Central Planning Region

REGIONAL DESCRIPTION

The Central Planning Region consists of five counties -- Canadian, Cleveland, McClain, Oklahoma, and Pottawatomie -- primarily in the North Canadian and Canadian River Basins (Figure 23). The region displays many of the physical diversities of the state, from metropolitan Oklahoma City to the open farmlands of Canadian County. This region benefits from the convergence of coast-to-coast and border-to-border interstate highways, including I-40 and I-35.

The Central Region is the smallest of the eight planning regions, comprising only 3,544 square miles. However, Oklahoma County is projected to account for more than 17 percent of the total projected municipal and industrial (M&I) water demand for the entire state, and more than 68 percent of the total M&I water demand for the region in the year 2050. The region's agricultural water demand is projected to be relatively low.

The climate is generally pleasant with annual mean temperatures ranging between 60 and 62 degrees. Summer high temperatures generally approach 100°F while winter lows dip into the mid-teens. Annual evaporation within the region ranges from 63 inches per year in western areas to 57 inches per year in the east. Rainfall averages vary from 28 inches per year in western Canadian County to more than 34 inches in southeastern Pottawatomie County. As with most of the state, thunderstorms are a frequent occurrence during much of the spring and summer and are often accompanied by heavy rain, lightning, hail and tornados. In addition, these storms may generate flash floods, making flood control storage a critical element in most reservoirs in the region.

WATER RESOURCES

Stream Water

Table 9 summarizes the stream water sources of the Central Planning Region. Although the region is generally bounded by the North Canadian and Canadian Rivers, much of the stream water within the region is of poor quality and not suitable for most M&I uses.

The Canadian River typically experiences high levels of chloride and total dissolved solids (TDS). Downstream of Oklahoma City, return flows from wastewater treatment plants enter the river and constitute a significant portion of the flow. Water quality has improved in recent years with the addition of secondary treatment of wastewater flows; however, the water remains unsuitable for many uses.

The North Canadian River has similar water quality problems. TDS and chloride levels are relatively high and Oklahoma City wastewater return flows constitute a large percentage of the North Canadian River's total flow. While some stream water quality parameters have improved, others -- such as dissolved nitrate plus nitrate -- have worsened.

The Upper Little River is located in the eastern portion of the region in Cleveland and Pottawatomie Counties. The water is of good quality with low mineral content. Lake Thunderbird exists at the headwaters of the Little River.

The Deep Fork River, located in Oklahoma County, is of fair quality with moderate mineral content. However, at certain times of the year, the chloride content approaches the maximum allowed under Safe Drinking Water Act standards.

MAJOR RESERVOIRS

There are two major impoundments within the Central Planning Region. The largest is Lake Thunderbird in Cleveland County. This Bureau of Reclamation project was constructed in 1965 for flood control (storage for which is operated by the Corps of Engineers), water supply, recreation, and fish and wildlife purposes. Located on the Little River, its water is of excellent quality with a firm dependable water supply yield of 21,700 af/yr (approximately 19.4 mgd). All available yield is allocated to the Central Oklahoma Master Conservancy District which provides municipal and industrial supplies to the cities of Norman, Midwest City and Del City.

Arcadia Lake is the other major impoundment in the region. Completed by the Corps of Engineers in 1986, the lake provides water supply, flood control, and recreation opportunities along the Deep Fork River in Oklahoma County. The reservoir provides 12,100 af/yr (11 mgd) of water supply. The entire available yield is allocated to the Edmond Public Works Authority.

MUNICIPAL LAKES

There are five major municipal lakes within the Central Planning Region; three are owned and operated by Oklahoma City while the City of Shawnee and Pottawatomie County Development Authority own the others. The largest municipal lake is Lake Stanley Draper, on East Elm Creek in Cleveland County. Built in 1962 by the City of Oklahoma City, the impoundment is utilized primarily as terminal storage for water pumped, via a 90 mgd pipeline, from Atoka and McGee Creek Reservoirs in the Southeast Planning Region. The lake has little dependable yield of its own; the 86,000 af/yr (76.8 mgd) of dependable yield is comprised of deliveries from Atoka (63,776 af/yr) and McGee Creek (40,000 af/yr), minus evaporative losses. Water in Lake Draper is of excellent quality and the lake provides many recreational benefits.

Lake Hefner, also owned and operated by Oklahoma City, was built on Bluff Creek in 1943 for water supply and recreation in northwest Oklahoma County. As with Lake Draper, the lake has virtually no yield of its own, serving as terminal storage for diversions from the North Canadian River and releases from Canton Lake. Though containing some chlorides, the water is of fair quality and suitable for most uses.

Lake Overholser, the third Oklahoma City reservoir in the area, is located on the North Canadian River in eastern Canadian County. The lake was built in 1919 for water supply and recreational purposes; its dependable yield of 5,000 af/yr (4.5 mgd) is supplemented by releases from Canton Reservoir. Water in the lake is of fair quality and, during periods of low flow, the river is diverted around Overholser to avoid worsening the lake's quality.

Shawnee Lake, on South Deer Creek in Pottawatomie County, is owned and operated by the City of Shawnee. The lake is actually two impoundments connected by a 10-foot-deep canal. Lake Number One was built in 1935 and covers a surface area of 1,336 acres; Lake Number Two was built in 1960 and has a surface area of 1,100 acres. The combined reservoirs have a dependable yield of 4,400 af/yr (3.9 mgd).

Wes Watkins Reservoir (Site 1M) is an NRCS project currently under construction on North Deer Creek in far north-

west Pottawatomie County. When completed, the lake is estimated to have a dependable yield of 2,050 af/yr (1.8 mgd).

OTHER IMPOUNDMENTS

There are numerous other NRCS projects, small municipal lakes and private reservoirs within the Central Planning Region. These small lakes provide municipal supply, irrigation water and recreational opportunities. Cedar Lake (1,125 ac-ft of approximate conservation storage), Lake Dahlgren (222 ac-ft), Tecumseh Lake (1,118 ac-ft), Purcell Lake (2,600 ac-ft), El Reno Lake (709 ac-ft), Lake Hiwassee (2,400 ac-ft), Wiley Post Memorial Lake (2,082 ac-ft) and Uncle John Creek (S-10; 1,080 ac-ft) are some of the larger impoundments in this category.

AUTHORIZED DEVELOPMENT

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

POTENTIAL DEVELOPMENT

There are very few potential sites within the Central Planning Region for the development of new water supply projects. This is due in part to the poor water quality of many of the major streams and rivers in the region. Two sites which have been studied are Purcell Reservoir and West Elm Lake.

Purcell Reservoir is a potential site on Walnut Creek in McClain County, northwest of Purcell. The potential yield of the reservoir is 19,000 af/yr (17 mgd), with an additional 40,000 ac-ft of flood control storage. The proposed lake would inundate 5,400 acres at normal conservation pool. No potential water quality data is available at this time.

West Elm Lake -- located on West Elm Creek in Cleveland County southwest of Lake Stanley Draper -- is a potential terminal storage site for Oklahoma City. Due to its limited watershed of 16 square miles, the lake is not anticipated to have any dependable yield. If fully developed, the lake would impound 3,300 acres at normal conservation pool and have conservation storage of 103,600 ac-ft.

STREAM WATER RIGHTS

As of June 1994, the OWRB had issued stream water allocation permits totaling 179,915 ac-ft per year from lakes, rivers and streams within the Central Planning Region. Table 10 provides a breakdown of these stream water allocations.

Groundwater

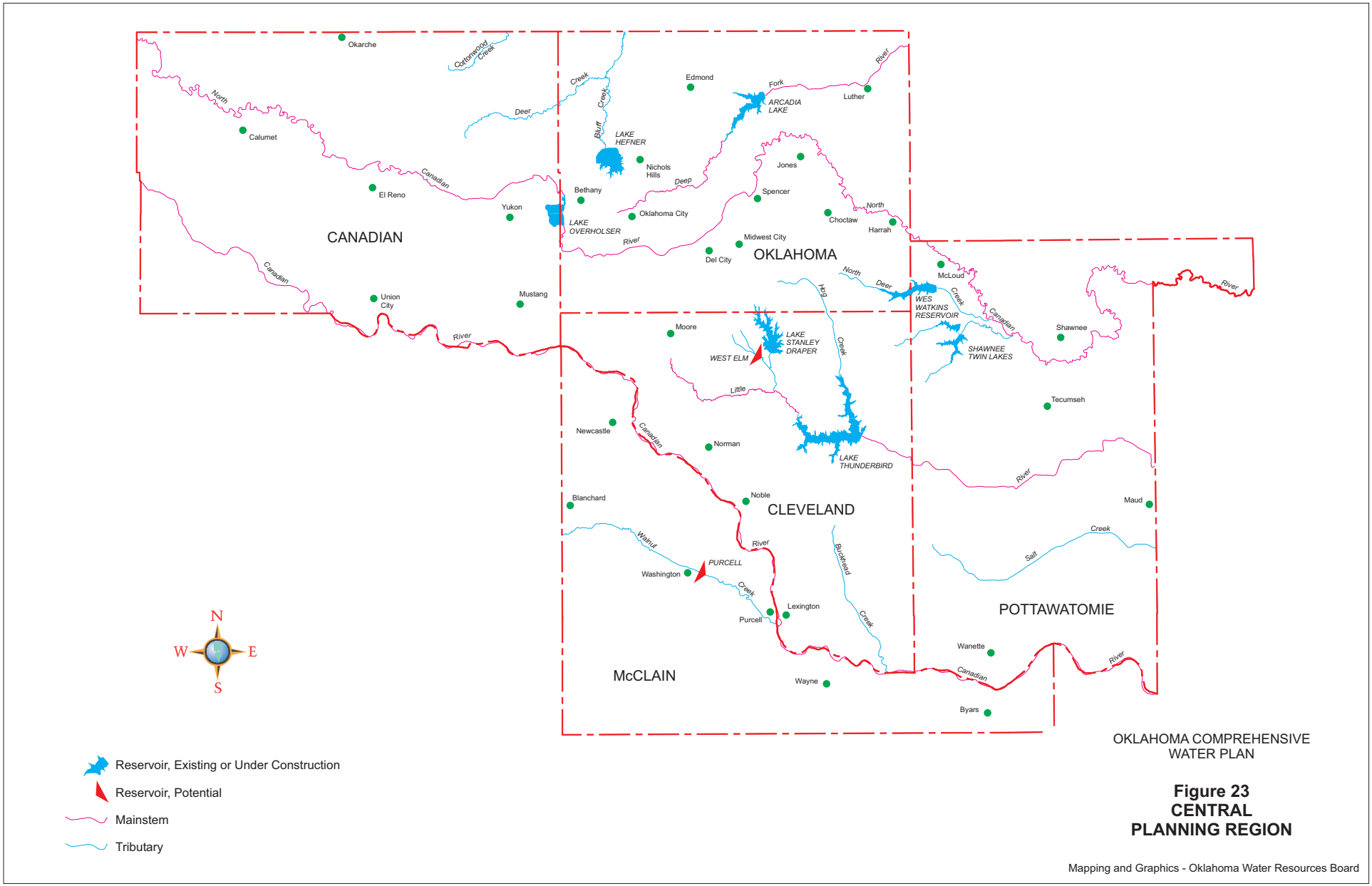
Central Oklahoma overlies the Garber-Wellington Formation and alluvium and terrace deposits of three major rivers. The Garber-Wellington Aquifer is a fine-grained sandstone with shale and siltstone. It has a maximum thickness of approximately 900 feet with a saturated thickness of 150 to 650 feet. Well depths are generally 100 to 200 feet deep where the formation is unconfined and 200 to 900

Table 9
STREAM WATER DEVELOPMENT
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			
Arcadia	Deep Fork Creek	ws, fc, r	64,430	27,380	12,320
Stanley Draper	East Elm Creek	ws, r	---	100,000	86,000 [1]
Hefner	Bluff Creek	ws, r	---	75,000	17,000 [2]
Overholser	North Canadian River	ws, r	---	15,000	5,000 [2]
Thunderbird	Little River	ws, fc, r, fw	76,600	105,900	21,700
Shawnee	South Deer Creek	ws, r	---	34,000	4,400
Wes Watkins	North Deer Creek	w s	---	---	2,050
TOTAL			**141,030**	**357,280**	**148,470**
		POTENTIAL			
Purcell	Walnut Creek	ws, fc, r	40,000	98,000	19,000 [3]
West Elm	West Elm Creek	ws, r	---	103,600	---- [4]
TOTAL			**40,000**	**201,600**	**19,000**
TOTAL YIELD					**167,470**

*ws-municipal water supply, fc-flood control, r-recreation, fw-fish and wildlife.

[1] Draper Lake is terminal storage for water pumped from Lake Atoka in Southeast Region via Atoka pipeline. Draper Lake will also store water pumped from McGee Creek Reservoir in Southeast Region. Available yield from pipeline (90 mgd = 100,800 af/yr), minus evaporation losses, is 86,000 af/yr.
[2] Yields do not include releases from Canton Reservoir.
[3] Proposed impoundment located northwest of Purcell, Oklahoma. This potential project should not be confused with Purcell Lake (2,600 ac-ft storage), south of the Town of Purcell.
[4] Proposed terminal storage with no dependable yield.



OKLAHOMA COMPREHENSIVE WATER PLAN

Figure 23
CENTRAL PLANNING REGION

Mapping and Graphics - Oklahoma Water Resources Board

feet deep in confined areas. Wells commonly yield 100 to 300 gpm from the formation but may exceed 500 gpm in some locations.

Water from the Garber-Wellington is generally of a calcium magnesium bicarbonate type. Dissolved solids concentrations are usually less than 500 mg/L. The aquifer becomes more saline with depth and in the western areas of the region. Heavy pumpage in some areas has led to drawdowns of 100 to 200 feet and saltwater intrusion from below, as well as contamination from oilfield brines in shallow areas.

The alluvial and terrace deposit aquifers are usually found around major rivers in the region, extending outward from one to 15 miles. These deposits are present in all five counties of the region along the Canadian River, North Canadian River and Deep Fork of the North Canadian River. Well yields range from less than 100 gpm to as much as 600 gpm. Formation deposits are as much as 60 to 80 feet thick and consist of clays, sand, silt and gravels. Hardness and total dissolved solids are the major water quality problems, with reported values frequently exceeding 500 mg/L for each.

GROUNDWATER DEVELOPMENT

Extensive development of groundwater supplies has occurred in the Central Planning Region. Many communities, including numerous Oklahoma City suburbs, rely on groundwater for all or part of their water supply needs. With the limited availability of suitable quality surface water, groundwater is expected to remain an important part of the region's water supplies.

GROUNDWATER RIGHTS

As of June 1994, the OWRB had issued groundwater allocation permits totaling 313,542 ac-ft per year from aquifers within the Central Planning Region. Table 10 provides a breakdown of these groundwater allocations.

SUPPLY AND DEMAND ANALYSIS

Despite its relatively small size, the Central Planning Region is the most populated planning region. The long-range projection for municipal and industrial water demand in the year 2050 is 292,000 af/yr (259.9 mgd), or approximately 81 percent of the region's total projected water demand. As shown in Table 11, current supplies indicate that anticipated demands could be met with relatively few local deficits. Continued use of out-of-basin sources is essential to ultimately meeting the long-range water supply needs of the region, since existing sources include groundwater or marginal quality surface impoundments.

Table 10
WATER RIGHTS
Central Planning Region

STREAM WATER ALLOCATIONS
(acre-feet)

COUNTY	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Canadian	---	99	4,744	120	1,176	---	---	6,139
Cleveland	21,600	---	836	---	401	---	---	22,837
McClain	160	20	4,013	---	205	---	---	4,398
Oklahoma	92,500	207	2,835	108	1,401	12,304	---	109,355
Pottawatomie	31,556	---	5,628	---	2	---	---	37,186
TOTAL	**145,816**	**326**	**18,056**	**228**	**3,185**	**12,304**	**---**	**179,915**

GROUNDWATER ALLOCATIONS
(acre-feet)

COUNTY	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Canadian	4,770	2,094	46,237	362	991	11,602	---	66,056
Cleveland	48,161	716	12,358	8,335	280	60	15	69,925
McClain	6,070	54	8,890	9	10	---	---	15,033
Oklahoma	114,175	4,921	11,564	9,140	1,678	3,604	452	145,533
Pottawatomie	7,412	508	8,855	90	131	---	---	16,995
TOTAL	**180,586**	**8,294**	**87,904**	**17,935**	**3,090**	**15,266**	**467**	**313,542**

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

Table 11
SUPPLY AND DEMAND ANALYSIS
Central Planning Region
(1,000 ACRE-FEET/YEAR)

SOURCE	COUNTY Canadian	Cleveland	McClain	Oklahoma	Pottawatomie	TOTAL
			MUNICIPAL AND INDUSTRIAL COMPONENT			
Arcadia	---	---	---	12.3	---	12.3
Stanley Draper	---	---	---	86.0	---	86.0
Hefner	---	---	---	17.0	---	17.0
Overholser	---	---	---	5.0	---	5.0
Shawnee	---	---	---	---	4.4	4.4
Thunderbird	---	21.7	---	---	---	21.7
Wes Watkins	---	---	---	---	2.1	2.1
SCS & Municipal Lakes	2.4	0.6	1.8	1.9	0.6	7.3
Groundwater	8.2	57.5	6.1	130.4	8.1	210.4
M & I Supply	**10.6**	**79.8**	**8.0**	**252.6**	**15.1**	**366.1**
2050 M & I Demand	**21.1**	**44.9**	**7.3**	**199.5**	**19.2**	**292.0**
M & I Surplus/(Deficit)	**(10.5)**	**34.9**	**0.7**	**53.1**	**(4.1)**	**74.1**
			AGRICULTURAL COMPONENT			
SCS & Municipal Lakes	5.1	1.7	12.6	3.4	4.4	27.1
Groundwater	46.2	12.4	8.9	11.6	8.9	87.9
Agricultural Supply	**51.3**	**14.0**	**21.5**	**15.0**	**13.2**	**115.0**
2050 Agricultural Demand	**18.7**	**3.8**	**3.2**	**4.0**	**7.7**	**37.4**
Agricultural Surplus/(Deficit)	**32.6**	**10.2**	**18.3**	**11.0**	**5.5**	**77.6**
			POWER COMPONENT			
Horsehoe Lake	---	---	---	12.3	---	12.3
Groundwater	11.6	0.1	---	3.6	---	15.3
Power Supply	**11.6**	**0.1**	**---**	**15.9**	**---**	**27.6**
2050 Power Demand	**6.8**	**---**	**---**	**22.2**	**---**	**29.0**
Power Surplus/(Deficit)	**4.8**	**0.1**	**---**	**(6.3)**	**---**	**(1.4)**
			TOTALS			
Total Local Supply	**73.5**	**93.9**	**29.5**	**283.5**	**28.4**	**508.7**
Total 2050 Demand	**46.6**	**48.7**	**10.5**	**225.7**	**26.9**	**358.4**
Net Surplus/(Deficit)	**26.9**	**45.2**	**19.0**	**57.8**	**1.5**	**150.3**