

WATER RESOURCES REGIONAL PLANNING PILOT STUDY
FOR
THE SOUTHERN CUMBERLAND PLATEAU

PHASE I



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CHAPTER 1

EXECUTIVE SUMMARY

1.1 BACKGROUND AND OBJECTIVES

The U.S. Army Corps of Engineers (USACE), Nashville District, the Tennessee Department of Environment and Conservation (TDEC), and a steering committee composed of representatives from TDEC's Water Resources Technical Advisory Committee (WRTAC) are conducting a comprehensive water resources study for the Southern Cumberland Plateau Region. This project is one of two pilot studies for regional water resources planning by TDEC. The study has been split into two phases. This report presents the results of Phase I. Phase I primarily focuses on the collection of the existing background data for the study area.

The entire study is concerned in general with the existing and future water resources of the area. The objective of this phase of the study is to assess existing water source information and water source uses, document existing resource information, and develop a Geographic Information System (GIS) database for the data collected.

1.2 PROBLEM DEFINITION

The major problems typically associated with water supply relate to water quality and water quantity. Existing and potential water supply problems in the Southern Cumberland Plateau Region are obtaining supplies of adequate quantity from currently used sources and supplying adequate quantities of water to meet future demands.

1.3 EXISTING WATER SOURCES AND SYSTEMS

Information has been collected on existing water sources within the planning region. These sources may include, but are not limited to, groundwater, surface water, and connections to other utility systems.

1.4 GEOGRAPHIC INFORMATION SYSTEM (GIS)

Data has been collected and implemented into a GIS database to house the information developed during the study. The

GIS database includes basin outlines, all streams, springs, major water lines, intake locations, water treatment plants, wastewater plants, discharge points, and utility inter-connections of the Southern Cumberland Plateau Region.

1.5 PHASE II SCOPE OF WORK

The Scope of Work for Phase II of the study includes: critical regional drought identification, completion of existing water source yield analysis, water demand projections, determination of alternative water sources, alternative water source yield analysis, identification of water demand management opportunities, and coordination of public notice and public comment opportunities.

1.6 PROPOSED GEOGRAPHIC AREA OF PHASE II

The utility districts of Big Creek, Tracy City, Monteagle, and Sewanee, and the geographic areas which they serve, are recommended for further investigation during Phase II of this regional planning pilot.

CHAPTER 2

INTRODUCTION

2.1 BACKGROUND AND AUTHORITY

The U.S. Army Corps of Engineers (USACE), Nashville District, the Tennessee Department of Environment and Conservation (TDEC), and a steering committee composed of representatives from TDEC's Water Resources Technical Advisory Committee (WRTAC) are conducting a comprehensive water resources study for the Southern Cumberland Plateau Region. This project serves as a pilot study for regional water resources planning by TDEC.

This study is being conducted under the Planning Assistance to States (Section 22) Authority, of the Water Resources Dev. Act of 1974, as amended. This authority allows USACE to provide technical assistance to support state preparation of comprehensive water resource development plans and to conduct individual studies supporting the state plan. TDEC is contributing fifty percent of the cost of this study. This study has been split into two phases. This report presents the results of Phase I.

2.2 SCOPE OF STUDY

The Southern Cumberland Plateau Region covers a four-county geographical region. Portions of Franklin, Grundy, Marion, and Sequatchie Counties, which include the towns of Tracy City, Sewanee, Altamont, and Monteagle, are included in the study.

The study is concerned in general with the water resources of the area. The purpose of this phase of the study is to assess existing water source information and water source uses, document existing resource information, and develop a GIS database for the data collection

The first phase of work includes the following tasks: compiling general basin information within the planning region, a literature search for existing studies, data collection to establish a GIS database, and initiation of the analysis of existing source yield.

2.3 STUDY OBJECTIVES

The ultimate objective of the Southern Cumberland Plateau Water Resources Study is to develop water source alternative plans to insure that an adequate quantity of water is available to serve the area's needs (e.g., community water supplies, agricultural, industrial, critical aquatic habitat, etc.) throughout the 50 year planning period.

In this phase of the study, information has been collected on existing water sources, water use, and wastewater production within the planning region. These sources may include, but are not limited to, groundwater, surface water, and connections to other utilities. An estimate of sources used for self supplied residences has been determined. Existing demand has been determined for the current population served, number of utility connections, and the number of municipal and industrial connections. Usage for self supplied users has also been determined. Current percent of water produced that is billed, and system losses have been compiled for utilities within the planning region. Location of service lines for each utility has been identified and compiled within a GIS database. The GIS database includes basin outlines, all streams, springs, wells, aquifers, major water lines, and connections.

2.4 STUDY PARTICIPANTS

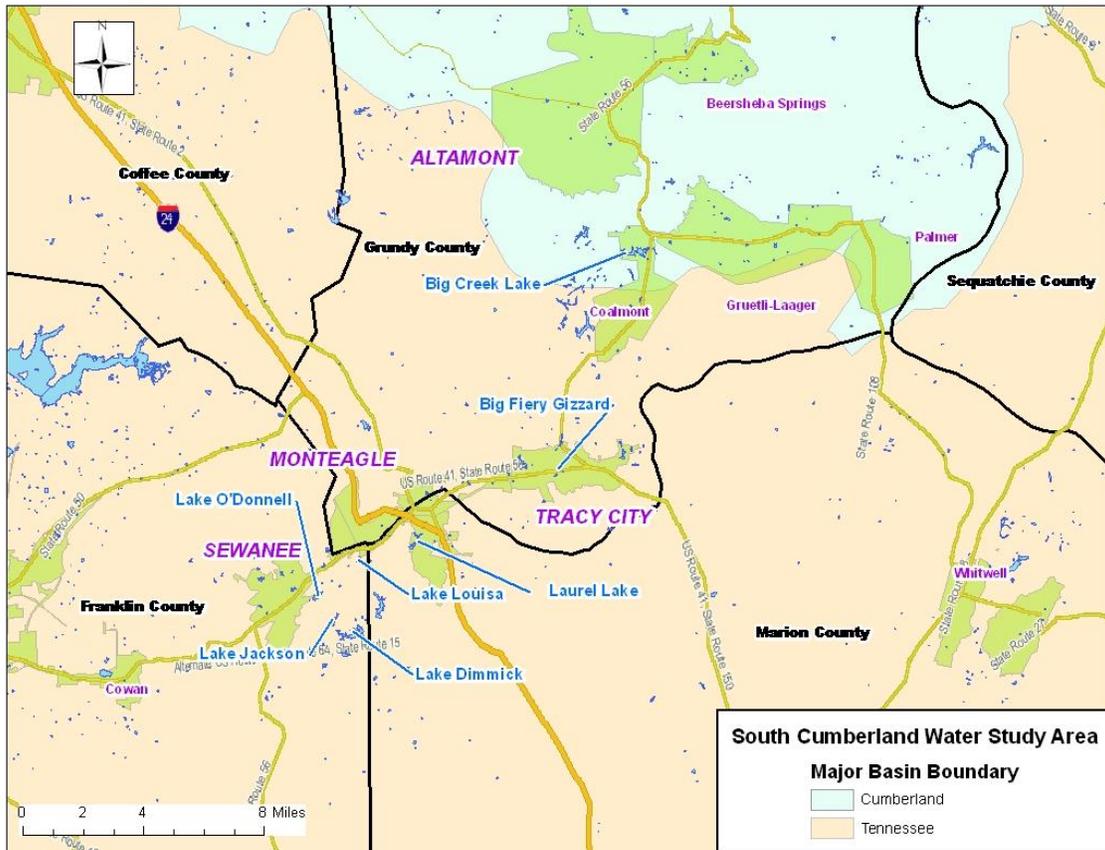
The U.S. Army Corps of Engineers, Nashville District, the Tennessee Department of Environment and Conservation and a steering committee composed of representatives from TDEC's Water Resources Technical Advisory Committee are participating together in this Southern Cumberland Plateau Water Resources Regional Planning Pilot Study.

2.5 STUDY AREA DESCRIPTION

The Southern Cumberland Plateau Region covers a four-county geographical region. Parts of Franklin, Grundy, Marion, and Sequatchie Counties, which include the towns of Tracy City, Sewanee, Altamont, and Monteagle, are included in the study. This geographical region includes parts of the Upper Elk River Basin, Collins River Basin, Sequatchie River Basin, and Guntersville Lake Basin. Figure 2.5,

Southern Cumberland Plateau Region, shows the study area and the towns included within.

FIGURE 2.5
SOUTHERN CUMBERLAND PLATEAU REGION



2.5.1 Climate and Geography of Study Region

The climate of the Southern Cumberland Plateau Region is characterized by warm, humid summers, relatively mild winters and generally abundant rainfall. The mean annual temperature for the area is around 55 degrees. Precipitation ranges from 56 to 62 inches per year, the majority of which occurs in the winter and spring.

The Southern Cumberland Plateau is a deeply dissected plateau, with topographic relief commonly of about 400', with frequent sandstone outcroppings and bluffs. The elevation range of the Southern Cumberland Plateau is 1000' to 3000', with areas surrounding the plateau having elevations under 1000'. The elevations of Sewanee,

Monteagle, Altamont, and Tracy City are 1920', 1920', 1930', and 1830', respectively.

2.6 SCOPE OF STUDY FOR PHASE II

Critical regional drought periods will be evaluated for the planning region, or focus areas. The critical regional drought will be a primary factor in determining existing water source yields, as well as alternative source yields, and may be different depending upon the focus area of concern and the type (groundwater, reservoir, river, etc...) and location of the existing or proposed water source. Present and proposed drought contingency plans will be reviewed and presented as a part of the regional drought evaluation.

The existing water source yield analysis will be completed, and include an assessment of yield for peak demand as well as average daily usage. The results of the critical regional drought evaluation will be applied to the existing water source yield analyses. Possible factors affecting existing water sources such as T&E species, scenic waters, wetlands, impaired waters, and a source's location relative to other withdrawals/discharges will be described. Initiatives such as TWRA's In-stream Flow Prescriptions will be considered as limiting factors for existing water source yield where they have been defined within the focus areas. Potential threats to existing water sources will be identified.

Water demand, for the focus areas, will be projected for a period 50 years into the future, divided into increments of no more than 10 years. Three growth scenarios will be evaluated reflecting anticipated levels of growth and uncertainty in growth predictions. Local economic development goals, existing land use patterns, and official land use plans will form the basis for the projections of future residential, commercial, and industrial water use. A general, focus area-wide, ultimate land use scenario will be developed. An assessment will be made of the local government and utilities' ability to support the growth driving water supply demand with fees and tax rates acceptable to their constituents. Water demand forecasting software from the Institute for Water Resources (IWR-MAIN) will be used to develop demand projections. An assessment will be made, and the results presented, of the likely time

frame within which projected water demand will outstrip existing water source yields.

Current and proposed conservation practices will be reviewed. Possible opportunities for additional measures will be identified, and a minimum of six conservation methods including system loss reduction, conservation pricing, and other active and passive conservation methods will be evaluated. A regional water conservation plan for each focus area will be presented. The potential impact of conservation measures upon water demand projections will be determined.

Potential alternative water sources will be identified for each focus area (e.g., groundwater, surface waters, new reservoir, resized reservoir, water harvesting, etc.) and potential issues (e.g., legal, resources, etc.) associated with each source will be identified and presented.

Each potential alternative will include an analysis to determine the alternative's firm yield. The results of the critical regional drought evaluation will be applied to the alternative water source yield analyses. Possible factors affecting alternative water sources such as T&E species, scenic waters, wetlands, impaired waters, and a source's location relative to other withdrawals/ discharges will be described. Initiatives such as TWRA's In-stream Flow Prescriptions will be considered as limiting factors for alternative water source yield, where they have been defined within the focus areas. Potential threats to alternative water sources will be identified.

Conceptual level design of each alternative water source will be performed sufficient to develop material quantities and construction methods. Conceptual level cost estimates will be developed, and presented, for each alternative inclusive of anticipated engineering, design, and construction costs for each. CADD drawings will be produced for each alternative with detail sufficient to support design and cost estimating efforts.

The conclusion of this phase of the study will result in a regional planning. This regional planning report will present a comparison of proposed alternatives, the designation of a preferred alternative (or combination of alternatives) and an implementation strategy for the preferred alternative for the focus area.

Consistent with TDEC and USACE policy, Public Notices will be issued and opportunity given for Public Comment on relevant aspects of this project.

CHAPTER 3

EXISTING WATER SOURCES AND SYSTEMS

3.1 WATER SOURCES

All of the water systems in the Southern Cumberland Plateau purchase water or utilize reservoirs to meet area water resource needs with small quantities of water being obtained from ground water sources for self supplied water users. These water sources and their storage capacities are presented in Table 3-1, Natural Sources of Water Supply. Utility district intakes and water treatment plant locations are shown on the map in Figure 3.1, Water Source Intakes and Water Treatment Plants. Pictures of the existing water supply sources for the Southern Cumberland Plateau are shown in figures 3.2 through 3.8.

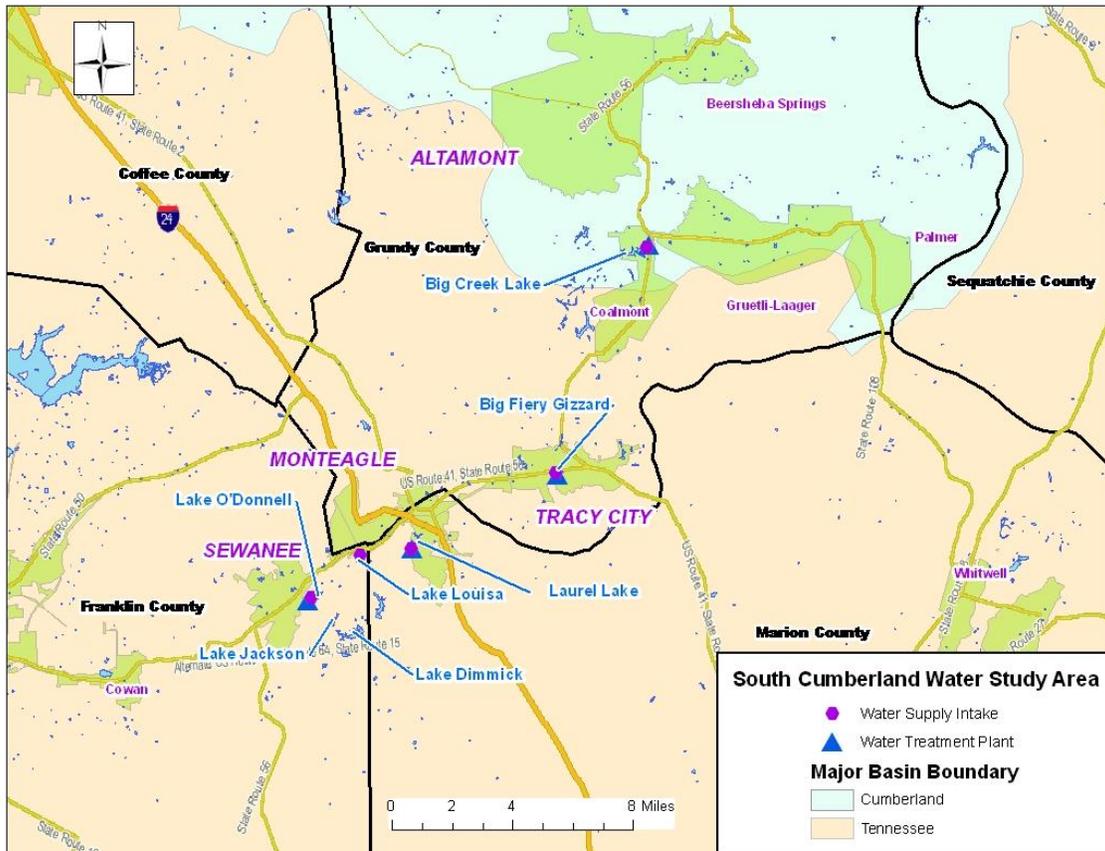
<u>TABLE 3-1</u>		
<u>NATURAL SOURCES OF WATER SUPPLY</u>		
Utility	Water Supply Source	Storage Capacity (MG)
Big Creek	Big Creek Reservoir	254
Monteagle	Lake Laurel - Primary	213
	Lake Louisa - Emergency	94
Sewanee	Lake O'Donnell - Primary	62
	Lake Jackson - Secondary	112
	Lake Dimmick (Day Lake) - Emergency	218
Tracy City	Big Fiery Gizzard Reservoir	200

All of the major utility systems in the Southern Cumberland Plateau Study Area supply their water from reservoirs. The U.D.'s of Griffith Creek, Foster Falls, and Cagle/Fredonia purchase their water. All of the reservoirs in the study area have uncontrolled emergency spillways, with low-level outlets for draining the reservoir if necessary.

Big Creek U.D. water supply source is Big Creek Reservoir. The storage capacity of Big Creek Reservoir is 751.9 acre ft (245 MG).

Monteagle's primary water supply source is from Lake Laurel. This lake has a surface area of 40 acres at normal pool elevation of 1820 feet and contains approximately 653.7 acre-ft (213 MG) of storage. Monteagle connected to Lake Louisa after the drought of 2007 as an emergency water supply source. Lake Louisa has a storage capacity of 288 acre-feet.

Figure 3.1
Water Source Intakes & Water Treatment Plants



Sewanee has three surface water sources. Lake O'Donnell is the primary water source for Sewanee. It has a maximum pool elevation of 1910 feet and can hold 190.71 acre-feet (62 MG) of water. Lake O'Donnell has a drainage area of 196.4 acres and a surface area of 18.75 acres. The maximum desirable drawdown is 18 feet and the lake is 28 feet deep. Tennessee Safe Dams classify Lake O'Donnell as high hazard. Lake Jackson is a 23.73 acre lake and serves as the secondary water source for Sewanee. It has a maximum pool elevation of 1850 feet and can hold 343.49 acre-feet (112 MG) of water. Lake Jackson has a drainage area of 470.15 acres and is 60 feet deep. Water is drawn off near the

bottom of the lake and is pumped into Lake O'Donnell. The maximum desirable drawdown is 14 feet. At that level, 110.5 acre-ft (36 MG) of storage remains, but the lake can be drawn down completely. Lake Dimmick (Day Lake) is the emergency water supply for Sewanee and is owned and controlled by The University of the South. The lake is fed by tributaries from an 803-acre watershed. The maximum pool elevation is 1810 feet and it has 669.09 acre-feet (218 MG) of storage, with a surface area of 85.52 acres. The maximum dept of Lake Dimmick is 28 feet. The maximum allowable drawdown is two feet.

Tracy City's water supply source is the Big Fiery Gizzard Lake. The normal pool elevation is 1829.7 feet and it has 612.2 acre-ft (200 MG) of storage. There are three inlets on the reservoir with the first at 9.7 feet, the second at 19.7 feet, and the third at 25.7 feet (all below normal pool elevation). Big Fiery Gizzard Reservoir has a minimum release requirement of 450 gallons per minute to Big Fiery Gizzard Branch.

Figure 3.2
Monteagle Laurel Lake Intake - Primary



Figure 3.3
Monteagle Lake Louisa Intake - Emergency



Figure 3.4
Sewanee Lake O'Donnell Emergency Spillway - Primary



Figure 3.5
Sewanee Lake Jackson - Secondary



Figure 3.6
Sewanee Lake Dimmick - Emergency



Figure 3.7
Tracy City Big Fiery Gizzard Lake



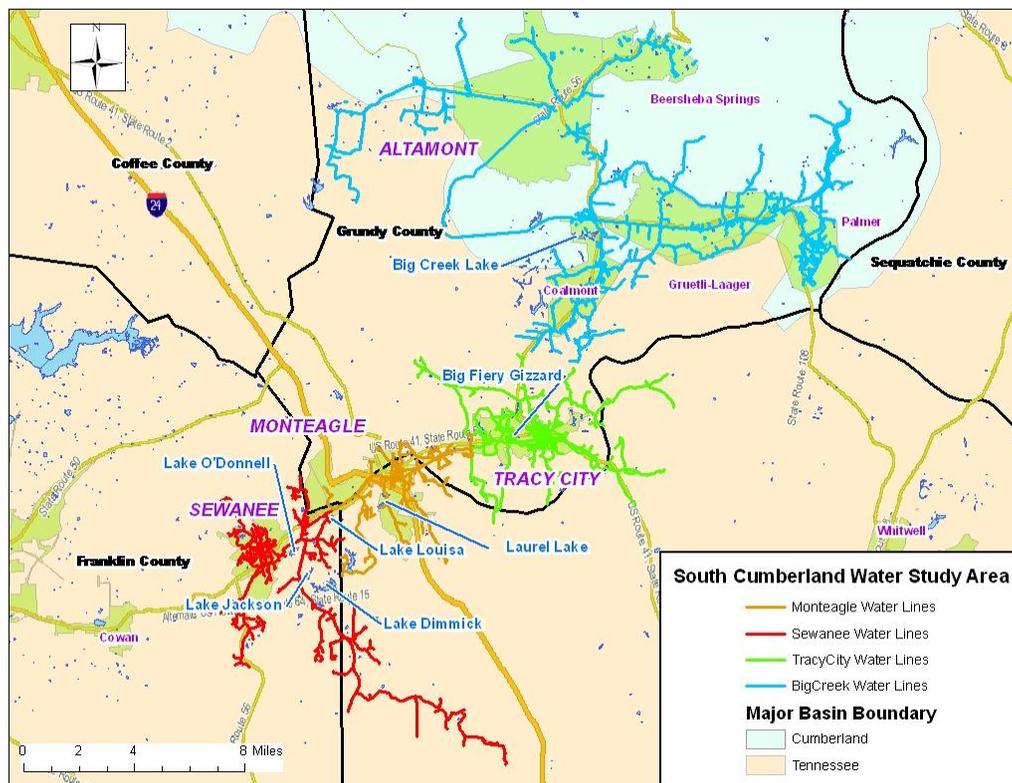
Figure 3.8
Big Creek Lake Spillway



3.2 WATER SUPPLY SYSTEMS

There are presently four major water systems in the Southern Cumberland Plateau Region. Three of these systems serve as both suppliers and distributors (Monteagle U.D. purchases water from Tracy City but do not distribute water to any other U.D.). Table 3-2A, Water Supply Systems, lists the water systems and identifies the suppliers for each system. Treatment capacities are given for those systems which have their own water treatment plants. The utility districts of Cagle/Fredonia, Griffith Creek, and Foster Falls all receive their water supply from the utility districts in this study. Table 3-2B, Size of Water System Connections, presents the pipe sizes connecting the utility districts to each other. A GIS map showing the utility districts' water lines and utility inter-connections are presented in Figure 3.9, Water Supply Systems. None of the utility districts are certain of the ultimate capacities of their inter-connections to other utility districts. Table 3-2B, Size of Water System Connections, lists the sizes of the pipes connecting the utility districts.

Figure 3.9
Water Supply Systems



3.2.1 Location of Utility Districts

Tracy City Utility District serves the town of Tracy City, areas of Grundy County, and some areas of Marion County (Figure 2.5). Tracy City provides services in the Gunterville Lake Basin which is in the Tennessee River Basin.

Big Creek Utility District serves the town of Altamont and the mountain portion of Grundy County north of Tracy City (Figure 2.5). Big Creek U.D. provides services in both the Cumberland River Basin and the Tennessee River Basin.

Sewanee Utility District serves the town of Sewanee in Franklin County (Figure 2.5). Sewanee provides services in the Upper Elk Basin and the Gunterville Lake Basin which both are located in the Tennessee River Basin.

Monteagle Utility District serves the town of Monteagle and parts of Franklin, Marion, and Grundy Counties (Figure 2.5). Monteagle provides services in the Upper Elk Basin and the Gunterville Lake Basin which both are located in the Tennessee River Basin.

3.2.2 Utility District Water Supply Systems

Sewanee withdraws all their water supply from Lake O'Donnell. Water from Lake Jackson is pumped to Lake O'Donnell when water levels in Lake O'Donnell need to be replenished. Lake Dimmick is Sewanee's emergency reservoir in case of extreme drought. Sewanee is also connected to Monteagle in the case that Sewanee needs to sell emergency water to Monteagle. Sewanee has a storage capacity of 640,000 gallons which provides 47.3 hours of supply based on average gross water use.

Monteagle's current water source is Laurel Lake. Monteagle withdraws an average of 0.275 MGD in the winter and 0.425 MGD in the summer. Monteagle has connections to Sewanee and Tracy City utility districts. Monteagle receives an average of 50,000 gallons per day from Tracy City by contract. Monteagle purchases emergency water, through Tracy City, from Big Creek U.D. There was a permanent pump station and line run to Lake Louisa in 2007 for emergency water withdrawal for Monteagle. Lake Louisa has been utilized very minimally since being connected. Monteagle

has a storage capacity of 660,000 gallons which provides 52.8 hours of supply based on average gross water use.

Tracy City withdraws their water supply from the Big Fiery Gizzard Reservoir. They have connections to Big Creek, Foster Falls, and Monteagle utility districts but primarily sell to Foster Falls and Monteagle. Foster Falls is a part of Tracy City U.D. and is managed by Tracy City. Tracy City purchases water from Big Creek to sell to Monteagle. Tracy City has one 429,000 gallon storage tank and twin 500,000 gallon storage tanks which provides 98 hours of supply based on average gross water use.

Big Creek U.D. withdraws their water supply from Big Creek Reservoir. Big Creek sells water daily to Cagle/Fredonia and Griffith Creek U.D. Big Creek also has a connection to Tracy City and sells emergency water to that district, which in turn sells that water to Monteagle. Big Creek has a storage capacity of 1 million gallons which provides 31.4 hours of supply based on average gross water use.

<u>TABLE 3-2A</u>						
<u>WATER SUPPLY SYSTEMS</u>						
WATER SYSTEMS	TREATMENT PLANT CAPACITY (mgd)	IMPOUNDMENTS/SUPPLIERS	Withdrawal (mgd)	Water Purchased (mgd)	Water Sold (mgd)	Gross Water Use (mgd)
Big Creek	1.5	Big Creek Reservoir	1	-	-	0.765
		Cagle/Fredonia (buyer)	-	-	0.17	
		Griffith Creek (buyer)	-	-	0.065	
Monteagle	1	Lake Laurel	0.35	-	-	0.3
		Lake Louisa	-	-	-	
		Tracy City (seller)	-	0.05	-	
Sewanee	0.56	Lake O'Donnell	0.325	-	-	0.325
		Lake Jackson	-	-	-	
		Lake Dimmick	-	-	-	
Tracy City	0.936	Fiery Gizzard	0.45	-	-	0.35
		Foster Falls (buyer)	-	-	0.045	
		Big Creek	-	-	-	
		Monteagle (buyer)	-	-	0.055	

<u>TABLE 3-2B</u>	
<u>Size of Water System Connections</u>	
Utility Districts	Connection Size
Sewanee & Monteagle	6"
Monteagle & Tracy City	6"
Tracy City & Big Creek	6"

3.2.3 Water Quality Issues

All of the utility districts with water treatment plants in the study area use the conventional sand filtration method for their water treatment.

Tracy City and Big Creek U.D. anticipate having trouble meeting drinking water regulations due to water quality issues. Tracy City anticipates having trouble with trihalomethanes and haloacetic acids. If the Tennessee River becomes a part of Tracy City's water supply, these problems would intensify due to the age of the water introduced into their system. Big Creek U.D. anticipates and currently has problems with trihalomethanes. Sewanee and Monteagle do not anticipate having trouble meeting future drinking water regulations.

3.2.4 Plans for Expansion of Water Systems

Tracy City currently has a development, called Dyke's Hollow, which does not have water available. Dyke's Hollow is located directly east of Tracy City on the foothill of Cane Mountain. They are currently dealing with several developers desiring to extend water lines for these developments. A public hearing was conducted on 13 January 2009 to discuss raising Big Fiery Gizzard Lake by 7 feet. Tracy City U.D. was in the process of getting a permit to raise Big Fiery Gizzard Lake but TDEC cancelled the permit process because Tracy City U.D. was not authorized to file permit. TDEC stated that if the City of Tracy City signed the permit then they would re-start the permit process. The 7 feet increase in dam height was a funding condition of Rural Development, TDEC, and others in the early 1990's.

Sewanee is constructing a new water treatment plant with a capacity of 0.85 MGD that will be online at the end of 2009.

Big Creek U.D. and Monteagle U.D. have no known plans for expanding their water systems.

3.2.4.1 Limiting Factors of Expansion

Tracy City has some factors that would limit expansion of their existing distribution system. Tracy City is bounded on three sides by existing utility districts, Big Creek to the north, Foster Falls to the east, and Monteagle to the west. Within Tracy City's Utility jurisdiction are thousands of acres of land that could be developed. The size of their reservoir's drainage basin and the upper limit of the reservoir's expansion potential will limit distribution system expansion to about 190% of its existing capacity. Environmental regulations may also hamper their ability to increase the capacity of their existing water supply and thereby limit expanding the distribution system.

The University of the South controls development on about half of Sewanee's distribution area and has no plans for development, thus limiting expansion of Sewanee U.D.'s existing distribution system.

Big Creek's source water capacity is one factor which would limit expansion of their existing distribution system.

3.2.4.2 Environmental Impact of Expansion

Tracy City is not aware of any environmental impact that may result from increased water withdrawals from existing sources, expansion of treatment plant capacity or distribution system, or development of new water supply sources. Big Fiery Gizzard Reservoir's current safe yield prevents increasing water withdrawals or expanding their existing treatment plant. Raising the dam, and increasing their reservoir storage capacity 90%, would inundate about 1,300 additional feet of existing streambeds and flood an additional 40 acres.

3.3 EXISTING WATER DEMAND

Existing demand for the current population served, the number of utility connections, the number of municipal and

industrial connections, current percent of water produced that is billed, and system losses for each U.D. within the planning region are shown in Table 3-3, Existing Demand. The approximate population served was calculated by taking the average household size from the 2000 U.S. Census and multiplying it by the number of residential accounts in the utility service areas. In this phase of the study, the amount (MGD) of water billed to the different accounts has not been determined.

Big Creek U.D. serves primarily residential accounts and a few commercial accounts. The average household size for the Big Creek area (Altamont) is 2.76 persons.

Monteagle serves primarily residential accounts and a few commercial accounts. The average household size for the Monteagle area is 2.59 persons.

Sewanee serves a majority of residential accounts. There are a few commercial accounts but Sewanee does not bill their water separately. The average household size for the Sewanee area is 2.15 persons.

Tracy City serves a majority of residential accounts and a few commercial accounts. The average household size for the Tracy City area is 2.51 persons.

TABLE 3-3

EXISTING DEMAND

Utility	Approx. Pop. Served	# of Accounts	Residential Accounts	Commercial Accounts	Industrial Accounts	Other Accounts	Avg. Quantity of Water Billed (mgd)	Estimate of Water Losses
Big Creek	8029	3099	2909	190	-	-	0.685	20%
Monteagle	2784	1385	1075	126	-	-	0.246	20%
Sewanee	3010	1400	1400	-	-	-	0.29	18%
Tracy City	3600	1497	1396	101	-	-	0.334	6%

3.3.1 Water Shortages

Some of the utility systems in the study area experience shortages during periods of peak demand or face a situation where future demand exceeds, or will exceed, local supply capabilities. Shortages may occur due to inadequate treatment, transmission, or distribution capacity. These

systems must supplement their supplies by further source development or water purchased from other systems.

All of the utilities in the study area receive their water from surface water sources. When these lakes reach low levels, there are no permanent backup sources available. During droughts, the utility districts in this area try to assist each other based on who has a greater supply of water at that given time.

Monteagle's primary water source, Laurel Lake, was almost completely depleted during the 2007 summer drought. An emergency line to Lake Louisa is now installed as but was not in operation during the 2007 drought. Tracy City provided water to Monteagle by purchasing water from Big Creek. But, Big Creek and Tracy City's water source was also limited and they had no choice but to terminate supplying water to Monteagle. The town banned all outdoor watering, commercial car washes, and cut off water to the Rest Area on Interstate 40. Even with these conservation efforts, Monteagle was still about 70,000 gallons short of demand. To cover the shortage, Monteagle made arrangements to buy 100,000 gallons per day of water from Sewanee.

3.3.2 Self-Supplied Water Use in Study Area

All of the self supplied users in the study area are assumed to withdraw their water from groundwater sources. Since none of the utility districts provided their water use broken into different accounts, an average of 125 gallons per day per person was used to determine the estimated amount of water use by self supplied users in the study area.

Big Creek U.D. serves an area of roughly 119 square miles. Using 2000 U.S. Census data, it was determined that the service area has an approximate population of 11,612. Since Big Creek U.D. serves an approximate population of 8,029, it was estimated that the population of self-supplied users in the service area is 3,583. With an average household size of 2.76 persons, the estimated number of potential new residential accounts within the current service area is 1,298. With each person using an average of 125 GPD, the estimated amount of self supplied water use in the service area is 447,875 GPD.

Monteagle U.D. serves an area of roughly 16 square miles. Using 2000 U.S. Census data, it was determined that the service area has an approximate population of 2894. Since Monteagle U.D. serves an approximate population of 2784, it was estimated that the population of self-supplied users within the service area is 110. With an average household size of 2.59 persons, the estimated number of potential new residential accounts within the current service area is 43. With each person using an average of 125 GPD, the estimated amount of self supplied water use in the service area is 13,750 GPD.

Sewanee U.D. serves an area of roughly 28 square miles. Using 2000 U.S. Census data, it was determined that the service area has an approximate population of 3293. Since Sewanee U.D. serves an approximate population of 3010, it was estimated that the population of self-supplied users in the service area is 283. With the average household size of 2.15, the estimated number of potential new residential accounts within the current service area is 132. With each person using an average of 125 GPD, the estimated amount of self supplied water use in the service area is 35,375 GPD.

Tracy City U.D. serves an area of roughly 26 square miles. Using 2000 U.S. Census data, it was determined that the service area has an approximate population of 4,144. Since Tracy City U.D. serves an approximate population of 3,600, it was estimated that the population of self-supplied users in the service area is 544. With the average household size of 2.51, the estimated number of potential new residential accounts within the current service area is 217. With each person using an average of 125 GPD, the estimated amount of self supplied water use in the service area is 68,000 GPD.

3.3.3 Unaccounted for Water Use

In any water system, it is inevitable that not all of the produced water reaches paying consumers. Water that is produced but not billed is referred to as Unmetered/Unaccounted for Water (UAW). Leakage represents the largest portion of UAW, but a significant portion of UAW can be attributed to a combination of unmetered connections, firefighting, meter error, line flushing, and/or accidental breaks. The estimates of water losses presented in Table 3-3, Existing Demand, were provided by each U.D.

3.4 EXISTING WASTE WATER SYSTEMS

Existing capacity of wastewater treatment plants, number of sewer customers, method of discharge, location of treatment plants and discharge, and average daily discharge are presented in Table 3-4, Existing Waste Water Systems. The locations of the WWTP and discharge points are presented in Figure 3.10, WWTP and Discharge Locations. Some utility districts have sewer customers but no treatment plant. These districts pump their sewage to another utility district.

TABLE 3-4						
<u>EXISTING WASTE WATER SYSTEMS</u>						
Utility	Existing Capacity of WW Treatment (mgd)	# Sewer Customers	Method of Discharge	Location of WWTP	Location of Discharge	Avg. Discharge (mgd)
Big Creek	-	-	-	-	-	-
Monteagle	0.5	333	Direct Discharge	US Hwy 41 & US Hwy 41A	Jaunita Creek and tributary to Trussell Creek	0.305 (Jaunita Creek) & 0.051 (Trussell Creek)
Sewanee	0.56	660	Land Application	150 Sherwood Rd	150 Sherwood Rd	-
Tracy City	-	51	Pumped to Monteagle	-	-	-

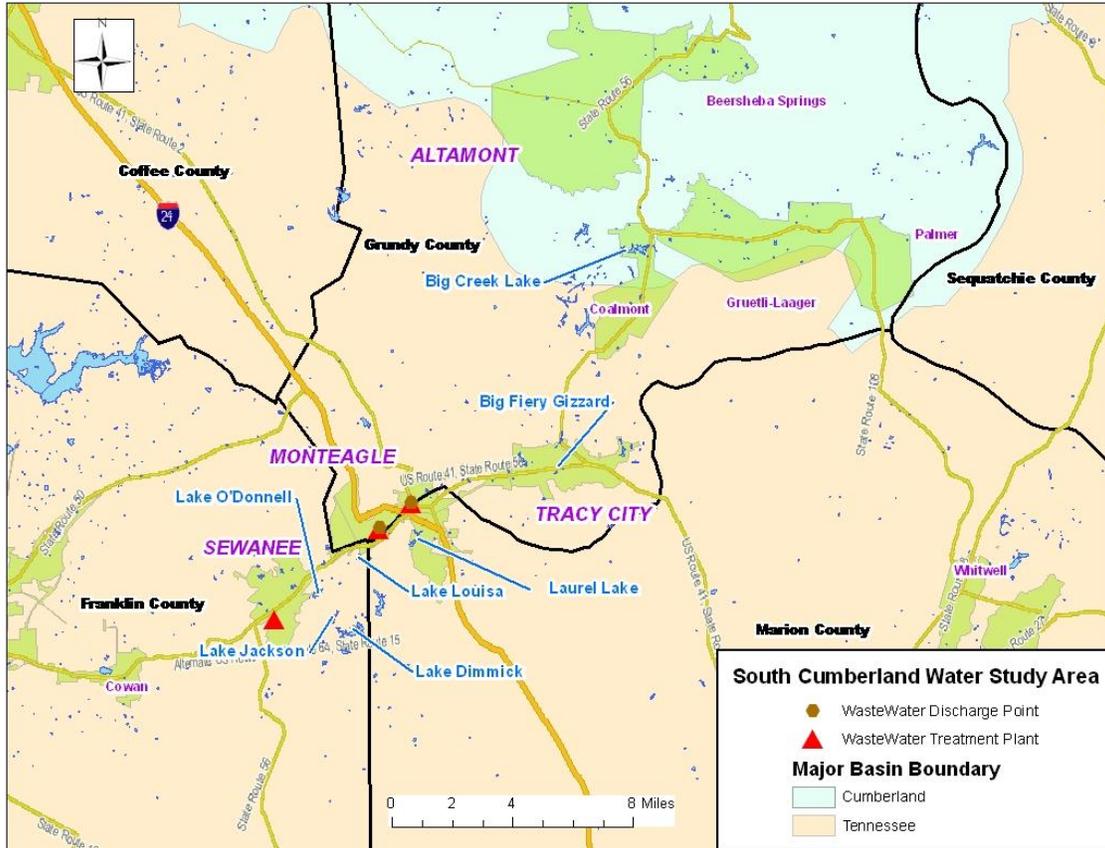
Monteagle U.D. has two NPDES (National Pollutant Discharge Elimination System) permits for their discharge. One plant is located on the west side of US Hwy 41 toward Pelham, TN and discharges into Jaunita Creek. The other plant is located off Hwy 41A toward Sewanee, TN and discharges into an un-named tributary to Trussell Creek. Last year Monteagle discharged 0.173 MGD in August and 0.437 in December to Jaunita Creek and 0.043 MGD in August and 0.059 in December to the Trussell Creek Tributary.

Sewanee U.D. does not have a permit to discharge treated wastewater into a river or stream, they currently apply their treated wastewater over land.

Tracy City U.D. has only a wastewater collection system and they pump their sewage to the town of Monteagle.

Big Creek U.D. does not have any sewer customers or a wastewater treatment plant.

Figure 3.10
WWTP and Discharge Locations



CHAPTER 4

GEOGRAPHIC INFORMATION SYSTEM (GIS)

4.1 GIS DATABASE

Data has been collected and implemented into a GIS database to house the information developed during the study. The GIS database includes basin outlines, all streams, springs, major water lines, intake locations, water treatment plants, wastewater plants, discharge points, and utility inter-connections of the South Cumberland Plateau Region. Hydrography data was incorporated from the USACE existing GIS database. The geographic coordinate system used for the projection of hydrography in the South Cumberland Plateau GIS database is GCS_North_American_1983 and the datum used is D_North_American_1983. Water treatment plants, water supply intakes, wastewater treatment plants, and wastewater discharge points for the utility districts in the study area were created in a GIS shapefile by using their physical locations from street addresses and/or latitudes and longitudes.

Big Creek U.D. provided a Computer Aided Design (CAD) drawing of their water system. The CAD drawing presented Big Creek's water lines, pipe sizes, fire hydrants, storage tanks, and pumping stations. This file was imported into the South Cumberland Plateau GIS Database and converted into a GIS shapefile.

Monteagle U.D. provided an Adobe PDF map that represented their system. The map provided the locations of Monteagle's water lines, pipe sizes, fire hydrants, water storage tanks, water treatment plants, and water meters. The map was then digitized manually into a GIS shapefile to be added to the South Cumberland Plateau GIS Database.

Sewanee U.D. provided a GIS shapefile presenting their water system. The shapefile included Sewanee's water lines and pipe sizes.

Tracy City U.D. provided a Computer Aided Design (CAD) drawing of their water system. The CAD drawing presented Tracy City's water lines, pipe sizes, valves, and fire hydrants. This file was imported into the South Cumberland Plateau GIS Database and converted into a GIS shapefile.

CHAPTER 5

PROPOSED GEOGRAPHIC AREA OF PHASE II

5.1 PHASE II STUDY AREA

The utility districts of Big Creek, Tracy City, Monteagle, and Sewanee, and the geographic areas which they serve, are recommended for further investigation during Phase II of this regional planning pilot.

All of the utility districts in the study area of the South Cumberland Plateau were selected for further investigation during Phase II because of their inter-connections with each other. Monteagle U.D. came very close to an emergency during the 2007 and 2008 droughts and they were supplied water from all of the other utility districts in the study area. The utility districts are also selected because of their geographic relationship with each other. They are all located on the South Cumberland Plateau and currently provide services only on the South Cumberland Plateau.

CHAPTER 6

REGIONAL WATER SUPPLY STUDIES

6.1 PREVIOUS WATER SUPPLY STUDIES

The Municipal Waterworks of Tracy City conducted a Strategic Plan for 2007-2027 that was prepared by Nolen Engineering Group LLC on April 2007.

Sewanee Utility District of Franklin and Marion Counties conducted a Raw Water Source Study that was prepared by Consolidated Technologies, INC. on July 2, 2008.

Sewanee Utility District of Franklin and Marion Counties conducted a Raw Water Source Study Phase II Calibration that was prepared by Consolidated Technologies, INC. on July 25, 2008.

Sequatchie Valley conducted a Water Supply Study for the Southeast Tennessee Development District that was prepared by GRW Elrod Dunson, Inc. on August 2004.

Cagle and Fredonia Utility District conducted a study for the safe yield of Dunway and Laurel Lakes, prepared by James C. Hailey & Company, on April 9, 2007.

Preliminary Engineering Report on Southern Cumberland Plateau Permanent Water Source for Grundy County, Tennessee Appalachian Regional Commission Application, Prepared by James C. Hailey & Company on June 2008.

CHAPTER 7

WATER SUPPLY STUDY CONTACTS

7.1 CONTACTS

The contacts for the Southern Cumberland TN Study Area are presented in TABLE 7-1, Water Supply Study Contacts.

TABLE 5-1								
WATER SUPPLY STUDY CONTACTS								
Utility/ Organization	Address	City	Zip Code	Point of Contact	Phone	Fax	E-mail	Web Page
Big Creek	PO Box 160	Altamont	37301	Allen Joslyn	931-692-2505 & 931-235- 2303	931-692-2508	bigcreekoﬀ@ blomand.net	-
Cagle/ Fredonia	PO Box 1191	Dunlap	37327	Steve Farley	423-413-6431	423-949-8576	-	-
Griffith Creek	6684 Highway 108	Whitwell	37397	-	423-658-6937	-	-	-
Monteagle	PO Box 127, 16 Dixie Lee Hwy	Monteagle	37356	Kevin D. Gilliam	931-924-2265	931-924-2264	k_gilliam@bl omand.net	-
Sewanee	PO Box 3211	Sewanee	37375	Ben Beavers	931-598-5611	931-598-0177	bbeavers@sew aneutility. org	www.sewane eutility.o rg
Tracy City/ Foster Falls	PO Box 28	Tracy City	37387	Tommy E. McFarland	931-592-2787 & 424-903- 0588	931-592-2795	macmgr@bloma nd.net	-
Nashville COE	PO Box 1070	Nashville	37202	Sue Ferguson	615-736-7192	615-736-7220	sue.l.feguso n@usace.army .mil	http://www .orn.usace .army.mil/
Nashville COE	PO Box 1070	Nashville	37202	Ben Rohrbach	615-736-7497	615-736-7220	ben.rohrbach @usace.army. mil	http://www .orn.usace .army.mil/
TDEC	401 Church St.	Nashville	37243	Elaine H. Boyd	615-532-0288	615-741-8858	elaine.boyd@ state.tn.us	-
TDEC	401 Church St.	Nashville	37243	Robert L. Foster, Jr.	615-532-0155	-	robert.foste r@state.tn.u s	-
TDEC	401 Church St.	Nashville	37243	Paul E. Davis	615-532-0632	-	paul.estill. davis@state. tn.us	-