12 miles from the Tennessee River and nine miles north of Mooresville aspired to the county seat designation, but was beaten out by Athens, which had incorporated Nov. 18, 1818. Cotton Port located south of Athens on the right bank of Piney Creek where it empties into Limestone Creek, flourished for a time and was incorporated Jan. 29, 1829. Bridgewater, another small town located 15 miles south of Elkton, TN and 10 miles above Ft. Hampton at Sim's landing, was also a flourishing town in the early history of the county.

The town of Mooresville, incorporated Nov. 16, 1818, is the oldest legal town in Limestone County. Tradition says the first settler was William Moore. Today, visitors to historic Mooresville find beautiful, well-maintained, antebellum homes where the residents still enjoy small town living.

Other towns in the county include historic Belle Mina where Thomas Bibb built his beautiful home Belle Manor, Elkmont, Ardmore, Lester and Capshaw, now home to the only Hindu temple in the immediate area. Some small towns no longer in existence such as Cotton Port, Cambridge and Bridgewater, were important in the early 1800s. Many beautiful antebellum homes and buildings still grace the landscape such as the Houston Museum and Library, home to Governor George Smith Houston and the Beaty/Mason home located on the Athens State University campus.

The first settlers in Limestone County were mostly Presbyterian, Baptist, Methodist, and Christian Church members. Later, the Episcopal, Catholic and Lutherans established churches in the county. When German settlers moved into the county in the late 1800s, they brought with them their Lutheran faith and established St. Paul Lutheran Church, which is now home to Sand Springs Baptist Church . Located in the Germantown community near the Thach community is the Germantown Cemetery where tombstone inscriptions attest to their Germanic background. Today many descendants of these settlers continue to call Limestone County home.

Education was important to the early settlers. Athens Female Academy was built in 1822, and the Athens Female Institute opened in 1843 in the old academy building. The first building was called Founders Hall, which is now a part of Athens State University. The county's oldest high school is the former Limestone County High School, now Elkmont High School , built in 1912. W. R. Hansard built the original school in Elkmont on that site in 1874.

Black schools also have an interesting history in the county. Alabama Forks School was founded in 1915 on land donated by Miss Maggie Barbee. Other Black schools included Belle Mina, Beulah built in 1910, Big Creek School on Buck Island Road conceived in 1904, Blue Ridge erected in 1917, Cotton Hill, Dogwood Flat, Elkmont, Greenbriar,

Green Hill, Trinity, and numerous others. Today, students of all races attend Limestone County and City of Athens public schools, as well as local faith-based schools.

Until the 1850s, wagon roads and the rivers were the only means of transportation in the county. This changed, however, when the Tennessee and Central Alabama Railroad was built through central Alabama. A station was built at Elkmont and the old Elkmont depot still stands and is well maintained as a reminder of those times. Today the depot is used as a senior center and a modern Rails to Trails walking and riding path has replaced the old train tracks from Hays Mill to the Giles County TN state line.

Because the rail system throughout the south was the focus of much activity during the War Between the States, towns along the path, including Athens and Elkmont were scenes of fighting. In May 1862, Union Colonel John B. Turchin and his soldiers sacked Athens and occupied the city, looting, burning, and destroying property there. The east side of the square was burned, and the Presbyterian Church was extensively damaged while it was used to quarter Union troops, animals and a warehouse. The 1833 county courthouse was also burned.

In Elkmont, a notable battle was fought at Sulphur Creek Trestle. The Union Army established a hillside fort at Sulphur Creek Trestle on property now owned by the Dubois family. In September 1864, Confederate General Nathan Bedford Forest in an 8-hour battle captured the fort, the trestle, two blockhouses, the Union garrison, along with weapons and horses. The war brought hard times to families in the area, but more was to come during the reconstruction phase

After the war, former soldiers released from Union prisons and from duty returned home to find the county occupied by Union soldiers, some of whom were former slaves. Many found their property destroyed and their homes in ashes. These former soldiers were disenfranchised and were required to take the oath of loyalty, but it was almost impossible to regain economic stability without equipment, horses, or money. The government, in order to rebuild the state's infrastructure and to pay for the war, imposed high taxes forcing many famers, large and small, to sell their land. Among the properties sold at auction was that of James W. S. Donnell of Athens and Jonesboro. His 240-acre Athens property, which included the Donnell home located on the Athens Middle School property, was part of that auction.

The physical ravages of war were almost gone by May of 1869. By then the new courthouse was rebuilt and numerous programs, such as the Freedman's Bureau, were set into place to assist the newly freed Blacks' transition to freedom. However, difficult days continued to plague the local businesses and farmers who needed money to operate. Farmers began employing the furnishing system where supplies needed for crops were bought by pledging the crop itself as security. The farmer paid exorbitant interest rates for those supplies and many were never out of debt from one year to the next. This continued throughout the next two decades as farmers worked to re-establish themselves and gain some form of security for their families.

The 20th century bought new prosperity to Limestone County. By 1900, there were 22,687 residents in the county and the largest town was Athens with a population of

1,010. Cotton was still the main crop in the county, and in 1900 a cotton mill was established. Telephones also came to Athens and a telegraph office was built. In 1907, the need for electricity had increased, and the city of Athens contracted with Westinghouse to provide a 140 kilowatt electric plant and 30 new street lights for $4,025.

By 1920, the economy in the county was booming. The First Methodist Church was built that year, as was the First Christian Church. In 1928, the old Methodist Church building was converted to a movie theater. The economic boom was short-lived due to the shockwaves spreading out from the 1929 Great Depression. Two local banks failed, and a number of homes and farms were lost to mortgage foreclosures. Despite the loss of jobs and the other losses and hardships, county residents survived the depression, and in some respects were better off than people in other areas of the country.

The Tennessee Valley Authority was established in the 1930s and hydroelectric dams were built on the Tennessee River to produce electricity. Approximately 50,000 acres of land was taken from Limestone County to create Wheeler Lake and a dam of the same name. Many county residents were employed by TVA to clear trees and remove houses, farm buildings, and cemeteries from the soon to be flooded land. In 1934, Athens became the second city to sign a contract with TVA to purchase electricity. The first was Tupelo, MS. By 1936, the city of Athens began extending electric lines into rural areas of the county by borrowing money from the Rural Electrification Administration. Today, county residents have affordable electric and gas service provided by Athens Utilities.

Government jobs were important in rebuilding Limestone County after the depression. TVA and the Works Progress Administration (WPA) provided needed jobs for local residents. By the 1930s, money was finally available to build the current system of roads in the county. Today Limestone County has an excellent road system that is continually being upgraded and maintained by a capable engineering department and crews in the four districts.

Following the WWII, agriculture boomed in Limestone County with bumper crops of cotton. While the sharecropper had been an institution since the War Between the States, mechanization was rapidly becoming available to local farmers. Today, Limestone County is one of the largest cotton producers in the state, planting approximately 60,000 acres each year.

The two World Wars, the Korean conflict, the Vietnam War and later conflicts found many Limestone County youth the first to volunteer for duty. As is often the case, some gave all, but they are not forgotten. Today all veterans from the Revolutionary War to the current war in Iraq are honored by the Alabama Veterans Museum and Archives, located on Pryor Street in the old freight depot leased from the county. The museum was established a few years ago and is dedicated to honoring the memory of all veterans.

In May 1967, TVA constructed the largest nuclear power generating plant in the country on a 920-acre reservation acquired from the Glaze family. Today, the Browns Ferry Nuclear Plant is in full operation providing electricity to county residents.

Land Use: The Swan Creek watershed is comprised of one 12 digit HUC (06030004-390). The total drainage area of the Swan Creek watershed is 55.2 square miles. The entirety of the watershed is located in Limestone County, Alabama.

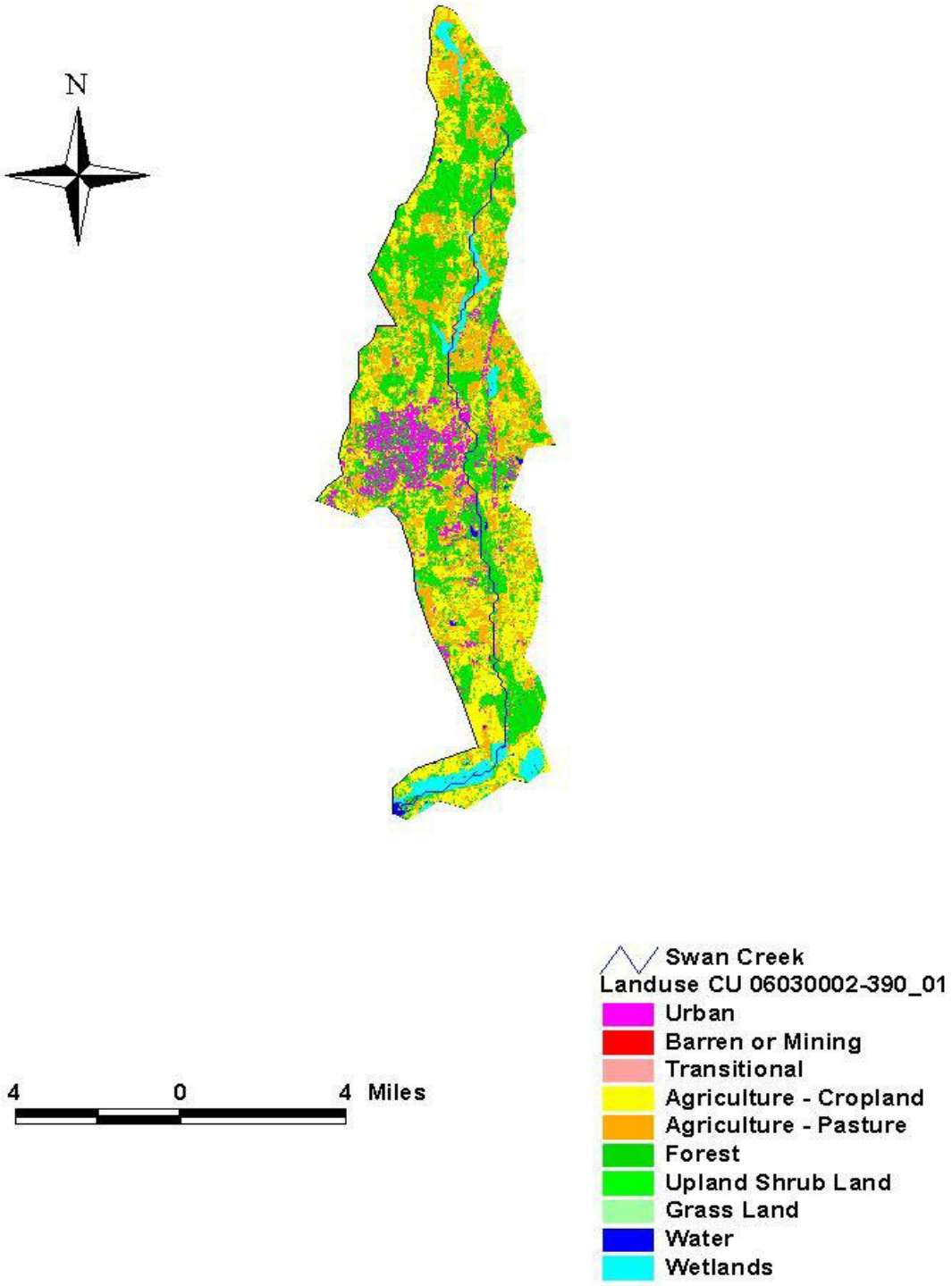
Land Use in the Swan Creek Watershed

LAND USE	PERCENTAGE
Open Water	0.4
High/Low Intensity Residential	5.0
Commercial/Industrial/Transport	1.9
Wetlands	4.3
Other	1.7
Deciduous Forest	22.1
Evergreen Forest	4.0
Mixed Forest	9.3
Pasture/Hay	23.8
Row Crops	27.5

Approximately 50% of the land use within Swan Creek is agricultural and about 35% of the land is forested. The remaining 15% is utilized as commercial/residential developments or wetlands. Based on these statistics, the Swan Creek watershed can be considered rural. A large percentage of the land used for agriculture can have significant nonpoint source impact if it is not managed properly.

The pollutant impacted portion Swan Creek watershed has two main land uses: agriculture and forest. Pollutant loadings from forested areas tend to be low due to their filtering capabilities and will be considered as background conditions. The most likely sources of siltation and organic enrichment/low dissolved oxygen loadings in Swan Creek are from the agricultural land uses. It is not considered practicable to calculate individual components for nonpoint source loadings.

Land Use Map for the Swan Creek Watershed



Fish and Wildlife Classification: The impaired stream segment, Swan Creek is classified as both F&W and A&I. Usage of waters in F&W classification is described in ADEM Admin. Code R. 335-6-10-.09(5)(a), (b), (c), and (d).

(a) Best usage of waters: Fishing, propagation of fish, aquatic life, and wildlife, and any other usage except for swimming and water-contact sports or as a source of water supply for drinking or food processing purposes.

(b) Conditions related to best usage: The waters will be suitable for fish, aquatic life and wildlife propagation. The quality of salt and estuarine waters to which this classification is assigned will also be suitable for the propagation of shrimp and crabs.

(c) Other usage of waters: It is recognized that the waters may be used for incidental water contact and recreation during June through September, except that water contact is strongly discouraged in the vicinity of discharges or other conditions beyond the control of the Department or the Alabama Department of Public Health.

(d) Conditions related to other usage: The waters, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor swimming places and will be considered satisfactory for swimming and other whole body water-contact sports.

Usage of waters in A&I classification is described in ADEM Admin. Code R. 335-6-10-.09(7)(a), (b), b(i), and b(ii).

(a) Best usage of waters: Agricultural irrigation, livestock watering, industrial cooling and process water supplies, and any other usage, except fishing, bathing, recreational activities, including water-contact sports, or as a source of water supply for drinking or food-processing purposes.

(b) Conditions related to best usage:

(i) The waters, except for natural impurities which may be present therein, will be suitable for agricultural irrigation, livestock watering, industrial cooling waters, and fish survival. The waters will be usable after special treatment, may be needed under each particular circumstance, for industrial process water supplies. The waters will also be suitable for other uses which waters of lower quality will be satisfactory.

(ii) This category includes watercourses in which natural flow is intermittent and non-existent during droughts and which may, of necessity, receive treated wastes from existing municipalities and industries, both now and in the future. In such instances, recognition must be given to the lack of opportunity for mixture of the treated wastes with the receiving stream for purposes of compliance. It is also understood in considering waters for this classification that urban runoff or natural conditions may impact any waters so classified.

Low D.O./Organic Loading Criteria for F&W and A&I: Alabama's water quality criteria document for (F&W) classified streams (ADEM Admin. Code R. 335-6-10-.09-(5)(e)(4.)) states that for a diversified warm water biota, including game fish, daily dissolved oxygen concentrations shall not be less than 5 mg/l at all times; except under extreme conditions due to natural causes, it may range between 5mg/l and 4 mg/l, provided that the water quality is favorable in all other parameters. The normal seasonal and daily fluctuations shall be maintained above these levels. In no event shall the dissolved oxygen level be less than 4 mg/l due to discharges from existing hydroelectric generation impoundments. All new hydroelectric generation impoundments, including addition of new hydroelectric generation units to existing impoundments, shall be designed so that the discharge will contain at least 5 mg/l dissolved oxygen where practicable and technologically possible. The Environmental Protection Agency, in cooperation with the State of Alabama and parties responsible for impoundments, shall develop a program to improve the design of existing facilities. Alabama's water quality criteria document for A&I classified streams (ADEM Admin. Code R 335-6-10-.09-(7)(c)(4.)) states sewage, industrial wastes, or other wastes that shall not cause the dissolved oxygen to be less than 3.0 parts per million. In the application of dissolved oxygen criteria referred to above, dissolved oxygen shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, dissolved oxygen criteria will be applied at mid-depth.

Swan Creek Watershed Pollution Problems and Causes: Both point and non-point sources contribute CBODu and NBOD (i.e., organic loading) to Swan Creek as previously identified by the Tennessee Valley authority and the ADEM. In rural areas, such as Swan Creek, , storm runoff from row crops, livestock pastures, animal waste application sites, and feedlots can transport significant loads of organic loading. Poorly treated municipal sewage comprises a major source of organic compounds that are hydrolyzed to create additional organic loading. Urban storm water runoff, sanitary sewer overflows, and combined sewer overflows can also be significant sources of organic loading.

The pollutants shown in the tables below include ultimate carbonaceous biochemical oxygen demand (CBODu) and nitrogenous biochemical oxygen demand (NBOD), the principle causes for observed low dissolved oxygen concentrations in Swan Creek. CBODu is a measure of the total amount of oxygen required to degrade the carbonaceous portion of the organic matter present in the water. NBOD is the amount of oxygen utilized by bacteria as they convert ammonia to nitrate.

The first table lists allowable pollutant loadings by source (point and non-point sources) for the summer season (May through November). The second table lists the allowable pollutant loadings by source (point and non-point sources) for the winter season (December through April).

Maximum Allowable Pollutant Loads by Source – Summer

Pollutant	Point Source Loads(lbs./day)	*Non-point Source Loads (lbs./day)
CBODu	31.0	1294.0
NBOD	150.9	999.10
Total	181.9	2293.10

Maximum Allowable Pollutant Loads by Source – Winter

Pollutant	Point Source Loads(lbs./day)	*Non-point Source Loads (lbs./day)
CBODu	31.0	2344.5
NBOD	150.9	2518.0
Total	181.9	4862.5

Since 1996, Swan Creek has been included on the State's §303(d) use impairment list since 1996 for siltation. The primary sources of impairment identified through the TMDL process for Swan Creek are row cropping practices as well as roadways. In the impaired segments, these uses represent greater than 90 percent of the sediment load.

Impaired Segment (ID)	1996 Priority Level	WLA Point Source Load (tons/year)	LA Non-point Source Load (tons/year
Swan Creek (AL/06030002-390_01)	Low	410.8	9,735

Point Sources in the Swan Creek Watershed for organic enrichment/low dissolved oxygen: ADEM maintains a database of current NPDES permits and GIS files that locate each permitted outfall. This database includes municipal, semi-public/private, industrial, mining, industrial storm water, and concentrated animal feeding operations (CAFOs) permits.

Those within the Swan Creek watershed include:

NPDES Permit	Type Facility	Facility Name	Significant Contributor
AL 0044644	Semi-Public/Private	Piney Chapel Jr. High School	Yes 8%
ALG 0065684	Industrial Storm Water	Georgia Pacific	No
ALG 0027731	Industrial Storm Water	Martin Industries	No
ALG 0023817	Industrial Storm Water	Sweet Sue Kitchens	No
ALG 0026077	Industrial Storm Water	Conagra Processing	No
ALG 0064424	Industrial Storm Water/Leachate	Athens Limestone Co. Landfill	No
AL 0020206	Municipal	Athens WWTP	Yes 96%
AL 0058670	Semi-Public/Private	Lawson Trailer Park	Yes 19%

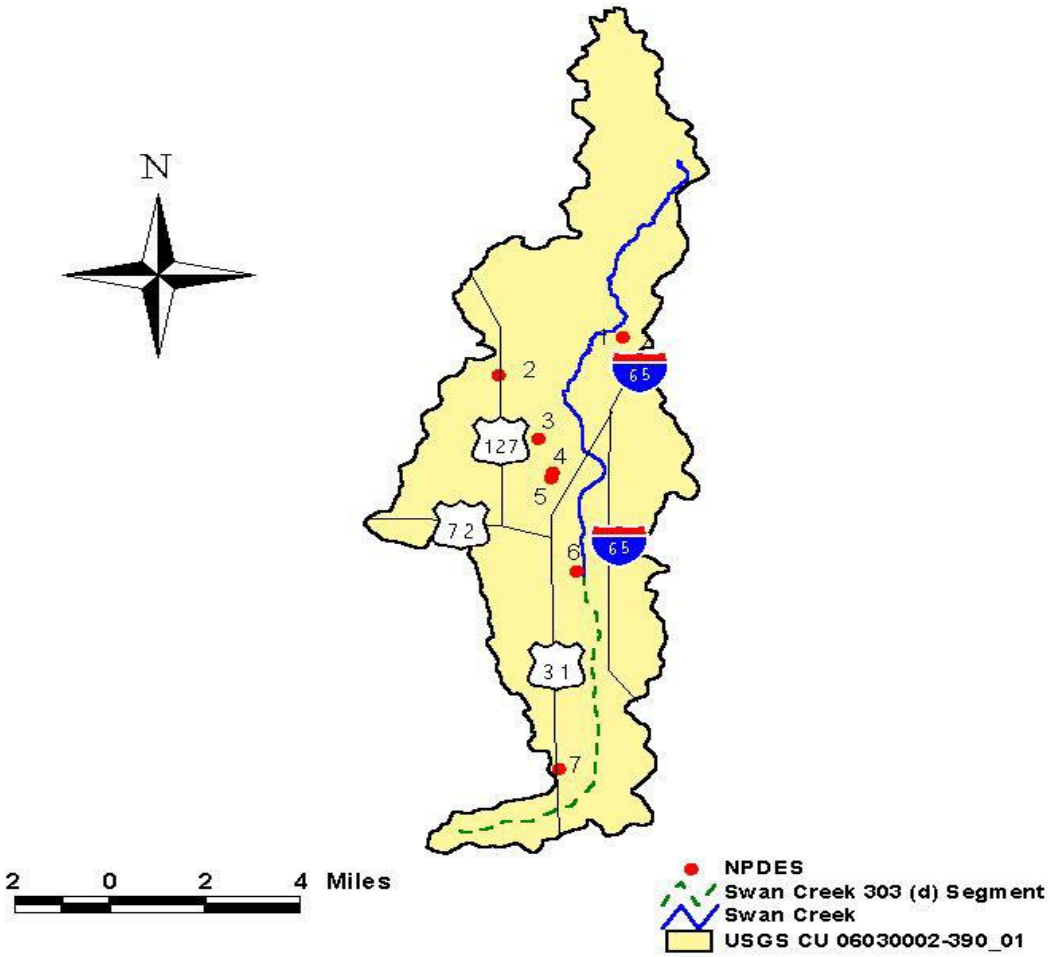
NPDES Permit Limits for Significant Contributing Point Sources with the Swan Creek Watershed:

NPDES Permit	**Facility**	**Permit Limits Summer**					**Permit Limits Winter**					
		CBOD5 (mg/L)	**CBOD5 (mg/L)**	**NH3-N (MG/L)**		**DO (Mg/L)**	**CBOD5 (mg/L)**	**CBOD5 (mg/L)**	**NH3-N (MG/L)**		**DO (Mg/L)**	**Flow MGD**
		Max	**Avg**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Max**	**Avg**	**Min**	
AL 0044644	**Piney Chapel Jr. High**	**45**	**30**	**1.8**	**1.2**	**6.0**	**45**	**30**	**3.1**	**2.1**	**6.0**	**0.01**
AL 0020206	**Athens WWTP**	**16.5**	**11.0**	**1.5**	**1.0**	**6.0**	**25.5**	**17.0**	**4.6**	**3.1**	**6.0**	**9.0**
AL 0058670	**Lawson**	**37.5**	**25.0**	**Report**	**Report**	**3.0**	**37.5**	**25.0**	**Report**	**Report**	**3.0**	**.09**

Location of Point Sources Include:

Piney Chapel Jr. High School	34o 51' 20" 86o 56' 09"
Georgia Pacific	34o 50' 32" 86o 58' 24"
Martin Industries	34o 49' 10" 86o 57' 39"
Sweet Sue Kitchens	34o 48' 27" 86o 57' 25"
Conagra Processing	34o 48' 19" 86o 57' 25"
Athens WWTP	34o 46' 21" 86o 56' 58"
Lawson Trailer Park	34o 42' 07" 86o 57' 17"

Location Map of Point Sources:

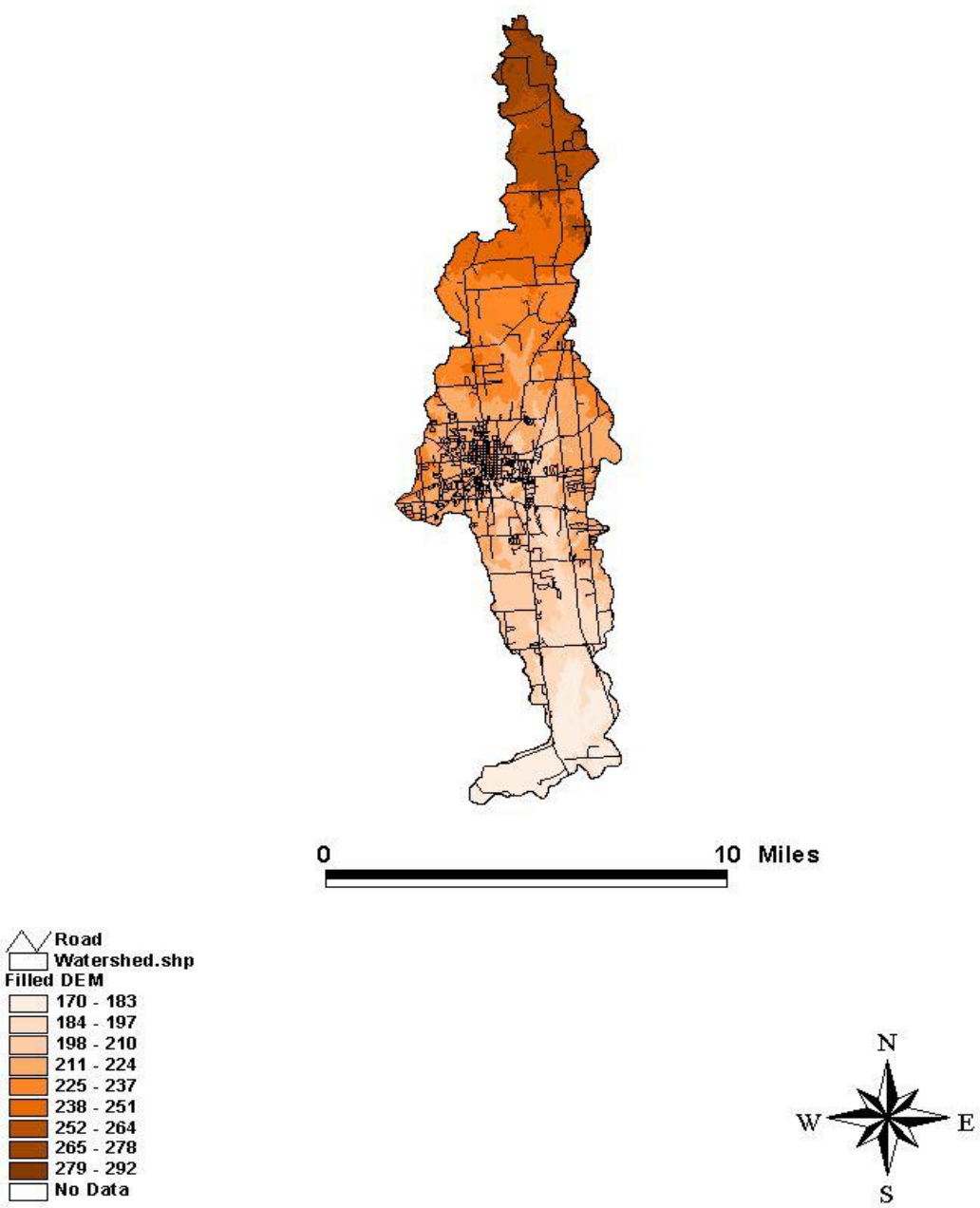


Non-point Source Pollution in the Swan Creek Watershed:

The predominant land uses within the Swan Creek watershed are forest, row crops, and pasture/hay. Their respective percentages of the total watershed are 35.4, 27.5, and 23.8%. The major sources of organic enrichment from non-point sources within the Swan Creek watershed are the forest, row crops, and pasture/hay land uses. In contrast to forested land, agricultural land can be a major source of organic loading. Runoff from pastures, animal operations, improper land application of animal wastes, and animals with access to streams are all mechanisms that can introduce organic loading to waterbodies.

For the listed waterbodies within Swan Creek, the primary sources of non-point source sediment loadings come from agriculture, roadways, and urban sources. The primary agricultural practice that causes or contributes to sediment loads is row cropping. Within the watersheds of the Tennessee River Basin the primary crops grown that utilize the practice of row cropping are cotton, soybean, and corn.

Cornfields such as the one above located within the Swan Creek Watershed would benefit from the implementation of best management practices such as tillage and residue management.



Swan Creek Watershed Roadway Density Coverage Map

Swan Creek Watershed Animal Feeding Operations:

Animal Feeding Operations (AFOs) are agricultural operations where animals are kept and raised in confined situations. AFOs congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland.

AFOs may have to obtain an NPDES permit from ADEM if they meet the criteria for them to be considered a Concentrated Animal Feeding Operation (CAFO), according to the requirements of 40 CFR 122.23 and as generally described by EPA's Guide Manual on NPDES Regulations for Concentrated Animal Feeding Operations CAFOs).

According to the Limestone County USDA–NRCS, there are no CAFOs located within the Swan Creek watershed.

Municipal Point Sources:

The U.S. Environmental Protection Agency (EPA) defines point source pollution as "any single identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack" (Hill, 1997).

Factories and sewage treatment plants are two common types of point sources. Factories, including oil refineries, pulp and paper mills, and chemical, electronics and automobile manufacturers, typically discharge one or more pollutants in their discharged waters (called effluents). Some factories discharge their effluents directly into a waterbody. Others treat it themselves before it is released, and still others send their wastes to sewage treatment plants for treatment. Sewage treatment plants treat human wastes and send the treated effluent to a stream or river.

Another way that some factories and sewage treatment plants handle waste material is by mixing it with urban runoff in a combined sewer system. Runoff refers to storm water that flows over surfaces like driveways and lawns. As the water crosses these surfaces, it picks up chemicals and pollutants. This untreated, polluted water then runs directly into a sewer system. The City of Athens wastewater treatment plant is the only municipal permitted point source within the Swan Creek watershed at this time.

Non-point Source Management Measures to target the TMDL: By installing proven effective management measures at critical sites, the pollutant load to watersheds can be dramatically reduced. This will eventually improve the ecological health in the watershed and reduce the severity of water quality degradation in the future.

On the ground BMP sign-ups for grant funding will be advertised in accordance with established USDA program cost-share methodologies along with special target based advertising within the watershed.

Projected costs for installation of these practices include programs of the Soil and Water Conservation district (SWCD), Alabama Cooperative Extension System, USDA-Farm Services Agency, and the NCRS.

The BMP's and budgets are project guides and are estimates of some known watershed needs. Actual types and needs of BMP's to be implemented may change as:

- New nonpoint pollution sites, sources, and causes are identified, prioritized, and targeted.
- Additional water quality or resource assessment data or other information become available.
- Future watershed, natural resource, human health, and threatened and endangered species protection needs and priorities are assessed.
- Resource agency funding priorities and appropriations change or dictate.

Agricultural BMP's will consider those as presented in "Protecting Water Quality on Alabama's Farms" (Alabama Soil and Water Conservation Committee). Actual costs of BMP's as applicable, will be based on the latest cost-averaging per Title 120 of the USDA-NCRS General Manual. In general, non-federal match will come from participating landowners.

Potential Best Management Practice Implementation Sites For Non-Point Pollution Control Within Swan Creek Watershed Include:

Site Location	Longitude	Latitude	Possible BMP's for These Locations	Primary Current Usage
1	-86.989607	34.684325	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
2	-86.994028	34.683408	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
3	-86.983846	34.683239	• Conservation tillage • Nutrient management • Cover crops	Row Crop Farming

			• Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	
4	-86.975494	34.678493	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
5	-86.980085	34.675904	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
6	-86.971743	34.686824	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
7	-86.968732	34.686932	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
8	-86.969533	34.683316	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System	Row Crop Farming

			• Underground Outlet	
9	-86.965413	34.680034	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
10	-86.961379	34.678870	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
11	-86.953568	34.676646	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
12	-86.947732	34.685399	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
13	-86.951551	34.687128	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System	Row Crop Farming

			• Underground Outlet	
14	-86.952581	34.693550	• Conservation tillage • Nutrient management • Cover crops • Stream bank protection • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
15	-86.944341	34.693162	• Conservation tillage • Nutrient management • Cover crops • Stream bank protection • Critical planting area • Buffer strips	Row Crop Farming
16	-86.946975	34.705863	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
17	-86.946633	34.698447	• Conservation tillage • Nutrient management • Cover crops • Stream bank protection • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
18	-86.945881	34.705779	• Conservation tillage • Nutrient management	Row Crop Farming

			• Cover crops • Stream bank protection • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	
19	-86.946257	34.711678	• Conservation tillage • Nutrient management • Cover crops • Stream bank protection • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
20	-86.952271	34.711902	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
21	-86.948581	34.720693	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
22	-86.943319	34.718222	• Conservation tillage • Nutrient management • Cover crops • Critical planting area	Row Crop Farming

			• Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	
23	-86.935699	34.718615	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
24	-86.936246	34.722884	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
25	-86.937852	34.728781	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
26	-86.947350	34.725776	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
27	-86.951895	34.725720	• Conservation tillage • Nutrient management • Cover crops	Row Crop Farming

			• Buffer strips • Broad based Terrace System • Underground Outlet	
28	-86.945437	34.734678	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
29	-86.940448	34.733920	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
30	-86.927259	34.732460	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
31	-86.933751	34.733611	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming

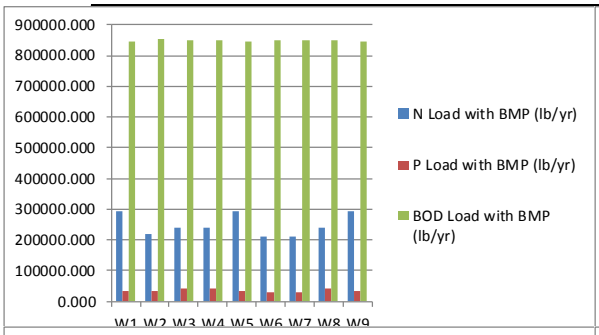
32	-86.926029	34.740771	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming
33	-86.935460	34.739311	• Conservation tillage • Nutrient management • Cover crops • Critical planting area • Drainage water management • Buffer strips • Broad based Terrace System • Underground Outlet	Row Crop Farming

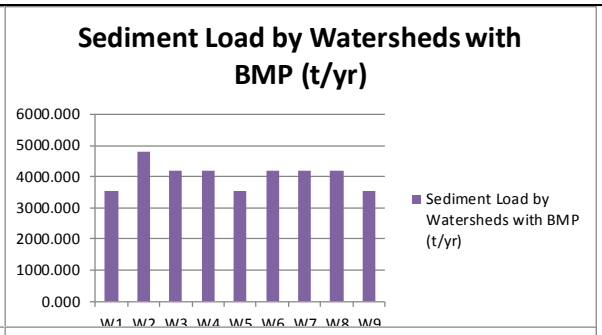
1. Total load by subwatershed(s)

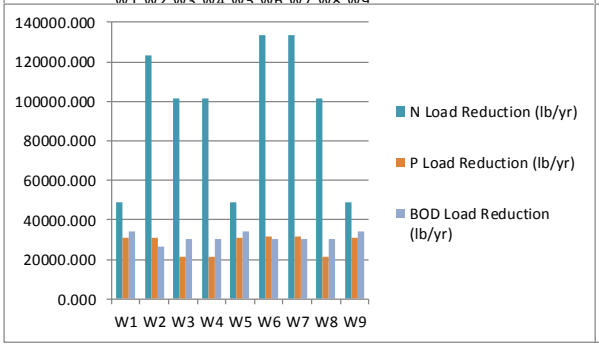
Watershed	N Load (no BMP)	P Load (no BMP)	BOD Load (no BMP)	Sediment Load (no BMP)	N Reduction	P Reduction	BOD Reduction	Sediment Reduction	N Load (with BMP)	P Load (with BMP)	BOD (with BMP)	Sediment Load (with BMP)	%N Reduction	%P Reduction	%BOD Reduction	%Sed Reduction
	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	%	%	%	%
W1	342753.7	63084.8	878481.6	8927.4	48670.9	30697.7	34348.5	5379.3	294082.8	32387.1	844133.1	3548.2	14.2	48.7	3.9	60.3
W2	342697.6	63063.3	878369.5	8897.0	123330.7	30846.7	26185.1	4091.4	219367.0	32216.6	852184.4	4805.6	36.0	48.9	3.0	46.0
W3	342697.6	63063.3	878369.5	8897.0	101722.4	21299.7	30213.6	4720.9	240975.2	41763.5	848155.9	4176.1	29.7	33.8	3.4	53.1
W4	342697.6	63063.3	878369.5	8897.0	101722.4	21299.7	30213.6	4720.9	240975.2	41763.5	848155.9	4176.1	29.7	33.8	3.4	53.1
W5	342697.6	63063.3	878369.5	8897.0	48617.6	30677.2	34242.1	5350.3	294080.0	32386.0	844127.4	3546.7	14.2	48.6	3.9	60.1
W6	342697.6	63063.3	878369.5	8897.0	133219.0	31622.2	30213.6	4720.9	209478.6	31441.1	848155.9	4176.1	38.9	50.1	3.4	53.1
W7	342697.6	63063.3	878369.5	8897.0	133219.0	31622.2	30213.6	4720.9	209478.6	31441.1	848155.9	4176.1	38.9	50.1	3.4	53.1
W8	342697.6	63063.3	878369.5	8897.0	101722.4	21299.7	30213.6	4720.9	240975.2	41763.5	848155.9	4176.1	29.7	33.8	3.4	53.1
W9	342697.6	63063.3	878369.5	8897.0	48617.6	30677.2	34242.1	5350.3	294080.0	32386.0	844127.4	3546.7	14.2	48.6	3.9	60.1
Total	3084334.7	567591.0	7905437.9	80103.3	840842.3	250042.4	280085.9	43775.7	2243492.4	317548.6	7625352.0	36327.5	27.3	44.1	3.5	54.6

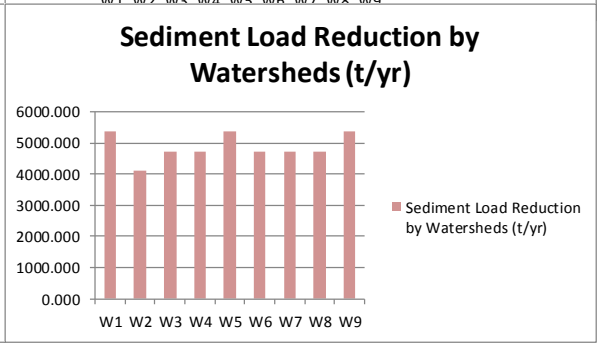
2. Total load by land uses (with BMP)

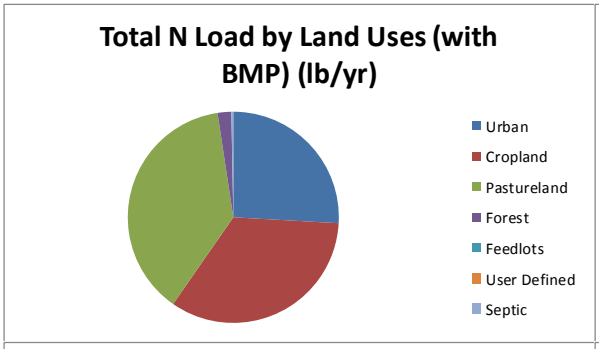
Sources	N Load (lb/yr)	P Load (lb/yr)	BOD Load (lb/yr)	Sediment Load (t/yr)
Urban	580855.72	89488.25	2252003.52	13320.36
Cropland	757839.53	129443.95	2500410.92	12903.73
Pastureland	851084.15	72856.93	2729629.88	9098.40
Forest	46995.17	23128.29	115882.29	1003.52
Feedlots	0.00	0.00	0.00	0.00
User Defined	0.00	0.00	0.00	0.00
Septic	6715.05	2630.06	27419.81	0.00
Gully	2.42	0.93	4.83	1.31
Streambank	0.39	0.15	0.77	0.21
Groundwater	0.00	0.00	0.00	0.00
Total	2243492.43	317548.56	7625352.01	36327.54

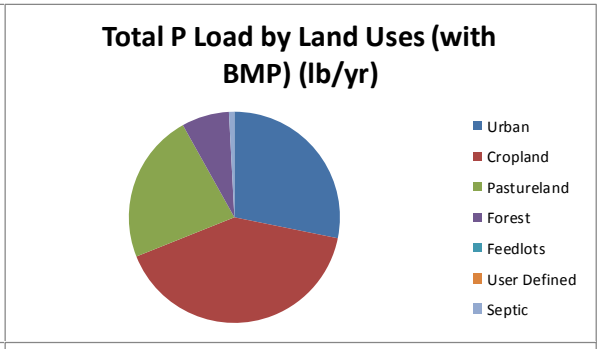

900000.000
800000.000
700000.000
600000.000
500000.000
400000.000
300000.000
200000.000
100000.000
0.000
W1 W2 W3 W4 W5 W6 W7 W8 W9
N Load with BMP (lb/yr)
P Load with BMP (lb/yr)
BOD Load with BMP (lb/yr)

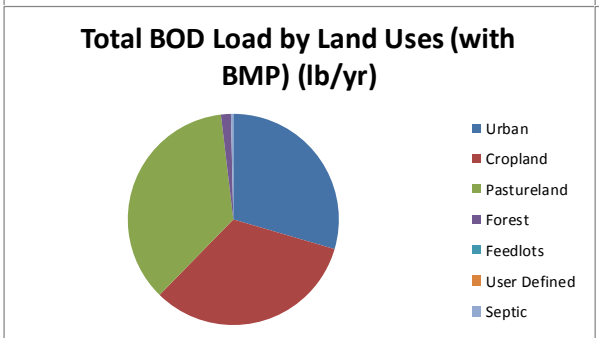

Sediment Load by Watersheds with BMP (t/yr)
6000.000
5000.000
4000.000
3000.000
2000.000
1000.000
0.000
W1 W2 W3 W4 W5 W6 W7 W8 W9
Sediment Load by Watersheds with BMP (t/yr)

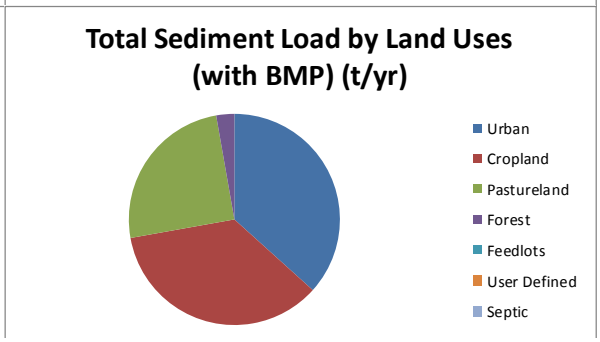

140000.000
120000.000
100000.000
80000.000
60000.000
40000.000
20000.000
0.000
W1 W2 W3 W4 W5 W6 W7 W8 W9
N Load Reduction (lb/yr)
P Load Reduction (lb/yr)
BOD Load Reduction (lb/yr)


Sediment Load Reduction by Watersheds (t/yr)
6000.000
5000.000
4000.000
3000.000
2000.000
1000.000
0.000
W1 W2 W3 W4 W5 W6 W7 W8 W9
Sediment Load Reduction by Watersheds (t/yr)


Total N Load by Land Uses (with BMP) (lb/yr)
Urban
Cropland
Pastureland
Forest
Feedlots
User Defined
Septic


Total P Load by Land Uses (with BMP) (lb/yr)
Urban
Cropland
Pastureland
Forest
Feedlots
User Defined
Septic


Total BOD Load by Land Uses (with BMP) (lb/yr)
Urban
Cropland
Pastureland
Forest
Feedlots
User Defined
Septic


Total Sediment Load by Land Uses (with BMP) (t/yr)
Urban
Cropland
Pastureland
Forest
Feedlots
User Defined
Septic

Best Management Practices Budget for Swan Creek Watershed:

- $50,000.00 personnel/management services.
- $6,000.00 for monitoring mileage and bacteriological supplies (petri dishes, coolers, pipettes, growing media, etc.)
- $3,000.00 for mileage for farm visits/construction oversight.
- $2,500.00 for equipment and office supplies.
- $500.00 was for the public meetings.

Practice Number	Item Description	Number	Average Cost *	Federal	Non Federal	Total
332	Contour Buffer Strips	100 Acres	$251.54 per	$15,092.40	$10,061.60	$25,154.00
340	Cover Crop / 3+ Mix	1,200 Acres	$76.75 per	$55,260.00	$36,840.00	$92,100.00
342	Critical Planting Area	100 Acres	$268.45 per	$16,107.00	$10,738.00	$26,845.00
345	Residue & Tillage Management	1,600 Acres	$21.79 per	$20,918.40	$13,945.60	$34,864.00
558	Drainage Water Management	15	$59.62 per	$536.58	$357.72	$894.30
580	Streambank Protection	5,000 ft.	$14.45 per ft.	$43,350.00	$28,900.00	$72,250.00
590	Nutrient Management	1,600 Acres	$18.59 per	$17,846.40	$11,897.60	$29,744.00
600	Broad Based Terrace	27,360 ft.	1.68 per ft.	$27,578.88	$18,385.92	$45,964.80
620	Underground Outlet	1,410 ft.	10.02 per ft	$8,476.80	$5,651.20	$14,128.00
Total				$205,166.46	$136,777.64	$341,944.10

Details of Best Management Practices to Be Implemented: Additional non-federal dollars may go toward this project in the form of private non-cost shared BMP's that participating landowners may be doing within the watershed. These funds may be captured in future project reports as non-federal match.

Technical & Financial Assistance: The LCSWCD and the NCRS are potential providers of technical assistance related to "Watershed" best management practices. The NCRS and SWCD will bear primary responsibility for installing "on-the-ground" practices previously mentioned.

Sources of funding (actual dollars and in-kind) include ADEM, LCSWCD, town of Elkmont, Limestone County Commission, private landowners, and the Alabama Cooperative Extension System.

Best management practices will include critical area vegetation treatments, fencing/livestock exclusion fencing, stream crossing, HUA protection installation with pipelines, pasture planting, alternative watering systems, conservation tillage, nutrient management, cover crop planting, tree planting, and installation of fire brakes.

The Limestone County NRCS will inform potential participants in the watershed about needed best management practices implementation, secure commitments from landowners and operators willing to install the above described best management practices, and assist these participants in developing conservation plans and implementing best management practices.

The Limestone County NRCS can provide technical resources and education through a number of Federal cost-share programs, the natural Resource inventory, public service announcements, technical documents, and their website (http://www.al.nrcs.usda.gov). Information on some of these programs and resources is provided by contacting the:

USDA-NRCS
Limestone County USDA Service Center
1795B Highway 72 E.,
Athens, Alabama 35611
Hours: Monday through Friday from 7:30 a.m. until 4:00 p.m
Phone: 256-232-4025
Fax: 256-232-3510

NRCS programs provide technical and/or financial assistance to landowners for conservation of particular land uses and restoration of natural habitats. A list of these programs is listed below:

Conservation Reserve Program (CRP):
http://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index

This USDA program was established as a conservation provision of the Farm Bill to encourage and assist farm producers willing to set aside highly erodible, riparian, and other environmentally sensitive lands from crop production for a 10 – 15 year period. Producers may enroll in the CRP program according to USDA program rules. If a landowners CRP bid is accepted, a Conservation Plan of operation is developed. In addition to an annual CRP payment, USDA will provide a 50% cost-share to establish the selected conservation practice. Landowners may receive a maximum of $50,000 annually in CRP payments.

Agricultural Conservation Easement Program (ACEP):
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/easements/acep/?cid=stelprdb1242695

The Agricultural Conservation Easement Program (ACEP) provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the Agricultural Land Easements component, NRCS helps Indian tribes, state and local governments and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. Under the Wetlands Reserve Easements component, NRCS helps to restore, protect and enhance enrolled wetlands.

Environmental Quality Incentives Program (EQIP):
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

This USDA program works primarily in locally identified conservation priority areas where there are significant problems with natural resources. High priority is given to areas where State and/or local governments offer financial, technical, or educational assistance and to areas where agricultural improvements will help meet water quality objectives. Landowners can apply to the program for assistance in solving problems related to animal waste management, erosion, and other environmental problems. EQIP will provide up to 60% cost-share for restoration. A landowner may receive up to $50,000 annually in EQIP payments.

Education and Outreach: This section will primarily be the responsibility of the Limestone County Soil and Water Conservation District. Project funding will be utilized to distribute public information/education via newsletters, hosting public meetings, publishing flyers, bulletins, news articles, conducting education programs in area schools, targeting teachers within the watershed area and presenting courses as opportunities arise within local schools.

Objectives: The overall goal of the Swan Creek watershed plan is to improve and protect water quality in the watershed in an effort to meet or exceed Alabama water quality standards for the fish and Wildlife classification. Tasks will include the following:

- Increase public awareness of the value of clean water

- Increase public awareness of how land use and common everyday activities affect water quality
- Increase public awareness of how “Best Management Practices” improve and protect water quality and aquatic habitat
- Increase public awareness of the long-term environmental and economic advantages of protecting and improving water quality and habitat.

Activities: The following education and outreach activities will assure that effective stakeholder involvement is taking place and that adequate opportunities for making positive changes in attitudes and practices are presented. Increasing public awareness will involve community outreach meetings, presentations, volunteer events, farm tours, elected official tours, fact sheets, newspaper articles, and newsletters. Specific tasks may include:

- Educating citizens on local, state, and federal regulations governing water quality, enforcement options, and best management practices.
- Facilitating opportunities for education and training on sedimentation and erosion control for landowners, public works employees, contractors, developers and others.
- Organizing and conducting public watershed meetings to inform the public of ongoing watershed efforts, to emphasize the importance of community-based involvement, to allow the public to express concerns and ideas, and to provide the opportunity for public participation.
- Conducting community and stakeholder field trips to view and discuss water quality issues. Ecological values, potential conservation targets, and conservation strategies.
- Preparing press releases for local media.
- Creating and conducting presentations to civic organizations, professional groups, schools, and others focusing on water quality and conservation activities within the watershed.

Activities will address stakeholder awareness concerning water quality problems and issues, particularly the role resource agencies, landowners/users, businesses, community/civic/watershed groups, and private citizens can and must play in watershed protection. Activities will be designed so that long-term improvements in water quality can be realized and a cooperative long-term watershed planning and implementation partnership approach can be promoted and maintained.

These activities will assist stakeholders in assuming ownership for local watershed problems using reasonable and cost-effective management options that can be locally implemented and maintained. It is recognized that even after reasonable steps have been taken to enhance public understanding and participation in implementing nonpoint source pollution management practices, it may take a number of years to achieve project goals and objectives in an effort to realize water quality improvements.

Schedule for Nonpoint Pollution Management Measure Implementation:

Activities and Practices	Timeline	Lead Entities
Activity: Implement the watershed-based plan Interim Measures: • Identify impaired sites and types and number of BMP's needed to address impairments • Coordinate planning and implementation of project BMP's with appropriate partnership capabilities and expertise • Implement appropriate BMP's to address sediment load reductions	Begin within one month of receiving funding and continue for the duration of the project	Limestone County SWCD/ Local Watershed Coordinator
Activity: Conduct watershed project outreach campaign to inform citizens/landowners about the project and its benefits, to encourage input, and to build and sustain project support. Interim Measures: • Coordinate partnership education efforts and opportunities • Coordinate, develop, and produce appropriate materials for distribution • Provide quarterly updates to key stakeholders via email, website, newsletter, meetings, ect. • Document all communication with stakeholders, citizen/landowner information requests, records of meetings, ect.	Begin within one month of receiving funding and continue for the duration of the project.	Limestone County SWCD / Local Watershed Coordinator

Activity: Conduct water quality monitoring and assessments of the watershed (pre-and post) BMP implementation. Interim Measures: • Compile and report analyses and results in user friendly electronic reporting format.	Begin within one month of receiving funding and continue for the duration of the project.	ADEM

Monitoring and Assessment: Monitoring will be coordinated with and reported to watershed stakeholders in Section 319 reports, at watershed meetings and in the ADEM basin assessment publications. The Watershed Project Coordinator also will distribute water quality data and information to stakeholders as it becomes available. Monitoring sites will include historical ADM watershed-scale monitoring stations and targeted best management practices implementation sites. A scientifically based and statistically valid probabilistic water quality approach may be used.

Environmental indicators to measure BMP implementation success or failure will be developed in collaboration by watershed stakeholders and partnering agencies such as USDA and ADEM. Project deliverables will be based on the evaluation of water quality data and subsequent stakeholder perception and input. The BMP locations will be tracked using GIS. Watershed monitoring after BMP installation is expected to effectively determine pollutant load reductions.

Alabama Water Watch monitoring using standard chemical, physical, and biological water quality parameters may be used to assess water quality improvements as BMPs are progressively implemented. Water quality monitoring will be conducted by the project contractee.

Further, the ADEM Field Operations will collect post BMP monitoring data to assess the effectiveness of BMPs. All ADEM water quality samples will be collected and processed according to the EPA approved QAC plan. A watershed specific monitoring plan will be developed to address pre/post best management practice implementation and will be revised, as necessary, as the project continues to evolve.

Evaluation and Assessment of Progress:

Agencies responsible for implementing watershed activities will track best management practice implementation and provide semiannual or annual reports to the Watershed Project Coordinator. Annual management plan implementation success evaluations will be based on:

1. Achievements of milestones
2. Achieving state water quality standards

3. Achieving Fish and Wildlife water quality use classification

If the above noted criteria are not being incrementally achieved in a timely manner, or for the resources available/expended, an interagency/citizen review of the plan will be conducted. Any watershed stakeholder may request from the DeKalb County SWCD for a timely review of the management plan. Investigations of best management practice effectiveness may also be facilitated by the Limestone County SWCD. The Limestone County SWCD will receive public comments and recommendations and be responsible for updating/revising the management plan as needed.

The Limestone County SWCD may revise the watershed management plan after public comments and requests are received and reconciled. If watershed plan evaluation criteria are being met, the watershed plan will not be revised. If evaluation criteria are not being achieved, the implementation approach will be revised. If a different watershed issue(s) is identified during plan implementation, this management plan will be revised within three months of issue discovery. Stakeholders will be advised of management plan revisions at meetings, on stakeholder/agency websites, and by using other media.

Swan Creek Watershed Management Plan assessment and monitoring also will be designed to be flexible so that load reduction targets and best management practices can be easily revised if in-site monitoring or professional judgment indicates water quality standards are not being achieved. Citizen perception will also be considered as a feedback loop by water quality monitoring/collection entities.

Swan Creek Monitoring Data from ADEM:

Station ID	**Visit Date**	**DO mgl**	**TSS mgl**	**Turb NTU**	**CBOD5 mgl**	**Flow CFS**
SWNL-1	**3/31/2003**	**10.22**	**4**	**4.5**	**8.7**	**14**
SWNL-1	**4/22/2003**	**9.77**	**4**	**4.2**	**1**	**4.2**
SWNL-1	**5/20/2003**	**10.97**	**12**	**9.7**	**1**	**105.6**
SWNL-1	**6/25/2003**	**7.68**	**3**	**2.93**	**0.3**	
SWNL-1	**7/17/2003**	**7.37**	**3**	**2.8**	**0.4**	
SWNL-1	**8/5/2003**	**7.8**	**2**	**1.75**	**0.2**	
SWNL-1	**9/15/2003**	**7.51**	**3**	**1.11**	**0.4**	
SWNL-1	**10/16/2003**	**9.78**	**2**	**0.9**	**0.8**	
SWNL-1A	**3/15/2006**	**11.71**	**2**	**4.26**	**1.7**	**37.4**
SWNL-1A	**4/4/2006**	**14.08**	**1**	**3.4**	**0.9**	**34.9**
SWNL-1A	**5/9/2006**	**9.2**	**3**	**5.86**	**0.1**	**68.7**

SWNL-1A	6/19/2006	8.71	6	5.19	0.87	19.3
SWNL-1A	7/6/2006	6.96	7	2.53	0.64	13.3
SWNL-1A	8/23/2006	7.76	3	2.06	0.78	9.6
SWNL-1A	9/19/2006	6.85	3	3.37	0.56	8.5
SWNL-1A	10/25/2006	10.15	3	1.72	0.5	11.4
SWNL-1A	6/12/2007	6.63		3.72		
SWNL-1A	6/13/2007	4.57	3	1.75	1.06	
SWNL-1A	6/13/2007	8.6	4	1.95	1.12	
SWNL-1A	6/14/2007	5.7	2	1.73	1.02	
SWNL-2	3/20/2003	3.35	8	10	1.9	
SWNL-2	4/16/2003	13.2	3	9.4	1.6	9.4
SWNL-2	5/28/2003		3	12.3	0.9	
SWNL-2	6/12/2003	11.82	11	4.9	0.1	
SWNL-2	6/18/2003	10.07		7.68		47
SWNL-2	7/28/2003	8.59	4	21.7	0.5	12
SWNL-2	8/13/2003	9.89	1	6.9	0.6	22.8
SWNL-2	9/15/2003	11.11	2	3.47	0.6	13.1
SWNL-2	10/30/2003	12.98	2	5.59	0.9	10.5
SWNL-2	3/15/2006	12.44	1	4.07	2.2	37.6
SWNL-2	4/4/2006	12.3	2	4.22	1.2	42.8
SWNL-2	5/9/2006	9.84	5	6.35	0.8	78.1
SWNL-2	6/7/2006	9.9		2.7		17.7
SWNL-2	6/19/2006	8.09	5	2.58	0.43	8.8
SWNL-2	7/6/2006	9.09	1	2.43	0.89	10.7
SWNL-2	8/23/2006	8.87	4	2.2	0.91	6.3
SWNL-2	9/18/2006	11.47	1	1.48	0.52	6
SWNL-2	10/25/2006	12.64	1	1.75	0.41	10.6
SWNL-2	6/12/2007	10.5		3.54		
SWNL-2	6/13/2007	9.84	6	2.25	1.53	
SWNL-2	6/13/2007	14.29	5	3.7	1.2	
SWNL-2	6/14/2007	10.66	4	1.66	1	
SWNL-2	3/7/2013	13.13	4	6.88	2	81.9563
SWNL-2	4/2/2013	12.47	2	4.89	2	108.4541

SWNL-2	5/1/2013	10.63	1	3.19	2	74.1704
SWNL-2	6/3/2013	11.25				
SWNL-2	6/3/2013			1.28		28.0893
SWNL-2	6/11/2013	9.42	4	4.45	2	49.906
SWNL-2	7/1/2013					
SWNL-2	7/17/2013	11.21	1	1.13		25.9379
SWNL-2	8/5/2013			1.42		18.033
SWNL-2	8/6/2013			16.6		
SWNL-2	8/7/2013			5.61		39.858
SWNL-2	8/7/2013	10.35	2	2.44	2	33.0616
SWNL-2	8/8/2013			7.18		123.606
SWNL-2	9/17/2013	11	2	0.82	2	8.1896
SWNL-2	10/8/2013	12.87	1	0.78	2	11.9505
SWNL-380	3/7/2013	13.62	4	7.97	2	99.8345
SWNL-380	4/2/2013	10.92	4	5.21	2	112.3157
SWNL-380	5/1/2013	10.26	1	3.49	2	84.9364
SWNL-380	6/3/2013	11.65				
SWNL-380	6/3/2013			1.04		24.3787
SWNL-380	6/11/2013	10.04	4	5.52	2	62.9319
SWNL-380	7/17/2013	8.33	1	1.59		27.0028
SWNL-380	8/5/2013			1.53		21.586
SWNL-380	8/6/2013			2.51		
SWNL-380	8/7/2013	9.53	3	2.84	2	42.8555
SWNL-380	8/7/2013			2.9		
SWNL-380	8/8/2013			12		170.479
SWNL-380	8/8/2013			6.72		
SWNL-380	9/17/2013	8.36	3	0.88	2	9.814

SWNL-380	**10/8/2013**	**10.16**	**2**	**1.37**		**11.7055**
SWNL-380	**3/16/2015**	**10.32**				
SWNL-380	**3/16/2015**		**5**	**3.93**	**2**	**127.6595**
SWNL-380	**4/8/2015**	**10.7**				
SWNL-380	**4/8/2015**		**5**	**5**	**2**	**91.0308**
SWNL-380	**5/6/2015**	**9.59**				
SWNL-380	**5/6/2015**		**2**	**1.52**	**2**	**27.0254**
SWNL-380	**6/2/2015**	**8.2**				
SWNL-380	**6/2/2015**		**6**	**5.66**	**2**	**99.2251**
SWNL-380	**7/1/2015**	**5.95**				
SWNL-380	**7/1/2015**		**2**	**2.47**	**2**	**16.9468**
SWNL-390	**3/15/2006**	**8.5**	**4**	**3.34**	**1.3**	**42.6**
SWNL-390	**4/4/2006**	**10.8**	**1**	**3.53**	**0.9**	**41.4**
SWNL-390	**5/9/2006**	**8.93**	**5**	**7.03**	**1**	**88.5**
SWNL-390	**6/7/2006**	**10**		**2.71**		**14.9**
SWNL-390	**6/19/2006**	**8.36**	**3**	**3.46**	**1.08**	**17.9**
SWNL-390	**7/5/2006**	**8.6**	**6**	**5.88**	**1.5**	**3.1**
SWNL-390	**8/23/2006**	**7.24**	**3**	**3.98**	**0.88**	**9.2**
SWNL-390	**9/18/2006**	**8.61**	**6**	**4.92**	**0.47**	**5.4**
SWNL-390	**10/25/2006**	**11.27**	**1**	**1.91**	**0.52**	**9.7**
SWNL-390	**6/12/2007**	**8.07**		**7.73**		
SWNL-390	**6/13/2007**	**9.51**	**4**	**4.44**	**1.23**	
SWNL-390	**6/13/2007**	**16.22**	**1**	**8.7**	**1**	

SWNL-390	**6/14/2007**	**10.1**	**7**	**6.37**	**1**	
SWNL-390	**3/19/2009**	**10.85**	**3**	**4**	**1.44**	**89.6**
SWNL-390	**4/15/2009**	**13.35**				
SWNL-390	**4/15/2009**		**1**	**5.24**	**2**	**112.9**
SWNL-390	**5/12/2009**	**9.79**				
SWNL-390	**5/12/2009**		**1**	**5.07**	**2**	**87.2**
SWNL-390	**6/3/2009**	**6.77**				
SWNL-390	**6/3/2009**			**2.07**		**24.3873**
SWNL-390	**6/10/2009**	**8.71**				
SWNL-390	**6/10/2009**		**2**	**2.27**	**4.8**	**24.2**
SWNL-390	**7/15/2009**	**12.31**				
SWNL-390	**7/15/2009**		**1**	**3.46**	**2**	**44.46**
SWNL-390	**8/12/2009**	**11.43**				
SWNL-390	**8/12/2009**		**1**	**3.15**	**2**	**20.56**
SWNL-390	**9/8/2009**	**9.23**				
SWNL-390	**9/8/2009**		**7**	**2.01**	**2**	**11.456**
SWNL-390	**10/26/2009**	**11.25**				
SWNL-390	**10/26/2009**		**1**	**4.34**	**2**	**64.31**
SWNL-390	**3/7/2013**	**14.1**	**2**	**7.69**	**2**	**87.4008**
SWNL-390	**4/2/2013**	**11.62**	**1**	**5.21**	**2**	**124.0455**
SWNL-390	**5/1/2013**	**10.53**	**1**	**3.23**	**2**	**80.6955**
SWNL-390	**6/11/2013**	**8.51**	**3**	**4.91**	**2**	**49.8725**
SWNL-390	**7/17/2013**	**8.31**	**1**	**1.32**		**24.2125**

SWNL-390	**8/5/2013**			**2.16**		**13.841**
SWNL-390	**8/6/2013**			**4.87**		**163.661**
SWNL-390	**8/7/2013**	**8.43**	**3**	**2.79**	**2**	**33.0795**
SWNL-390	**8/7/2013**			**3.31**		**27.744**
SWNL-390	**8/8/2013**			**11.3**		**170.952**
SWNL-390	**8/8/2013**			**7.26**		
SWNL-390	**9/17/2013**	**7.86**	**1**	**1.32**	**2**	**11.2228**
SWNL-390	**10/8/2013**	**9.59**	**1**	**0.94**	**2**	**9.6408**
SWNL-392	**3/15/2006**	**12.2**	**2**	**3.91**	**1.4**	**20.3**
SWNL-392	**4/4/2006**	**12.19**	**2**	**4.83**	**0.4**	**22.4**
SWNL-392	**5/9/2006**	**9.84**	**3**	**7.16**	**0.3**	**54.2**
SWNL-392	**6/7/2006**	**9.3**		**3.54**		**5.9**
SWNL-392	**6/19/2006**	**7.92**	**5**	**6.09**	**2.28**	**3.7**
SWNL-392	**7/5/2006**	**6.09**	**4**	**3.18**	**0.57**	**2.7**
SWNL-392	**8/23/2006**	**8.25**	**1**	**3.16**	**0.5**	**2.6**
SWNL-392	**9/18/2006**	**7.78**	**3**	**2.82**	**1.01**	
SWNL-392	**10/25/2006**	**10.45**	**1**	**1.22**	**0.49**	**2.1**
SWNL-392	**6/12/2007**	**8.38**		**3.82**		
SWNL-392	**6/13/2007**	**6.5**	**5**	**2.85**	**1**	
SWNL-392	**6/13/2007**	**6.31**	**2**	**2.53**	**1**	
SWNL-392	**6/14/2007**	**6.79**	**2**	**2.38**	**1**	
SWNL-392	**3/7/2013**	**13.19**	**1**	**8.33**	**2**	**47.9903**
SWNL-392	**4/2/2013**	**11.66**	**5**	**5.02**	**2**	**70.3648**

SWNL-392	5/1/2013	9.77	1	3.74	2	40.4126
SWNL-392	6/3/2013	9.07				
SWNL-392	6/3/2013			1.76		14.4017
SWNL-392	6/11/2013	9.72	3	5.6	2	24.6403
SWNL-392	7/17/2013	8.97	3	1.71		14.0209
SWNL-392	8/5/2013			2.29		10.326
SWNL-392	8/6/2013			17.2		123.936
SWNL-392	8/7/2013			3.31		19.708
SWNL-392	8/7/2013	8.16	6	5.62	2	
SWNL-392	8/8/2013			8.47		56.053
SWNL-392	9/17/2013	8.36	3	5.05	2	3.6485
SWNL-392	10/8/2013	9.28	10	1.74	2	4.1648
SWNL-4	6/12/2007	7.2		5.05		
SWNL-4	6/13/2007	7.45	8	5.77	1.88	
SWNL-4	6/13/2007	8.83	7	6.2	3.84	
SWNL-4	6/14/2007	7.86	7	5.75	2.13	
SWNL-4	3/7/2013	12.16	3	8.48	2	94.1455
SWNL-4	4/2/2013	9.17	5	6.27	2	119.489
SWNL-4	5/1/2013	6.95	2	5	2	
SWNL-4	6/11/2013	5.52	7	8.11	2	
SWNL-4	7/17/2013	5.21	5	3.71		
SWNL-4	8/5/2013			2		0.8513
SWNL-4	8/6/2013			2.71		112.271
SWNL-4	8/7/2013	5.34	6	3.72	2	
SWNL-4	8/7/2013			16		
SWNL-4	8/8/2013			18.8		180.012
SWNL-4	8/8/2013			9.31		
SWNL-4	9/17/2013	6.17	5	5.59	2	

SWNL-4	**10/8/2013**	**7.44**	**3**	**1.95**		

Sites such as this near the Tanner Community within the Swan Creek watershed can be improved with proper implementation of public education and outreach.

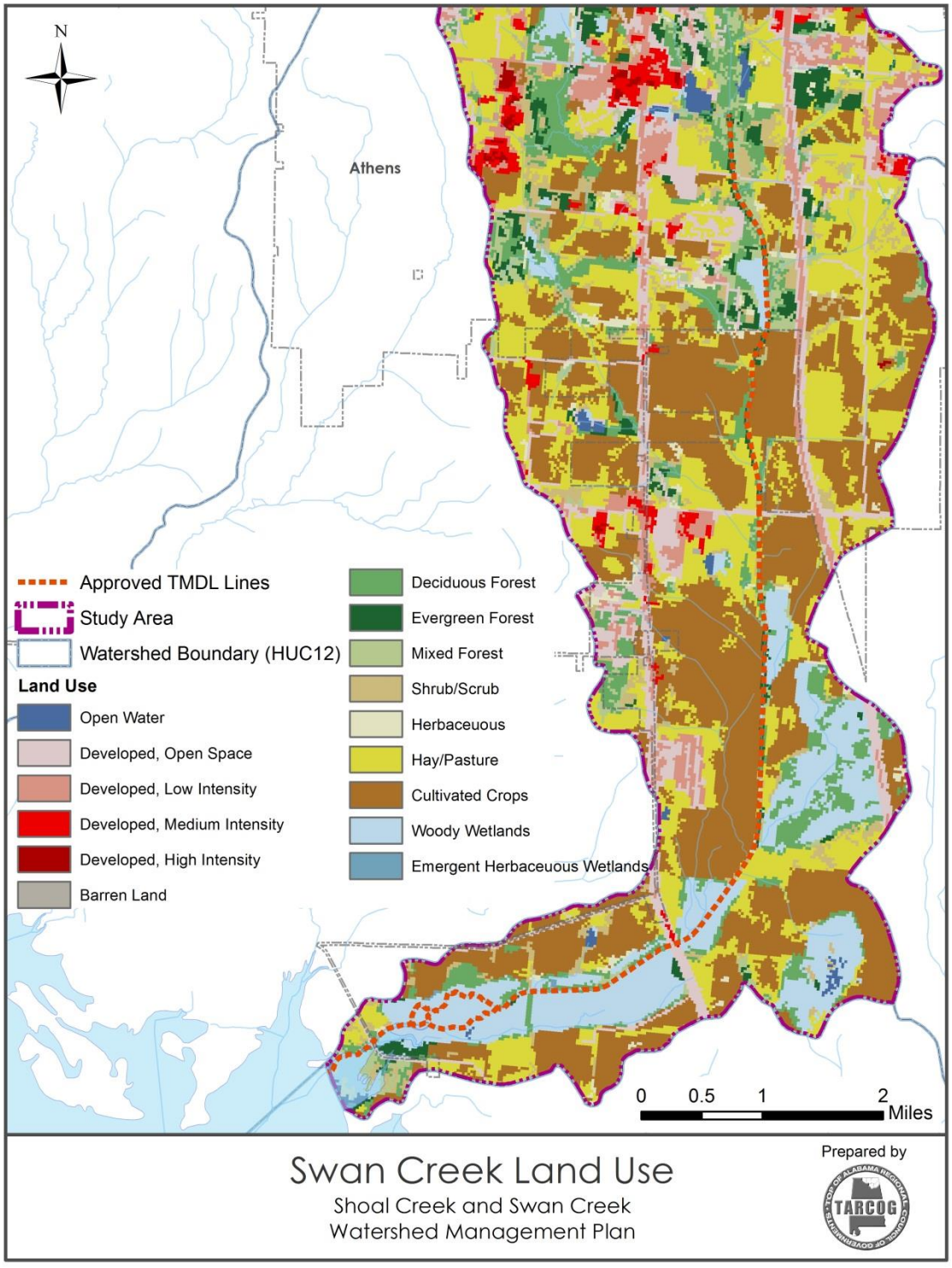
This photograph represents a potential BMP site with the Swan Creek Watershed. Conservation tillage and nutrient management BMP's could potentially be implemented at this location to improve water quality.

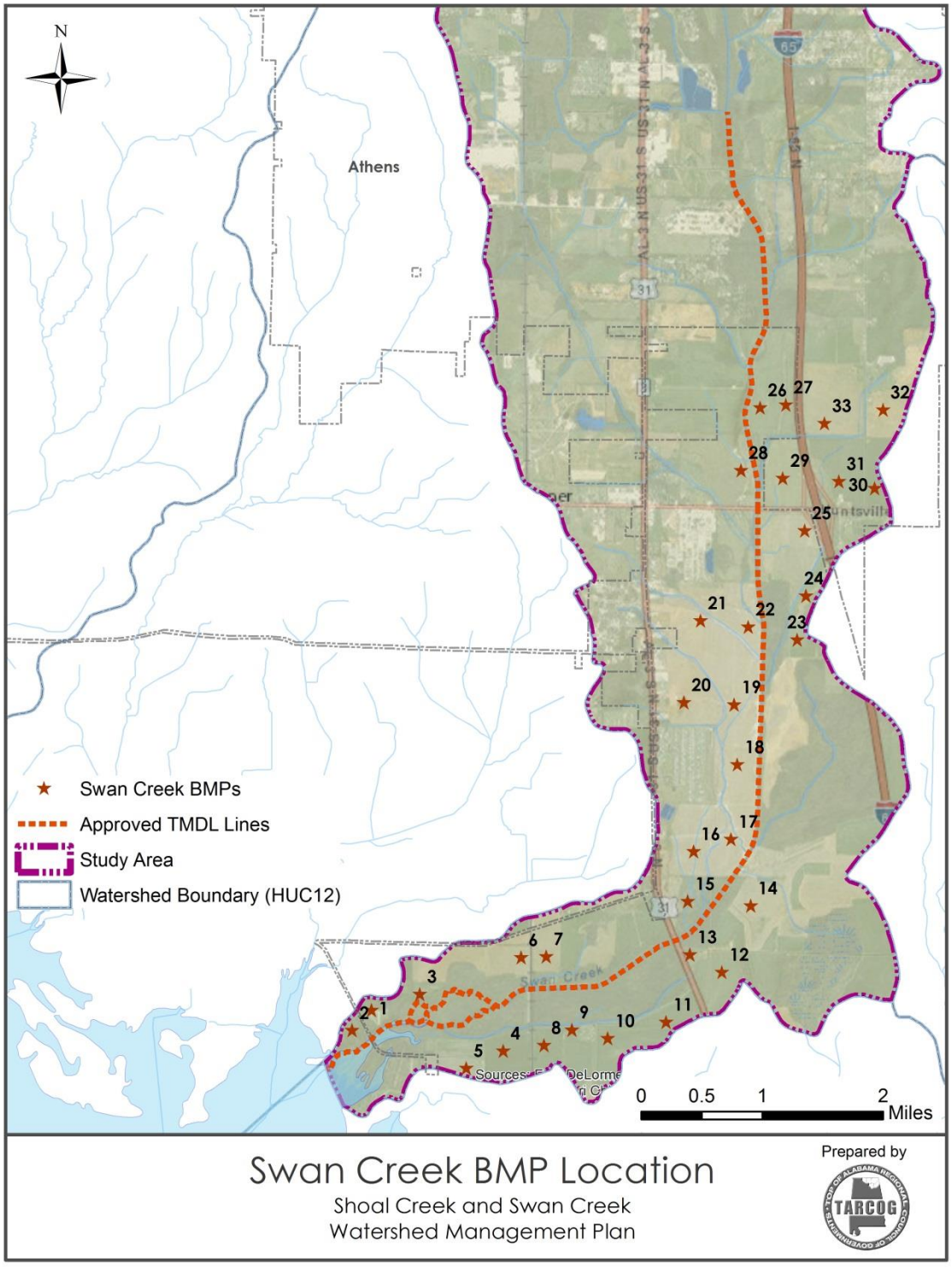
The photograph represents a potential BMP site with the Swan Creek Watershed in rural Limestone County. Conservation tillage and nutrient management BMP's could potentially be implemented at this location to improve water quality.

Corn fields such as the one above located within the Swan Creek Watershed near Browns Ferry Road would benefit from the implementation of best management practices such as tillage and residue management.

Soybean fields such as the one above located within the Swan Creek Watershed would benefit from the implementation of best management practices such as tillage and residue management.

Wheat fields such as the one above located within the Swan Creek Watershed would benefit from mechanical irrigation systems such as the one pictured above.


N
Athens
Approved TMDL Lines
Study Area
Watershed Boundary (HUC12)
Land Use
Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Herbaceuous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceuous Wetlands
0 0.5 1 2
Miles
Swan Creek Land Use
Shoal Creek and Swan Creek
Watershed Management Plan
Prepared by
TARCOG


N
Athens
Swan Creek BMPs
Approved TMDL Lines
Study Area
Watershed Boundary (HUC12)
Swan Creek
0 0.5 1 2
Miles
Swan Creek BMP Location
Shoal Creek and Swan Creek
Watershed Management Plan
Prepared by
TARCOG

List of Partners for Swan Creek Watershed Management Plans (Limestone County, Alabama)

Agency	Contact	Title	Phone	Email
Limestone/Madison County SWCD	Sam Sandlin	District Admin Coordinator	256-532-1677 ext. 116	Sam.Sandlin@al.nacdnet.net
NRCS (Athens Service Center)	Joyce A. Lane	District Conservationist	256.232.4025 ext. 3	Joyce.Lane@al.usda.gov
Limestone County SWCD	Brent Shaw	Chairman	256.232.4025	shawfarms@pclnet.net
Auburn University / Alabama A&M Extension Center	Spenser Bradley	Regional Extension Agent I (Wildlife/Natural Resource Management)	256.773.2549	seb0043@aces.edu
Tennessee Valley Regional Resource & Extension Center	Tyler Sandlin	Regional Extension Agent I (Agronomy)	256.353.8702	Tns0012@aces.edu
Limestone County Health Department	Marcus Fitzgerald	Environmental Supervisor	256.771.6050	marcus.fitzgerald@adph.state.al.us
U.S. Fish and Wildlife Services (Wheeler NWF)	Rob Hurt	Wildlife Biologist	256.353.7243 Ext 28	rob_hurt@fws.gov
Alabama A&M University	Karnita Golson-Garner, Ph.D	Extension Environmental Specialist, Forestry, Wildlife and Natural Resources Management, Alabama Cooperative Extension System	256-372-8331 or 256-372-4982	Karnita.golson@aamu.edu kfg0003@aces.edu
Nature Conservancy	Paul Freeman	Aquatic Ecologist	205.251.1155	pfreeman@tnc.org
TVA	J. Kenley Austin	Wheeler Watershed Team/Natural Resource Management	1.800.882.5263	jkaustin@tva.gov
The Alabama	Mike	Exec. Director	256.773-8495	mike.roden@amrvrcd.com

Agency	Contact	Title	Phone	Email
Mountains, Rivers & Valleys RC&D Council	Roden			
Alabama Clean Water Partnership	Jay Grantland	Tennessee River Basin Facilitator	205.266.6285	jay.grantland@amrvrcd.com
Athens City School System	W.L. Holladay III	Superintendent	256.233.6600	Trey.holladay@acs-k12.org
Limestone County School System	Dr. Tom Sisk	Superintendent	256.232.5353	Tom.sisk@lcsk12.org
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Limestone County Water & Sewer Authority	James Moffatt	Chairman	256.233.6445	Moffatt@mlwlaw.org
Limestone County Water & Sewer Authority	Byron Cook	Manager	256.233.6445	bcook@lcwsa.com
Elkmont Water Dept.	Howard Hobbs Jr.	Manager	256.509.5121	elkmontown@ardmore.net
City of Athens	Ronnie Marks	Mayor	256.233.8730	vdowd@athensal.us
Limestone County Commission	Mark Yarbrough	Chairman	256.233.6400	mark.yarbrough@limestonecounty-al.gov
Department of Agriculture and Industries	Tony Cofer	Division Director of Pesticide Mgmt	334.240.7237	Tony.cofer@agi.alabama.gov
Town of Elkmont	Tracy Compton	Mayor	256.732.4211	elkmontown@ardmore.net
Town of Lester	Richard Durham	Mayor	256.232.6491	richard.earl.durham@gmail.com
Limestone County Cattlemen's Association	Daveen Stanford	Association Rep.	256.777.2199	elviracat@bellsouth.net
Limestone County SWCD	Brenda Wigginton	District Admin. Coordinator	256.232.4025 Ext. 3	bwigginton@pclnet.net