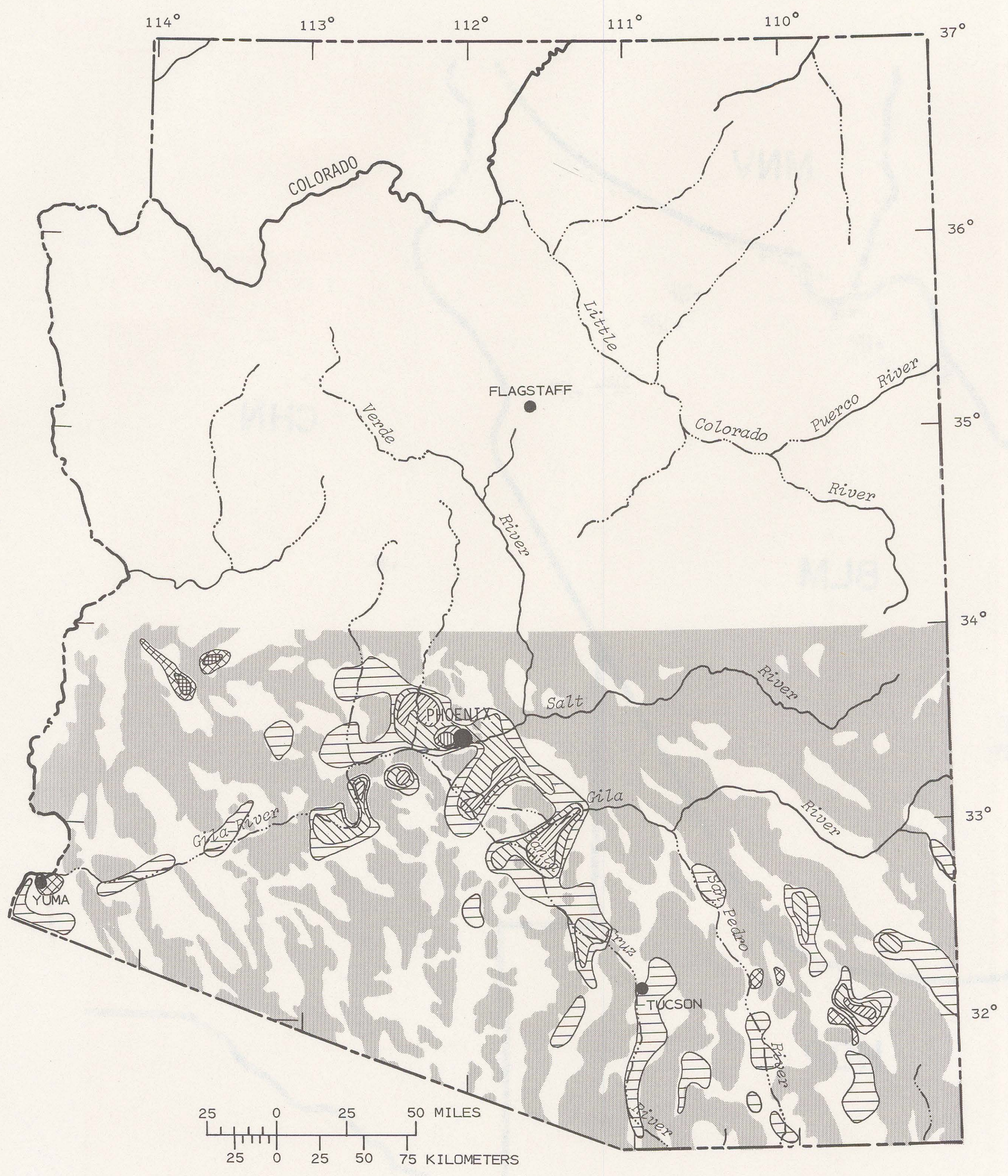
PREPARED IN COOPERATION WITH THE
ARIZONA DEPARTMENT OF WATER RESOURCES



EXPLANATION

CHANGE IN WATER LEVEL, IN FEET

More than +20

+10 to +20

+5 to +10

0 to +5

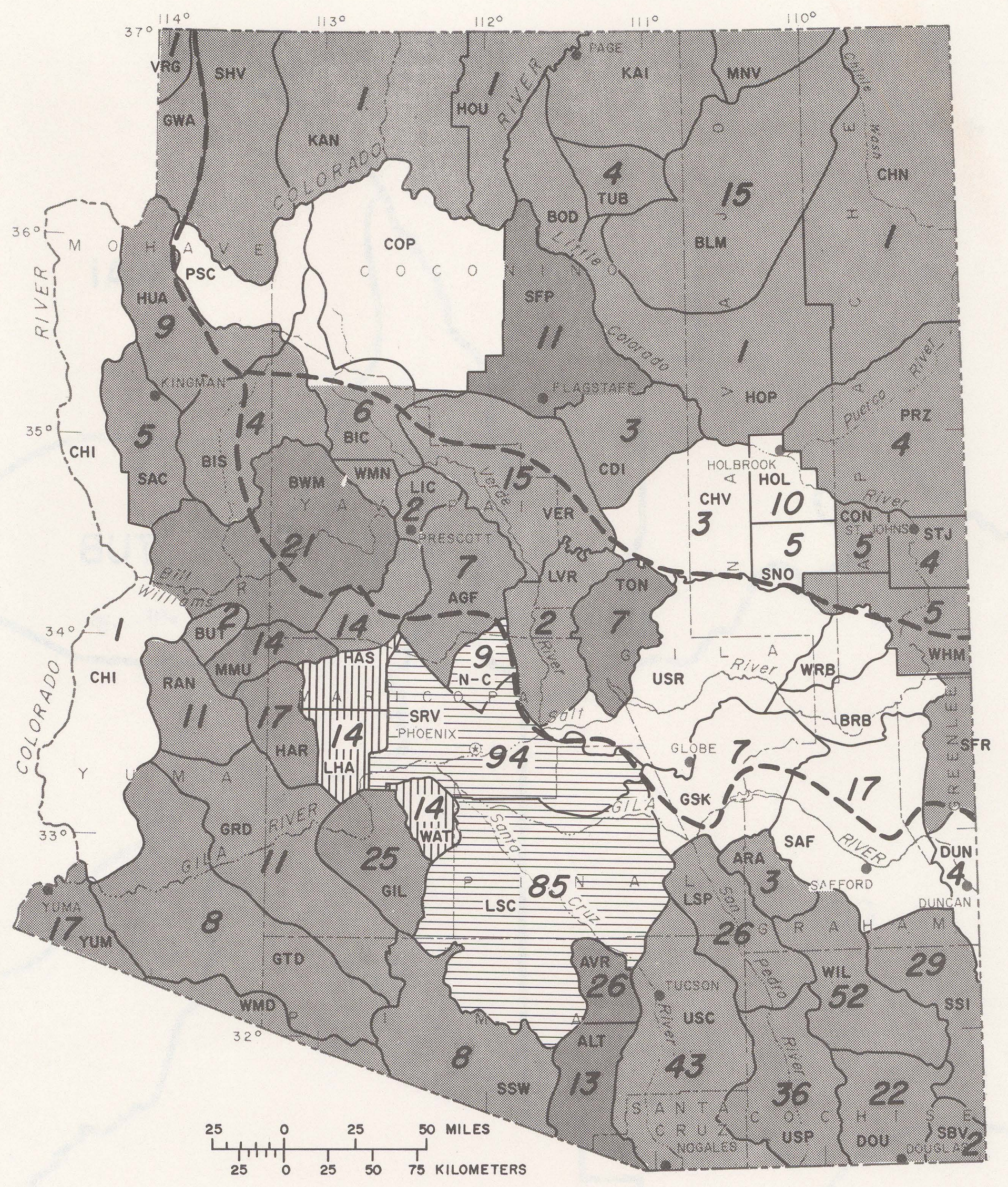
0 to -5

-5 to -10

Insufficient data

CRYSTALLINE AND CONSOLIDATED SEDIMENTARY ROCKS

CHANGE IN WATER LEVEL, SPRING 1983 TO SPRING 1984



EXPLANATION

AREA FOR WHICH A REPORT HAS BEEN RELEASED

AREA FOR WHICH A REPORT HAS BEEN RELEASED AND AN UPDATE IS IN PROGRESS

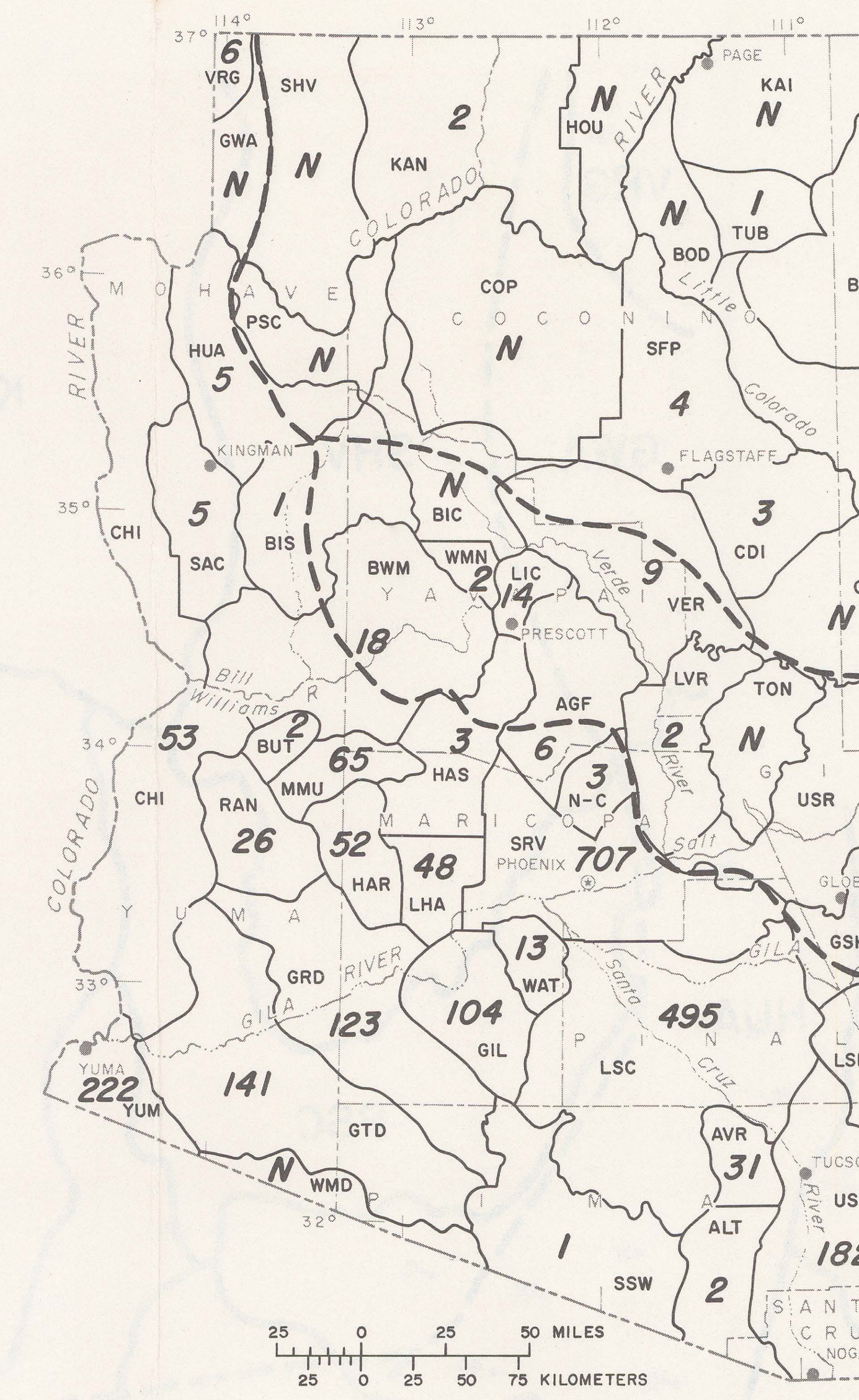
AREA FOR WHICH AN UPDATE OF PREVIOUS REPORT HAS BEEN PUBLISHED

AREA BOUNDARY

WATER-PROVINCE BOUNDARY

8 NUMBER OF ACTIVE OBSERVATION WELLS—As of Spring 1984

STATUS OF GROUND-WATER INVENTORY AND OBSERVATION-WELL PROGRAM



EXPLANATION

182 ESTIMATED GROUND-WATER PUMPAGE, IN THOUSANDS OF ACRE-FEET

N PUMPAGE OF 500 ACRE-FEET OR LESS

AREA BOUNDARY

WATER-PROVINCE BOUNDARY

NOTE: In areas where no data are shown, the pumpage is mostly from domestic and stock wells, and the amount is unknown. The total pumpage in these areas is estimated to be about 10,000 acre-feet for 1983 (see table).

ESTIMATED GROUND-WATER PUMPAGE IN ARIZONA IN 1983

ESTIMATED ANNUAL GROUND-WATER PUMPAGE, IN THOUSANDS OF ACRE-FEET, IN ARIZONA, BY AREA
[NUMBERS ROUNDED TO NEAREST THOUSAND ACRE-FEET. AREA: AVR, SEE MAPS FOR LOCATION]

YEAR	AGF	ALT	ARA	AVR	BIC	BIS	BLM	BOD	BUT	BWM	CDI	CHV	CHN	COP	CHI	CON	DOU	DUN	GIL	GRD	GSK	GTD	GWA	MAR
PRIOR TO 1915	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	--	--
1915	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	4	--	--
1916	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	4	--	--
1917	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	4	--	--
1918	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	4	--	--
1919	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	6	--	--
1920	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	6	--	--
1921	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	3	--	--
1922	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	3	--	--
1923	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	10	--	--
1924	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	15	--	--
1925	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	15	--	--
1926	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	20	--	--
1927	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	20	--	--
1928	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	20	--	--
1929	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	--	10	--	--
1930	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	15	--	--
1931	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	20	--	--
1932	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	20	--	--
1933	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	15	--	--
1934	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	15	--	--
1935	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	2	N	2	--	--	20	--	--
1936	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	2	N	2	--	--	20	--	--
1937	--	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	2	N	2	--	--	25	--	--
1938	--	--	--	8	--	--	--	--	--	--	--	--	--	--	--	--	2	1	2	--	--	25	--	--
1939	--	--	--	9	--	--	--	--	--	--	--	--	--	--	--	--	2	1	2	--	--	25	--	--
1940	--	--	--	12	--	--	--	--	--	--	--	--	--	--	--	--	5	2	19	1	--	25	--	1
1941	--	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--	5	1	19	1	--	25	--	1
1942	--	--	--	6	--	--	--	--	--	--	--	--	--	--	--	--	5	2	19	2	--	30	--	1
1943	--	--	--	20	--	--	--	--	--	--	--	--	--	--	--	--	5	7	20	2	--	35	--	1
1944	--	--	--	19	--	--	--	--	--	--	--	--	--	--	--	--	5	8	20	6	--	37	--	1
1945	--	--	--	23	--	--	--	--	--	--	--	--	--	--	--	--	8	6	20	9	--	35	--	1
1946	--	--	--	23	--	--	--	--	--	--	--	--	--	--	--	--	12	17	33	11	--	38	--	1
1947	--	--	--	34	--	--	--	--	--	--	--	--	--	--	--	--	17	21	40	11	--	43	--	1
1948	--	--	--	38	--	--	--	--	--	--	--	--	--	--	--	--	22	21	61	7	--	50	--	1
1949	--	--	--	48	--	--	--	--	--	--	--	--	--	--	--	--	30	11	67	13	--	45	--	1
1950	--	--	--	41	20	--	--	--	--	--	--	--	--	--	--	--	35	23	59	15	--	46	--	5
1951	--	--	--	75	20	--	--	--	--	--	--	--	--	--	--	--	38	33	104	21	--	50	--	7
1952	--	--	--	80	20	--	--	--	--	--	--	--	--	--	--	--	42	17	120	32	--	40	--	10
1953	--	--	--	85	20	--	--	--	--	--	--	--	--	--	--	--	45	30	145	42	--	16	--	20
1954	--	--	--	90	20	--	--	--	--	--	--	--	--	--	--	--	42	27	139	37	--	9	--	33
1955	--	--	--	95	20	--	--	--	--	--	--	--	--	--	--	--	50	25	140	31	--	8	--	30
1956	--	--	--	100	20	--	--	--	--	--	--	--	--	--	--	--	60	20	180	30	--	5	--	40
1957	--	--	--	110	20	--	--	--	--	--	--	--	--	--	--	--	55	20	180	30	--	5	--	50
1958	--	--	--	120	20	--	--	--	--	--	--	--	--	--	5	--	55	25	200	30	--	2	--	60
1959	--	--	--	130	20	--	--	--	--	--	--	--	--	--	10	--	55	25	250	40	--	2	--	95
1960	--	--	--	140	20	--	--	--	--	--	--	--	--	--	10	--	60	25	250	50	--	2	--	125
1961	--	--	--	145	20	--	--	--	--	--	--	--	--	--	10	--	65	25	200	50	--	140A	--	100
1962	--	--	--	140	20	--	--	--	--	--	--	--	--	--	10	--	65	25	170	50	--	215A	--	200
1963	--	--	--	115	20	--	--	--	--	--	--	--	--	--	10	--	65	25	130	60	--	201A	--	200
1964	--	--	--	115	20	--	--	--	--	--	--	--	--	--	15	--	60	25	130	65	--	181A	--	200
1965	--	--	--	125	20	--	--	--	--	--	--	--	--	--	13	--	90	25	115	65	--	186A	--	200
1966	--	--	--	95	20	--	--	--	--	--	--	--	--	--	12	--	105	25	145	80	--	217A	--	160
1967	--	--	--	121	9	--	--	--	--	--	--	--	--	--	20	--	120	25	198	100	--	213A	--	170
1968	--	--	--	134	9	--	--	--	--	--	--	--	--	--	17	--	120	25	153	126	--	220A	--	165
1969	--	--	--	155	9	--	--	--	--	--	--	--	--	--	12	--	104	25	166	120	--	218A	--	145
1970	--	--	--	157	9	--	--	--	--	--	--	--	--	--	12	--	103	25	162	108	--	218A	--	111
1971	--	--	--	140	9	--	--	--	--	--	--	--	--	--	16	--	95	25	212	122	--	215A	--	99
1972	--	--	--	146	8	--	--	--	--	--	--	--	--	--	19	--	89	25	238	125	--	201A	--	108
1973	--	--	--	152	8	--	--	--	--	--	--	--	--	--	25	--	110	25	198	143	--	208A	--	109
1974	--	--	--	129	11	--	5	N	4	--	2	N	1	N	28	3	138	25	249	191	--	206A	N	137
1975	--	--	--	159	12	--	5	N	5	--	3	N	2	N	32	5	118	25	288	164	--	210A	N	130
1976	--	--	--	115	10	--	6	N	5	--	3	N	3	N	43	7	112	30	287	182	--	204A	N	129
1977	--	--	--	110	9	--	6	N	4	--	4	N	2	N	53	7	87	30	300	210	--	208A	N	123
1978	--	--	--	66	6	8	5	N	4	--	4	N	2	N	53	7	80	30	292	193	--	191A	N	100
1979	3	--	3	71	5	2	5	N	4	18	2	N	2	N	66	9	81	25	218	193	--	175A	N	88
1980	4	--	3	83	5	2	5	N	4	18	2	N	3	N	61	14	91	30	275	234	--	197A	N	108
1981	4	--	3	67	6	2	5	N	4	18	3	N	3	N	63	9	85	30	308	315	--	157A	N	117
1982	4	--	3	55	N	1	6	N	3	18	2	N	3	N	82	11	76	30	253	221	--	152A	N	73
1983	6	2	1	31	N	1	6	N	2	18	3	N	3	N	53	10	50	8	104	123	14	141A	N	52
TOTAL	21G	2I	13G	3948	465	16F	54B	-B	39B	90G	28B	-B	24B	-B	750	82B	2780	956	6886	3661	14I	5371	-B	3509

YEAR	HAS	HOL	HOP	HOU	HUA	KAI	KAN	LIC	LHA	LSP	LSC	LVR	MMU	MNV	N-C	PSC	PRZ	RAN	SAC	SAF	SRV	SBV	SFP	SFR	SSI	SSW	SHV
PRIOR TO 1915	--	--	--	--	--	--	--	--	--	--	200	--	--	--	--	--	--	--	--	--	57	--	--	--	5	--	--
1915	--	--	--	--	--	--	--	--	--	--	82	--	--	--	--	--	--	--	--	--	15	--	--	--	10	--	--
1916	--	--	--	--	--	--	--	--	--	--	83	--	--	--	--	--	--	--	--	--	15	--	--	--	8	--	--
1917	--	--	--	--	--	--	--	--	--	--	84	--	--	--	--	--	--	--	--	--	15	--	--	--	8	--	--
1918	--	--	--	--	--	--	--	--	--	--	85	--	--	--	--	--	--	--	--	--	40	--	--	--	6	--	--
1919	--	--	--	--	--	--	--	--	--	--	86	--	--	--	--	--	--	--	--	--	60	--	--	--	6	--	--
1920	--	--	--	--	--	--	--	--	--	--	88	--	--	--	--	--	--	--	--	--	95	--	--	--	5	--	--
1921	--	--	--	--	--	--	--	--	--	--	90	--	--	--	--	--	--	--	--	--	100	--	--	--	5	--	--
1922	--	--	--	--	--	--	--	--	--	--	93	--	--	--	--	--	--	--	--	--	200	--	--	--	5	--	--
1923	--	--	--	--	--	--	--	--	--	--	96	--	--	--	--	--	--	--	--	--	400	--	--	--	5	--	--
1924	--	--	--	--	--	--	--	--	--	--	99	--	--	--	--	--	--	--	--	--	500	--	--	--	5	--	--
1925	--	--	--	--	--	--	--	--	--	--	101	--	--	--	--	--	--	--	--	--	500	--	--	--	5	--	--
1926	--	--	--	--	--	--	--	--	--	--	104	--	--	--	--	--	--	--	--	--	500	--	--	--	4	--	--
1927	--	--	--	--	--	--	--	--	--	--	106	--	--	--	--	--	--	--	--	--	500	--	--	--	4	--	--
1928	--	--	--	--	--	--	--	--	--	--	109	--	--	--	--	--	--	--	--	--	500	--	--	--	4	--	--
1929	--	--	--	--	--	--	--	--	--	--	111	--	--	--	--	--	--	--	--	--	600	--	--	--	4	--	--
1930	--	--	--	--	--	--	--	--	--	--	135	--	--	--	--	--	--	--	--	--	650	--	--	--	4	--	--
1931	--	--	--	--	--	--	--	--	--	--	160	--	--	--	--	--	--	--	--	--	600	--	--	--	4	--	--
1932	--	--	--	--	--	--	--	--	--	--	185	--	--	--	--	--	--	--	--	--	300	--	--	--	3	--	--
1933	--	--	--	--	--	--	--	--	--	--	210	--	--	--	--	--	--	--	--	--	572	--	--	--	3	--	--
1934	--	--	--	--	--	--	--	--	--	--	235	--	--	--	--	--	--	--	--	--	711	--	--	--	3	--	--
1935	--	--	--	--	--	--	--	--	--	--	260	--	--	--	--	--	--	--	--	20	554	--	--	--	3	--	--
1936	--	--	--	--	--	--	--	--	--	--	285	--	--	--	--	--	--	--	--	20	684	--	--	--	3	--	--
1937	--	--	--	--	--	--	--	2	--	--	305	--	--	--	--	--	--	--	--	20	665	--	--	--	3	--	--
1938	--	--	--	--	--	--	--	3	--	--	325	--	--	--	--	--	--	--	--	20	905	--	--	--	3	--	--
1939	--	--	--	--	--	--	--	4	--	--	352	--	--	--	--	--	--	--	--	20	738	--	--	--	3	--	--
1940	--	--	--	--	--	--	--	4	--	--	372	--	N	--	--	--	--	--	N	25	943	--	--	--	3	--	--
1941	--	--	--	--	--	--	--	4	--	--	421	--	N	--	--	--	--	--	N	9	444	--	--	--	3	--	--
1942	--	--	--	--	--	--	--	5	--	--	500	--	N	--	--	--	--	--	N	19	1004	--	--	--	4	--	--
1943	--	--	--	--	--	--	--	6	--	--	515	--	N	--	--	--	--	--	N	35	1104	--	--	--	4	--	--
1944	--	--	--	--	--	--	--	7	--	--	530	--	N	--	--	--	--	--	N	52	1017	--	--	--	4	--	--
1945	--	--	--	--	--	--	--	7	--	--	610	--	2	--	--	--	--	--	N	35	1143	--	--	--	5	--	--
1946	--	--	--	--	--	--	--	8	--	--	660	--	2	--	--	--	--	--	N	115	1360	--	--	--	6	--	--
1947	--	--	--	--	--	--	--	9	--	--	700	--	2	--	--	--	--	--	N	100	1406	--	--	--	6	--	--
1948	--	--	--	--	--	--	--	12	--	--	950	--	2	--	--	--	--	--	N	110	1670	--	--	--	6	--	--
1949	--	--	--	--	--	--	--	12	--	--	1100	--	2	--	--	--	--	--	N	40	1644	--	--	--	6	--	--
1950	--	--	--	--	--	--	--	13	--	--	1000	--	2	--	--	--	--	2	N	90	1852	--	--	--	6	--	--
1951	--	--	--	--	--	--	--	13	--	--	1030	--	2	--	--	--	--	5	N	125	1910	--	--	--	6	--	--
1952	--	--	--	--	--	--	--	12	--	--	950	--	5	--	--	--	--	15	N	70	2020	--	--	--	15	--	--
1953	--	--	--	--	--	--	--	13	--	--	1400	--	6	--	--	--	--	22	N	120	2300	--	--	--	25	--	--
1954	--	--	--	--	--	--	--	12	--	--	1200	--	7	--	--	--	--	19	N	90	2300	--	--	--	32	--	--
1955	--	--	--	--	--	--	--	13	--	--	1200	--	9	--	--	--	--	16	N	90	2240	--	--	--	40	--	--
1956	--	--	--	--	--	--	--	14	--	--	1100	--	15	--	--	--	--	16	N	90	2300	--	--	--	40	--	--
1957	--	--	--	--	--	--	--	14	--	--	1100	--	21	--	--	--	--	9	N	100	2300	--	--	--	48	--	--
1958	--	--	--	--	--	--	--	14	--	--	1200	--	38	--	--	--	--	10	N	50	2300	--	--	--	50	--	--
1959	--	--	--	--	--	--	--	14	--	--	1200	--	50	--	--	--	--	10	N	100	2206	--	--	--	50	--	--
1960	--	--	--	--	N	--	--	14	--	--	1100	--	60	--	--	--	--	11	N	90	2005	--	--	--	60	--	--
1961	--	--	--	--	1	--	--	15	--	--	1150	--	70	--	--	--	--	12	N	140	2178	--	--	--	65	--	--
1962	--	--	--	--	1	--	--	15	--	--	1050	--	65	--	--	--	--	15	N	60	1976	--	--	--	65	--	--
1963	--	--	--	--	1	--	--	13	--	--	1000	--	75	--	--	--	--	17	N	80	2134	--	--	--	65	--	--
1964	--	--	--	--	2	--	--	13	--	--	1150	--	90	--	--	--	--	7	N	110	1972	--	--	--	75	--	--
1965	--	--	--	--	2	--	--	14	--	--	910	--	90	--	--	--	--	6	4	150	1500	--	--	--	70	--	--
1966	--	--	--	--	3	--	--	14	--	30	915	--	105	--	--	--	--	7	4	90	1350	--	--	--	72	--	--
1967	--	--	--	--	4	--	--	12	--	29	1120	--	98	--	--	--	--	12	4	145	1763	--	--	--	76	--	--
1968	--	--	--	--	4	--	--	12	--	42	910	--	95	--	--	--	--	15	6	78	1264	--	--	--	81	--	--
1969	--	--	--	--	4	--	--	12	--	51	1043	--	98	--	--	--	--	16	5	140	1600	--	--	--	78	--	--
1970	--	--	--	--	4	--	--	12	--	58	890	--	86	--	--	--	--	15	4	120	1700	--	--	--	105	--	--
1971	--	--	--	--	4	--	--	12	--	51	819	--	101	--	--	--	--	15	5	190	1800	--	--	--	107	--	--
1972	--	--	--	--	4	--	--	12	--	53	798	--	112	--	--	--	--	19	6	130	1800	--	--	--	104	--	--
1973	--	--	--	--	4	--	--	12	91	57	990	--	113	--	--	--	--	19	5	140	1200	--	--	--	115	--	--
1974	--	16	N	N	5	N	N	13	89	61	1171	--	134	N	--	N	1	22	7	110	1800	--	2	--	135	--	N
1975	--	16	N	N	4	N	N	15	94	59	1016	--	139	N	--	N	2	13	8	145	1750	--	4	--	122	--	N
1976	--	18	N	N	4	N	2	14	98	67	1007	--	129	N	--	N	2	6	8	170	1680	--	2	--	122	--	N
1977	--	19	N	N	4	N	2	18	84	62	1037	--	132	N	--	N	2	13	7	213	1709	--	2	--	117	--	N
1978	3	24	N	N	6	N	2	15	63	55	748	--	115	N	--	N	2	12	8	132	1098	--	2	1	121	--	N
1979	3	19	N	N	6	N	2	15	64	46	737	--	115	N	2	N	1	14	6	83	1043	--	2	1	113	3	N
1980	3	18	N	N	4	N	2	15	74	52	898	--	123	N	2	N	2	10	4	107	1109	--	3	1	139	5	N
1981	3	24	1	N	6	N	2	15	87	60	998	2	144	N	3	N	2	50	5	140	1620	--	3	1	127	8	N
1982	3	24	1	N	5	N	2	14	70	52	858	2	90	N	3	N	2	40	2	94	1115	--	3	1	75	10	N
1983	3	22	N	N	5	N	2	14	48	40	495	2	65	N	3	N	2	26	2	72	707	N	4	N	42	1	N
TOTAL	18F	200B	2B	-B	87	-B	16B	545	862C	925D	44617	6H	2609	-B	13G	-B	18B	516	100	4494	81812	NI	27B	5F	2731	27G	-B

YEAR	SNO	STJ	TON	TUB	USP	USC	VER	VRG	WAT	WHM	WIL	WMD	WMN	YUM	OTHERS	TOTAL	YEAR
PRIOR TO 1915	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	347	PRIOR TO 1915
1915	--	--	--	--	--	7	--	--	--	--	2	--	--	2	--	123	1915
1916	--	--	--	--	--	7	--	--	--	--	2	--	--	2	--	122	1916
1917	--	--	--	--	--	8	--	--	--	--	1	--	--	2	--	122	1917
1918	--	--	--	--	--	8	--	--	--	--	N	--	--	3	--	146	1918
1919	--	--	--	--	--	10	--	--	--	--	N	--	--	4	--	172	1919
1920	--	--	--	--	--	35	--	--	--	--	N	--	--	4	--	233	1920
1921	--	--	--	--	--	20	--	--	--	--	N	--	--	4	--	222	1921
1922	--	--	--	--	--	30	--	--	--	--	N	--	--	4	--	335	1922
1923	--	--	--	--	--	37	--	--	--	--	N	--	--	4	--	552	1923
1924	--	--	--	--	--	45	--	--	--	--	N	--	--	4	--	668	1924
1925	--	--	--	--	--	42	--	--	--	--	N	--	--	5	--	668	1925
1926	--	--	--	--	--	40	--	--	--	--	1	--	--	6	--	675	1926
1927	--	--	--	--	--	40	--	--	--	--	1	--	--	7	--	678	1927
1928	--	--	--	--	--	45	--	--	--	--	2	--	--	8	--	688	1928
1929	--	--	--	--	--	40	--	--	--	--	2	--	--	9	--	776	1929
1930	--	--	--	--	--	38	--	--	--	--	1	--	--	10	--	854	1930
1931	--	--	--	--	--	25	--	--	--	--	1	--	--	11	--	822	1931
1932	--	--	--	--	--	20	--	--	--	--	1	--	--	12	--	543	1932
1933	--	--	--	--	--	16	--	--	--	--	1	--	--	13	--	832	1933
1934	--	--	--	--	--	30	--	--	--	--	1	--	--	14	--	1011	1934
1935	--	--	--	--	--	28	--	--	--	--	1	--	--	15	5	911	1935
1936	--	--	--	--	--	32	--	--	--	--	1	--	--	16	5	1071	1936
1937	--	--	--	--	--	35	--	--	--	--	1	--	--	17	10	1091	1937
1938	--	--	--	--	--	40	--	--	--	--	2	--	--	18	10	1364	1938
1939	--	--	--	--	--	50	--	--	--	--	2	--	--	19	20	1247	1939
1940	--	--	--	--	--	62	--	--	N	--	2	--	--	19	25	1520	1940
1941	--	--	--	--	--	70	--	--	N	--	5	--	--	20	25	1063	1941
1942	--	--	--	--	--	94	--	--	N	--	5	--	--	21	25	1742	1942
1943	--	--	--	--	--	95	--	--	N	--	5	--	--	22	25	1901	1943
1944	--	--	--	--	--	100	--	--	N	--	5	--	--	20	25	1856	1944
1945	--	--	--	--	--	106	--	--	N	--	9	--	--	22	25	2066	1945
1946	--	--	--	--	--	109	--	--	N	--	15	--	--	32	30	2472	1946
1947	--	--	--	--	--	136	--	--	N	--	20	--	--	39	30	2615	1947
1948	--	--	--	--	--	135	--	--	1	--	23	--	--	62	35	3206	1948
1949	--	--	--	--	--	132	--	--	1	--	28	--	--	65	35	3280	1949
1950	--	--	--	--	--	160	--	--	5	--	35	--	2	64	40	3515	1950
1951	--	--	--	--	--	180	--	--	10	--	38	--	2	70	50	3789	1951
1952	--	--	--	--	--	195	--	--	17	--	39	--	2	68	50	3819	1952
1953	--	--	--	--	--	200	--	--	28	--	94	--	2	69	50	4732	1953
1954	--	--	--	--	--	200	--	--	30	--	105	--	2	69	50	4513	1954
1955	--	--	--	--	--	200	--	--	40	--	110	--	2	72	50	4481	1955
1956	--	--	--	--	--	200	--	--	40	--	120	--	2	87	60	4539	1956
1957	--	--	--	--	--	200	--	--	40	--	135	--	2	114	60	4613	1957
1958	--	--	--	--	--	175	--	--	45	--	155	--	2	121	60	4737	1958
1959	--	--	--	--	--	165	--	--	50	--	183	--	2	122	60	4839	1959
1960	--	--	--	--	--	165	--	--	60	--	195	--	2	122	75	4641	1960
1961	--	--	--	--	--	175	--	--	65	--	184	--	2	124	90	5026	1961
1962	--	--	--	--	--	200	--	--	50	--	180	--	2	121	110	4805	1962
1963	--	--	--	--	--	180	--	--	50	--	180	--	2	121	110	4854	1963
1964	--	--	--	--	--	175	--	--	50	--	220	--	2	154	120	4951	1964
1965	--	--	--	--	--	200	--	--	45	--	250	--	2	179	150	4411	1965
1966	--	--	--	--	35	190	--	--	45	--	240	--	2	178	100	4239	1966
1967	--	--	--	--	34	200	--	--	52	--	300	--	2	229	100	5156	1967
1968	--	--	--	--	29	210	--	--	54	--	290	--	2	234	100	4395	1968
1969	--	--	--	--	28	236	--	--	60	--	291	--	2	231	100	4949	1969
1970	--	--	--	--	33	240	--	--	55	--	289	--	2	220	100	4838	1970
1971	--	--	--	--	36	258	--	--	55	--	309	--	2	233	100	5030	1971
1972	--	--	--	--	38	253	--	--	57	--	292	--	2	257	100	4996	1972
1973	--	--	--	--	41	280	--	--	55	--	305	--	2	272	100	4779	1973
1974	29	1	--	N	45	264	4	5	69	3	339	--	2	247	24	5727	1974
1975	21	3	--	1	52	280	4	5	64	3	293	--	2	255	21	5549	1975
1976	24	3	--	1	59	281	4	5	70	3	306	--	2	240	12	5475	1976
1977	28	3	--	1	54	257	9	6	72	2	220	--	2	233	15	5476	1977
1978	28	3	--	1	46	220	8	6	54	4	169	--	2	234	15	4238	1978
1979	28	4	N	1	50	215	8	6	67	3	175	N	2	192	15	4011	1979
1980	30	5	N	1	67	228	7	6	65	3	199	N	2	248	15	4586	1980
1981	33	7	N	1	75	225	8	6	65	3	180	N	2	238	15	5358I	1981
1982	38	6	N	1	71	187	9	6	20	4	140	N	2	211	15	4169	1982
1983	31	5	N	1	49	182	9	6	13	3	82	N	2	222	10	2801	1983
TOTAL	290B	40B	-G	9B	842D	9023	70B	57B	1619	31B	6782	-G	68	6386E	2472J	196031	TOTAL

EXPLANATION OF SYMBOLS

N: PUMPAGE OF 500 ACRE-FEET OR LESS.

A: WITHDRAWAL MOSTLY FOR DRAINAGE PURPOSES.

B: PUMPAGE FOR THESE AREAS WAS NOT ESTIMATED PRIOR TO 1974. THUS, TOTAL IS FOR 1974-83 ONLY. ESTIMATED PUMPAGE BEFORE 1974 IS INCLUDED IN "OTHERS."

C: PUMPAGE FOR LHA AREA WAS INCLUDED IN SRV AREA PRIOR TO 1973. THUS, TOTAL IS FOR 1973-83 ONLY.

D: PUMPAGE FOR LSP AND USP AREAS WAS NOT ESTIMATED PRIOR TO 1966. THUS, TOTAL IS FOR 1966-83 ONLY. ESTIMATED PUMPAGE BEFORE 1966 IS INCLUDED IN "OTHERS."

E: YUM AREA INCLUDES SOUTH GILA VALLEY, YUMA MESA, AND YUMA VALLEY. BEGINNING IN 1947 IN YUMA VALLEY, IN 1961 IN SOUTH GILA VALLEY, AND IN 1970 IN YUMA MESA, PART OF THE PUMPAGE WAS FOR DRAINAGE OF WATERLOGGED LANDS.

F: PUMPAGE FOR BIS, HAS, AND SFR AREAS WAS NOT ESTIMATED PRIOR TO 1978. THUS, TOTAL IS FOR 1978-83 ONLY. ESTIMATED PUMPAGE BEFORE 1978 IS INCLUDED IN "OTHERS."

G: PUMPAGE FOR AGF, ARA, BWM, N-C, SSW, TON, AND WMB AREAS WAS NOT ESTIMATED PRIOR TO 1979. THUS, TOTAL IS FOR 1979-83 ONLY. ESTIMATED PUMPAGE BEFORE 1979 IS INCLUDED IN "OTHERS."

H: PUMPAGE FOR LVR AREA WAS NOT ESTIMATED PRIOR TO 1981. THUS, TOTAL IS FOR 1981-83 ONLY. ESTIMATED PUMPAGE BEFORE 1981 IS INCLUDED IN "OTHERS."

I: PUMPAGE FOR ALT, GSK, AND SBV AREAS WAS NOT ESTIMATED PRIOR TO 1983. THUS, TOTAL IS FOR 1983 ONLY. ESTIMATED PUMPAGE BEFORE 1983 IS INCLUDED IN "OTHERS."

J: "OTHERS" INCLUDE: BLACK RIVER BASIN, UPPER SALT RIVER BASIN, AND WHITE RIVER BASIN. PUMPAGE IN THESE AREAS IS MOSTLY FROM DOMESTIC AND STOCK WELLS, AND THE AMOUNT IS UNKNOWN. TOTAL ANNUAL PUMPAGE FOR THESE AREAS IS APPROXIMATED.

Introduction

In arid and semiarid regions such as Arizona, the availability of adequate water supplies has a significant influence on the type and extent of economic development. About two-thirds of the water used in the State is ground water. The nature and extent of the ground-water reservoirs must be known for proper management of this valuable resource.

The U.S. Geological Survey, in cooperation with the State of Arizona, which is represented by the Arizona Department of Water Resources, has conducted a program of ground-water studies in Arizona since 1939. The primary purposes of these studies are to define the amount, location, and quality of the ground-water resources of Arizona and to monitor the effects of large-scale development of the ground-water supplies. The program includes the collection, compilation, and analysis of the geologic and hydrologic data necessary to evaluate the ground-water resources of the State. The geohydrologic data, results of areal studies, and research findings are presented in publications of the U.S. Geological Survey and the Arizona Department of Water Resources and in technical journals and other publications. (See section entitled "Recent Publications.") The basic hydrologic data are in computer storage and are available to the public. Since 1974, a major thrust of the program has been to inventory the ground-water conditions in the 68 ground-water areas of the State. Several selected ground-water areas are studied each year; water levels are measured annually in a statewide observation-well network, many ground-water samples are collected and analyzed annually, and ground-water pumpage is computed for most of the areas. (See small maps at top of sheet 1.) As of July 1984, reports had been published for 56 of the 68 ground-water areas. Data collected in the ground-water areas include information on selected wells, water-level measurements, and water samples for chemical analysis. The data for each of the selected ground-water areas are analyzed, and the results are published in map form. Typically, the maps show depth to water; change in water levels; altitude of the water level; and quality-of-water data, such as specific conductance, dissolved solids, and fluoride.

Conversion Factors

For readers who prefer to use the International System of Units (SI) rather than inch-pound units, the conversion factors for the terms used in this report are listed below:

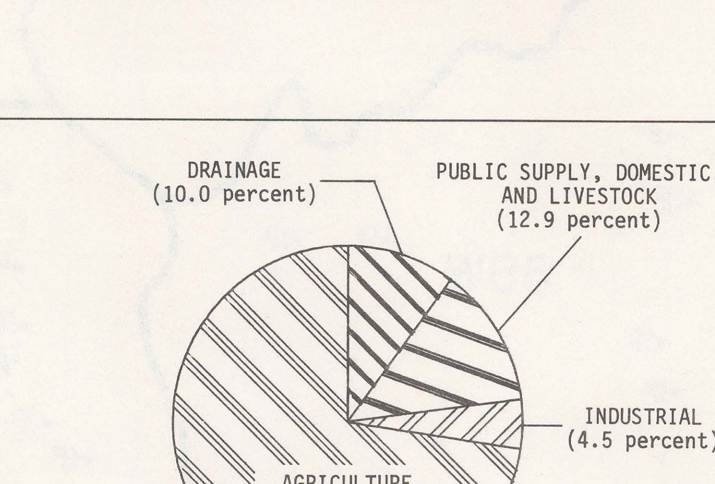
Multiply	By	To obtain
foot (ft)	0.3048	meter (m)
gallon per minute (gal/min)	0.06309	liter per second (L/s)
acre-foot (acre-ft)	0.001233	cubic hectometer (hm^3)

Availability and Use of Water

In Arizona the availability of adequate and potable water supplies has as great an influence on the location of cities and cropland as any other factor. Agriculture is dependent almost entirely on irrigation because rainfall is inadequate for raising crops. Some surface water is available in a few areas, but the amount is not sufficient to meet the continually increasing demand. For many years, nearly two-thirds of Arizona's water supply has been withdrawn from the ground-water reservoirs. The principal use of the ground water is for the irrigation of crops, although municipal and industrial uses are increasing steadily.

In 1983 the withdrawal of ground water was about 2.8 million acre-ft. This amount is about 1.4 million acre-ft less than the amount withdrawn in 1982, 2.6 million acre-ft less than in 1981, and 1.8 million acre-ft less than in 1980. The withdrawal in 1983 is the least amount withdrawn since the mid-1940's. Most of the decrease in 1983 was in the amount of ground water used for irrigation in the Basin and Range lowlands province. Slightly more than 2.0 million acre-ft of ground water or 72.6 percent of the total withdrawal was used for the irrigation of crops in 1983. The rest was used for public-supply, industrial, domestic, and livestock uses, and some ground water was pumped for drainage of waterlogged lands. The percentage of total withdrawal that was used for agriculture is the smallest since these percentages have been calculated beginning in 1974; in other years more than 80 percent was used for agriculture. Through 1983, about 196 million acre-ft of ground water had been withdrawn from the ground-water reservoirs in Arizona. The amount of water pumped in 1983 is given on the map showing estimated ground-water pumpage; the annual and accumulated pumpage since the beginning of record are shown in the table. In addition to the ground water pumped, about 3.0 million acre-ft of surface water was diverted for use in the State in 1983. About 2.2 million acre-ft of the diverted surface water was consumptively used and the rest was returned to the Colorado River through drains and spillways. All the surface water diverted is used in the Basin and Range lowlands province. Potential well production, depth to water in selected wells in spring 1984, and change in water level in selected wells from 1979 to 1984 are shown on the map on sheet 2. The use of ground water and the effects of this use on the ground-water reservoirs in each of the three water provinces (see map showing water provinces, sheet 2) are discussed separately in the following sections.

Basin and Range lowlands province.--The Basin and Range lowlands province is the most highly developed of the three water provinces. The province is characterized by rugged mountain ranges separated by broad elongated alluvium-filled basins. The ground-water reservoirs are mainly alluvial deposits in the basins, but small supplies of water can be obtained locally from the crystalline and sedimentary rocks in the mountains that bound the basins. In 1983, about 2.65 million acre-ft of ground water was withdrawn in the province, of which about 1.96 million acre-ft was used for the irrigation of crops. Through 1983, more than 191 million acre-ft of ground water had been withdrawn from the ground-water reservoirs in the province. The amount of ground water withdrawn in 1983 is about 1.35 million acre-ft less than that withdrawn in 1982 and is the least since pumpage has been calculated separately for the water provinces (1974). The amount withdrawn for the province probably is the least since the mid-1940's. Precipitation in the province in 1983 averaged nearly 7 in. above the long-term average. (See U.S. Environmental Data Service, 1983, Climatological data—annual summary—Arizona: National Oceanic and Atmospheric Administration, v. 87, no. 13, 27 p.) The above-average precipitation and greater availability of surface water only partly account for the fact that the amount of ground water used to irrigate crops was about 1.36 million acre-ft or 41 percent less in 1983 than in 1982. The factor that probably had more influence on the decline in pumpage was the "Payment-in-Kind" (PIK) program in which farmers were paid to let land be idle. The program was administered by the U.S. Agriculture Stabilization and Conservation Service and their report indicates eligible farms were those that had previously been planted in wheat, cotton, rice, or feed grains. In some counties more than 40 percent of the farms eligible for the program participated and many acres were fallowed in 1983. Annual reports



TOTAL ESTIMATED GROUND-WATER PUMPAGE, 2.8 MILLION ACRE-FEET

ESTIMATED GROUND-WATER PUMPAGE BY TYPE OF USE IN 1983

show that 285,360 acres less were harvested in 1983 than in 1982 (Arizona Crop and Livestock Reporting Service, 1982 and 1983, Arizona Agricultural Statistics: Statistical Reporting Service, U.S. Department of Agriculture and University of Arizona, College of Agriculture). The lesser amount of acreage harvested and the unusually wet year can easily account for the smaller amount of pumpage in 1983. Industrial use of ground water was about 7,000 acre-ft or 8 percent greater than in 1982. Municipal and domestic use increased about 19,000 acre-ft or 6 percent.

The Salt River Valley and the lower Santa Cruz basin are the largest agricultural areas in the State. Agricultural ground-water pumpage in the two areas amounted to more than half the total pumpage for the State in 1983. In the Salt River Valley area, about 707,000 acre-ft of ground water was withdrawn in 1983—the first time the pumpage has been less than 1 million acre-ft since 1942. In several years during the 1950's, pumpage was more than 2 million acre-ft. In the lower Santa Cruz basin area, the ground-water withdrawal in 1983 was 495,000 acre-ft, which is the smallest since 1942. In nearly all the areas where large amounts of ground water are pumped each year, the withdrawal in 1983 was less than that in 1982; in many other areas, the withdrawal was the smallest in many years. In the Yuma area, ground-water withdrawal in 1983 was 11,000 acre-ft greater than that in 1982; the increase was about equally divided between the amount used for agriculture and the amount pumped for drainage of water-logged land.

A significant effect of the decrease in pumpage and the greater amount of precipitation during 1983 was the rise in water levels that occurred from spring 1983 to spring 1984. Patterns of the change in water level in the developed areas of the State for this period are shown on one of the small maps at the top of the sheet. In large areas, the water level rose as much as 5 ft and in smaller areas more than 20 ft of rise occurred. Water-level declines of 5 to 10 ft occurred in only a few small areas.

Plateau uplands province.--In the Plateau uplands province, ground-water development is small compared with that in the Basin and Range lowlands province but somewhat greater than that in the Central highlands province. The area is underlain by a sequence of sandstone, siltstone, and limestone overlain locally by volcanic rocks and "shoestring" deposits of thin alluvium. Most of the ground water is pumped from layered sandstone that stores ground water under confined and unconfined conditions and from thin deposits of alluvium along the major streams. The use of ground water is limited largely to scattered farms and homesites; industrial and utility sites; and a few population centers, such as Flagstaff, Holbrook, and the White Mountains recreational areas. In 1983 about 92,000 acre-ft of ground water was withdrawn in the province, which is about 11,000 acre-ft less than in 1982. For the most part, no pattern of rise or decline in water levels is discernible, although a few feet of decline has occurred in the Black Mesa, Snowflake, and Holbrook areas.

Central highlands province.--The Central highlands province is a transition zone between the Basin and Range lowlands province and the Plateau uplands province and is the smallest of the three water provinces. Ground water is obtained from thick alluvial deposits in a few areas; from layered sandstone, limestone, and conglomerate in some areas; from thin alluvial deposits along major stream channels; and locally from fractured crystalline and sedimentary rocks. Only a few thousand acres of land is under cultivation, and the amount of ground water withdrawn annually is small—about 45,000 acre-ft in 1983. The small amount of ground water withdrawn has not resulted in notable water-level declines except in parts of Little Chino Valley.

Recent Publications

The following reports on the water resources and geology of Arizona were published from July 1, 1983, through June 30, 1984. The reports were prepared by the Water Resources Division of the U.S. Geological Survey in Arizona and by the Arizona Department of Water Resources.

Aldridge, B. N., and Eychaner, J. H., 1984, Floods of October 1977 in southern Arizona and March 1978 in central Arizona: U.S. Geological Survey Water-Supply Paper 2223, 143 p.

Anderson, T. W., 1984, Southwest Alluvial Basins, RASA study—An overview, in Replogle, J. A., and Renard, K. G., eds., Water today and tomorrow: Specialty Conference, Irrigation and Drainage Division of the American Society of Civil Engineers, Flagstaff, Arizona, July 24-26, 1984, Proceedings, p. 606-613.

Eychaner, J. H., 1983, Comparison of flood-frequency estimates in southern Arizona [abs.]: Eos Transactions, American Geophysical Union, v. 64, no. 45, November 8, 1983, p. 706-707.

Fields, R. L., and Vetter, E. F., 1984, A data-management system for use in ground-water modeling and resource evaluation: U.S. Geological Survey Water-Resources Investigations Report 84-4014, 277 p.

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Freethey, G. W., and Anderson, T. W., 1984, Predevelopment hydrologic conditions in the alluvial basins of Arizona and adjacent parts of California and New Mexico: U.S. Geological Survey Hydrologic Investigations Atlas HA-664, 3 sheets [in press].

Freethey, G. W., Pool, D. R., Anderson, T. W., and Tucci, Patrick, 1984, Description and generalized distribution of aquifer materials in the alluvial basins of Arizona and adjacent parts of California and New Mexico: U.S. Geological Survey Hydrologic Investigations Atlas HA-663, 4 sheets [in press].

Hollett, K. J., 1983, Geohydrology and water resources of the Papago Farms-Great Plain area, Papago Indian Reservation, Arizona, and the upper Rio Sonoyta area, Sonora, Mexico: U.S. Geological Survey Open-File Report 83-774, 76 p.

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Loeltz, O. J., and Leake, S. A., 1983, A method for estimating ground-water return flow to the lower Colorado River in the Yuma area, Arizona and California—Executive summary: U.S. Geological Survey Water-Resources Investigations Report 83-4221, 8 p.

Murphy, B. A., and Hedley, J. D., 1984, Maps showing groundwater conditions in the upper Santa Cruz basin area, Pima, Santa Cruz, Pinal, and Cochise Counties, Arizona—1982: Arizona Department of Water Resources Hydrologic Map Series Report 11, 3 sheets.

Owen-Joyce, S. J., 1984, Hydrology of a stream-aquifer system in the Camp Verde area, Yavapai County, Arizona: Arizona Department of Water Resources Bulletin 3, 60 p. [in press].

Pool, D. R., Aquifer geology of alluvial basins of Arizona, in Replogle, J. A., and Renard, K. G., eds., Water today and tomorrow: Specialty Conference, Irrigation and Drainage Division of the American Society of Civil Engineers, Flagstaff, Arizona, July 24-26, 1984, Proceedings, p. 683-690.

Raymond, L. H., 1984, Overview of remote sensing for estimating consumptive use in the lower Colorado River flood plain, Arizona and California [abs.]: The Application of Remote Sensing to Agriculture, Casa Grande, Arizona, May 18, 1984, Proceedings, p. 23.

Robertson, F. N., 1984, Trace elements in ground water in southern Arizona [abs.], in Replogle, J. A., and Renard, K. G., eds., Water today and tomorrow: Specialty Conference, Irrigation and Drainage Division of the American Society of Civil Engineers, Flagstaff, Arizona, July 24-26, 1984, Proceedings, p. 674.

Rogers, G. F., Malde, H. E., and Turner, R. M., 1984, Bibliography of repeat photography for evaluating landscape change: Salt Lake City, University of Utah Press, 179 p.

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