



# *Evaluation of Surface and Groundwater Supplies*

## *Methodology and Findings*

**T**his section presents results of an evaluation of surface and groundwater supplies in Oklahoma. The study consisted of two phases. Phase I involved the evaluation of all existing and proposed water supply sources (both surface and groundwater) to determine availability. Phase II consisted of a comparison of available sources to projected demands in the year 2050.

For each region, existing major federal surface water supplies were evaluated for flood control storage, conservation storage and dependable yield. For the purpose of this analysis, water supply and water quality storage were classified as conservation storage available for use. Significant municipal lakes within each region were also investigated along with multipurpose Natural Resource Conservation Service (NRCS) lakes.

Small public and private lakes of 100 acre-feet or more of storage, along with all NRCS impoundments, were evaluated to determine approximate yields for each county. There are hundreds of small public, private and watershed protection lakes for which no dependable yield studies have been performed. Yield figures for these impoundments were estimated by applying OWRB-supplied county recharge rates to estimated storage.

Water permit allocation records were obtained from the OWRB for both surface and groundwater. State-wide/regional surface and groundwater permits are summarized in Table 7. OWRB allocations were also analyzed for each major reservoir to properly allocate supplies to the appropriate county. Existing groundwater allocations were used as the basis to estimate year 2050 groundwater supply.

Projected municipal and industrial (M&I), agricultural and power demands for water in the year 2050 were provided by the OWRB. These demands were compared with existing supplies on both a county and regional basis. All regions reflected a potential excess of water, although several counties indicated potential shortages.

Table 8 includes a composite regional summary of existing supplies and projected demands. Despite the apparent surplus of available supplies, water quality is marginal in some areas of the Northwest, Southwest, and South Central Planning Regions and additional supplies of higher quality municipal and industrial water may

be required there. Reallocations of hydropower storage may also be required in the Northeast and Southeast Planning Regions. It should also be noted that the net surplus shown in Table 8 and subsequent regional "supply and demand analysis" tables include yields from groundwater, SCS/NRCS and municipal

lakes as well as from major federal lakes. Water from sources other than major federal lakes are more localized in nature and may not be realistically available to meet regional demands. In addition, estimates of water supply were not limited by water quality considerations or sedimentation.

Table 7  
COMPOSITE WATER RIGHTS  
STATE OF OKLAHOMA

STREAM WATER ALLOCATIONS								
(acre-feet)								
REGION	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Central	145,816	326	18,056	228	3,185	12,304	---	179,915
East Central	143,635	40,221	33,705	505	4,224	35,000	---	257,290
North Central	143,794	17,230	17,959	125	11,723	77,765	---	268,596
Northeast	657,190	76,007	98,057	1,266	6,013	228,262	20	1,066,815
Northwest	6,971	107	27,741	20	6,776	---	---	41,615
South Central	99,580	7,634	47,900	901	22,670	---	111	178,796
Southeast	232,840	50,597	57,900	53	10,021	32,285	---	383,696
Southwest	152,170	7,191	147,462	26	9,113	1,636	2,000	319,598
<b>TOTAL</b>	<b>1,581,996</b>	<b>199,313</b>	<b>448,780</b>	<b>3,124</b>	<b>73,725</b>	<b>387,252</b>	<b>2,131</b>	<b>2,696,321</b>
GROUNDWATER ALLOCATIONS								
(acre-feet)								
REGION	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Central	180,586	8,294	87,904	17,935	3,090	15,266	467	313,542
East Central	8,083	7,845	31,400	1,010	1,619	90	5	50,051
North Central	63,070	12,107	89,280	963	294	171	29	165,914
Northeast	30,327	23,908	29,759	326	64	427	768	85,578
Northwest	105,655	10,652	1,312,012	2,444	3,876	4,864	242	1,439,745
South Central	44,512	19,236	97,160	508	804	4,200	20	166,440
Southeast	66,890	11,459	26,570	799	368	2,602	---	108,688
Southwest	48,666	36,114	674,016	2,514	1,076	3,697	191	766,273
<b>TOTAL</b>	<b>547,789</b>	<b>129,615</b>	<b>2,348,101</b>	<b>26,499</b>	<b>11,191</b>	<b>31,317</b>	<b>1,722</b>	<b>3,096,232</b>
<b>GRAND TOTAL</b>	<b>2,129,785</b>	<b>328,928</b>	<b>2,796,881</b>	<b>29,623</b>	<b>84,916</b>	<b>418,569</b>	<b>3,853</b>	<b>5,792,553</b>

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

Table 8  
COMPOSITE SUPPLY AND DEMAND ANALYSIS  
STATE OF OKLAHOMA

(1,000 ACRE-FEET)

	REGION								TOTALS
	Central	East Central	North Central	Northeast	Northwest	South Central	Southeast	Southwest	
M & I Supply	366.1	186.6	246.5	532.3	133.1	144.6	218.6	240.8	2,068.6
2050 M&I Demand	292.0	63.0	100.1	361.8	45.5	74.6	105.5	125.4	1,167.9
Local M&I Surplus/(Deficit)	74.1	123.6	146.4	170.5	87.6	70.0	113.1	115.4	900.7
Agricultural Supply	115.0	107.1	138.4	110.7	1,319.5	186.2	85.9	813.8	2,876.6
2050 Agricultural Demand	37.4	40.0	44.8	46.6	1,057.7	61.3	45.1	531.5	1,864.4
Local Agricultural Surplus/(Deficit)	77.6	67.1	93.6	64.1	261.8	124.9	40.8	282.3	1,012.2
Power Supply	27.6	76.5	76.8	293.9	4.9	4.2	34.6	10.6	529.1
2050 Power Demand	29.0	75.6	74.4	224.7	4.1	---	15.8	11.8	435.4
Local Power Surplus/(Deficit)	(1.4)	0.9	2.4	69.2	0.8	4.2	18.8	(1.2)	93.7
Regional Surplus Availability <sup>1</sup>	---	15.9	33.6	57.3	---	163.5	530.3	---	800.6
<b>TOTAL SUPPLY</b>	<b>508.7</b>	<b>386.1</b>	<b>495.3</b>	<b>994.2</b>	<b>1,457.5</b>	<b>498.5</b>	<b>869.4</b>	<b>1,065.2</b>	<b>6,274.9</b>
<b>TOTAL 2050 DEMAND</b>	<b>358.4</b>	<b>178.6</b>	<b>219.3</b>	<b>633.1</b>	<b>1,107.3</b>	<b>135.9</b>	<b>166.4</b>	<b>668.7</b>	<b>3,467.7</b>
<b>NET SURPLUS/(DEFICIT)</b>	<b>150.3</b>	<b>207.5</b>	<b>276.0</b>	<b>361.1</b>	<b>350.2</b>	<b>362.6</b>	<b>703.0</b>	<b>396.5</b>	<b>2,807.2</b>

<sup>1</sup> Unallocated from major federal lakes.