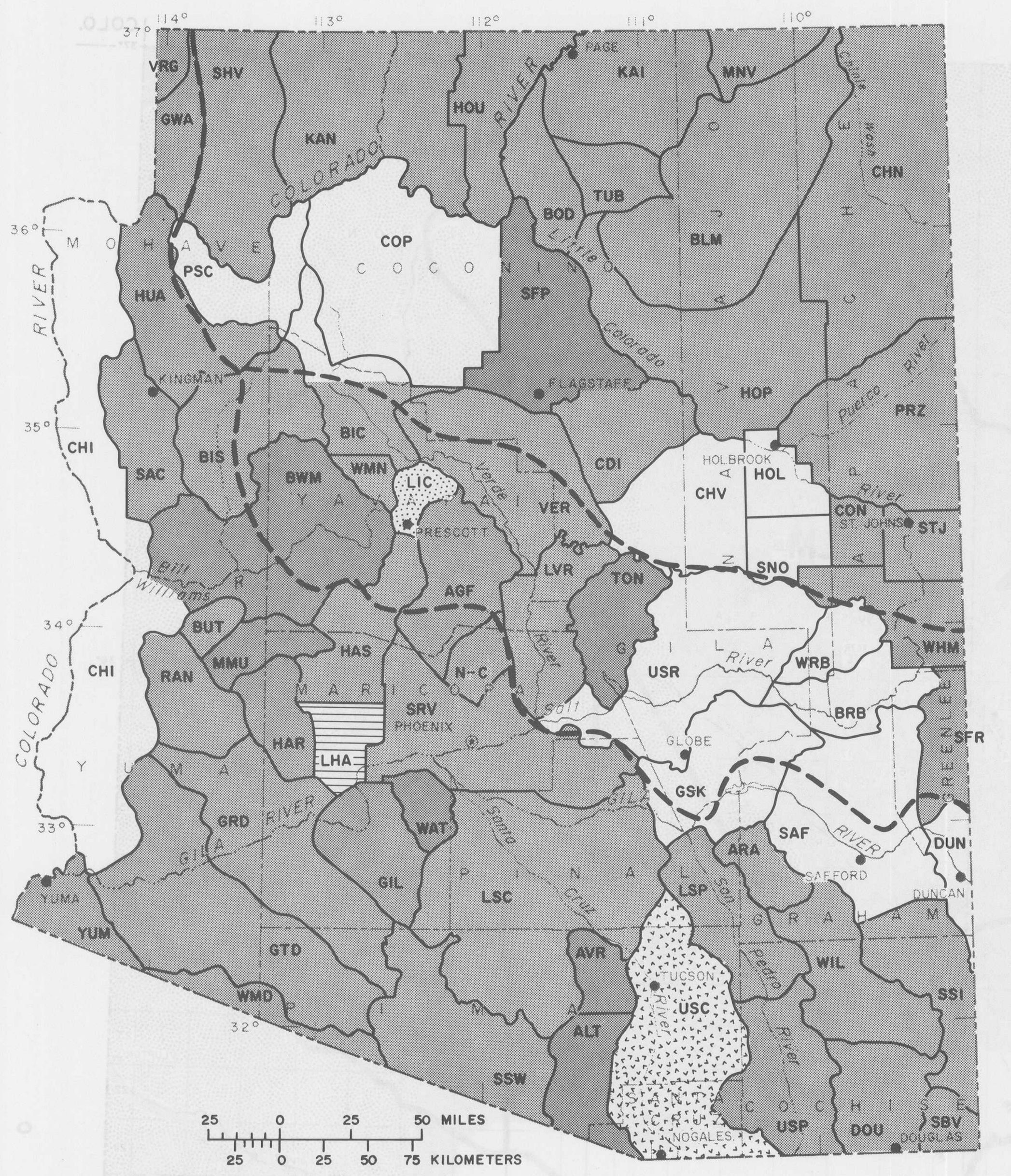
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
ARIZONA DEPARTMENT OF WATER RESOURCES

OPEN-FILE REPORT 82-1009
SHEET 1 OF 2



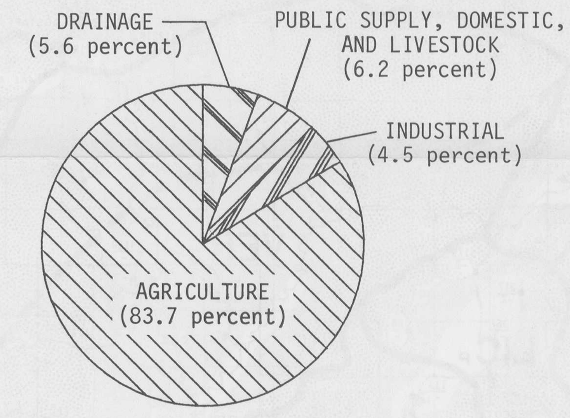
EXPLANATION

- AREA FOR WHICH GROUND-WATER BASIC-DATA INVENTORY WAS IN PROGRESS—As of July 1982
- AREA FOR WHICH A REPORT WAS IN PREPARATION—As of July 1982
- AREA FOR WHICH A REPORT HAS BEEN RELEASED
- AREA FOR WHICH A REPORT HAS BEEN RELEASED AND AN UPDATE IS IN PROGRESS
- AREA BOUNDARY
- WATER-PROVINCE BOUNDARY

STATUS OF GROUND-WATER INVENTORY

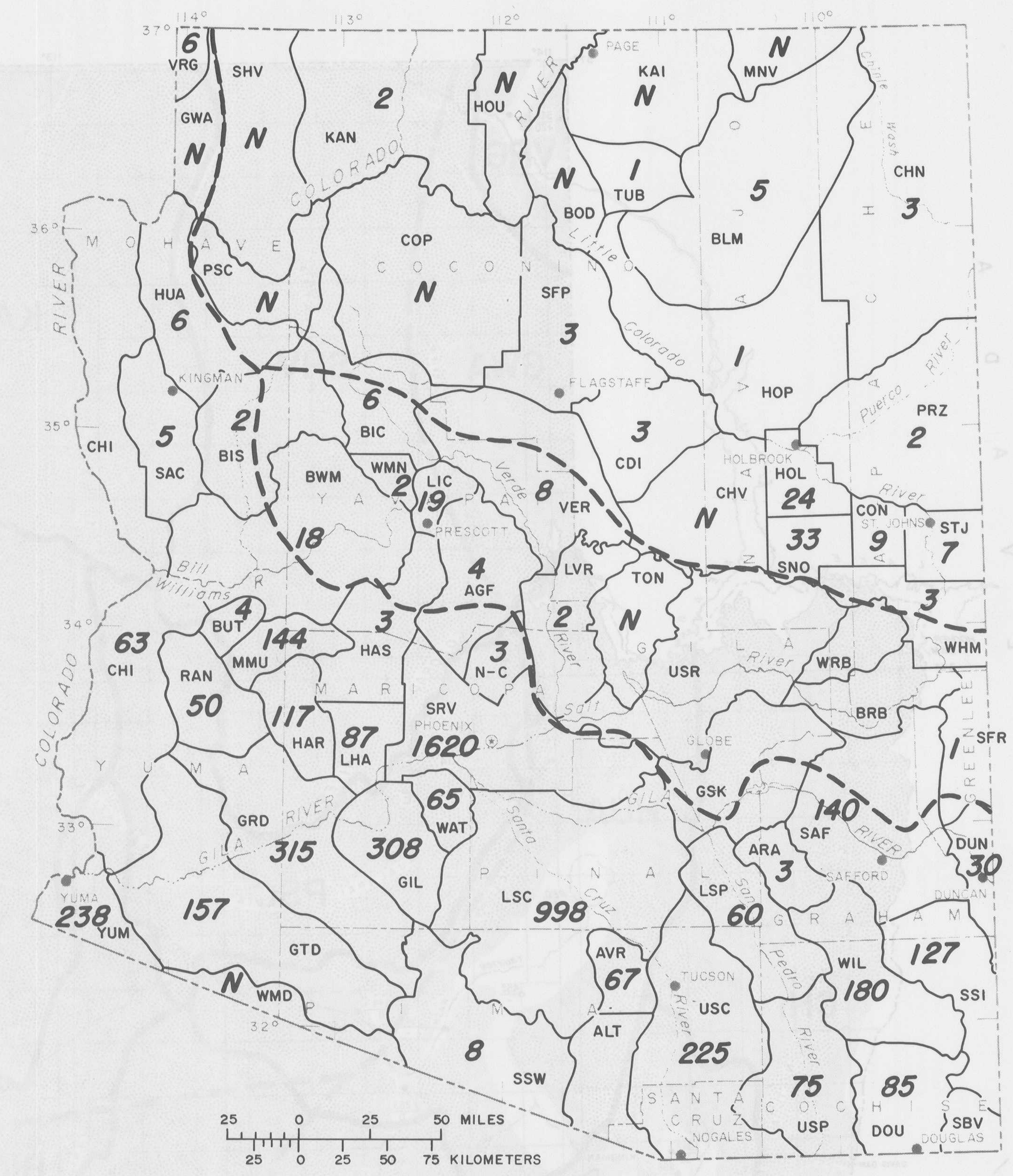
AREAS AND ABBREVIATIONS

AGF = Agua Fria basin
ALT = Altar Valley
ARA = Aravaipa Valley
AVR = Avra Valley
BIC = Big Chino Valley
BIS = Big Sandy Valley
BWM = Bill Williams
BLM = Black Mesa
BRB = Black River basin
BOD = Bodaway Mesa
BUT = Butler Valley
CDI = Canyon Diablo
CHV = Chevelon
CHN = Chinle
COP = Coconino Plateau
CHI = Colorado River, Hoover Dam to Imperial Dam
CON = Concho
DOU = Douglas basin
DUN = Duncan basin
GIL = Gila Bend basin
GRD = Gila River drainage from Painted Rock Dam to Texas Hill
GSK = Gila River from head of San Carlos Reservoir to Kelvin
GTD = Gila River from Texas Hill to Dome
GWA = Grand Wash
HAR = Harquahala Plains
HAS = Hassayampa basin
HOL = Holbrook
HOP = Hopi
HOU = House Rock
HUA = Hualapai Valley
KAI = Kaibito
KAN = Kanab
LIC = Little Chino Valley
LHA = Lower Hassayampa
LSP = Lower San Pedro basin
LSC = Lower Santa Cruz basin
LVR = Lower Verde River
MMU = McMullen Valley
MNV = Monument Valley
N-C = New River-Cave Creek
PSC = Peach Spring Canyon
PRZ = Puerco-Zuni
RAN = Ranegras Plain
SAC = Sacramento Valley
SAF = Safford basin
SRV = Salt River Valley
SBV = San Bernardino Valley
SFP = San Francisco Peaks
SFR = San Francisco River basin
SSI = San Simon basin
SSW = San Simon Wash
SHV = Shivwits
SNO = Snowflake
STJ = Saint Johns
TON = Tonto basin
TUB = Tuba City
USR = Upper Salt River basin
USP = Upper San Pedro basin
USC = Upper Santa Cruz basin
VER = Upper Verde River
VRG = Virgin River
WAT = Waterman Wash
WMD = Western Mexican drainage
WHM = White Mountains
WRB = White River basin
WIL = Willcox basin
WMN = Williamson Valley
YUM = Yuma



TOTAL ESTIMATED GROUND-WATER PUMPAGE, 5.4 MILLION ACRE-FEET

ESTIMATED GROUND-WATER PUMPAGE BY TYPE OF USE IN 1981



EXPLANATION

- 225 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 15,000 acre-feet for 1981 (see table).

ESTIMATED GROUND-WATER PUMPAGE IN ARIZONA IN 1981

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	ARA	AVR	BIC	BIS	BLM	BOD	BUT	BWM	CDI	CHV	CHN	COP	CHI	CON	DOU	DUN	GIL	GRD	GTD	GWA	HAR	HAS	HOL	HOP	HOU	HUA	KAI	KAN	LIC	LHA	LSP	LSC
PRIOR TO 1915	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5	--	--	--	--	--	--	--	--	--	--	--	--	200
1915	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	82
1916	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	83
1917	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	84
1918	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	85
1919	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	6	--	--	--	--	--	--	--	--	--	--	--	--	86
1920	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	6	--	--	--	--	--	--	--	--	--	--	--	--	88
1921	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	90
1922	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	93
1923	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--	96
1924	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	15	--	--	--	--	--	--	--	--	--	--	--	--	99
1925	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	15	--	--	--	--	--	--	--	--	--	--	--	--	101
1926	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	20	--	--	--	--	--	--	--	--	--	--	--	--	104
1927	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	20	--	--	--	--	--	--	--	--	--	--	--	--	106
1928	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	20	--	--	--	--	--	--	--	--	--	--	--	--	109
1929	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	N	--	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--	111
1930	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	15	--	--	--	--	--	--	--	--	--	--	--	--	135
1931	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	20	--	--	--	--	--	--	--	--	--	--	--	--	160
1932	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	20	--	--	--	--	--	--	--	--	--	--	--	--	185
1933	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	15	--	--	--	--	--	--	--	--	--	--	--	--	210
1934	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	15	--	--	--	--	--	--	--	--	--	--	--	--	235
1935	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	2	N	2	--	20	--	--	--	--	--	--	--	--	--	--	--	--	260
1936	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	2	N	2	--	20	--	--	--	--	--	--	--	--	--	--	--	--	285
1937	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	2	N	2	--	25	--	--	--	--	--	--	--	--	--	2	--	--	305
1938	--	--	8	--	--	--	--	--	--	--	--	--	--	--	--	2	1	2	--	25	--	--	--	--	--	--	--	--	--	3	--	--	325
1939	--	--	9	--	--	--	--	--	--	--	--	--	--	--	--	2	1	2	--	25	--	--	--	--	--	--	--	--	--	4	--	--	352
1940	--	--	12	--	--	--	--	--	--	--	--	--	--	--	--	5	2	19	1	25	--	1	--	--	--	--	--	--	--	4	--	--	372
1941	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--	5	1	19	1	25	--	1	--	--	--	--	--	--	--	4	--	--	421
1942	--	--	6	--	--	--	--	--	--	--	--	--	--	--	--	5	2	19	2	30	--	1	--	--	--	--	--	--	--	5	--	--	500
1943	--	--	20	--	--	--	--	--	--	--	--	--	--	--	--	5	7	20	2	35	--	1	--	--	--	--	--	--	--	6	--	--	515
1944	--	--	19	--	--	--	--	--	--	--	--	--	--	--	--	5	8	20	6	37	--	1	--	--	--	--	--	--	--	7	--	--	530
1945	--	--	23	--	--	--	--	--	--	--	--	--	--	--	--	8	6	20	9	35	--	1	--	--	--	--	--	--	--	7	--	--	610
1946	--	--	23	--	--	--	--	--	--	--	--	--	--	--	--	12	17	33	11	38	--	1	--	--	--	--	--	--	--	8	--	--	660
1947	--	--	34	--	--	--	--	--	--	--	--	--	--	--	--	17	21	40	11	43	--	1	--	--	--	--	--	--	--	9	--	--	700
1948	--	--	38	--	--	--	--	--	--	--	--	--	--	--	--	22	21	61	7	50	--	1	--	--	--	--	--	--	--	12	--	--	950
1949	--	--	48	--	--	--	--	--	--	--	--	--	--	--	--	30	11	67	13	45	--	1	--	--	--	--	--	--	--	12	--	--	1100
1950	--	--	41	20	--	--	--	--	--	--	--	--	--	--	--	35	23	59	15	46	--	5	--	--	--	--	--	--	--	13	--	--	1000
1951	--	--	75	20	--	--	--	--	--	--	--	--	--	--	--	38	33	104	21	50	--	7	--	--	--	--	--	--	--	13	--	--	1030
1952	--	--	80	20	--	--	--	--	--	--	--	--	--	--	--	42	17	120	32	40	--	10	--	--	--	--	--	--	--	12	--	--	950
1953	--	--	85	20	--	--	--	--	--	--	--	--	--	--	--	45	30	145	42	16	--	20	--	--	--	--	--	--	--	13	--	--	1400
1954	--	--	90	20	--	--	--	--	--	--	--	--	--	--	--	42	27	139	37	9	--	33	--	--	--	--	--	--	--	12	--	--	1200
1955	--	--	95	20	--	--	--	--	--	--	--	--	--	--	--	50	25	140	31	8	--	30	--	--	--	--	--	--	--	13	--	--	1200
1956	--	--	100	20	--	--	--	--	--	--	--	--	--	--	--	60	20	180	30	5	--	40	--	--	--	--	--	--	--	14	--	--	1100
1957	--	--	110	20	--	--	--	--	--	--	--	--	--	--	--	55	20	160	30	5	--	50	--	--	--	--	--	--	--	14	--	--	1100
1958	--	--	120	20	--	--	--	--	--	--	--	--	--	5	--	55	25	200	30	2	--	60	--	--	--	--	--	--	--	14	--	--	1200
1959	--	--	130	20	--	--	--	--	--	--	--	--	--	10	--	55	25	250	40	2	--	95	--	--	--	--	--	--	--	14	--	--	1200
1960	--	--	140	20	--	--	--	--	--	--	--	--	--	10	--	60	25	250	50	2	--	125	--	--	--	--	N	--	--	14	--	--	1100
1961	--	--	145	20	--	--	--	--	--	--	--	--	--	10	--	65	25	200	50	140A	--	100	--	--	--	--	1	--	--	15	--	--	1150
1962	--	--	140	20	--	--	--	--	--	--	--	--	--	10	--	65	25	170	50	215A	--	200	--	--	--	--	1	--	--	15	--	--	1050
1963	--	--	115	20	--	--	--	--	--	--	--	--	--	10	--	65	25	130	60	201A	--	200	--	--	--	--	1	--	--	13	--	--	1000
1964	--	--	115	20	--	--	--	--	--	--	--	--	--	15	--	60	25	130	65	181A	--	200	--	--	--	--	2	--	--	13	--	--	1150
1965	--	--	125	20	--	--	--	--	--	--	--	--	--	13	--	90	25	115	65	186A	--	200	--	--	--	--	2	--	--	14	--	--	910
1966	--	--	95	20	--	--	--	--	--	--	--	--	--	12	--	105	25	145	80	217A	--	160	--	--	--	--	3	--	--	14	--	30	915
1967	--	--	121	9	--	--	--	--	--	--	--	--	--	20	--	120	25	198	100	213A	--	170	--	--	--	--	4	--	--	12	--	29	1120
1968	--	--	134	9	--	--	--	--	--	--	--	--	--	17	--	120	25	153	126	220A	--	165	--	--	--	--	4	--	--	12	--	42	910
1969	--	--	155	9	--	--	--	--	--	--	--	--	--	12	--	104	25	166	120	218A	--	145	--	--	--	--	4	--	--	12	--	51	1043
1970	--	--	157	9	--	--	--	--	--	--	--	--	--	12	--	103	25	162	108	218A	--	111	--	--	--	--	4	--	--	12	--	58	890
1971	--	--	140	9	--	--	--	--	--	--	--	--	--	16	--	95	25	212	122	215A	--	99	--	--	--	--	4	--	--	12	--	51	819
1972	--	--	146	8	--	--	--	--	--	--	--	--	--	19	--	89	25	238	125	201A	--	108	--	--	--	--	4	--	--	12	--	53	798
1973	--	--	152	8	--	--	--	--	--	--	--	--	--	25	--	110	25	198	143	208A	--	109	--	--	--	--	4	--	--	12	91	57	990
1974	--	--	129	11	--	5	N	4	--	2	N	1	N	28	3	138	25	249	191	206A	N	137	--	16	N	N	5	N	N	13	89	61	1171
1975	--	--	159	12	--	5	N	5	--	3	N	2	N	32	5	118	25	288	164	210A	N	130	--	16	N	N	4	N	N	15	94	59	1016
1976	--	--	115	10	--	6	N	5	--	3	N	3	N	43	7	112	30	287	182	204A	N	129	--	18	N	N	4	N	2	14	98	67	1007
1977	--	--	110	9	--	6	N	4	--	4	N	2	N	53	7	87	30	300	210	208A	N	123	--	19	N	N	4	N	2	18	84	62	1037
1978	--	--	66	6	8	5	N	4	--	4	N	2	N	53	7	80	30	292	193	191A	N	100	3	24	N	N	6	N	2	15	63	55	748
1979	3	3	71	5	2	5	N	4	18	2	N	2	N	66	9	81	25	218	193	175A	N	88	3	19	N	N	6	N	2	15	64	46	737
1980	4	3	83	5	2	5	N	4	18	2	N	3	N	61	14	91	30	275	234	197A	N	108	3	18	N	N	4	N	2	15	74	52	898
1981	4	3	67	6	2	5	N	4	18	3	N	3	N	63	9	85	30	308	315	157A	N	117	3	24	1	N	6	N	2	19	87	60	998
TOTAL	11G	9G	3862	465	14F	42B	-B	34B	54G	23B	-B	18B	-B	615	61B	2654	918	6529	3317	5078	-B	3384	12F	154B	1B	-B	77	-B	12B	521	744C	833D	43264

LVR	MMU	MNV	N-C	PSC	PRZ	RAN	SAC	SAF	SRV	SFP	SFR	SSI	SSW	SHV	SNO	STJ	TON	TUB	USP	USC	VER	VRG	WAT	WHM	WIL	WMD	WMN	YUM	OTHERS	TOTAL	YEAR
--	--	--	--	--	--	--	--	--	57	--	--	5	--	--	--	--	--	--	--	80	--	--	--	--	--	--	--	--	--	347	PRIOR TO 1915
--	--	--	--	--	--	--	--	--	15	--	--	10	--	--	--	--	--	--	--	7	--	--	--	--	2	--	--	2	--	123	1915
--	--	--	--	--	--	--	--	--	15	--	--	8	--	--	--	--	--	--	--	7	--	--	--	--	2	--	--	2	--	122	1916
--	--	--	--	--	--	--	--	--	15	--	--	8	--	--	--	--	--	--	--	8	--	--	--	--	1	--	--	2	--	122	1917
--	--	--	--	--	--	--	--	--	40	--	--	6	--	--	--	--	--	--	--	8	--	--	--	--	N	--	--	3	--	146	1918
--	--	--	--	--	--	--	--	--	60	--	--	6	--	--	--	--	--	--	--	10	--	--	--	--	N	--	--	4	--	172	1919
--	--	--	--	--	--	--	--	--	95	--	--	5	--	--	--	--	--	--	--	35	--	--	--	--	N	--	--	4	--	233	1920
--	--	--	--	--	--	--	--	--	100	--	--	5	--	--	--	--	--	--	--	20	--	--	--	--	N	--	--	4	--	222	1921
--	--	--	--	--	--	--	--	--	200	--	--	5	--	--	--	--	--	--	--	30	--	--	--	--	N	--	--	4	--	335	1922
--	--	--	--	--	--	--	--	--	400	--	--	5	--	--	--	--	--	--	--	37	--	--	--	--	N	--	--	4	--	552	1923
--	--	--	--	--	--	--	--	--	500	--	--	5	--	--	--	--	--	--	--	45	--	--	--	--	N	--	--	4	--	668	1924
--	--	--	--	--	--	--	--	--	500	--	--	5	--	--	--	--	--	--	--	42	--	--	--	--	N	--	--	5	--	668	1925
--	--	--	--	--	--	--	--	--	500	--	--	4	--	--	--	--	--	--	--	40	--	--	--	--	1	--	--	6	--	675	1926
--	--	--	--	--	--	--	--	--	500	--	--	4	--	--	--	--	--	--	--	40	--	--	--	--	1	--	--	7	--	678	1927
--	--	--	--	--	--	--	--	--	500	--	--	4	--	--	--	--	--	--	--	45	--	--	--	--	2	--	--	8	--	688	1928
--	--	--	--	--	--	--	--	--	600	--	--	4	--	--	--	--	--	--	--	40	--	--	--	--	2	--	--	9	--	776	1929
--	--	--	--	--	--	--	--	--	650	--	--	4	--	--	--	--	--	--	--	38	--	--	--	--	1	--	--	10	--	854	1930
--	--	--	--	--	--	--	--	--	600	--	--	4	--	--	--	--	--	--	--	25	--	--	--	--	1	--	--	11	--	822	1931
--	--	--	--	--	--	--	--	--	300	--	--	3	--	--	--	--	--	--	--	20	--	--	--	--	1	--	--	12	--	543	1932
--	--	--	--	--	--	--	--	--	572	--	--	3	--	--	--	--	--	--	--	16	--	--	--	--	1	--	--	13	--	832	1933
--	--	--	--	--	--	--	--	--	711	--	--	3	--	--	--	--	--	--	--	30	--	--	--	--	1	--	--	14	--	1011	1934
--	--	--	--	--	--	--	--	20	554	--	--	3	--	--	--	--	--	--	--	28	--	--	--	--	1	--	--	15	5	911	1935
--	--	--	--	--	--	--	--	20	684	--	--	3	--	--	--	--	--	--	--	32	--	--	--	--	1	--	--	16	5	1071	1936
--	--	--	--	--	--	--	--	20	665	--	--	3	--	--	--	--	--	--	--	35	--	--	--	--	1	--	--	17	10	1091	1937
--	--	--	--	--	--	--	--	20	905	--	--	3	--	--	--	--	--	--	--	40	--	--	--	--	2	--	--	18	10	1364	1938
--	--	--	--	--	--	--	--	20	738	--	--	3	--	--	--	--	--	--	--	50	--	--	--	--	2	--	--	19	20	1247	1939
--	N	--	--	--	--	--	N	25	943	--	--	3	--	--	--	--	--	--	--	62	--	--	N	--	2	--	--	19	25	1520	1940
--	N	--	--	--	--	--	N	9	444	--	--	3	--	--	--	--	--	--	--	70	--	--	N	--	5	--	--	20	25	1063	1941
--	N	--	--	--	--	--	N	19	1004	--	--	4	--	--	--	--	--	--	--	94	--	--	N	--	5	--	--	21	25	1742	1942
--	N	--	--	--	--	--	N	35	1104	--	--	4	--	--	--	--	--	--	--	95	--	--	N	--	5	--	--	22	25	1901	1943
--	N	--	--	--	--	--	N	52	1017	--	--	4	--	--	--	--	--	--	--	100	--	--	N	--	5	--	--	20	25	1856	1944
--	2	--	--	--	--	--	N	35	1143	--	--	5	--	--	--	--	--	--	--	106	--	--	N	--	9	--	--	22	25	2066	1945
--	2	--	--	--	--	--	N	115	1360	--	--	6	--	--	--	--	--	--	--	109	--	--	N	--	15	--	--	32	30	2472	1946
--	2	--	--	--	--	--	N	100	1406	--	--	6	--	--	--	--	--	--	--	136	--	--	N	--	20	--	--	39	30	2615	1947
--	2	--	--	--	--	--	N	110	1670	--	--	6	--	--	--	--	--	--	--	135	--	--	1	--	23	--	--	62	35	3206	1948
--	2	--	--	--	--	--	N	40	1644	--	--	6	--	--	--	--	--	--	--	132	--	--	1	--	28	--	--	65	35	3280	1949
--	2	--	--	--	--	2	N	90	1852	--	--	6	--	--	--	--	--	--	--	160	--	--	5	--	35	--	2	64	40	3515	1950
--	2	--	--	--	--	5	N	125	1910	--	--	6	--	--	--	--	--	--	--	180	--	--	10	--	36	--	2	70	50	3789	1951
--	5	--	--	--	--	15	N	70	2020	--	--	15	--	--	--	--	--	--	--	195	--	--	17	--	39	--	2	68	50	3819	1952
--	6	--	--	--	--	22	N	120	2300	--	--	25	--	--	--	--	--	--	--	200	--	--	28	--	94	--	2	69	50	4732	1953
--	7	--	--	--	--	19	N	90	2300	--	--	32	--	--	--	--	--	--	--	200	--	--	30	--	105	--	2	69	50	4513	1954
--	9	--	--	--	--	16	N	90	2240	--	--	40	--	--	--	--	--	--	--	200	--	--	40	--	110	--	2	72	50	4481	1955
--	15	--	--	--	--	16	N	90	2300	--	--	40	--	--	--	--	--	--	--	200	--	--	40	--	120	--	2	87	60	4539	1956
--	21	--	--	--	--	9	N	100	2300	--	--	48	--	--	--	--	--	--	--	200	--	--	40	--	135	--	2	114	60	4613	1957
--	38	--	--	--	--	10	N	50	2300	--	--	50	--	--	--	--	--	--	--	175	--	--	45	--	155	--	2	121	60	4737	1958
--	50	--	--	--	--	10	N	100	2206	--	--	50	--	--	--	--	--	--	--	165	--	--	50	--	183	--	2	122	60	4839	1959
--	60	--	--	--	--	11	N	90	2005	--	--	60	--	--	--	--	--	--	--	165	--	--	60	--	195	--	2	122	75	4641	1960
--	70	--	--	--	--	12	N	140	2178	--	--	65	--	--	--	--	--	--	--	175	--	--	65	--	184	--	2	124	90	5026	1961
--	65	--	--	--	--	15	N	60	1976	--	--	65	--	--	--	--	--	--	--	200	--	--	50	--	180	--	2	121	110	4605	1962
--	75	--	--	--	--	17	N	80	2134	--	--	65	--	--	--	--	--	--	--	180	--	--	50	--	180	--	2	121	110	4854	1963
--	90	--	--	--	--	7	N	110	1972	--	--	75	--	--	--	--	--	--	--	175	--	--	50	--	220	--	2	154	120	4951	1964
--	90	--	--	--	--	6	4	150	1500	--	--	70	--	--	--	--	--	--	--	200	--	--	45	--	250	--	2	179	150	4411	1965
--	105	--	--	--	--	7	4	90	1350	--	--	72	--	--	--	--	--	--	35	190	--	--	45	--	240	--	2	178	100	4239	1966
--	98	--	--	--	--	12	4	145	1763	--	--	76	--	--	--	--	--	--	34	200	--	--	52	--	300	--	2	229	100	5156	1967
--	95	--	--	--	--	15	6	78	1264	--	--	81	--	--	--	--	--	--	29	210	--	--	54	--	290	--	2	234	100	4395	1968
--	98	--	--	--	--	16	5	140	1600	--	--	78	--	--	--	--	--	--	28	236	--	--	60	--	291	--	2	231	100	4949	1969
--	86	--	--	--	--	15	4	120	1700	--	--	105	--	--	--	--	--	--	33	240	--	--	55	--	289	--	2	220	100	4838	1970
--	101	--	--	--	--	15	5	190	1800	--	--	107	--	--	--	--	--	--	36	258	--	--	55	--	309	--	2	233	100	5030	1971
--	112	--	--	--	--	19	6	130	1800	--	--	104	--	--	--	--	--	--	38	253	--	--	57	--	292	--	2	257	100	4996	1972
--	113	--	--	--	--	19	5	140	1200	--	--	115	--	--	--	--	--	--	41	280	--	--	55	--	305	--	2	272	100	4779	1973
--	134	N	--	N	1	22	7	110	1800	2	--	135	--	N	29	1	--	N	45	264	4	5	69	3	339	--	2	247	24	5727	1974
--	139	N	--	N	2	13	8	145	1750	4	--	122	--	N	21	3	--	1	52	280	4	5	64	3	293	--	2	255	21	5549	1975
--	129	N	--	N	2	6	8	170	1680	2	--	122	--	N	24	3	--	1	59	281	4	5	70	3	306	--	2	240	12	5475	1976
--	132	N	--	N	2	13	7	213	1709	2	--	117	--	N	28	3	--	1	54	257	9	6	72	2	220	--	2	233	15	5476	1977
--	115	N	--	N	2	12	8	132	1098	2	1	121	--	N	28	3	--	1	46	220	8	6	54	4	169	--	2	234	15	4238	1978
--	115	N	2	N	1	14	6	83	1043	2	1	113	3	N	28	4	N	1	50	215	8	6	67	3	175	N	2	192	15	4011	1979
--	123	N	2	N	2	10	4	107	1109	3	1	139	5	N	30	5	N	1	67	228	7	6	65	3	199	N	2	248	15	4586	1980
2	144	N	3	N	2	50	5	140	1620	3	1	127	8	N	33	7	N	1	75	225	8	6	65	3	180	N	2	238	15	5362	1981
2H	2454	-B	7G	-B	14B	450	96	4328	79990	20B	4F	2614	16G	-B	221B	29B	-G	7B	722D	8654	52B	45B	1586	24B	6560	-G	64	5953E	2447I	189065	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 1974-81 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 1973-81 ONLY.

D: PUMPAGE FOR LSP AND USP AREAS WAS NOT ESTIMATED PRIOR TO 1966. THUS, TOTAL IS FOR 1966-81 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 1978-81 ONLY. ESTIMATED PUMPAGE BEFORE 1978 IS INCLUDED IN "OTHERS."

G: PUMPAGE FOR AGF, ARA, BWM, N-C, SSW, TON, AND WMD AREAS WAS NOT ESTIMATED PRIOR TO 1979. THUS, TOTAL IS FOR 1979-81 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 ONLY. ESTIMATED PUMPAGE BEFORE 1981 IS INCLUDED IN "OTHERS."

I: "OTHERS" INCLUDE: ALTAR VALLEY, BLACK RIVER BASIN, GILA RIVER FROM HEAD OF SAN CARLOS RESERVOIR TO KELVIN, SAN BERNARDINO VALLEY, 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. Most 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 is to inventory the ground-water conditions in the 68 ground-water areas of the State. Several selected ground-water areas (see map showing status of ground-water inventory) are studied each year; water levels are measured annually in a statewide observation-well network, and ground-water pumpage is computed for most of the areas. As of July 1982, reports had been published for 54 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 inch-pound unit	By	To obtain SI unit
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 1981 the withdrawal of ground water was about 5.4 million acre-ft, which is about 800,000 acre-ft more than the amount withdrawn in 1980. The total withdrawal in 1981 is nearly equivalent to the large amounts pumped in the early and mid-1970's prior to the substantially smaller amounts withdrawn in 1978 and 1979 when precipitation was above average. Most of the increase in 1981 was in the amount of ground water used for irrigation in the Basin and Range lowlands province. Nearly 4.5 million acre-ft of ground water was used for the irrigation of crops in 1981. The rest was used for public-supply, industrial, domestic, and livestock uses, and some ground water was pumped for drainage of waterlogged lands. Through 1981, slightly more than 189 million acre-ft of ground water had been withdrawn from the ground-water reservoirs in Arizona. The amount of water pumped in 1981 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, nearly 3.2 million acre-ft of surface water was diverted for use in the State in 1981; about 2.4 million acre-ft of the water was consumptively used, and the rest was returned to the Colorado River. Potential well production, depth to water in selected wells in spring 1982, and change in water level in selected wells from 1977 to 1982 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 alluvial-filled basins. The ground-water reservoirs are mainly sedimentary 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 1981, nearly 5.2 million acre-ft of ground water was withdrawn in the province, of which slightly more than 4.4 million acre-ft was used for the irrigation of crops. Through 1981, nearly 185 million acre-ft of ground water had been withdrawn from the ground-water reservoirs in the province. The amount of ground water withdrawn in 1981 is about 800,000 acre-ft more than the amount withdrawn in 1980. The increase indicates a change in the trend of the past few years when above-average precipitation caused pumpage to be less. Most of the increase was in the amount of ground water used for irrigation although municipal and industrial use also increased; municipal use increased about 50,000 acre-ft and industrial use increased about 16,000 acre-ft.

The Salt River Valley and the lower Santa Cruz basin are the largest agricultural areas in the State. Ground-water pumpage in the two areas amounts to nearly half the total pumpage for the State. In the Salt River Valley area slightly more than 1.6 million acre-ft of ground water was withdrawn in 1981. This amount is about 500,000 acre-ft more than that withdrawn in 1980 and is nearly equivalent to the large withdrawals of the early and mid-1970's. In the lower Santa Cruz basin area the ground-water withdrawal in 1981 was about 998,000 acre-ft, which is about 100,000 acre-ft more than the withdrawal in 1980.

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 sediment 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 1981 about 96,000 acre-ft of ground water was withdrawn in the province. 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 sedimentary deposits in a few areas; from layered sandstone, limestone, and conglomerate in some areas; from thin sedimentary deposits along 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 56,000 acre-ft in 1981. 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, 1981, through June 30, 1982. 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., 1981, Hydrology of the floods of March 1978 through February 1980 in the Phoenix area, Arizona, in Proceedings of a symposium, September 17-18, 1980, on storms, floods, and debris flows in southern California and Arizona—1978 and 1980: California Institute of Technology, p. 87-99.

Anderson, T. W., 1979, Development of ground-water models of alluvial basins in south-central Arizona, in Proceedings of the 23rd annual Arizona water symposium: Arizona Department of Water Resources Report 2, p. 13-17.

Appel, C. L., and Bills, D. J., 1981, Maps showing ground-water conditions in the San Francisco Peaks area, Coconino County, Arizona—1979: U.S. Geological Survey Open-File Report 81-914, scale 1:125,000.

Culler, R. C., Hanson, R. L., Myrick, R. M., Turner, R. M., and Kipple, F. P., 1982, Evapotranspiration before and after clearing phreatophytes, Gila River flood plain, Graham County, Arizona: U.S. Geological Survey Professional Paper 655-P, 67 p.

Denis, E. E., 1981, Map showing ground-water conditions in the Tonto basin area, Gila County, Arizona—1979: U.S. Geological Survey Open-File Report 82-116, scale 1:125,000.

Eychaner, J. H., 1981, Geohydrology and effects of water use in the Black Mesa area, Navajo and Hopi Indian Reservations, Arizona: U.S. Geological Survey Open-File Report 81-911, 46 p.

Hollett, K. J., and Garrett, J. M., 1982, Geohydrology of the Papago, San Xavier, and Gila Bend Indian Reservations, Arizona—1978-81: U.S. Geological Survey Hydrologic Investigation Atlas HA-660, 3 sheets [in press].

Laney, R. L., 1981, Geohydrologic reconnaissance of Lake Mead National Recreation Area—Las Vegas Wash to Opal Mountain, Nevada: U.S. Geological Survey Open-File Report 82-115, 23 p.

Matlock, D. T., 1981, Simulative models for the analysis of ground-water flow in Vekol Valley, the Waterman Wash area, and the Bosque area, Maricopa and Pinal Counties, Arizona: U.S. Geological Survey Open-File Report 82-77, 77 p.

Myrick, R. M., and Aldridge, B. N., 1981, Delineation of flood hazards in the Jaynes quadrangle, Pima County, Arizona: U.S. Geological Survey Miscellaneous Investigations Series Map I-843-D, 1 sheet.

Reeter, R. W., and Cady, C. V., 1982, Maps showing ground-water conditions in the Avra/Altar Valley area, Pima and Santa Cruz Counties, Arizona—1981: Arizona Department of Water Resources Hydrologic Map Series Report 7, scale 1:125,000.

Remick, W. H., 1981, Maps showing ground-water conditions in the McMullen Valley area, Maricopa, Yavapai, and Yuma Counties, Arizona—1981: Arizona Department of Water Resources Hydrologic Map Series Report 6, scale 1:125,000.

Sanger, H. W., and Littin, G. R., 1981, Maps showing ground-water conditions in the Bill Williams area, Mohave, Yavapai, and Yuma Counties, Arizona—1980: U.S. Geological Survey Open-File Report 82-87, scale 1:125,000.

Stiehr, P. L., 1981, Preliminary analysis of Arizona streamflow-data network for regional information: U.S. Geological Survey Open-File Report 81-920, 25 p.

Stulik, R. S., 1982, Maps showing groundwater conditions in the Waterman Wash area, Maricopa and Pinal Counties, Arizona—1982: Arizona Department of Water Resources Hydrologic Map Series Report 8, scale 1:125,000.

Tucci, Patrick, 1981, Density of basin-fill deposits calculated from borehole gravity data in four basins in central and southern Arizona [abs.]: Transactions, American Geophysical Union, v. 62, no. 45, November 10, 1981, p. 863.

Tucci, Patrick, Schmoker, J. W., and Robbins, S. L., 1982, Borehole gravity data and basin-fill densities in Arizona: U.S. Geological Survey Open-File Report 82-473, 23 p.

U.S. Geological Survey, 1981, Annual summary of ground-water conditions in Arizona, spring 1979 to spring 1980: U.S. Geological Survey Open-File Report 81-906, scale 1:125,000.

______1982, Annual summary of ground-water conditions in Arizona, spring 1980 to spring 1981: U.S. Geological Survey Open-File Report 82-368, scale 1:125,000.

______1982, Water resources data for Arizona, water year 1980: U.S. Geological Survey Water-Data Report AZ-80-1, 568 p.

ANNUAL SUMMARY OF GROUND-WATER CONDITIONS IN ARIZONA, SPRING 1981 TO SPRING 1982

BY U.S. GEOLOGICAL SURVEY