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GROUND-WATER PUMPAGE

IN PARTS OF
MERCED, MADERA, FRESNO,
KINGS, AND TULARE
COUNTIES
CALIFORNIA
1962-66



OPEN—FILE REPORT

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Water Resources Division

Menlo Park, California, 1971

Prepared in cooperation with the
CALIFORNIA DEPARTMENT OF
WATER RESOURCES

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1971



UNITED STATES
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GEOLOGICAL SURVEY
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GROUND-WATER PUMPAGE IN PARTS OF MERCED, MADERA, FRESNO
KINGS, AND TULARE COUNTIES, CALIFORNIA
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By
Hugh T. Mitten and William Ogilbee

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GROUND-WATER PUMPAGE IN PARTS OF MERCED, MADERA, FRESNO, KINGS, AND
TULARE COUNTIES, CALIFORNIA, 1962-66

By Hugh T. Mitten and William Ogilbee

Quantitative estimates of ground-water pumpage from the principal ground-water basins in California are necessary for future appraisal studies, for constructing hydrologic models, and for systematic planning of water use and conservation. Methods of estimating pumpage for this report are based on metered pumpages, on electric-power consumption and fuel consumption by internal-combustion engines for agricultural wells, and on duty of water for municipal areas. This report is the third of a series planned to include the Central Valley of California.

Data used to assemble this report were obtained through the cooperation of the Pacific Gas and Electric Co., Southern California Edison Co., Southern California Gas Co., military installations, and from local agencies. The data were used to estimate pumpage in municipal areas for calendar years 1962 through 1966 and to estimate agricultural pumpage for agricultural years 1962 through 1966 (Apr. 1 through Mar. 31). The results are summarized without indication of the source of data.

Data on electric power consumption by agricultural wells for the 1966 agricultural year were available for the entire area covered by this report. Also, data for prior years were available for most of the area. For those parts of the area where the data were not identifiable with individual townships, the total power consumption for a larger than township part was prorated on the basis of the number of wells in the township. Data for all or parts of T. 17 S., R. 24-27 E., and all townships lying south of T. 17 S. and east of R. 20 E., were prorated in this manner.

Data on fuel consumption by internal-combustion engines were available only for the 1965 and 1966 agricultural years. Ground-water pumpage by pumps driven by internal-combustion engines was not estimated for agricultural years 1962 through 1964. Internal-combustion engines are used in the southern part of the area, but their use does not represent more than 10 percent of the total pumpage except in T. 16 S., R. 25 E.; T. 18 S., R. 24 E.; and T. 20 S., R. 24 E.

This report was prepared by the Geological Survey, Water Resources Division, in cooperation with the California Department of Water Resources, as part of a statewide program of water-resources studies. The work was done under the general supervision of R. Stanley Lord, district chief in charge of water-resources investigations in California, and under the immediate supervision of Willard W. Dean, chief of the Sacramento subdistrict office.

Table 1.--Estimated municipal pumpage, 1962-66

Municipal pumpage is estimated by multiplying the population by an annual per capita use factor. Population figures for incorporated areas are taken from the 1960 United States Census and from subsequent estimates made on request by the Population Research Section, California Department of Finance. Federal census figures are available only for communities of 1,000 or more.

The per capita use factors are determined using population and pumpage figures acquired from a limited number of communities in the San Joaquin Valley.

Per capita use factor
in acre-feet per year

0.25
.30
.40

Population

less than 3,000
3,000-10,000
more than 10,000

Municipality	Per capita use factor	Ground-water pumpage in acre-feet (rounded to three significant figures)				
		1962	1963	1964	1965	1966
Atwater	(a)	2,200	2,200	4,440	4,580	4,580
Chowchilla	.30	1,360	1,360	1,360	1,380	1,380
Clovis	(b)	2,330	2,360	2,370	2,380	4,580
Dinuba	.30	1,870	1,870	2,100	2,100	2,110
Exeter	.30	1,280	1,280	1,280	1,280	1,350
Farmersville	.30	913	913	992	992	1,060
Fowler	.25	473	473	473	473	487
Fresno	.40	56,600	58,900	60,600	63,200	63,700
Kerman	.25	492	492	636	636	636
Kingsburg	.30	928	928	928	1,030	1,030
Lindsay	.30	1,620	1,620	1,620	1,620	1,620
Livingston	.25	612	612	612	612	669
Madera	.40	5,770	5,810	6,100	6,100	6,370
Merced	.40	8,380	9,400	8,550	9,180	9,180
Orange Cove ^{1/}	.25	360	360	360	416	416
Parlier	.25	342	342	342	351	486
Porterville	.30	2,630	2,700	2,800	2,830	2,830
Reedley	.30	1,990	2,030	2,140	2,140	2,140
Sanger	.30	2,560	2,560	2,560	2,800	2,890
Selma	.30	2,080	2,120	2,130	2,140	2,140
Tulare	.40	5,660	5,690	5,710	5,860	6,380
Visalia	.40	6,800	7,130	7,440	8,420	9,440
Woodlake	.25	656	656	675	675	675

1. Assuming half municipal water is supplied from wells.

a. Per capita use factor is 0.30 for 1962-63; 0.40 for 1964-66.

b. Per capita use factor is 0.30 for 1962-65; 0.40 for 1966.

Table 2.--Agricultural pumpage for agricultural years 1962-66

Agricultural pumpage is obtained from electric power and average unit power per acre-foot of water pumped or fuel consumption and average lift

Township	Ground-water pumpage in acre-feet (rounded to three significant figures)				
	1962	1963	1964	1965	1966
<u>Mount Diablo Base Line and Meridian</u>					
T. 4 S., R. 12 E.	1,170	1,780	1,970	1,870	1,800
13 E.	832	729	969	883	1,170
14 E.	461	392	755	541	1,210
T. 5 S., R. 12 E.	13,200	13,000	15,900	14,800	15,600
13 E.	5,570	4,660	7,510	9,830	10,700
14 E.	504	578	829	640	585
15 E.			5	7	
T. 6 S., R. 9 E.	122	90	174	160	1,020
10 E.	5,530	3,890	4,330	4,100	3,810
11 E.	13,500	10,900	15,600	12,000	21,300
12 E.	23,200	27,000	31,700	32,200	57,000
13 E.	8,990	12,800	11,600	12,800	16,600
14 E.	844	817	949	1,230	2,200
T. 7 S., R. 9 E.	1,210	1,470	2,140	1,850	1,820
10 E.	12,400	9,020	14,600	11,900	15,600
11 E.	56,600	43,400	53,100	51,500	49,500
12 E.	35,300	26,900	43,000	33,400	34,800
13 E.	11,600	10,500	16,300	14,000	32,700
14 E.	13,400	13,300	19,800	15,200	23,600
15 E.	6,650	8,060	13,200	11,700	19,900
16 E.	2,720	1,560	2,330	2,050	1,950
T. 8 S., R. 11 E.	4,600	3,230	4,930	2,190	2,410
12 E.	10,200	9,020	11,900	8,690	13,300
13 E.	8,870	10,800	13,100	11,400	20,300
14 E.	18,700	17,100	22,000	20,500	33,700
15 E.	33,500	36,600	39,800	46,800	43,600
16 E.	10,300	11,000	13,200	15,700	14,000
17 E.	136	93	189	140	138
T. 9 S., R. 12 E.	13,900	17,700	18,300	20,100	22,800
13 E.	40,800	39,300	44,500	38,900	39,800
14 E.	47,300	51,100	52,400	54,700	55,300
15 E.	39,300	38,200	42,300	41,100	41,500
16 E.	17,800	16,700	21,200	17,200	12,300
17 E.	10,300	9,000	11,200	13,200	12,000
18 E.	112	102	114	229	544

Table 2.--Agricultural pumpage for agricultural years 1966-66--Continued

Township	Ground-water pumpage in acre-feet (rounded to three significant figures)				
	1962	1963	1964	1965	1966
<u>Mount Diablo Base Line and Meridian--Continued</u>					
T. 10 S., R. 13 E.	28,200	30,500	35,200	32,900	41,000
14 E.	66,400	62,700	82,000	71,900	74,100
15 E.	66,800	60,000	62,900	53,300	72,900
16 E.	27,600	25,900	30,000	27,400	37,000
17 E.	16,700	12,600	9,730	18,200	14,300
18 E.	4,000	4,400	4,110	4,880	4,100
19 E.	653	855	762	2,600	3,010
T. 11 S., R. 13 E.	1,350	1,490	1,370	1,350	1,260
14 E.	35,300	37,400	43,000	47,300	50,800
15 E.	54,500	56,800	61,600	88,100	75,000
16 E.	79,300	75,300	77,200	87,100	80,100
17 E.	38,600	33,000	39,700	29,500	31,900
18 E.	17,300	14,800	17,600	11,500	16,400
19 E.	5,490	4,210	6,530	4,770	8,320
20 E.	2,770	2,710	4,570	4,030	5,040
21 E.	23	13	14	19	21
T. 12 S., R. 15 E.	34,800	31,300	39,400	51,400	50,900
16 E.	39,600	42,000	45,600	48,800	47,000
17 E.	70,100	67,600	74,100	70,600	68,100
18 E.	42,900	32,900	41,000	34,800	39,100
19 E.	18,400	16,500	20,700	20,700	23,700
20 E.	13,400	13,500	16,400	16,900	21,000
21 E.	21,600	13,600	16,900	14,100	12,900
22 E.	4,690	3,310	2,420	3,560	4,480
T. 13 S., R. 15 E.	2,640	2,540	2,650	2,320	2,090
16 E.	71,100	70,400	77,200	64,000	64,200
17 E.	57,700	49,200	58,800	50,700	48,300
18 E.	31,600	22,900	28,700	19,700	24,600
19 E.	19,200	14,200	18,200	15,600	19,000
20 E.	7,280	6,590	6,480	7,170	7,270
21 E.	24,700	18,800	27,700	20,500	26,600
22 E.	24,900	15,000	20,400	15,800	27,000
23 E.	5,090	4,320	7,050	6,660	10,000
24 E.	1,690	1,730	2,560	2,460	3,550

Table 2.--Agricultural pumpage for agricultural years 1962-66--Continued

Township	Ground-water pumpage in acre-feet (rounded to three significant figures)				
	1962	1963	1964	1965	1966
<u>Mount Diablo Base Line and Meridian--Continued</u>					
T. 14 S., R. 15 E.		39	111		
16 E.	26,000	25,700	28,600	32,500	36,400
17 E.	52,000	52,900	61,400	68,100	67,000
18 E.	78,900	68,600	80,500	69,800	75,700
19 E.	40,200	37,600	37,200	33,700	37,900
20 E.	21,200	13,300	20,200	14,000	18,600
21 E.	54,700	42,200	51,400	45,100	49,100
22 E.	34,600	24,600	42,400	30,600	26,800
23 E.	11,700	9,940	14,500	10,800	12,300
24 E.	8,160	9,070	11,100	13,500	14,900
25 E.	4	5	1	4	3
T. 15 S., R. 15 E.	50	147	239	82	10
16 E.	6,740	3,860	4,570	4,300	5,090
17 E.	86,300	88,400	90,700	92,300	102,000
18 E.	77,300	80,000	81,200	77,000	84,200
19 E.	78,200	73,800	79,100	77,200	70,300
20 E.	55,400	44,100	62,800	55,600	57,100
21 E.	39,700	24,900	47,700	32,200	40,900
22 E.	37,000	24,000	45,500	31,800	45,000
23 E.	30,100	22,200	39,900	31,500	35,400
24 E.	31,800	23,900	39,900	29,600	37,300
25 E.	15,200	12,500	14,300	15,500	15,800
T. 16 S., R. 17 E.	8,700	8,510	7,600	6,930	7,440
18 E.	35,700	40,300	47,800	50,300	43,900
19 E.	86,800	97,400	108,000	96,800	93,500
20 E.	77,600	68,800	83,300	76,500	75,900
21 E.	77,200	65,500	87,800	72,600	79,500
22 E.	45,800	38,000	46,600	47,800	49,200
23 E.	37,200	29,600	47,300	34,900	44,000
24 E.	36,100	31,900	52,800	39,900	45,300
25 E.	28,700	20,900	31,700	26,300	31,500
26 E.	2,690	6,090	7,760	9,010	9,330
T. 17 S., R. 18 E.	12,000	13,000	18,000	11,700	13,800
19 E.	33,100	40,000	46,000	33,600	40,100
20 E.	46,400	45,800	52,400	55,300	51,700
21 E.	70,000	69,500	70,300	76,800	76,600
22 E.	60,900	59,500	60,400	63,300	62,700
23 E.	44,600	51,200	60,400	56,800	59,800
24 E.	31,800	31,900	41,200	36,600	65,200
25 E.	39,400	32,700	48,600	38,700	64,000
26 E.	58,100	43,300	78,300	60,400	61,500
27 E.	35,200	29,900	32,800	25,400	15,300

Table 2.--Agricultural pumpage for agricultural years 1962-66--Continued

Township	Ground-water pumpage in acre-feet (rounded to three significant figures)				
	1962	1963	1964	1965	1966
<u>Mount Diablo Base Line and Meridian</u> --Continued					
T. 18 S., R. 19 E.	8,440	7,340	5,510	5,690	6,020
20 E.	10,300	10,100	11,700	10,100	10,800
21 E.	40,000	37,100	54,800	37,500	34,200
22 E.	48,500	44,700	61,900	59,000	57,500
23 E.	23,300	20,500	22,300	21,300	58,500
24 E.	29,800	31,700	37,500	33,600	67,000
25 E.	88,500	88,200	106,000	99,300	61,900
26 E.	83,800	105,000	120,000	91,500	70,400
27 E.	62,000	58,900	63,500	68,600	46,000
T. 19 S., R. 21 E.	22,200	24,100	28,400	17,100	8,400
22 E.	18,000	16,600	21,300	17,400	28,700
23 E.	30,700	32,700	45,000	33,500	59,800
24 E.	59,800	54,000	71,400	60,400	55,500
25 E.	65,200	67,600	92,800	78,800	68,600
26 E.	64,600	63,900	77,300	63,000	71,200
27 E.	7,640	8,720	12,000	7,380	4,730
T. 20 S., R. 22 E.	485	879	1,230	1,060	2,460
23 E.	42,500	40,300	58,800	41,200	48,800
24 E.	59,700	47,900	69,900	53,100	46,700
25 E.	42,300	40,400	62,000	45,500	72,800
26 E.	60,900	66,200	69,200	64,200	47,200
27 E.	61,800	77,300	94,900	78,500	18,200
28 E.	733	804	822	717	
T. 21 S., R. 23 E.	7,590	7,590	12,500	7,790	28,500
24 E.	27,100	25,700	41,600	28,200	36,600
25 E.	43,300	35,900	47,200	35,500	52,100
26 E.	58,400	54,900	62,000	61,600	74,100
27 E.	72,400	69,900	76,000	64,600	35,400
28 E.	23,300	22,600	17,100	16,500	7,330
T. 22 S., R. 24 E.	25,300	23,200	31,800	25,900	39,800
25 E.	38,700	31,600	45,500	31,300	50,700
26 E.	28,000	25,500	35,200	28,400	48,800
27 E.	22,500	37,000	42,600	25,200	35,700
28 E.	7,400	14,400	11,300	12,600	13,300

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Table 2.--Agricultural pumpage for agricultural years 1962-66--Continued

Township	Ground-water pumpage in acre-feet (rounded to three significant figures)				
	1962	1963	1964	1965	1966

Mount Diablo Base Line and Meridian--Continued

T. 23 S., R. 24 E.	9,510	7,200	10,600	7,630	8,010
25 E.	50,200	41,300	65,000	42,900	40,500
26 E.	20,800	20,800	26,800	18,100	31,700
27 E.	5,310	4,900	6,050	4,620	24,500
28 E.	1,690	1,460	2,320	1,660	545
T. 24 S., R. 24 E.	2,290	3,110	3,430	2,180	2,820
25 E.	35,100	43,800	55,200	37,600	36,600
26 E.	23,600	28,700	34,800	30,000	49,400
27 E.	3,070	2,970	4,750	3,200	10,400
28 E.					1,070



