

South Central Planning Region

REGIONAL DESCRIPTION

Covering approximately 8.3 percent of the state (5,799 square miles), Carter, Garvin, Grady, Jefferson, Love, Marshall, Murray and Stephens Counties comprise the South Central Planning Region (Figure 28). Lying at the eastern edge of the Southern Great Plains, the region varies from lush pastures in the river bottoms to sparsely vegetated oilfields to the rugged foothills of the Arbuckle Mountains. Stream and surface water sources are abundant in the eastern portion of the region; however, they are relatively scarce in the west.

The South Central Region is projected to have the lowest overall water demand of any region for the year 2050. The region is sparsely populated, with the largest cities being Ardmore, Duncan and Chickasha. The projected 2050 agricultural demand is estimated to account for only 3.2 percent of the total statewide agricultural demand.

The region's climate is mild with annual mean temperatures varying from 61 to 64 degrees. Annual evaporation within the region ranges from 63 inches in the west to 55 inches in the east. Rainfall averages 30 inches per year in the west and approaches 39 inches per year in the east.

WATER RESOURCES

Stream Water

The region's major streams include the Red River and Washita River, along with Beaver Creek, Mud Creek and Walnut Bayou. Stream water is not a dependable supply source in this region due to intermittent flow in most streams and generally poor water quality.

Forming its southern border, the Red River is the major stream in the South Central Region. The river is highly mineralized above Lake Texoma, with chlorides and dissolved solids often exceeding EPA limits. The Red River Chloride Control Project has been proposed by the Corps of Engineers to reduce naturally occurring chloride levels in the River and its tributaries.

The Washita River flows through the northern portion of the region before joining the Red River in Lake Texoma. The

Washita is also highly mineralized, although tributary streams improve overall quality in the lower reaches to make it suitable for most uses.

MAJOR RESERVOIRS

Table 27 lists existing and proposed reservoirs within the region. The largest of four existing major impoundments is Lake Texoma, on the Oklahoma/Texas border in Love and Marshall Counties.

Texoma, a Corps of Engineers project, was constructed in 1944 for flood control, water supply, recreation, navigation and hydropower purposes, as well as for regulation of Red River flows. Its flood control storage of 2,613,777 ac-ft is credited with preventing more than \$101 million dollars in flood-related damages since becoming operational. The lake is located on the mainstem of the Red River and is subject to the Red River Compact which equally allocates water supplies to Texas and Oklahoma. Each state is allotted a dependable water supply yield of 168,000 af/yr (150 mgd). Lake Texoma has power pool storage of 1,010,170 ac-ft and installed hydroturbine capacity of 70,000 kW. The water is of generally poor quality and is not suitable for most municipal and industrial uses without treatment or blending. However, water in the Washita arm of the lake is generally suitable for most uses.

Lake of the Arbuckles was constructed by the Bureau of Reclamation in 1967. Located in Murray County on Rock Creek, a tributary of the Washita River, the impoundment provides water supply, flood control, recreation, and fish and wildlife mitigation. The reservoir has 36,400 ac-ft of flood control storage and 62,600 ac-ft of conservation storage which yields 24,000 af/yr (21.4 mgd). All of the available yield is allocated to the Arbuckle Master Conservancy District which provides water to the cities of Ardmore, Davis, Sulphur, Wynnewood and Dougherty. Quality of the water is good, making it suitable for all uses.

Lake Murray, a state-owned lake constructed in 1937 solely for recreational purposes, is one of southern Oklahoma's major tourist attractions, second only to Lake Texoma. Located on Hickory Creek in Love County, the lake has 153,250 ac-ft of conservation storage; however, none of that storage is for water supply. Several permits have been issued for recreation, fish and wildlife mitigation, and irrigation uses.

Waurika Lake is a Corps project on Beaver Creek in Jefferson County. The project was completed in 1982 for water supply, flood control, irrigation, water quality, recreation, and fish and wildlife mitigation purposes. The project contains 131,900 ac-ft of flood control storage (after sedimentation) and 170,200 ac-ft of conservation storage. The project yields 45,590 af/yr (40.7 mgd) of water supply (including water quality and irrigation uses). All yield is allocated to the Waurika Master Conservancy District which provides water service to the cities of Duncan, Lawton, Waurika, Temple and Comanche.

MUNICIPAL LAKES

There are 11 large municipal lakes within the South Central Planning Region. Ardmore City Lake, constructed in 1910, is one of the oldest impoundments in Oklahoma. The impoundment is on a tributary of Caddo Creek, approximately four miles north of the City of Ardmore in Carter County. Its primary use is now recreation; however, it is capable of providing 560 af/yr (0.5 mgd) of water supply from its 2,300 ac-ft of conservation storage.

Ardmore Mountain Lake is an impoundment on Hickory Creek in north central Carter County, approximately 21 miles northwest of Ardmore. The lake is owned by the City of Ardmore and is primarily used for recreation and water supply. The lake has 4,650 ac-ft of conservation storage and a dependable yield of 2,800 af/yr (2.5 mgd).

Clear Creek Lake (7,710 ac-ft), Duncan Lake (7,200 ac-ft), Lake Humphreys (SCS #22, 14,041 ac-ft) and Lake Fuqua (SCS #39, 21,100 ac-ft) are municipal lakes used by the City of Duncan for water supply and recreation. Clear Creek, Duncan and Humphreys are on tributaries of Wildhorse Creek in Stephens County; Fuqua is on Black Bear Creek in Stephens County. Humphreys and Fuqua are NRCS projects which also provide flood control storage. The combined yield of Clear Creek Lake, Duncan Lake and Lake Fuqua is 2,654 af/yr (2.4 mgd). The yield of Lake Humphreys is 2,442 af/yr (2.2 mgd).

Pauls Valley Lake is a 750-acre impoundment in Garvin County. Located on Washington Creek, the lake provides water supply and recreation for the City of Pauls Valley. The lake has 8,500 ac-ft of conservation storage which yields 4,000 af/yr (3.6 mgd) of water supply.

Lake R.C. Longmire (SCS-17M) is an NRCS project completed in 1990 for water supply, flood control and recreation in Garvin County on Keel Sandy Creek. The lake is owned by the City of Pauls Valley and has 4,142 ac-ft of flood control storage and 13,162 ac-ft of conservation storage which yields 3,360 af/yr (3 mgd).

Rock Creek Reservoir (SCS #18) is a multipurpose project on a tributary of Caddo Creek in Carter County, approximately seven miles northwest of Ardmore. The reservoir, with 248 surface acres, has 1,634 ac-ft of flood control storage. The 2,573 ac-ft of conservation storage yields

1,220 af/yr (1.1 mgd) of water supply for the City of Ardmore.

OTHER IMPOUNDMENTS

There are numerous other NRCS projects, small municipal lakes and private reservoirs within the South Central Planning Region. These small lakes provide municipal supply, irrigation water and recreational opportunities. Healdton (SCS #10; approximately 3,766 ac-ft of conservation storage), Taylor Lake (SCS #1; 1,8777 ac-ft), Madill Lake (3,000 ac-ft), Burtschi Lake (2,140 ac-ft), Comanche Lake (2,500 ac-ft), Carter Lake (990 ac-ft) and

Veterans Lake (600 ac-ft) are some of the larger impoundments in this category.

AUTHORIZED DEVELOPMENT

There are no major authorized water supply projects within the South Central Planning Region.

POTENTIAL DEVELOPMENT

Several sites in the South Central Planning Region have potential for development of new water supply projects. Of the eight sites identified in Table 27, several have been extensively studied, although no local sponsors currently exist for any of these projects.

Table 27
STREAM WATER DEVELOPMENT
South Central Planning Region

PROJECT	STREAM	PURPOSE*	FLOOD CONTROL STORAGE (acre-feet)	WATER SUPPLY STORAGE (acre-feet)	WATER SUPPLY YIELD (ac-ft/year)
EXISTING OR UNDER CONSTRUCTION					
Arbuckle	Rock Creek	ws, fc, r, fw	36,400	62,600	24,000
Ardmore	Tributary of Caddo Creek	ws, r	---	2,300	560
Clear Creek	Tributary of Wildhorse Creek	ws, r	---	7,710	---- ¹
Duncan	Tributary of Wildhorse Creek	ws, r	---	7,200	---- ¹
Fuqua	Black Bear Creek	ws, fc, r	3,500	17,600	2,654 ¹
Fort Cobb	Cobb Creek	ws, fc, r, i	63,750	78,350	8,280 ²
Humphreys	Tributary of Wildhorse Creek	ws, fc, r	11,900	10,700	2,442
Longmire, R.C. (SCS 17M)	Keel Sandy Creek	ws, fc, r	4,142	13,162	3,360
Mountain	Tributary of Caddo Creek	ws, r	---	4,650	2,800
Murray	Tributary of Hickory Creek	r	---	153,250	---
Jean Neustadt (SCS 13)	Tributary of Caddo Creek	ws, fc, r	4,357	4,542	2,150
Pauls Valley	Washington Creek	ws, r	---	8,500	4,000
Rock Creek (SCS 18)	Tributary of Caddo Creek	ws, r	1,634	2,573	1,220
Texoma	Red River	ws, fc, p, r, n, flow	2,613,777	150,000	168,000 ³
Waurika	Beaver Creek	ws, fc, wq, r, fw, i	131,900	170,200	18,400 ⁴
TOTAL			2,871,360	693,337	237,866
POTENTIAL					
Atlee	Mud Creek	w s	26,660	25,600	5,500
Burneyville	Walnut Bayou	ws, p, r	576,580	150,000	25,000
Caddo	Caddo Creek	ws, p, r	73,980	260,000	40,000
Courtney	Mud Creek	ws, p, r	79,000	224,100	45,100
Davis	Colbert Creek	w s	4,400	10,760	2,800
Gainesville	Red River	ws, p, r, fw, i	47,151	35,000	8,750 ⁵
Hennepin	Wildhorse Creek	ws, p	27,000	180,000	30,000
Purdy	Rush Creek	ws, fc, r	62,500	140,000	20,000
TOTAL			897,271	1,025,460	177,150
TOTAL YIELD					415,016

*ws-municipal water supply, fc-flood control, wq-water quality, p-power, r-recreation, fw-fish and wildlife, i-irrigation, n-navigation, flow-low flow augmentation.

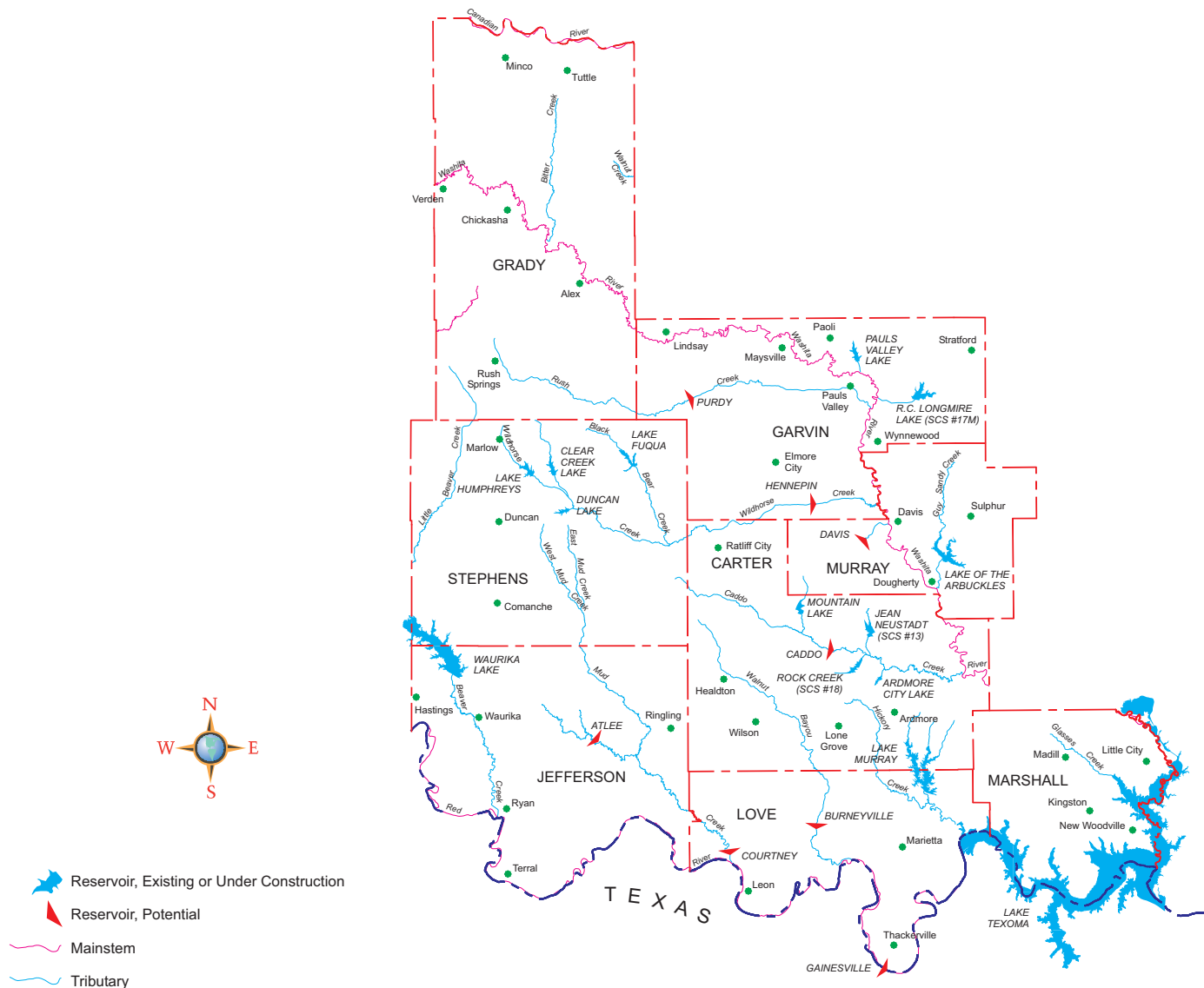
¹ Combined yield of Clear Creek Lake, Lake Fuqua and Lake Duncan is 2,654 af/yr.

² Located in Southwest Planning Region; total yield is 18,000 af/yr, with 9,720 af/yr allocated to Southwest Planning Region.

³ Lake Texoma is subject to Red River Compact Agreement between States of Oklahoma and Texas. Under terms of agreement, Oklahoma has rights to one-half of total water supply yield, or 168,000 af/yr (150 mgd).

⁴ Total yield of Waurika Lake is 45,590 af/yr, including 5,040 af/yr of irrigation storage. All yield allocated to Waurika Master Conservancy District; approximately 18,400 af/yr allocated to South Central Region and 27,190 af/yr allocated to Southwest Region.

⁵ Site located on interstate stream subject to Red River Compact Agreement. Total yield projected to be 17,500 af/yr, of which 8,750 af/yr would be available to Oklahoma.



OKLAHOMA COMPREHENSIVE
WATER PLAN

Figure 28
SOUTH CENTRAL
PLANNING REGION

Atlee Reservoir is a proposed water supply impoundment on West Mud Creek in Jefferson County. The potential yield of the reservoir is 5,500 af/yr (4.9 mgd) from the 26,500 ac-ft of conservation storage. Flood control storage of 26,660 ac-ft is anticipated in the reservoir. This project is an alternative site for Courtney Reservoir, discussed later.

Burneyville Lake is proposed for development on Walnut Bayou in Love County. The 8,500-acre project would provide water supply and hydropower. The potential yield is estimated at 25,000 af/yr (22.3 mgd) with 150,000 ac-ft of conservation storage. An additional 576,580 ac-ft of flood control storage is possible at this site.

Caddo Lake is a proposed multipurpose impoundment on Caddo Creek in Carter County. The lake would have 260,000 ac-ft of conservation storage yielding 40,000 af/yr (35.7 mgd). In addition, 73,980 ac-ft of flood control storage is planned.

Courtney Reservoir is a potential project on Mud Creek in western Love County. The potential yield of 45,100

af/yr (40.3 mgd) would be developed from 224,100 ac-ft of conservation storage. Flood control storage of 79,000 ac-ft is also possible.

Purdy Reservoir is a potential impoundment on Rush Creek in western Garvin County. Its conservation storage of 140,000 ac-ft is proposed to yield 20,000 af/yr (17.9 mgd), although quality of the water for M&I purposes is questionable. The site can also provide 62,550 ac-ft of flood control storage.

STREAM WATER RIGHTS

As of June 1994, the OWRB had issued stream water allocation permits totaling 178,796 ac-ft per year from lakes, rivers and streams in the South Central Planning Region (Table 28).

Groundwater

South Central Oklahoma overlies six principal groundwater aquifers -- the Arbuckle-Timbered Hills Group, Arbuckle-Simpson Group, Oscar Formation, Rush Springs Sandstone, Antlers Formation and alluvium and terrace deposits of the Red and Washita Rivers. Ground-

water is the principal source of supply for most of the region's irrigation and serves as the major supply for many small communities in the region.

The Arbuckle-Timbered Hills Group is a confined limestone, dolomite, sandy dolomite, mudstone and conglomerate formation found in portions of Carter and Murray Counties. Well depths are commonly between 100 and 2,800 feet. Well yields range between 90 and 600 gpm. The water is generally soft; however, fluoride concentrations exceed EPA limits and chloride concentrations approach those limits at most locations. The water is generally not suited for public consumption.

The Arbuckle-Simpson Group is a limestone, dolomite and sandstone formation found in portions of Carter and Murray Counties. Formation thicknesses vary between 5,000 and 9,000 feet. Well depths are commonly between 100 and 2,500 feet with yields between 100 and 500 gpm. The water is of a calcium magnesium bicarbonate type and very hard. Dissolved solids are generally within acceptable limits and the water is suitable for most uses.

Table 28
WATER RIGHTS
South Central Planning Region

STREAM WATER ALLOCATIONS								
(acre-feet)								
COUNTY	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Carter	8,027	4,855	6,581	---	12,253	---	---	31,716
Garvin	4,993	182	9,026	10	1,452	---	---	15,663
Grady	1,951	180	18,458	100	1,301	---	---	21,990
Jefferson	44,582	112	3,597	112	180	---	---	48,583
Love	---	17	2,280	667	---	---	---	2,964
Marshall	6,175	---	4,244	2	100	---	111	10,632
Murray	27,135	1,953	1,444	10	2,116	---	---	32,658
Stephens	6,717	335	2,270	---	5,268	---	---	14,590
TOTAL	99,580	7,634	47,900	901	22,670	---	111	178,796
GROUNDWATER ALLOCATIONS								
(acre-feet)								
COUNTY	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Carter	1,978	1,812	16,297	40	---	---	---	20,127
Garvin	4,931	12,779	12,944	---	33	---	5	30,692
Grady	4,995	1,546	30,019	275	141	---	5	36,981
Jefferson	2,973	280	3,668	---	---	---	10	6,931
Love	3,338	555	21,082	100	510	---	---	25,584
Marshall	5,670	180	3,060	---	100	---	---	9,010
Murray	18,421	1,681	7,320	---	---	4,200	---	31,622
Stephens	2,207	403	2,771	93	20	---	---	5,494
TOTAL	44,512	19,236	97,160	508	804	4,200	20	166,440

Note: Agricultural allocations include Irrigation. Mining included in Industrial.
Source of data: Oklahoma Water Resource Board printout, June 23, 1994.

The Oscar Formation is an interbedded shale, sandstone and limestone conglomerate aquifer which is 300 to 400 feet thick. The formation is found in western Stephens, southwestern Garvin and Carter, and eastern Jefferson County. Wells range from 60 to 400 gpm. The water quality is suitable for most uses.

The Rush Springs Sandstone is a fine-grained sandstone aquifer with some shale, dolomite and gypsum. Within the region, the aquifer is found in portions of Grady and Stephens Counties. Thickness of the formation ranges from 200 feet in the southern end to 300 feet in the north. Wells are usually 200 to 400 feet deep and yield between 200 and 600 gpm. The water tends to be of a calcium bicarbonate type and very hard and TDS levels are generally less than 500 mg/L. The water is suitable for most uses.

The Antlers Sandstone is a friable sandstone, silt, clay and shale formation with an average thickness of 450 feet. The formation is found in Love, Marshall and southern Carter Counties. Wells range between 200 and 800 feet deep with yields between 100 and 500 gpm. The

water is of a sodium or calcium bicarbonate type with dissolved solids generally less than 1,000 mg/L, although they can exceed 3,000 mg/L in some areas. The aquifer is largely undeveloped with an estimated 32 million ac-ft in storage.

The major alluvial and terrace deposit aquifers are found around the two major rivers in the region, the Red and Washita. Wells in these formations yield from 200 to 500 gpm while formation deposits average 70 feet in thickness. The formations consist of silt and clays downgrading into fine to coarse sand. The water is hard to very hard and generally of a calcium magnesium bicarbonate type. TDS values are usually less than 1,000 mg/L in the Washita River Basin and less than 2,000 mg/L in the Red River Basin. Water levels have generally declined in recent years.

GROUNDWATER DEVELOPMENT

Development of groundwater supplies continues within the South Central Planning Region, despite generally low yields and poor water quality. Some communities have developed the Oscar Formation as their principal supply.

Most irrigation in the region utilizes groundwater sources.

GROUNDWATER RIGHTS

As of June 1994, the OWRB had issued groundwater allocation permits totaling 166,440 ac-ft per year from aquifers in the South Central Planning Region (Table 28).

SUPPLY AND DEMAND ANALYSIS

The South Central Planning Region is the dividing line between the portion of Oklahoma containing ample water supply and the portion with insufficient supply. The western portion of the region may have local shortages without the development of future sources. Water quality is also a problem in the west. Table 29 reflects available surplus water within the region; Table 30 indicates the availability of water from existing sources. The long-range projection for M&I water demand in the year 2050 is 74,600 af/yr (66.6 mgd).

Table 29
SURPLUS WATER AVAILABILITY
South Central Planning Region
(1,000 ACRE-FEET/YEAR)

SOURCE	TOTAL YIELD	LOCAL ALLOCATION	OUT OF REGION ALLOCATION	POTENTIAL SURPLUS
Texoma	168.0	4.5	---	163.5
SCS & Municipal Lakes	94.2	94.2	---	---
Groundwater	166.4	166.4	---	---
TOTAL	428.6	265.1	---	163.5
Other Potential Sources				
Atlee	5.5	---	---	5.5
Burneyville	25.0	---	---	25.0
Caddo	40.0	---	---	40.0
Courtney	45.1	---	---	45.1
Davis	2.8	---	---	2.8
Gainsville	8.8	---	---	8.8
Hennepin	30.0	---	---	30.0
Purdy	20.0	---	---	20.0
TOTAL	177.2	---	---	177.2
TOTAL SURPLUS WATER AVAILABILITY	605.8	265.1	---	340.7

Table 30
SUPPLY AND DEMAND ANALYSIS
South Central Planning Region
(1,000 ACRE-FEET/YEAR)

SOURCE	COUNTY								TOTAL
	Carter	Garvin	Grady	Jefferson	Love	Marshall	Murray	Stephens	
MUNICIPAL AND INDUSTRIAL COMPONENT									
Arbuckle	15.9	4.3	---	---	---	---	3.8	---	24.0
Ardmore	0.6	---	---	---	---	---	---	---	0.6
Clear Creek/Duncan/Fuqua	---	---	---	---	---	---	---	2.7	2.7
Fort Cobb ¹	---	---	8.3	---	---	---	---	---	8.3
Humphreys	---	---	---	---	---	---	---	2.4	2.4
Jean Neustadt (SCS-13)	2.2	---	---	---	---	---	---	---	2.2
Longmire, RC (SCS-17M)	---	3.4	---	---	---	---	---	---	3.4
Mountain	2.8	---	---	---	---	---	---	---	2.8
Pauls Valley	---	4.0	---	---	---	---	---	---	4.0
Rock Creek (SCS-18)	1.2	---	---	---	---	---	---	---	1.2
Waurika	---	---	---	9.2	---	---	---	9.2	18.4
SCS & Municipal Lakes	1.3	---	1.1	---	---	5.6	---	1.7	9.7
Groundwater	3.8	17.7	7.0	3.3	4.5	5.9	20.1	2.7	65.0
M & I Supply	27.8	29.4	16.3	12.5	4.5	11.5	23.9	18.7	144.6
2050 M & I Demand	25.5	11.8	13.1	2.1	1.8	3.4	5.7	11.2	74.6
M & I Surplus/(Deficit)	2.3	17.6	3.2	10.4	2.7	8.1	18.2	7.5	70.0
AGRICULTURAL COMPONENT									
Texoma	1.0	---	---	---	---	3.5	---	---	4.5
SCS & Municipal Lakes	9.9	21.8	24.0	2.1	2.7	0.7	8.4	15.0	84.5
Groundwater	16.3	12.9	30.0	3.7	21.1	3.1	7.3	2.8	97.2
Agricultural Supply	27.2	34.7	54.0	5.7	23.8	7.3	15.7	17.7	186.2
2050 Agricultural Demand	5.7	13.7	19.2	4.7	4.9	6.8	2.6	3.7	61.3
Agricultural Surplus/(Deficit)	21.5	21.0	34.8	1.0	18.9	0.5	13.1	14.0	124.9
POWER COMPONENT									
SCS & Municipal Lakes	---	---	---	---	---	---	---	---	---
Groundwater	---	---	---	---	---	---	4.2	---	4.2
Power Supply	---	---	---	---	---	---	4.2	---	4.2
2050 Power Demand	---	---	---	---	---	---	---	---	---
Power Surplus/(Deficit)	---	---	---	---	---	---	4.2	---	4.2
TOTALS									
Total Local Supply	55.0	64.1	70.4	18.2	28.3	18.8	43.8	36.4	335.0
Total 2050 Demand	31.2	25.5	32.3	6.8	6.7	10.2	8.3	14.9	135.9
Net Surplus/(Deficit)	23.8	38.6	38.1	11.4	21.6	8.6	35.5	21.5	199.1

¹ Allocated from Southwest Planning Region.