Southeast Planning Region

REGIONAL DESCRIPTION

Atoka, Bryan, Choctaw, Coal, Johnston, McCurtain, Pontotoc and Pushmataha are the eight counties that comprise the Southeast Planning Region (Figure 29). The region's terrain varies from the rugged Kiamichi Mountains to the rolling, alluvial plains of the Red River. Stream and surface water sources are abundant in the region which is noted for its vast timber resources.

The Southeast Region is projected to have the second lowest overall water demand of any planning region in the year 2050. McCurtain County, with its large timber and related industry, is a county-specific exception. Ada, Durant, Hugo and Idabel are the largest cities in the region.

The region's climate is mild with annual mean temperatures varying from 62 to 64 degrees. Rainfall is abundant, ranging from 40 inches per year in the west to more than 56 inches in northern McCurtain County. Annual evaporation ranges from 56 inches in western areas to 48 inches in the east.

WATER RESOURCES

Stream Water

The region's major streams include the Red River, Little River, Kiamichi River, Blue River, Clear Boggy Creek, Muddy Boggy Creek and the Washita River. With the exception of the Red River below Lake Texoma, the region's streams contain good quality water which is generally suitable for all uses.

The Red River is the largest and longest stream within the Southeast Planning Region. The water contains high levels of dissolved solids and chlorides through much of Bryan and Choctaw Counties. Downstream of its confluence with the Blue River, Boggy Creek(s) and Kiamichi River, the river is of acceptable quality for most uses.

The Blue River flows southeasterly through Pontotoc, Johnston and Bryan Counties to its confluence with the Red River. The river's drainage basin is approximately 80 miles long and contains 676 square miles. There are no impoundments on the Blue River and its water is classified as hard with moderate levels of inorganic turbidity.

The Boggy Creek Basin consists of Clear Boggy Creek and Muddy Boggy Creek. The drainage basin contains 2,400 square miles in Pontotoc, Coal, Atoka, Bryan and Choctaw Counties. Atoka Lake and McGee Creek Lake are the major impoundments in the river basin. The water in upper Muddy Boggy Creek is generally hard with high chloride and moderate sulfate concentrations. Downstream of Atoka, the water becomes moderately hard with lower sulfate and chloride levels. High turbidity and nutrient levels exist along the entire branch. Water in Clear Boggy Creek is relatively hard with moderate turbidity and moderate levels of chlorides and sulfates.

The Kiamichi River flows southeasterly through Pushmataha and Choctaw Counties. The drainage basin encompasses 1,830 square miles, including Sardis Reservoir and Hugo Lake. Water in the Kiamichi River is of high quality with little mineralization. The water is moderately turbid and classified as soft.

The Little River flows southeasterly through Pushmataha and McCurtain Counties before entering Arkansas. The Mountain Fork and Glover Rivers join the Little River in McCurtain County. Pine Creek Lake and Broken Bow Lake are located on the Little River and its tributaries. Turbidity levels and nutrient levels are moderate. The water quality is generally good and suited for all uses.

MAJOR RESERVOIRS

There are six major impoundments within the Southeast Planning Region (Table 31). Atoka Lake, located on North Boggy Creek in Atoka County, is a water supply lake owned by the City of Oklahoma City. Built in 1964, the reservoir provides 125,000 ac-ft of conservation storage yielding 65,000 af/yr (58 mgd) of good quality water. The water is transferred via pipeline to Lake Stanley Draper in the Central Region for use by Oklahoma City. The pipeline has a capacity of 90 mgd.

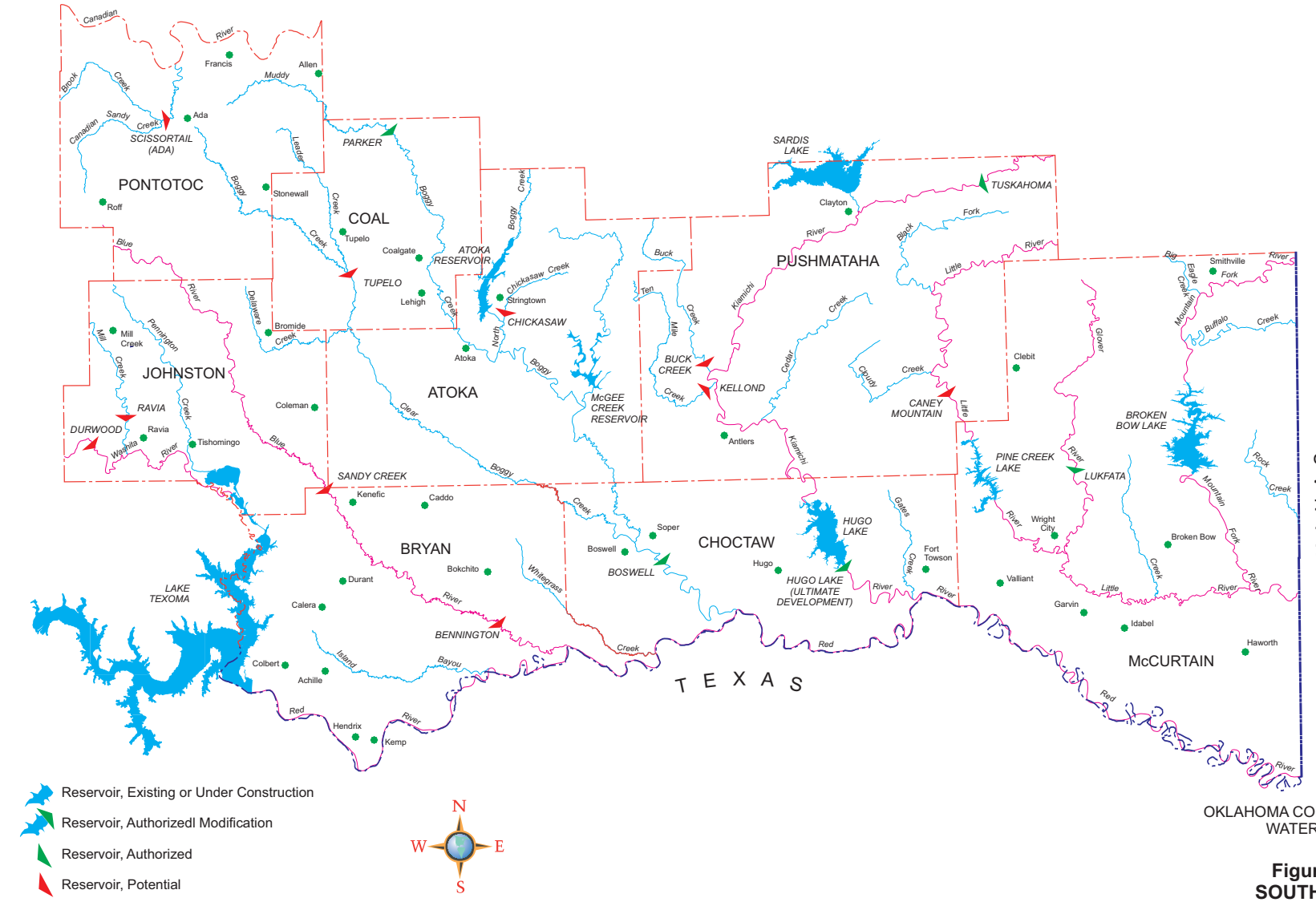
Broken Bow Lake is a Corps of Engineers impoundment on the Mountain Fork River in McCurtain County. The multipurpose reservoir, completed in 1970, provides water supply, flood control, recreation, hydropower, water quality, and fish and wildlife mitigation benefits. The reservoir has 450,160 ac-ft of flood control storage and 152,500 ac-ft yielding 196,000 af/yr (175 mgd) for water supply and water quality needs. Broken Bow Lake includes a re-regulation dam approximately nine miles downstream which satisfies low-flow requirements of the U.S. Fish and Wildlife Service and evens out fluctuations caused by power releases. Power facilities at Broken Bow Lake include two 50,000 kW generators which are fed from 317,320 ac-ft of power storage.

Hugo Lake, the largest lake in the Southeast Planning Region, is located on the Kiamichi River in Choctaw County. This Corps project provides flood control, water supply, water quality, recreation, and fish and wildlife mitigation. Hugo was completed in 1974 and contains 808,300 ac-ft of flood control storage that was completely filled during the floods of 1990. The lake also contains 121,500 ac-ft of conservation storage which yields 64,960 af/yr (58 mgd) of water supply and 100,800 af/yr (90 mgd) for water quality control purposes.

McGee Creek Reservoir is a Bureau of Reclamation project on McGee Creek, a tributary of Muddy Boggy Creek, in Atoka County. Completed in 1987, the project's purposes include water supply, water quality control, flood control, recreation, and fish and wildlife mitigation. The reservoir, which has a drainage area of 171 square miles, reserves 85,340 ac-ft of flood control storage and conservation storage of 107,980 ac-ft which yields 71,800 af/yr (64 mgd) of water supply. Oklahoma City, in the Central Planning Region, has the allocation rights to 40,000 af/yr (35.7 mgd) of the yield. The City of Atoka, Atoka County and the Southern Oklahoma Development Trust have allocations totaling 20,000 af/yr (17.9 mgd).

Pine Creek Lake, located on the Little River in McCurtain County, was completed by the Corps of Engineers in 1969 and provides flood control, water supply, water quality, recreation, and fish and wildlife mitigation. The lake currently has 412, 030 ac-ft of flood control storage and 46,610 ac-ft of conservation storage. When water supply demands require, the conservation pool is raised to 70,560 ac-ft (49,400 ac-ft of water supply; 21,160 ac-ft for water quality purposes), resulting in a yield of 94,080 af/yr (84 mgd) for water supply and 40,330 af/yr (36 mgd) for water quality control. Weyerhauser is the only significant user of the water, which is of excellent quality.

Sardis Lake is a relatively new lake in Oklahoma. Formerly known as Clayton Lake, the impoundment was completed by



OKLAHOMA COMPREHENSIVE WATER PLAN

Figure 29
SOUTHEAST PLANNING REGION

Mapping and Graphics - Oklahoma Water Resources Board

the Corps in 1983 on Jackfork Creek, a tributary of the Kiamichi River, in Pushmataha County. Authorized uses include flood control, water supply, recreation, and fish and wildlife mitigation. The lake contains 121,670 ac-ft of flood control storage, 270,270 ac-ft of conservation storage, and yields 156,800 af/yr (140 mgd) of good quality water.

MUNICIPAL LAKES

There is only one municipal water supply lake in the Southeast Planning Region. Coalgate City Lake (SCS-#2), located on Coon Creek in Coal County, is used by the City of Coalgate for water supply, flood control and recreation. The lake was built in 1965 and contains 3,437 ac-ft of conservation storage.

OTHER IMPOUNDMENTS

There are numerous other NRCS projects and private reservoirs in the Southeast Planning Region. These small lakes, which provide irrigation water and various recreational opportunities, include Clayton Lake (953 ac-ft of approximate conservation storage), Bluestem (840 ac-ft), Lake Nanih Waiya (1,064 ac-ft), Lake Ozzie Cobb (833 ac-ft), Lake Raymond Gary (1,681 ac-ft) and Lake Schooler (306 ac-ft).

AUTHORIZED DEVELOPMENT

There are four authorized water supply projects in the Southeast Planning Region. Boswell Lake is an authorized project on Boggy Creek in Choctaw County. The reservoir, as initially authorized, would contain 1,096,000 ac-ft of flood

Table 31
STREAM WATER DEVELOPMENT
Southeast 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			
Atoka	North Boggy Creek	ws, r	---	123,500	700 [1]
Broken Bow	Mountain Fork River	ws, fc, wq, p, r, fw	450,160	152,500	96,000 [2]
Hugo	Kiamichi River	ws, fc, wq, r, fw	808,300	121,500 [3]	165,760 [3]
McGee Creek	McGee Creek	ws, fc, wq, r, fw	85,340	107,980	31,800 [4]
Pine Creek	Little River	ws, fc, wq, r, fw	388,080	70,560 [5]	134,400 [5]
Sardis [6]	Jackfork Creek	ws, fc, r, fw	121,670	270,270 [6]	156,800
TOTAL			**1,853,550**	**846,310**	**685,460**
		AUTHORIZED			
Boswell [7]	Boggy Creek	ws, fc, r, fw	294,100	60,870	56,000
Lukfata	Glover Creek	ws, fc, r, fw	172,000	31,000 [8]	69,450
Parker	Muddy Boggy Creek	ws, fc, r	100,300	109,940	45,900
Tuskahoma	Kiamichi River	ws, fc, r, fw	138,600	231,000	224,000 [9]
TOTAL			**705,000**	**432,810**	**395,350**
		POTENTIAL			
Bennington (Durant)	Blue River	ws, fc, r	359,590	287,420	179,000
Buck Creek	Buck Creek	ws, fc, p, r	36,300	48,300	56,000
Caney Mountain	Little River	p	---	77,067	104,000
Chickasaw	Chickasaw Creek	ws, fc, p, r	158,940	36,320	17,900
Durwood	Washita River	ws, p	245,230	119,730	232,000
Hugo (Ultimate Development)	Kiamichi River	ws, fc, wq, r, fw	651,800	284,300	137,000 [10]
Kellond	Ten Mile Creek	ws, fc, r	43,300	133,000	56,000
Ravia	Mill Creek	ws, r, fw	51,600	100,800	25,300
Sandy Creek	Blue River	ws, p	88,080	16,920	10,800
Scissortail (Ada)	Sandy Creek	ws, r	---	88,200	32,000
Tupelo	Clear Boggy Creek	ws, fc, r, fw, i	177,300	280,000	93,000
TOTAL			**1,812,140**	**1,472,057**	**943,000**
TOTAL YIELD					**2,023,810**

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

[1] Total yield is 65,000 af/yr, of which 64,300 af/yr is allocated to City of Oklahoma City (Central Region) and 700 af/yr to Southeast Region. Water from McGee Creek is pumped to Atoka for transfer to Stanley Draper Lake via Atoka Pipeline (90 mgd capacity).
[2] Includes 57,000 ac-ft of water supply storage (72,800 af/yr yield) and 95,500 af/yr for water quality control (123,200 af/yr yield).
[3] Includes 47,600 ac-ft of water supply storage (64,960 af/yr yield) and 73,900 ac-ft for water quality control (100,800 af/yr yield).
[4] Total yield is 71,800 af/yr, of which 40,000 af/yr is allocated to City of Oklahoma City (Central Region).
[5] Includes 49,400 ac-ft of water supply storage (94,100 af/yr yield) and 21,160 ac-ft for water quality control (40,300 af/yr yield).
[6] Formerly known as Clayton Reservoir (1980 *Oklahoma Comprehensive Water Plan*). Total initial conservation storage of 274,210 ac-ft includes 4,900 ac-ft for sediment. Value listed reflects net of 100-year sediment.
[7] Largest possible impoundment which can be constructed due to presence of McGee Creek Dam upstream.
[8] Does not include 4,000 ac-ft for other conservation storage and sediment reserve.
[9] 1989 Interagency Technical Report recommends inclusion of power as an authorized use, reducing size of impoundment to 49,100 ac-ft of conservation storage, no flood control, and water supply yield of 63,850 af/yr.
[10] Assumes reallocation of some flood control storage after construction of Sardis and Tuskahoma projects.

control storage and 1,243,800 ac-ft of water supply storage yielding 621,700 af/yr (555 mgd). However, subsequent re-evaluation has determined that the project would inundate the downstream toe of McGee Creek Dam. As such, the largest project that could now be constructed would provide 294,100 ac-ft of flood control storage and 60,870 ac-ft of conservation storage yielding 56,000 af/yr (50 mgd) of water supply. The project is not currently economically viable, based solely on flood control benefits. Should a local sponsor emerge for the water supply storage, the project could be reactivated.

Lukfata Lake is an authorized impoundment on Glover Creek in McCurtain County. Authorized uses include flood control and water supply. The project would have 172,000 ac-ft of flood control storage and 31,000 ac-ft of conservation storage yielding 69,450 af/yr (62 mgd) of excellent quality water supply. Lukfata Lake is the only impoundment in the seven-lake system authorized for the Little River Basin that has not yet been constructed. In 1977, Congressional funding for the project was halted due to the potential adverse effect on the area's Leopard Darter habitat. The Leopard Darter is a small fish on the threatened species list.

Parker Lake is a proposed impoundment, authorized by the Water Resources Development Act of 1986, on Muddy Boggy Creek in Coal County. The lake is authorized for flood control, water supply, recreation, and fish and wildlife mitigation uses. It is estimated to have a drainage area of 164 square miles and would provide 110,300 ac-ft of flood control storage and 109,940 ac-ft of conservation storage yielding 45,900 af/yr (41 mgd) of good quality water. Pre-construction engineering and design have been completed for the project, but construction is on hold until a local sponsor for the water supply storage is secured.

Tuskahoma Lake is the fourth authorized project in the Southeast Planning Region. The project, in deferred status since 1981, is proposed for construction on the Kiamichi River in Pushmataha and LeFlore Counties for the purposes of flood control, water supply, recreation, and fish and wildlife conservation. The reservoir would provide flood control storage of 138,600 ac-ft and conservation storage of 231,000 ac-ft. The estimated yield is 224,000 af/yr (200 mgd). The project was re-evaluated by the Corps of Engineers in 1989 with hydropower as a proposed use. The recommended configuration would have no flood control storage and only 49,100 ac-ft of conservation storage yielding 63,850 af/yr (57 mgd) of water supply. While hydropower benefits indicate that the project may be economically justified, hydropower is not an authorized use and the project does not meet federal criteria for participation.

POTENTIAL DEVELOPMENT

There are numerous potential sites in the Southeast Planning Region for the development of new water supply projects. The abundance of rainfall in the region aids in this potential development. Of the 10 sites identified in Table 31, local interest remains high for several projects.

Ravia Reservoir is a potential impoundment on Mill Creek in Johnston County. The reservoir would provide 51,600 ac-ft of flood control storage, 100,800 ac-ft of conservation storage, and a firm yield of 25,300 af/yr (22.6 mgd).

Scissortail Reservoir is a potential project on Canadian Sandy Creek, a Canadian River tributary, in Pontotoc County. Formally known as the Ada Reservoir project, the lake would provide municipal water supply, recreation, and fish and wildlife enhancement. The site is anticipated to provide 88,200 ac-ft of conser-

Table 32
WATER RIGHTS
Southeast Planning Region

STREAM WATER ALLOCATIONS
(acre-feet)

COUNTY	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Atoka	140,309	12,000	3,267	---	139	285	---	156,000
Bryan	13,435	644	11,964	5	6,626	---	---	32,674
Choctaw	30,500	---	6,349	---	290	32,000	---	69,139
Coal	3,266	---	5,474	---	64	---	---	8,804
Johnston	1,290	445	8,177	25	2,325	---	---	12,262
McCurtain	21,432	37,256	17,406	---	295	---	---	76,389
Pontotoc	8,700	252	3,073	23	24	---	---	12,072
Pushmataha	13,908	---	2,190	---	258	---	---	16,356
TOTAL	**232,840**	**50,597**	**57,900**	**53**	**10,021**	**32,285**	**---**	**383,696**

GROUNDWATER ALLOCATIONS
(acre-feet)

COUNTY	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Atoka	698	---	380	---	20	---	---	1,098
Bryan	4,395	248	6,826	---	10	---	---	11,479
Choctaw	3,566	2,754	1,765	---	60	---	---	8,145
Coal	837	---	30	---	---	---	---	867
Johnston	4,141	1,404	3,506	4	240	2	---	9,297
McCurtain	392	60	230	---	2	---	---	684
Pontotoc	52,781	6,991	13,581	794	30	2,600	---	76,777
Pushmataha	80	2	252	---	6	---	---	340
TOTAL	**66,890**	**11,459**	**26,570**	**799**	**368**	**2,602**	**---**	**108,688**

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

vation storage and an average annual yield of 32,000 af/yr (28.6 mgd). The project has been extensively evaluated by the Bureau of Reclamation as a possible water supply source for the City of Ada.

Durwood Reservoir is a proposed multipurpose site on the Washita River in Johnston County. Potential uses include water supply, flood control, hydropower, irrigation and recreation. The reservoir is anticipated to provide 245,230 ac-ft of flood control storage and 119,730 ac-ft of conservation storage yielding 232,000 af/yr (207.1 mgd).

Of the remaining projects, Buck Creek, Caney Mountain, Chickasaw, Kellond and Tupelo did not pass Bureau of Reclamation screening criteria for potential hydropower, flood control, recreation and/or water supply projects during their last review. Bennington (Durant) Reservoir and Sandy Creek Reservoir were recommended as long-term potential projects since they did not meet the Bureau's selection criteria as viable projects for short-range development. Should certain economic conditions change in the future, their potential for development as long-range projects may prove feasible.

STREAM WATER RIGHTS

As of June 1994, the OWRB had issued stream water permits totaling 383,696 ac-ft per year from lakes, rivers and streams in the Southeast Planning Region (Table 32).

Groundwater

Southeast Oklahoma has two major groundwater aquifers, the Arbuckle-Simpson Group and Antlers Sandstone Formation.

The Arbuckle-Simpson Group is a limestone, dolomite and sandstone formation found in Pontotoc and Johnston 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. There is currently little development of this aquifer.

The Antlers Sandstone is a friable sandstone, silt, clay and shale formation with an average thickness of 450 feet. The formation is found in Bryan, Choctaw, McCurtain, Atoka and southern portions of Johnston and Pushmataha Counties. Well depths range between 200 and 800 feet with yields between 100 and 500 gpm. The water is generally of a sodium or calcium bicarbonate type with dis-

Table 33
SURPLUS WATER AVAILABILITY
Southeast Planning Region
(1,000 ACRE-FEET/YEAR)

SOURCE	TOTAL YIELD	LOCAL ALLOCATION	OUT OF REGION ALLOCATION	POTENTIAL SURPLUS
Atoka	65.0	0.7	64.3	---
Broken Bow	196.0	30.6	---	165.4
Hugo	165.8	63.3	---	102.5
McGee Creek	71.8	20.0	40.0	11.8
Pine Creek	134.4	33.6	---	100.8
Sardis	156.8	6.0	1.0	149.8
SCS & Municipal Lakes	75.4	75.4	---	---
Groundwater	109.4	109.4	---	---
TOTAL	**974.6**	**339.0**	**105.3**	**530.3**
Authorized Sources				
Boswell	56.0	0.1	---	55.9
Lukfata	69.5	---	---	69.5
Parker	45.9	---	---	45.9
Tuskahoma	224.0	5.0	---	219.0
TOTAL	**395.4**	**5.1**	**---**	**390.2**
Other Potential Sources				
Bennington (Durant)	179.0	---	---	179.0
Buck Creek	56.0	---	---	56.0
Caney Mountain	280.0	---	---	280.0
Chickasaw	17.9	---	---	17.9
Durwood	232.0	---	---	232.0
Kellond	56.0	---	---	56.0
Hugo (Ultimate Development)	137.0	---	---	137.0
Ravia	25.3	---	---	25.3
Sandy Creek	10.8	---	---	10.8
Scissortail (Ada)	32.0	---	---	32.0
Tupelo	100.8	---	---	100.8
TOTAL	**989.8**	**---**	**---**	**989.8**
TOTAL SURPLUS WATER AVAILABILITY	**2,222.8**	**344.2**	**105.3**	**2,047.3**

solved 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.

GROUNDWATER DEVELOPMENT

Extensive development of groundwater supplies has not occurred in the Southeast Planning Region due to the abundance of stream water.

GROUNDWATER RIGHTS

As of June 1994, the OWRB had issued groundwater allocation permits totaling 108,688 ac-ft per year from aquifers in the Southeast Planning Region (Table 32).

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SUPPLY AND DEMAND ANALYSIS

The Southeast Planning Region is well-suited for anticipated future growth and existing reservoirs currently have surplus water available. Table 33 indicates the excess availability of water from existing sources. The long-range projection for M&I water demand in the year 2050 is 105,500 af/yr (94.2 mgd). An agricultural demand of 45,100 af/yr (40.3 mgd) is also projected along with a power demand of 15,800 af/yr (14.1 mgd). Table 34 summarizes the anticipated supply and demand for the region.

Table 34
SUPPLY AND DEMAND ANALYSIS
Southeast Planning Region
(1,000 ACRE-FEET/YEAR)

SOURCE	COUNTY Atoka	Bryan	Choctaw	Coal	Johnston	McCurtain	Pontotoc	Pushmataha	TOTAL
				MUNICIPAL AND INDUSTRIAL COMPONENT					
Atoka	0.7	0.0	---	---	---	---	---	---	0.7
Broken Bow	---	---	---	---	---	30.6	---	---	30.6
Hugo	---	---	30.5	---	---	---	---	0.8	31.3
McGee Creek	19.0	---	---	1.0	---	---	---	---	20.0
Pine Creek	---	---	---	---	---	33.6	---	---	33.6
Sardis	---	---	---	---	---	---	---	6.0	6.0
SCS & Municipal Lakes [1]	2.4	12.3	---	1.7	---	0.4	---	---	16.8
Groundwater	0.7	4.7	6.4	0.8	5.8	0.5	60.6	0.1	79.5
M & I Supply	**22.8**	**17.0**	**36.9**	**3.6**	**5.8**	**65.1**	**60.6**	**6.9**	**218.6**
2050 M & I Demand	**3.8**	**10.2**	**4.9**	**2.7**	**2.8**	**64.7**	**13.1**	**3.3**	**105.5**
M & I Surplus/(Deficit)	**19.0**	**6.8**	**32.0**	**0.9**	**3.0**	**0.4**	**47.5**	**3.6**	**113.1**
				AGRICULTURAL COMPONENT					
SCS & Municipal Lakes	7.6	8.8	2.7	8.0	6.3	4.8	11.9	8.5	58.6
Groundwater	0.4	6.8	1.8	---	3.5	0.9	13.6	0.3	27.3
Agricultural Supply	**8.0**	**15.6**	**4.5**	**8.0**	**9.8**	**5.7**	**25.5**	**8.8**	**85.9**
2050 Agricultural Demand	**7.5**	**15.1**	**2.7**	**3.5**	**4.7**	**5.7**	**4.1**	**1.8**	**45.1**
Agricultural Surplus/(Deficit)	**0.5**	**0.5**	**1.8**	**4.5**	**5.1**	**---**	**21.4**	**7.0**	**40.8**
				POWER COMPONENT					
Hugo	---	---	32.0	---	---	---	---	---	32.0
SCS & Municipal Lakes	---	---	---	---	---	---	---	---	---
Groundwater	---	---	---	---	---	---	2.6	---	2.6
Power Supply	**---**	**---**	**32.0**	**---**	**---**	**---**	**2.6**	**---**	**34.6**
2050 Power Demand	**0.3**	**---**	**15.2**	**---**	**---**	**---**	**0.3**	**---**	**15.8**
Power Surplus/(Deficit)	**(0.3)**	**---**	**16.8**	**---**	**---**	**---**	**2.3**	**---**	**18.8**
				TOTALS					
Total Local Supply	**30.8**	**32.6**	**73.4**	**11.6**	**15.6**	**70.8**	**88.7**	**15.7**	**339.1**
Total 2050 Demand	**11.6**	**25.3**	**22.8**	**6.2**	**7.5**	**70.4**	**17.5**	**5.1**	**166.4**
Net Surplus/(Deficit)	**19.2**	**7.3**	**50.6**	**5.4**	**8.1**	**0.4**	**71.2**	**10.6**	**172.7**

[1] Bryan County values include surface water and storage off Blue River.