

Irrigation

134,000 million gallons per day

The quantity of water withdrawn for irrigation during 1995 was an estimated 134,000 Mgal/d or 150 million acre-feet. Irrigation withdrawals during 1995 were 2 percent less than during 1990 and acres irrigated were 1 percent more. This indicates lower irrigation application rates because of improved irrigation techniques. In addition, many areas received more precipitation during 1995 than during 1990. Irrigation use represents 39 percent of freshwater use for all offstream categories.

The source and disposition of water for irrigation are shown in the chart below. Surface water was the source for about 63 percent of irrigation withdrawals, and, except for a small fraction of 1 percent that was reclaimed wastewater, ground water was the source for the remainder. Surface-water withdrawals for irrigation during 1995 were about 1 percent less than during 1990, and ground-water withdrawals were about 4 percent less. Of the 134,000 Mgal/d withdrawn for irrigation, 19 percent was lost in conveyance, 61 percent was consumptive use, and 20 percent was returned to surface- or ground-water supplies.

Irrigation water use includes all water artificially applied to farm and horticultural crops as well as self-supplied water used to irrigate public and private golf courses. Irrigation water can be self supplied or supplied by irrigation companies or districts. However, all irrigation withdrawals in this report are identified as self-supplied.

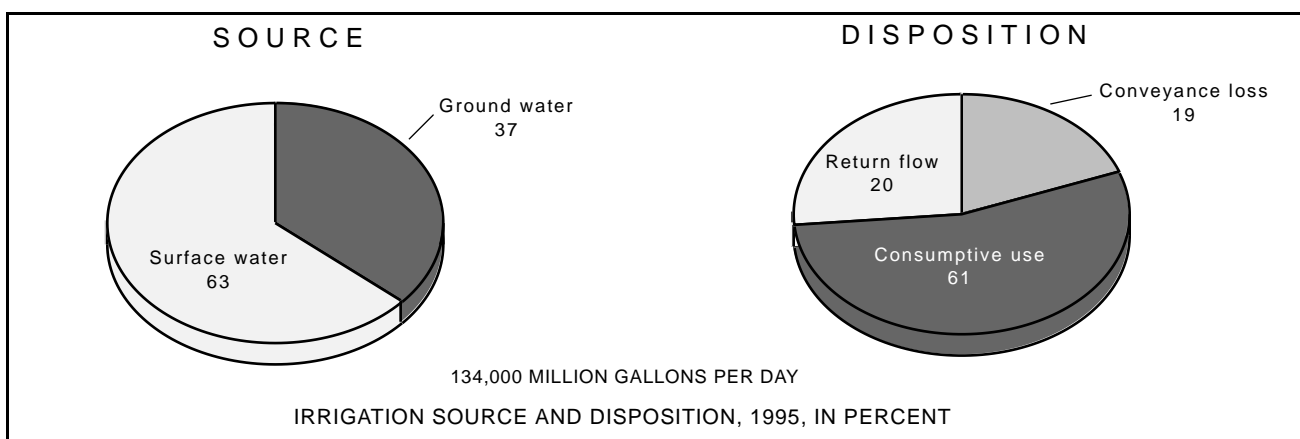
Irrigation of crops developed concurrently with the settlement of the arid West, where natural precipitation was insufficient to raise many crops. In the humid East, irrigation is used to supplement natural precipitation to increase the number of plantings per year or the yields of crops, and to reduce the risk of crop failures during droughts.

Information about the number of acres irrigated and the quantity of water withdrawn is obtained from a variety of sources such as State agencies responsible for permitting or allocating the withdrawal of water, the U.S. Soil

Conservation Service, U.S. Bureau of Reclamation, county Cooperative Extension Service, individual farmers, agricultural research stations, and the U.S. Bureau of the Census, Agricultural Census, and the Farm and Ranch Survey. Total acres irrigated are reported in three types—sprinkler (includes center pivot and travelling gun), micro (includes trickle and drip), and surface (includes flooding, furrow, and ditch).

Methods of estimating withdrawals for irrigation vary greatly. In some instances, they are based on theoretical estimates of water required to raise a given crop in an area. In other instances, accurate records of water application rates are available. Fairly accurate estimates of water withdrawn for irrigation can be made if the acreage irrigated, water application rates, and conveyance losses are known. It usually is difficult to obtain reliable estimates for consumptive use and for conveyance loss. Thus, some of the estimates of consumptive use and conveyance loss may be only rough approximations of actual conditions. In most States, consumptive use is based on coefficients ranging from 40 to 100 percent of withdrawals, or on theoretical crop requirements. In a few States, consumptive use is calculated as the difference between reported withdrawals and reported return flows.

Irrigation is by far the largest water use in the West. The nine western water-resources regions (excluding Alaska and Hawaii), led by the California region, account for 89 percent of the total water withdrawn for irrigation (figure 16; table 15). In the eastern regions, most of the water withdrawn for irrigation is in the Lower Mississippi and South Atlantic-Gulf regions. By State, California, is the largest user of irrigation water (figure 17) and, together with Idaho, Colorado, Texas, and Montana account for 54 percent of the national total (table 16). Florida has the most water withdrawn for irrigation in the East although it ranks thirteenth nationwide.



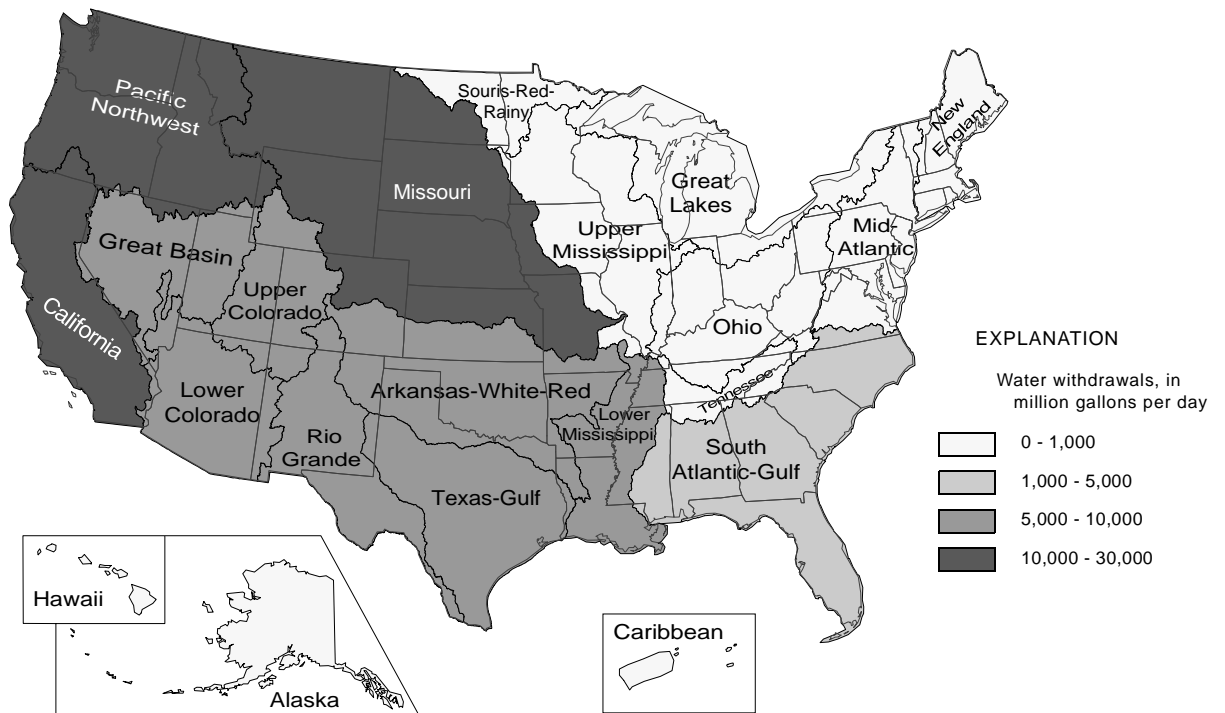


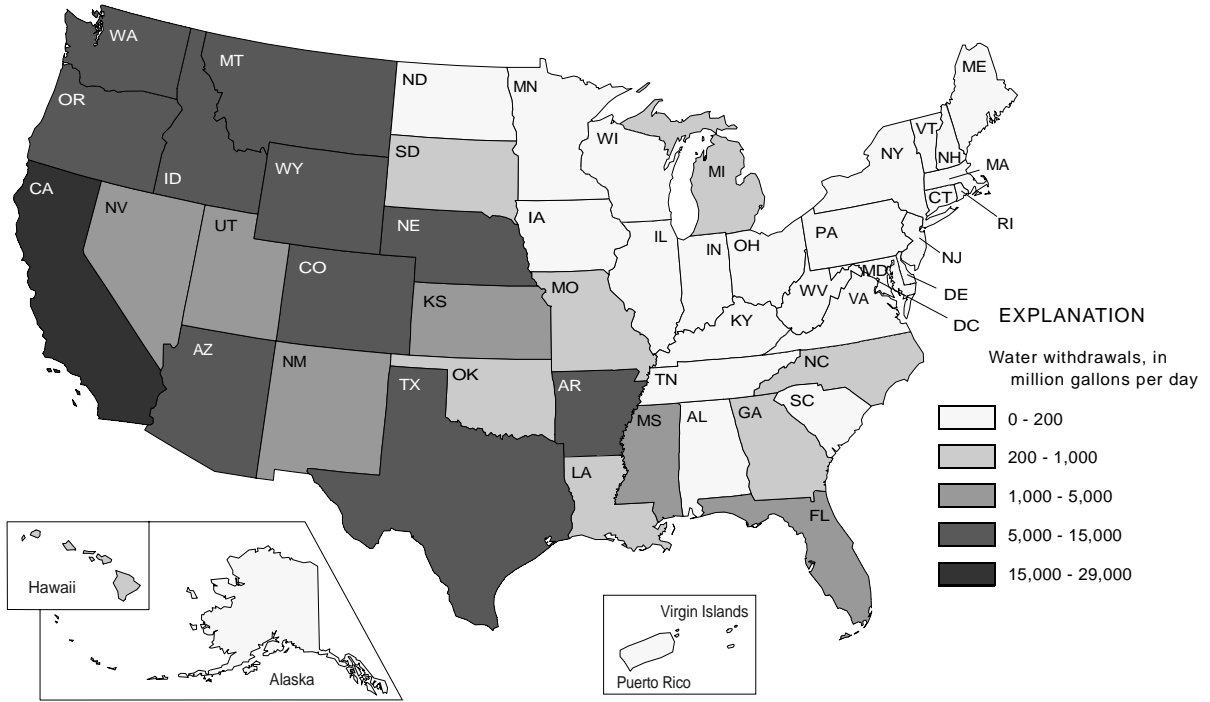
Figure 16. Irrigation freshwater withdrawals by water-resources region, 1995.

Table 15. Irrigation water use by water-resources region, 1995

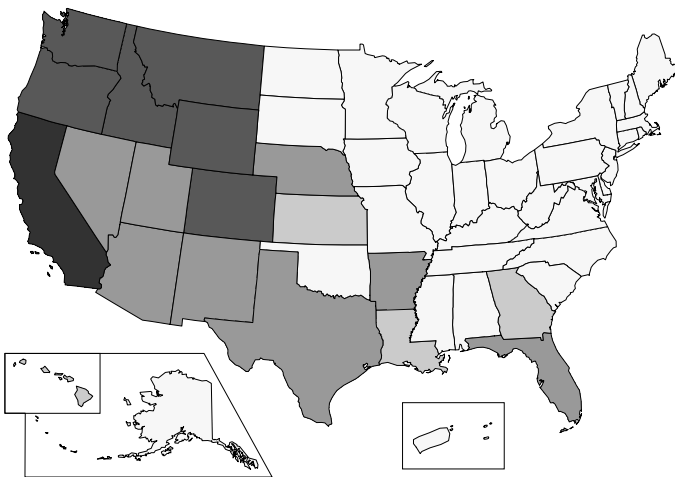
[Figures may not add to totals because of independent rounding]

STATE	IRRIGATED LAND BY TYPE, in thousand acres				THOUSAND ACRE-FEET PER YEAR			MILLION GALLONS PER DAY					
					Withdrawals, by source			Withdrawals, by source		Reclaimed waste- water	Convey- ance losses	Consump- tive use, fresh water	
	Freshwater		Total	Freshwater		Total							
	Sprinkler	Micro	Surface	Total	Ground	Surface	Ground	Surface	Ground	Surface	Total		
New England	88	2.6	12	103	53	111	164	47	99	146	0	0	142
Mid-Atlantic	310	15	3.6	328	144	185	328	128	165	293	0	1.9	200
South Atlantic-Gulf	1,840	670	1,040	3,550	2,560	2,600	5,160	2,280	2,320	4,600	221	33	3,290
Great Lakes	535	19	1.6	556	191	162	353	170	145	315	0	.1	295
Ohio	219	1.2	1.3	222	68	48	117	61	43	104	1.1	.7	97
Tennessee	39	4.6	.3	44	9.7	44	54	8.7	39	48	.3	0	48
Upper Mississippi .	1,040	.8	13	1,050	482	60	542	430	54	484	1.2	0	449
Lower Mississippi .	1,230	1.9	4,490	5,730	7,770	1,350	9,110	6,930	1,200	8,130	.1	553	5,860
Souris-Red-Rainy .	130	0	37	168	50	48	99	45	43	88	0	1.8	78
Missouri Basin . . .	5,980	9.5	7,170	13,200	9,000	18,600	27,600	8,030	16,600	24,600	18	7,840	13,000
Arkansas-White-Red	3,240	3.3	2,870	6,120	7,470	2,900	10,400	6,660	2,590	9,250	13	944	7,070
Texas-Gulf	1,920	40	2,320	4,280	4,890	1,310	6,200	4,370	1,170	5,530	38	390	5,320
Rio Grande	282	15	968	1,260	1,600	5,150	6,750	1,420	4,600	6,020	3.0	1,360	2,640
Upper Colorado . . .	236	.1	1,470	1,710	42	7,840	7,880	38	6,990	7,030	1.7	1,940	2,320
Lower Colorado . . .	315	2.9	938	1,260	2,480	4,710	7,190	2,210	4,200	6,410	131	1,090	3,710
Great Basin	537	8.7	1,060	1,610	1,230	4,500	5,730	1,090	4,020	5,110	33	1,140	2,900
Pacific Northwest .	4,630	105	2,300	7,030	4,510	24,300	28,900	4,030	21,700	25,700	.1	8,050	10,100
California	1,850	628	7,060	9,540	12,200	20,400	32,600	10,900	18,200	29,100	252	1,860	23,300
Alaska	1.4	0	0	1.4	.1	.6	.6	.1	.5	.6	0	.1	.3
Hawaii	17	108	10	136	194	537	731	173	479	652	6.2	98	415
Caribbean	0	17	21	38	36	84	120	33	75	107	0	15	70
Total	24,400	1,650	31,800	57,900	55,000	94,900	150,000	49,000	84,700	134,000	718	25,300	81,300

TOTAL WITHDRAWALS



SURFACE-WATER WITHDRAWALS



GROUND-WATER WITHDRAWALS

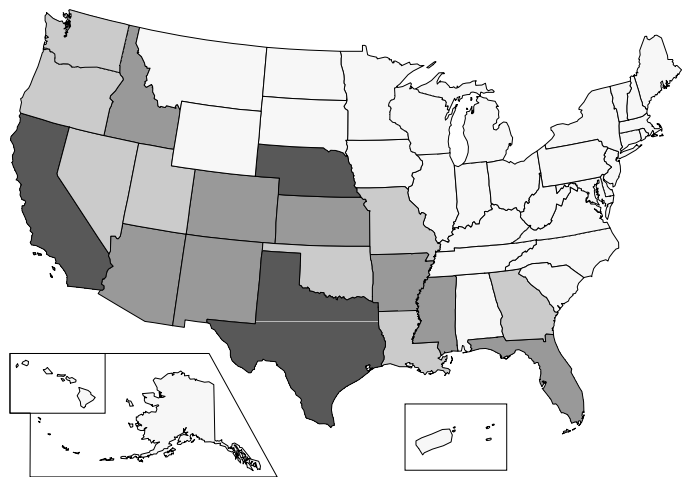


Figure 17. Irrigation freshwater withdrawals by source and State, 1995.

Table 16. Irrigation water use by State, 1995

[Figures may not add to totals because of independent rounding]

STATE	THOUSAND ACRE-FEET PER YEAR								MILLION GALLONS PER DAY					
	IRRIGATED LAND BY TYPE, in thousand acres				Withdrawals, by source				Withdrawals, by source			Reclaimed waste- water	Convey- ance losses	Consump- tive use, fresh water
	Sprinkler	Micro	Surface	Total	Freshwater		Total	Freshwater		Total				
					Ground	Surface		Ground	Surface					
Alabama	52	.4	0	52	57	98	155	51	88	139	.1	0	139	
Alaska	1.4	0	0	1.4	.1	.6	.6	.1	.5	.6	0	.1	.3	
Arizona	289	0	799	1,090	2,390	3,970	6,360	2,130	3,540	5,670	124	1,030	3,180	
Arkansas	527	0	2,980	3,510	5,520	1,130	6,650	4,930	1,010	5,940	0	416	4,390	
California	1,800	631	7,050	9,480	12,100	20,300	32,400	10,800	18,100	28,900	256	1,670	23,500	
Colorado	797	0	2,510	3,310	2,260	12,000	14,300	2,020	10,700	12,700	7.1	3,770	4,910	
Connecticut	18	.7	0	19	18	13	31	16	12	28	0	0	28	
Delaware	66	0	0	66	38	17	54	34	15	48	0	0	48	
D.C.	0	0	0	0	0	0	0	0	0	0	0	0	0	
Florida	484	606	1,040	2,130	1,880	2,010	3,890	1,670	1,800	3,470	220	32	2,170	
Georgia	1,090	60	0	1,150	537	273	810	479	243	722	0	0	722	
Hawaii	17	108	10	136	194	537	731	173	479	652	6.2	98	415	
Idaho	2,010	0	1,000	3,010	2,820	11,800	14,600	2,520	10,500	13,000	0	5,480	4,310	
Illinois	359	0	0	359	202	0	202	180	0	180	2.0	0	180	
Indiana	241	0	0	241	69	61	130	61	55	116	0	0	104	
Iowa	158	0	0	158	39	4.0	43	35	3.6	39	0	0	39	
Kansas	2,100	2.9	986	3,090	3,540	258	3,790	3,150	230	3,380	6.6	143	3,220	
Kentucky	32	0	.7	32	.5	12	13	.5	11	12	0	.5	11	
Louisiana	190	0	620	810	533	330	862	475	294	769	0	166	596	
Maine	25	1.9	0	27	2.9	27	30	2.6	24	27	0	0	24	
Maryland	74	0	0	74	41	29	70	37	26	62	0	0	57	
Massachusetts	28	0	12	40	31	60	91	28	54	82	0	0	81	
Michigan	334	19	1.5	354	113	142	255	101	127	227	0	0	216	
Minnesota	377	0	25	401	135	41	176	120	37	157	0	0	140	
Mississippi	389	0	985	1,370	1,840	109	1,950	1,640	97	1,740	0	17	1,110	
Missouri	351	4.4	431	786	599	37	636	535	33	567	0	0	421	
Montana	526	0	1,280	1,810	92	9,490	9,580	82	8,460	8,550	0	4,410	1,820	
Nebraska	3,940	0	3,510	7,450	6,480	1,990	8,460	5,780	1,770	7,550	1.0	906	6,740	
Nevada	136	0	424	560	719	1,120	1,840	641	1,000	1,640	24	473	1,060	
New Hampshire	8.6	0	0	8.6	.3	6.8	7.1	.3	6.1	6.3	0	0	5.7	
New Jersey	89	6.8	3.2	99	36	104	140	32	93	125	0	0	46	
New Mexico	410	5.2	544	959	1,430	1,920	3,360	1,280	1,710	2,990	0	628	1,680	
New York	44	2.8	.4	47	17	16	33	16	14	30	0	0	26	
North Carolina	163	4.4	0	167	64	203	267	57	181	239	1.0	0	239	
North Dakota	135	0	61	196	66	64	131	59	57	117	0	5.1	105	
Ohio	59	0	0	59	13	17	31	12	16	27	0	.2	26	
Oklahoma	377	0	184	560	859	110	969	766	98	864	0	4.9	401	
Oregon	1,070	5.3	766	1,840	985	5,930	6,910	878	5,290	6,170	0	1,300	3,070	
Pennsylvania	18	4.6	0	23	9.2	8.6	18	8.2	7.7	16	0	0	16	
Rhode Island	7.1	0	0	7.1	.8	1.8	2.6	.7	1.6	2.3	0	0	2.3	
South Carolina	23	0	0	23	31	28	58	27	25	52	0	0	52	
South Dakota	225	0	77	301	95	206	301	85	184	269	0	54	175	
Tennessee	55	4.6	4.1	63	11	16	27	9.9	15	24	.5	0	24	
Texas	2,740	51	3,520	6,310	7,320	3,280	10,600	6,530	2,920	9,450	48	540	8,140	
Utah	411	8.9	722	1,140	441	3,520	3,960	393	3,140	3,530	14	612	1,930	
Vermont	3.8	0	0	3.8	.4	3.9	4.3	.4	3.5	3.9	0	0	3.5	
Virginia	66	2.8	0	69	6.3	27	33	5.6	24	30	0	2.9	18	
Washington	1,510	100	512	2,120	918	6,330	7,250	819	5,650	6,470	0	1,090	2,800	
West Virginia	1.9	0	.9	2.8	0	0	0	0	0	0	0	0	0	
Wisconsin	331	0	0	331	187	1.7	189	167	1.5	169	0	0	151	
Wyoming	286	6.5	1,700	1,990	203	7,190	7,390	181	6,410	6,590	9.1	2,470	2,660	
Puerto Rico	0	17	21	38	36	84	120	33	75	107	0	15	70	
Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	24,400	1,650	31,800	57,900	55,000	94,900	150,000	49,000	84,700	134,000	718	25,300	81,300	