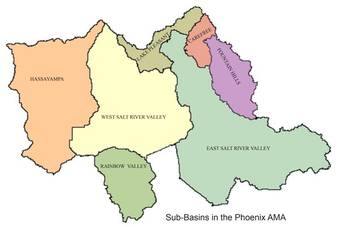


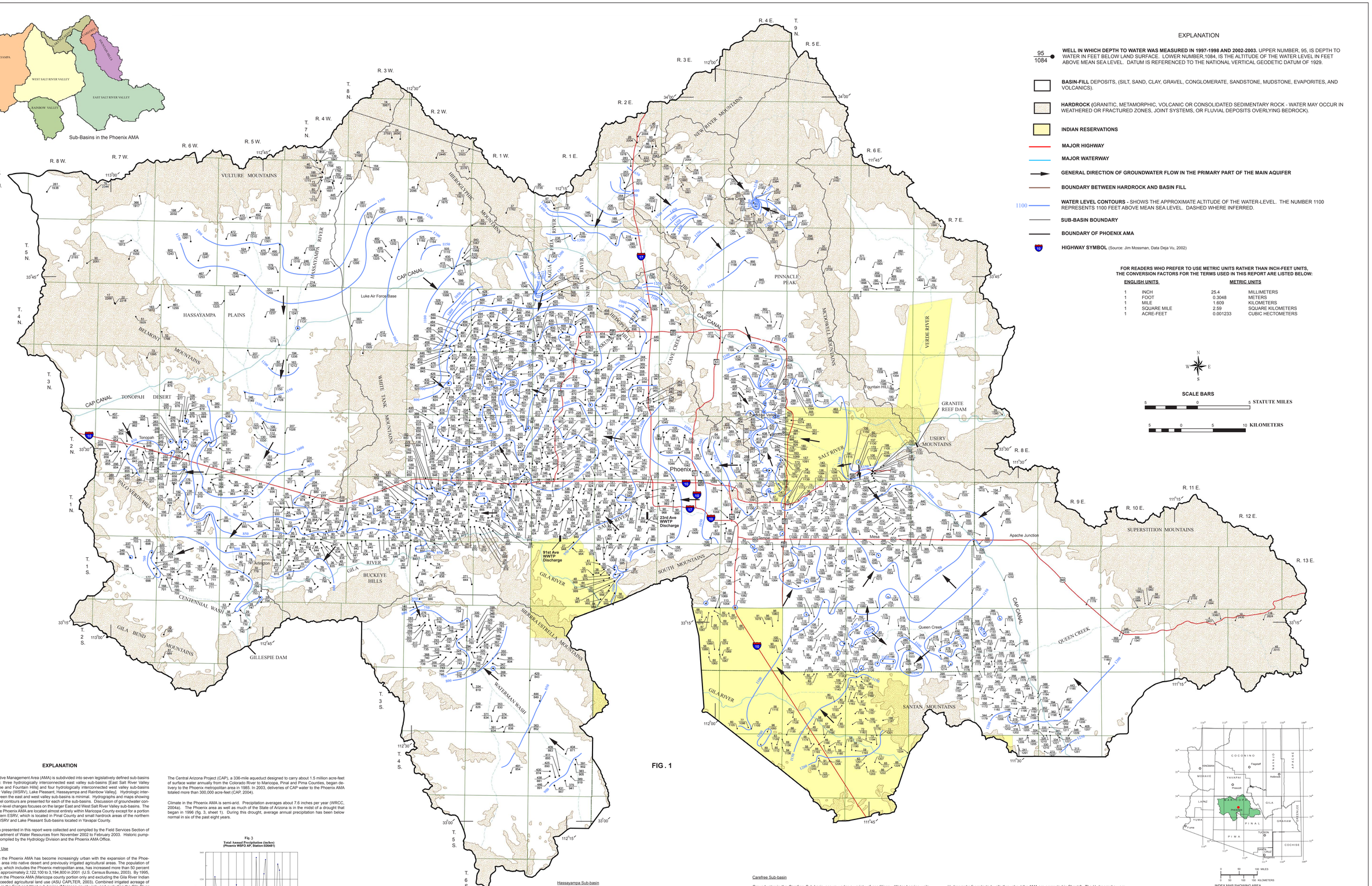


FIG . 1

EXPLANATION

The Phoenix Active Management Area (AMA) is subdivided into seven legislatively defined sub-basins (fig. 1, sheet 1): three hydrologically interconnected east valley sub-basins [East Salt River Valley (ESRV), Carefree and Fountain Hills] and four hydrologically interconnected west valley sub-basins [West Salt River Valley (WSRV), Lake Pleasant, Hassayampa and Rainbow Valley]. Hydrologic interconnection between the east and west valley sub-basins is minimal. Hydrographs and maps showing groundwater level conditions are presented for each of the sub-basins. Discussion of groundwater conditions and water-level changes focuses on the larger East and West Salt River Valley sub-basins. The sub-basins of the Phoenix AMA are located almost entirely within Maricopa County except for a portion of the southeastern ESRV, which is located in Pinal County and small hardrock areas of the northern Hassaymapa, WSRV and Lake Pleasant Sub-basins located in Yavapai County.

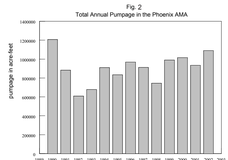
Water-level data presented in this report were collected and compiled by the Field Services Section of the Arizona Department of Water Resources from November 2002 to February 2003. Historic pumpage data were compiled by the Hydrology Division and the Phoenix AMA Office.

Land and Water Use

Land use within the Phoenix AMA has become increasingly urban with the expansion of the Phoenix metropolitan area into native desert and previously irrigated agricultural areas. The population of Maricopa County, which includes the Phoenix metropolitan area, has increased more than 50 percent since 1990 from approximately 2,122,100 to 3,194,800 in 2001 (U.S. Census Bureau, 2003). By 1995, urban land use in the Phoenix AMA (Maricopa county portion only and excluding the Gila River Indian Reservation) exceeded agricultural land use (ASU CAPLTER, 2003). Combined irrigated acreage of agricultural land in the East and West sub-basins (Maricopa county only and excluding the Gila River Indian Reservation) decreased from approximately 264,000 acres in 1995 to less than 200,000 acres in 2000 while urban land use has increased from approximately 280,000 acres to more than 420,000 over the same time period (ASU CAPLTER, 2003). Prior to the early 1990's agriculture was the dominant land use in the Phoenix AMA.

Despite the decrease in agricultural land use, groundwater withdrawn for agriculture still exceeds that withdrawn for municipal and industrial use. In 2000, agricultural use accounted for approximately 54.7% of all groundwater withdrawn in the AMA, and municipal (including domestic) and industrial (including mining and turf-related facilities) use was approximately 31.9% and 13.4%, respectively. From 1990 to 2002, the highest total groundwater pumpage in the AMA was in 1990 while the lowest was in 1992. However, since 1992 the trend has been a general increase in total annual pumpage (fig. 2, sheet 1).

Fig. 2
Total Annual Pumpage in the Phoenix AMA



Physiographical Setting

The Phoenix AMA is located primarily in south-central Arizona. This area is part of the Basin and Range physiographic province described by Fenneman (1931). It is characterized by alluvium filled basins separated by elongated fault-block mountain ranges.

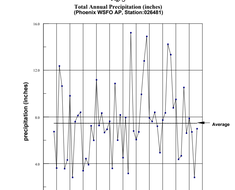
The major drainages include the Salt, Gila, Verde, Hassayampa, Agua Fria and New Rivers, Queen, Cave and Skunk Creeks and Indian Bend Wash. Upstream dams and diversions prevent all but the upper reach of Cave Creek and the Verde River from having natural perennial flow within the Phoenix AMA. The entire flow of the Salt River below Stewart Mountain Dam (except for minor overflow and during infrequent periods of extreme flooding) is diverted at Granite Reef Dam (10 miles downstream) for irrigation and municipal use in the Phoenix AMA (McCormack and others, 2003). Effluent dominated perennial flow is also present in the Salt River below the City of Phoenix 23rd and 91st Ave. wastewater treatment plants. Flows below the City of Phoenix 23rd and 91st Ave wastewater treatment plants are comprised primarily of treated effluent discharged by the plants but may also include irrigation return flows from agricultural fields and rainfall runoff from urban land.

Perennial flow in the Hassayampa River near Arlington is also dependant on effluent discharged by the City of Phoenix 91st Ave wastewater treatment plant. The effluent is mixed with groundwater in the Buckeye Canal and used to irrigate cotton and other crops. Downstream, effluent and irrigation return flows in the Buckeye Canal are discharged into the river near Arlington (Cordy and others, 2000

The Central Arizona Project (CAP), a 336-mile aqueduct designed to carry about 1.5 million acre-feet of surface water annually from the Colorado River to Maricopa, Pinal and Pima Counties, began delivery to the Phoenix metropolitan area in 1985. In 2003, deliveries of CAP water to the Phoenix AMA totaled more than 300,000 acre-feet (CAP, 2004).

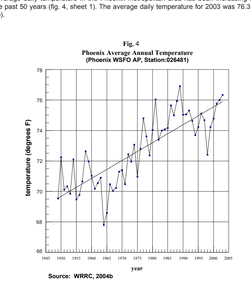
Climate in the Phoenix AMA is semi-arid. Precipitation averages about 7.6 inches per year (WRCC, 2004a). The Phoenix area as well as much of the State of Arizona is in the midst of a drought that began in 1996 (fig. 3, sheet 1). During this drought, average annual precipitation has been below normal in six of the past eight years.

Fig. 3
Total Annual Precipitation (inches)
(Phoenix WSFO AP, Station:026481)



The average daily temperature in the Phoenix metropolitan area has been increasing steadily during the past 50 years (fig. 4, sheet 1). The average daily temperature for 2003 was 76.3 °F, (WRCC, 2004b).

Fig. 4
Phoenix Average Annual Temperature
(Phoenix WSFO AP, Station:026481)



Groundwater

Groundwater occurs under generally unconfined conditions throughout most of the alluvial-filled basins and local hardrock areas of the Phoenix AMA. Depths to water range from just below land surface to more than 800 feet below land surface.

Groundwater in the Lower Hassayampa Area occurs primarily under unconfined conditions in the basin-fill deposits (Stulik, 1974), with smaller amounts under locally confined, artesian, or perched conditions (Long, 1983). Agricultural development in the Lower Hassayampa Area began in the early 1950's (Stulik, 1974) and continues to the present, particularly in the area near Tonopah.

Groundwater pumpage from the Hassayampa Sub-Basin (primarily from the Lower Hassayampa Area) was about 49,000 acre-feet in 2002. Although this is only half as much pumped throughout the 1970's and 80's, groundwater depressions are still present in both the Centennial Wash and the Tonopah areas. (fig. 1, sheet 1). Recent water-level declines are limited to the Tonopah area (sheet 2). Three newly constructed power plants have also recently begun operation in the Lower Hassayampa Area with a total projected annual water use of more than 17,000 acre-feet.

Prior to extensive pumping in the AMA, groundwater flowed primarily from ESRV to the WSRV along or toward the Salt and Gila Rivers. Groundwater exited the AMA near the former Gillespie Dam (Freethey and Anderson, 1986). By1964, a large groundwater depression had formed east of the White Tank Mountains, redirecting flow from virtually all directions in the WSRV toward the depression. (ADWR, 2003a). By 1983, localized groundwater depressions caused primarily by decades of agricultural pumping had formed throughout the AMA (Reeter and Remick, 1986). As a result, a groundwater divide has formed in the southwest quarter of Township 1N, Range 4E that essentially severed the hydraulic connection between the ESRV and WSRV sub-basins (Corkhill and others, 1993).

Although groundwater levels in the ESRV have risen somewhat, the map prepared for this report (fig. 1, sheet 1) shows that most of the groundwater depressions depicted on the 1983 and 1992 maps (Reeter and Remick, 1986 and Hammett and Herther, 1995, respectively) are still evident. The groundwater divide that developed around 1983 between the East and West Salt River Valley sub-basins is still present.

West Salt River Valley Sub-basin

The sources of groundwater in the WSRV are spread almost evenly among the three alluvial units: 32 percent from the UAU, 33 percent from the MAU, and 35 percent from the LAU (ADWR, 2003a). About 6,817,500 acre-feet of groundwater was withdrawn from the WSRV from 1990 to 2002.

Major sources of groundwater recharge in the WSRV include incidental recharge of agricultural irrigation (approx. 200,000 acre-feet/year) and effluent discharged from the City of Phoenix 23rd and 91st Ave. wastewater treatment plants (approx. 40,000 acre-feet/year). An increasing amount of aquifer recharge of surface water and effluent is currently managed at 10 permitted underground storage facilities (USFs) in the WSRV. Approximately 125,000 acre-feet was stored from 1996 to 2002 via USFs in the WSRV. From 1996 to 2002, 4,220,088 acre-feet from all sources was recharged in the WSRV (ADWR, 2003a).

Withdrawal of groundwater in the WSRV from 1990 to 2002 exceeded recharge by almost 2.6 million acre-feet. This fact, along with historic overpumping in the area around Luke Air Force Base has resulted in a large groundwater depression known locally as the Luke cone of depression. Coinciding with this large groundwater depression, land subsidence of up to 18 feet has been recorded in the vicinity of Luke Air Force Base (Schuman and O'day, 1995). ADWR is currently monitoring land subsidence in the WSRV. In addition to the area around Luke Air Force Base, preliminary results have identified several areas of active land subsidence as high as 7 cm (2.75 inches) per year between 1997 and 2000. (ADWR, 2003b).

Hassayampa Sub-basin

The Hassayampa Sub-basin is further divided into the upper Hassayampa Plain and the Lower Hassayampa Area. Groundwater in the upper Hassayampa Plain occurs primarily under unconfined conditions in the basin-fill deposits (Long, 1983). The upper Hassayampa Plain is predominantly undeveloped with few existing wells scattered over a large area.

Groundwater in the Lower Hassayampa Area occurs primarily under unconfined conditions in the basin-fill deposits (Stulik, 1974), with smaller amounts under locally confined, artesian, or perched conditions (Long, 1983). Agricultural development in the Lower Hassayampa Area began in the early 1950's (Stulik, 1974) and continues to the present, particularly in the area near Tonopah.

Groundwater pumpage from the Hassayampa Sub-Basin (primarily from the Lower Hassayampa Area) was about 49,000 acre-feet in 2002. Although this is only half as much pumped throughout the 1970's and 80's, groundwater depressions are still present in both the Centennial Wash and the Tonopah areas. (fig. 1, sheet 1). Recent water-level declines are limited to the Tonopah area (sheet 2). Three newly constructed power plants have also recently begun operation in the Lower Hassayampa Area with a total projected annual water use of more than 17,000 acre-feet.

Rainbow Valley Sub-basin

Groundwater in the Rainbow Valley Sub-basin (also known as the Waterman Wash Area) occurs under unconfined conditions in the basin-fill alluvial deposits that underlie the valley (Stulik, 1982). Groundwater pumping in the sub-basin began in the 1940's with the development of agriculture in the area. By 1952, continued pumpage resulted in the development of a groundwater depression in the northwest portion of the sub-basin (Stulik, 1982). Although annual pumpage has declined from a high of 72,000 acre-feet in 1972 (Stulik, 1982) to less than 7,000 acre-feet in 2002, the groundwater depression is still evident. (fig. 1, sheet 1).

Lake Pleasant Sub-basin

The hydrogeologic units of the Lake Pleasant Sub-basin consist of unconsolidated basin fill and streambed alluvium underlain by sedimentary sandstone and conglomerate. The sedimentary layer is underlain locally by Tertiary volcanics and Precambrian schist. The unconsolidated basin fill, interbedded with volcanics, intrusives and conglomerate make up the main water-producing aquifer in the sub-basin (Clear Creek & Associates, 2003).

Annual pumpage in the Lake Pleasant Sub-basin is minimal. Since 1992, reported pumpage has averaged about 1,550 acre-feet per year and has exceeded 2,000 acre-feet in only three of the past 13 years.

East Salt River Valley Sub-basin

The primary source of groundwater in the ESRV is the LAU. Nearly half (49 percent) of the total pumpage in the ESRV is withdrawn from the LAU. 40 percent from the MAU, and only 11 percent from the UAU (ADWR, 2003a). About 4,257,500 acre-feet of groundwater was withdrawn in the ESRV from 1990 to 2002 (ADWR, 2003a).

Major sources of groundwater recharge in the ESRV include agricultural irrigation (approx. 250,000 acre-feet/year), canal leakage (approx. 22,000 acre-feet/year), and storage at USFs. Aquifer recharge of surface water and effluent is currently managed at 12 permitted USFs in the ESRV. Approximately 789,500 acre-feet was stored from 1995 to 2002 at USFs in the ESRV, and about 6,946,430 acre-feet from all sources was recharged from 1990 to 2002 (ADWR, 2003a). Recharge of groundwater in the ESRV from 1990 to 2002 exceeded withdrawals by almost 2.7 million acre-feet.

Localized pumping near Apache Junction area in the ESRV may be the cause of past earth fissuring and ongoing land subsidence of up to 2.5 cm (about 1 inch) per year (ADWR, 2003b). Other areas in the ESRV with documented earth fissures and/or land subsidence are in the vicinities of Queen Creek, North Scottsdale and Paradise Valley (ADWR, 2003b).

Carefree Sub-basin

Groundwater in the Carefree Sub-basin occurs under a variety of conditions. Water bearing units may consist of unconsolidated streambed alluvium, and various members of the Carefree Formation (HydroSystems, 2000). Local areas of fractured schist, gneiss and granite also yield water to wells (Littin, 1979).

The Carefree Formation is the major water-producing unit, with the majority of water pumped in the basin coming from its various members (HydroSystems, 2000). Pumpage in the Carefree Sub-basin is primarily for domestic use, municipal use and golf course irrigation. Reported pumpage in the sub-basin has decreased from approximately 3,700 acre-feet in 1990 to less than 2,100 acre-feet in 2002.

As a result of historic heavy pumping, cones of depression formed near the Carefree Airport in the south-central portion of the basin and in the northern part of the Town of Cave Creek. The depression near the airport reached its largest extent in 1993 (Bernier, 2001), and is currently less pronounced. However, the cone of depression centered in the southeast quarter of section 21 in Township 6N, Range 4E in the northern part of the Town of Cave Creek, is still well defined. (fig 1, sheet 1.)

Fountain Hills Sub-basin

The hydrogeology of the Fountain Hills Sub-basin is not well documented. A geologic cross-section through the Town of Fountain Hills prepared by HydroSystems (1999), indicates a confined aquifer system consisting primarily of clays and interbedded conglomerates. Separate aquifer systems occur within the recent alluvium in the streams and washes around the Town of Fountain Hills (HydroSystems 1999) and along the Verde River. In the area on the west side of the Verde River, east of Pinnacle Peak and north of the McDowell Mountains, groundwater is present in an aquifer comprised of decomposed and fractured granites (ADWR, 2001). East of this area, a clay sequence as thick as 600 feet is encountered toward the Verde River. The clay acts as a barrier to groundwater flow between the shallow alluvial aquifer along the Verde River and the decomposed and fractured granites (ADWR, 2001).

Most of the groundwater development in the Fountain Hills Sub-basin is limited to the area around the town of Fountain Hills and the area west of the retirement community of Rio Verde. Groundwater pumpage is primarily for domestic use, municipal use and golf course irrigation. Both the number of wells and the volume of groundwater pumped in the sub-basin has increased steadily since 1990. Reported pumpage in 2002 was about 4,700 acre-feet compared to 1990 when pumpage was just over 2,500 acre-feet.

Water Level Changes

Since 1997, significant changes in water levels have been recorded throughout the AMA. The area with the largest increases in water levels from 1997 to 2000 (from +25 to +75 feet) is in the southeast portion of the ESRV while the largest and most extensive area of decline (from -25 to -50 feet) is in the WSRV (sheet 2).

The areas where substantial water-level rises have occurred coincide with sizeable decreases of agriculture combined with increased use of surface water, (primarily CAP) in lieu of groundwater on the remaining agricultural land. From 1992 to 2001 more than1.3 million acre-feet of in lieu CAP water was 'stored' in the Phoenix AMA (ADWR, 2003c). Of the 1.3 million acre-feet, most (approx. 75 percent) was 'stored' in the ESRV. Other small local areas of water-level rise have resulted from artificial recharge at many of the permitted USFs located throughout the AMA

Within the large area of water-level decline in the WSRV, agricultural land use has continued to decrease due to expanding urbanization. The extent of the recent water level decline is a result of increased groundwater pumping over the past five years due in large part to the ongoing drought. Salt River Project (SRP) operates a high number of large-capacity wells in this area of water-level decline and has had to rely heavily on pumping these wells during times when surface water is not readily available. At the center of the decline in Township 2N, Range 1E, withdrawals have increased from less than 40,000 acre-feet in 1997 to more than 60,000 acre-feet in 2002. Throughout the AMA, SRP pumped over 300,000 acre-feet of groundwater in 2002 compared to only 77,000 acre-feet in 1998, when surface water was readily available and demand was lower due to above average annual rainfall.

Hydrographs for selected wells throughout the AMA are presented in Sheet 3. The Hydrographs were prepared using data from ADWR's Groundwater Site Inventory (GWSI) Database.

References

ADWR, 2001, Arizona Department of Water Resources Hydrology Division Water Resources Section. Memo to File, Water Availability review for a Certificate of Assured Water Supply, Verde Estates, application no. 27-400468,dated March, 2001.

ADWR, 2003a, Arizona Department of Water Resources Hydrology Division Modeling Unit. Personal communication with Phil Janke.

ADWR, 2003b, Arizona Department of Water Resources Hydrology Division Surveying Unit. Personal communication with Maurice Tatlow.

ADWR, 2003c, Arizona Department of Water Resources Phoenix AMA. Personal communication with Virginia O'Connell.

ASU CAPLTER, 2003, Preliminary and revised data compiled by the Central Arizona Phoenix Long-termEcological Research Historic Land Use Team. Center for Environmental Studies, Arizona State University, Tempe, AZ.

Bernier, Joseph C., 2001, Report on the Year 2001 static water level measurements in the Carefree-Cave Creek Basin. Joseph C. Bernier & Associates, Glendale, AZ.

Brown, J. G. and Pool, D. R., 1989, Hydrogeology of the Western Part of the Salt River Valley, Maricopa County, Arizona. U. S. Geological Survey Water Resources Investigation Report 88-4202.

Central Arizona Project, 2004, Central Arizona Project CY 2003 Annual Turnout Delivery Summary.

Cordy, G. E., Gellenbeck, D. J., Gebler, J. B., Anning, D. W., Coes, A. L., Edmonds, R. J., Rees, J. A. H., and Sanger, H. W., 2000, Water Quality in the Central Arizona Basins, Arizona, 1995-98: U. S. Geological Survey Circular 1213, 38 p. on-line at http://pubs.water.usgs.gov/circ1213/

Corkhill, E. F., Correl, S. W., Hill, B. M. and Carr, D. A., 1993 A Regional Flow Model of the Salt River Valley - Phase I. Phoenix Active Management Area, Hydrogeologic Framework and Basic DataReport. Arizona Department of Water Resources Modeling Report No. 6.

Correl, S. W., and Corkhill, E. F., 1994, A Regional Flow Model of the Salt River Valley – Phase II. Phoenix Active Management Area, Hydrogeologic Framework and Basic Data Report. Arizona Department of Water Resources Modeling Report No. 6.

Clear Creek & Associates, 2003, City of Peoria Groundwater Flow Model of the West Salt River Valley . Clear Creek & Associates, Phoenix, AZ.

Fenneman, N. M., 1931, Physiography of the Western United States: McGraw Hill Book Co., Inc. New York and London.

Freethey, G. W., and Anderson, T. W., 1986, Predevelopment Hydrologic Conditions in the Alluvial Basins of Arizona and Adjacent Parts of California and New Mexico. USGS Hydrologic Investigation Atlas HA-664.

Hammett, B. A., and Herther, R. L., 1995, Maps Showing Groundwater Conditions in the Phoenix Active Management Area, Maricopa, Pinal and Yavapai Counties, Arizona-1992. Arizona Department of Water Resources Hydrologic Map Series. No. 27.

HydroSystems, 1999, Fountain Hills Sanitary District, Fountain Hills, Arizona, Underground Storage Facility and Aquifer Protection Permit Applications. HydroSystems, Inc., Tempe AZ.

HydroSystems, 2000, North Scottsdale Aquifer Storage and Recovery Project, Full Scale Underground Storage Facility Permit Applications. HydroSystems, Inc., Tempe AZ.

Laney, R. L., and Hahn, M. E., 1986, Hydrogeology of the Eastern Part of the Salt River Valley Area, Maricopa and Pinal Counties, Arizona. U. S. Geological Survey Water Resources Investigation Report 86-4147.

Littin, G. R., 1979, Maps Showing Groundwater Conditions in the New-River-Cave Creek Area, Maricopa and Yavapai Counties, Arizona-1979. U. S. Geological Survey Water Resources Investigation Open- File Report 79-1068.

Long, M. R., 1983, Maps Showing Groundwater Conditions in the Hassayampa Sub-basin of the Phoenix Active Management Area, Maricopa and Yavapai Counties, Arizona-1982. Arizona Department of Water Resources Hydrologic Map Series No. 10.

McCormick, H. F., Fiak, G. G., Duet, N. R., Evans, D. W., Roberts, W. P., Castillo, N. K., 2003, Water Resources Data for Arizona, Water Year 2002, Water-Data Report AZ-02-1. U. S. Geological Survey, WRD, Tucson, AZ.

Reeter, R.W. and Remick, W.H., 1986, Maps Showing Groundwater Conditions in the West Salt River, East Salt River, Lake Pleasant, Carefree and Fountain Hills Sub-basins of the Phoenix Active Management Area, Maricopa, Pinal and Yavapai Counties, Arizona-1983. Arizona Department of Water Resources Hydrologic Map Series No.12.

Schumann, H. H., and O'Day, C. M., 1995, Investigation of Hydrogeology, Land Subsidence, and Earth Fissures, Luke Air Force Base, Arizona. U. S. Geological Survey Administrative Report.

Stulik, R. S., 1974, Ground-water conditions in the Lower Hassayampa Area, Maricopa County, Arizona: Arizona Water Commission Bulletin 8.

Stulik, R. S., 1982, Ground-water conditions in the Waterman Wash Area, Maricopa and Pinal Counties, Arizona: Arizona Department of Water Resources Hydrologic Map Series No. 8.

U. S. Bureau of Reclamation, 1976, Central Arizona Project, Geology and Groundwater Resources Report, Maricopa and Pinal Counties, Arizona. Vols. 1 & 2.

U. S. Census Bureau, 2003, State and County QuickFacts. Source: U.S. Bureau of the Census, PopulationEstimates Program (PEP).Updated annually. http://eire.census.gov/popest/estimates.php

WRCC, 2004a, Monthly Total Precipitation (inches) Station:(026481) Phoenix WSFO AP From Year 1948 to Year 2003. Western Regional Climate Center, Division of Atmospheric Sciences, Desert Research Institute, Reno, Nevada. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?azphoe

WRCC, 2004b, Phoenix WSFO AP, Arizona Monthly Average (Degrees Fahrenheit) Station:(026481). Western Regional Climate Center, Division of Atmospheric Sciences, Desert Research Institute, Reno, Nevada.http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?azphoe

BASE MAP FROM U.S. GEOLOGICAL SURVEY
PHOENIX, ARIZONA, 1954, REV 1969,1:250,000
MESA, ARIZONA, 1954, REV. 1978, 1:125,000
HOLBROOK, ARIZONA, 1954, REV. 1970, 1:250,000
AJO, ARIZONA, 1953, REV. 1969, 1:250,000

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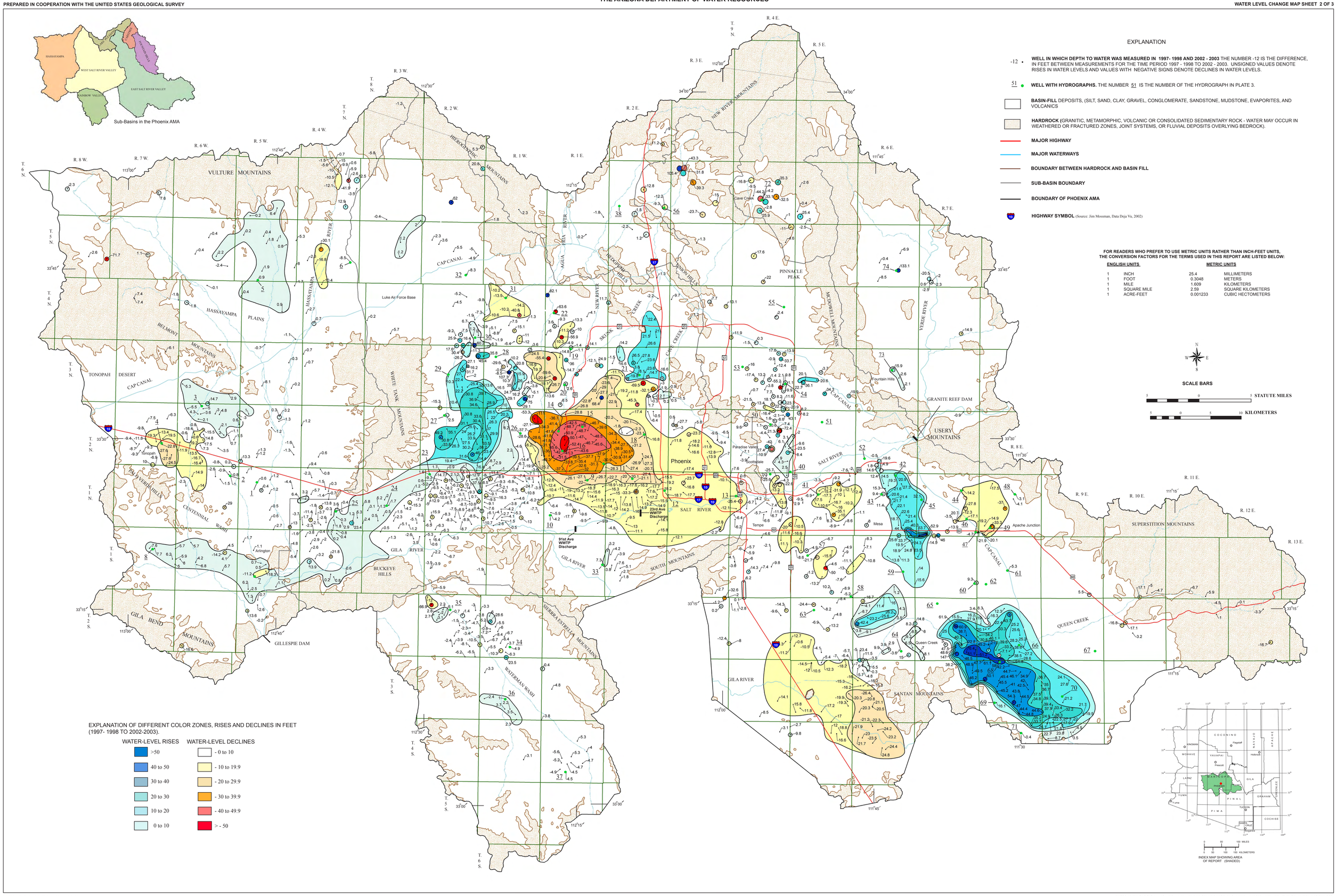
MAPS SHOWING GROUNDWATER CONDITIONS IN THE PHOENIX ACTIVE MANAGEMENT AREA
MARICOPA, PINAL, AND YAVAPAI COUNTIES, ARIZONA—NOV. 2002- FEB. 2003

BY
S.J. RASCONA

THESE HYDROLOGIC MAPS ARE AVAILABLE UPON REQUEST FROM THE ARIZONA DEPARTMENT OF WATER RESOURCES, INFORMATION CENTRAL, 3550 NORTH CENTRAL AVE, PHOENIX, ARIZONA, 85012. THE HYDROLOGIC DATA ON WHICH THESE MAPS ARE BASED ARE AVAILABLE AT THE ADWR BOOKSTORE. (602) 771-8638



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HASSAYAMPA

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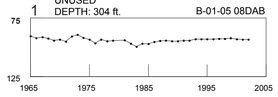

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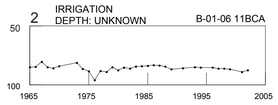

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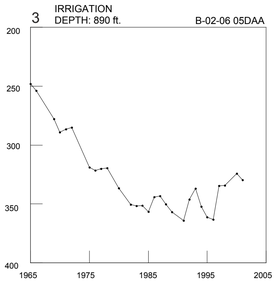

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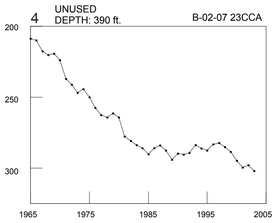

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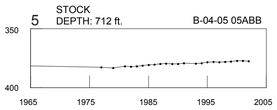

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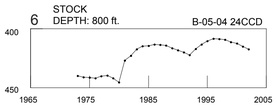
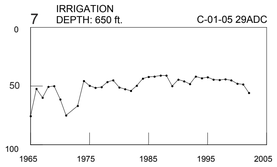
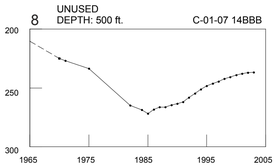


7 IRRIGATION DEPTH: 650 ft. C-01-05 29ADC

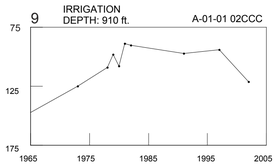


8 UNUSED DEPTH: 500 ft. C-01-07 14BBB

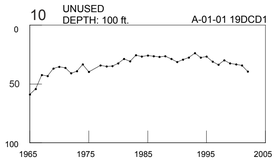


WEST SALT RIVER VALLEY

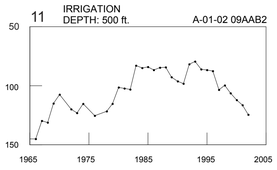
9 IRRIGATION DEPTH: 910 ft. A-01-01 02CCC



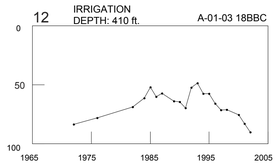
10 UNUSED DEPTH: 100 ft. A-01-01 19DCD1



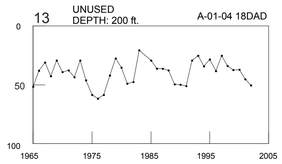
11 IRRIGATION DEPTH: 500 ft. A-01-02 09AAB2



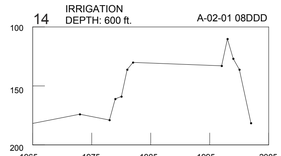
12 IRRIGATION DEPTH: 410 ft. A-01-03 18BBC



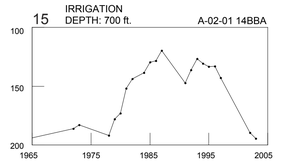
13 UNUSED DEPTH: 200 ft. A-01-04 18DAD



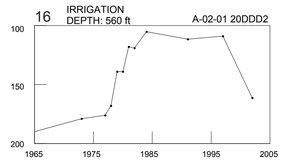
14 IRRIGATION DEPTH: 600 ft. A-02-01 08DDD



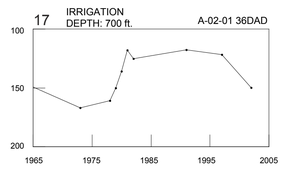
15 IRRIGATION DEPTH: 700 ft. A-02-01 14BBA



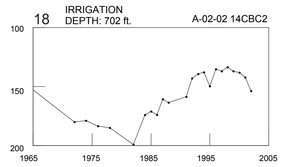
16 IRRIGATION DEPTH: 560 ft A-02-01 20DDD2



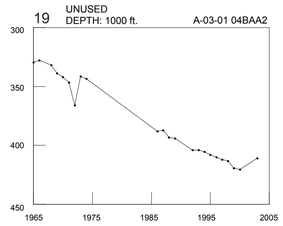
17 IRRIGATION DEPTH: 700 ft. A-02-01 36DAD



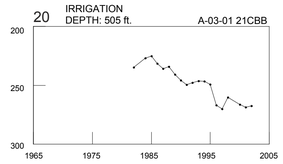
18 IRRIGATION DEPTH: 702 ft. A-02-02 14CBC2



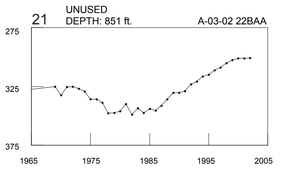
19 UNUSED DEPTH: 1000 ft. A-03-01 04BAA2



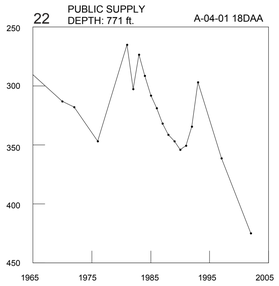
20 IRRIGATION DEPTH: 505 ft. A-03-01 21CBB



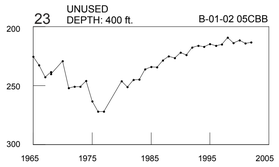
21 UNUSED DEPTH: 851 ft. A-03-02 22BAA



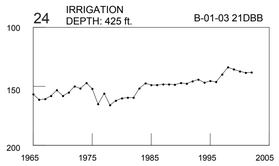
22 PUBLIC SUPPLY DEPTH: 771 ft. A-04-01 18DAA



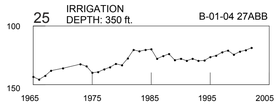
23 UNUSED DEPTH: 400 ft. B-01-02 05CBB



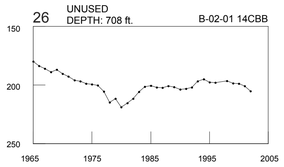
24 IRRIGATION DEPTH: 425 ft. B-01-03 21DBB



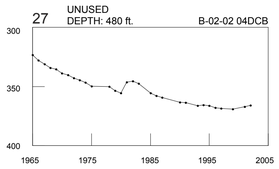
25 IRRIGATION DEPTH: 350 ft. B-01-04 27ABB



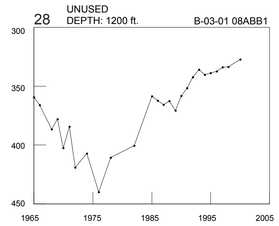
26 UNUSED DEPTH: 708 ft. B-02-01 14CBB



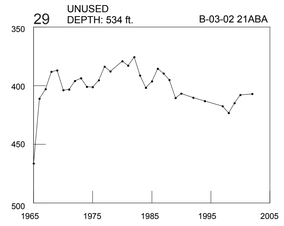
27 UNUSED DEPTH: 480 ft. B-02-02 04DCB



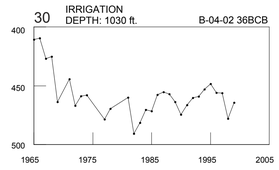
28 UNUSED DEPTH: 1200 ft. B-03-01 08ABB1



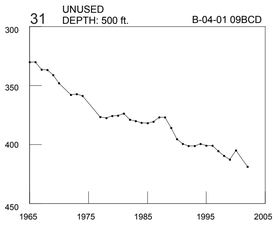
29 UNUSED DEPTH: 534 ft. B-03-02 21ABA



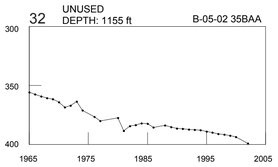
30 IRRIGATION DEPTH: 1030 ft. B-04-02 36BCB



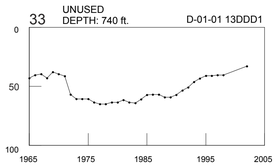
31 UNUSED DEPTH: 500 ft. B-04-01 09BCD



32 UNUSED DEPTH: 1155 ft B-05-02 35BAA

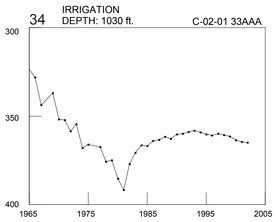


33 UNUSED DEPTH: 740 ft. D-01-01 13DDD1

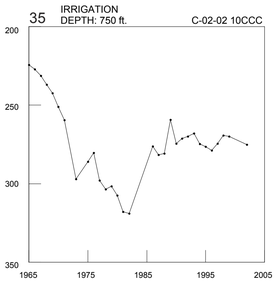


RAINBOW VALLEY

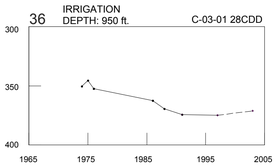
34 IRRIGATION DEPTH: 1030 ft. C-02-01 33AAA



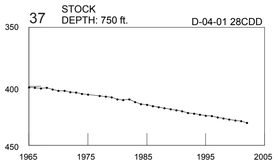
35 IRRIGATION DEPTH: 750 ft. C-02-02 10CCC



36 IRRIGATION DEPTH: 950 ft. C-03-01 28CDD

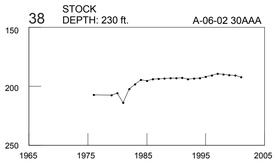


37 STOCK DEPTH: 750 ft. D-04-01 28CDD



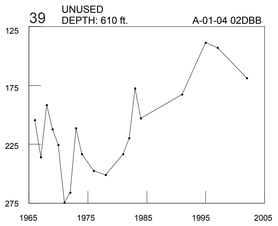
LAKE PLEASANT

38 STOCK DEPTH: 230 ft. A-06-02 30AAA

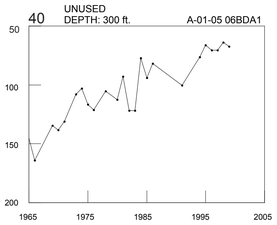


EAST SALT RIVER VALLEY

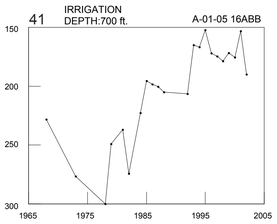
39 UNUSED DEPTH: 610 ft. A-01-04 02DBB



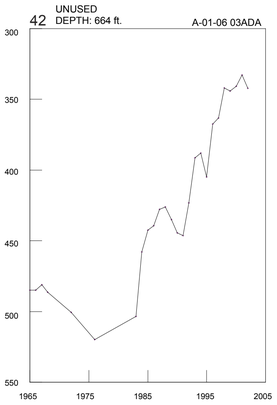
40 UNUSED DEPTH: 300 ft. A-01-05 06BDA1



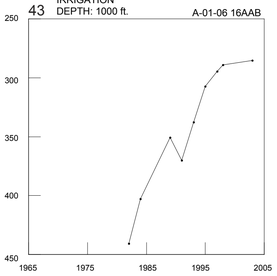
41 IRRIGATION DEPTH:700 ft. A-01-05 16ABB



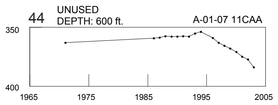
42 UNUSED DEPTH: 664 ft. A-01-06 03ADA



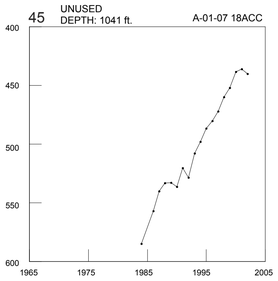
43 IRRIGATION DEPTH: 1000 ft. A-01-06 16AAB



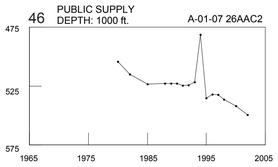
44 UNUSED DEPTH: 600 ft. A-01-07 11CAA



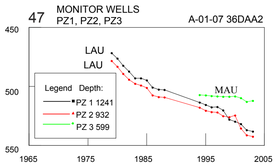
45 UNUSED DEPTH: 1041 ft. A-01-07 18ACC



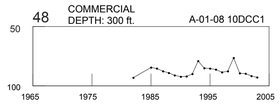
46 PUBLIC SUPPLY DEPTH: 1000 ft. A-01-07 26AAC2



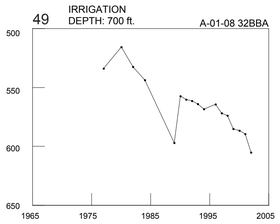
47 MONITOR WELLS PZ1, PZ2, PZ3 A-01-07 36DAA2



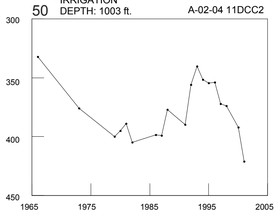
48 COMMERCIAL DEPTH: 300 ft. A-01-08 10DCC1



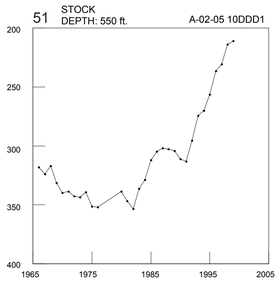
49 IRRIGATION DEPTH: 700 ft. A-01-08 32BBA



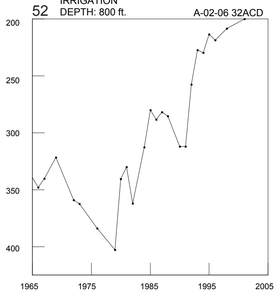
50 IRRIGATION DEPTH: 1003 ft. A-02-04 11DCC2



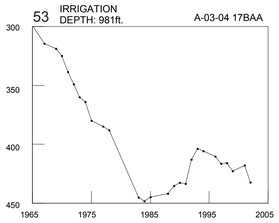
51 STOCK DEPTH: 550 ft. A-02-05 10DDD1



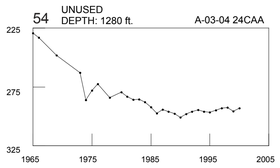
52 IRRIGATION DEPTH: 800 ft. A-02-06 32ACD



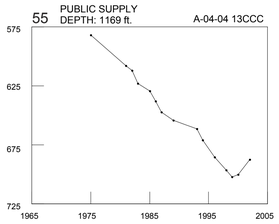
53 IRRIGATION DEPTH: 981ft. A-03-04 17BAA



54 UNUSED DEPTH: 1280 ft. A-03-04 24CAA

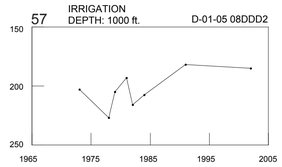


55 PUBLIC SUPPLY DEPTH: 1169 ft. A-04-04 13CCC

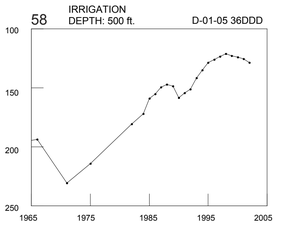


56 DOMESTIC DEPTH: 480 ft. A-06-02 25BDD1

57 IRRIGATION DEPTH: 1000 ft. D-01-05 08DDD2

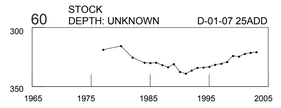


58 IRRIGATION DEPTH: 500 ft. D-01-05 36DDD

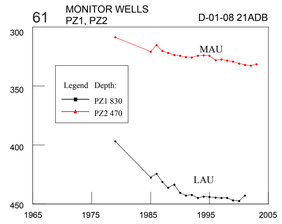


59 IRRIGATION DEPTH: 1008 ft. D-01-06 24CCC2

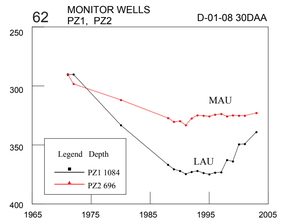
60 STOCK DEPTH: UNKNOWN D-01-07 25ADD



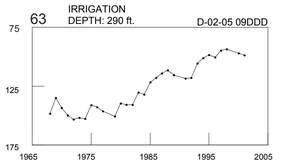
61 MONITOR WELLS PZ1, PZ2 D-01-08 21ADB



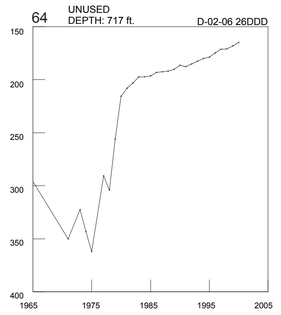
62 MONITOR WELLS PZ1, PZ2 D-01-08 30DAA



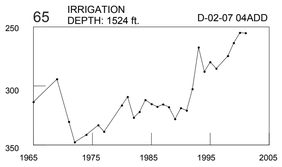
63 IRRIGATION DEPTH: 290 ft. D-02-05 09DDD



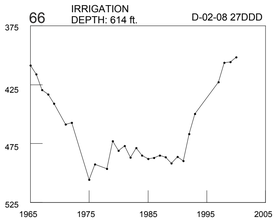
64 UNUSED DEPTH: 717 ft. D-02-06 26DDD



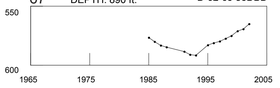
65 IRRIGATION DEPTH: 1524 ft. D-02-07 04ADD



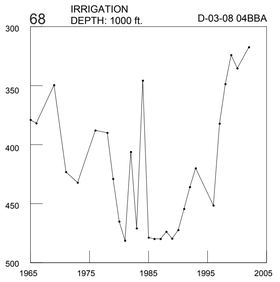
66 IRRIGATION DEPTH: 614 ft. D-02-08 27DDD



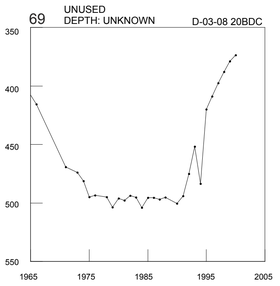
67 PUBLIC SUPPLY DEPTH: 890 ft. D-02-09 36DBD



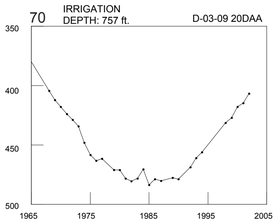
68 IRRIGATION DEPTH: 1000 ft. D-03-08 04BBA



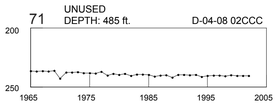
69 UNUSED DEPTH: UNKNOWN D-03-08 20BDC



70 IRRIGATION DEPTH: 757 ft. D-03-09 20DAA

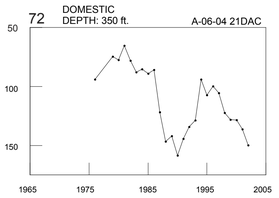


71 UNUSED DEPTH: 485 ft. D-04-08 02CCC



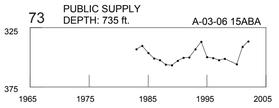
CAREFREE

72 DOMESTIC DEPTH: 350 ft. A-06-04 21DAC

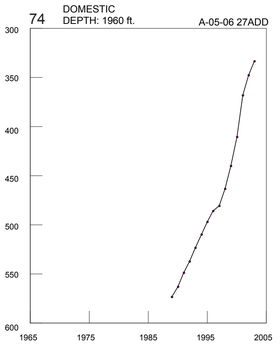


FOUNTAIN HILLS

73 PUBLIC SUPPLY DEPTH: 735 ft. A-03-06 15ABA



74 DOMESTIC DEPTH: 1960 ft. A-05-06 27ADD



EXPLANATION

MAU-Middle Alluvial Unit of the basin-fill deposits

LAU-Lower Alluvial Unit of the basin-fill deposits

BASE MAP FROM U.S. GEOLOGICAL SURVEY
PHOENIX, ARIZONA, 1954,REV.1969,1:250,000
MESA, ARIZONA, 1954, REV. 1978, 1:125,000
HOLBROOK, ARIZONA, 1954, REV. 1970, 1:250,000
AJO, ARIZONA, 1953, REV. 1969, 1:250,000

ADWR BOOKSTORE
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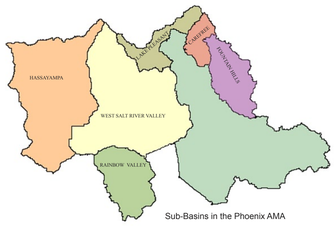
FAX: (602) 771-8690
WEBSITE: www.azwater.gov

MAPS SHOWING GROUNDWATER CONDITIONS IN THE PHOENIX ACTIVE MANAGEMENT AREA MARICOPA, PINAL, AND YAVAPAI COUNTIES, ARIZONA—NOV. 2002 - FEB. 2003

BY
S.J. RASCONA

THESE HYDROLOGIC MAPS ARE AVAILABLE UPON REQUEST FROM THE ARIZONA DEPARTMENT OF WATER RESOURCES, INFORMATION CENTRAL, 3550 NORTH CENTRAL AVE, PHOENIX, ARIZONA, 85013. THE HYDROLOGIC DATA ON WHICH THESE MAPS ARE BASED ARE AVAILABLE AT THE ADWR BOOKSTORE. (602) 771-8638



EXPLANATION

95/1084 ● **WELL IN WHICH DEPTH TO WATER WAS MEASURED IN 1997-1998 AND 2002-2003.** UPPER NUMBER, 95, IS DEPTH TO WATER IN FEET BELOW LAND SURFACE. LOWER NUMBER,1084, IS THE ALTITUDE OF THE WATER LEVEL IN FEET ABOVE MEAN SEA LEVEL. DATUM IS REFERENCED TO THE NATIONAL VERTICAL GEODETIC DATUM OF 1929.

BASIN-FILL DEPOSITS, (SILT, SAND, CLAY, GRAVEL, CONGLOMERATE, SANDSTONE, MUDSTONE, EVAPORITES, AND VOLCANICS).

HARDROCK (GRANITIC, METAMORPHIC, VOLCANIC OR CONSOLIDATED SEDIMENTARY ROCK - WATER MAY OCCUR IN WEATHERED OR FRACTURED ZONES, JOINT SYSTEMS, OR FLUVIAL DEPOSITS OVERLYING BEDROCK).

INDIAN RESERVATIONS

MAJOR HIGHWAY

MAJOR WATERWAY

GENERAL DIRECTION OF GROUNDWATER FLOW IN THE PRIMARY PART OF THE MAIN AQUIFER

BOUNDARY BETWEEN HARDROCK AND BASIN FILL

1100 **WATER LEVEL CONTOURS -** SHOWS THE APPROXIMATE ALTITUDE OF THE WATER-LEVEL. THE NUMBER 1100 REPRESENTS 1100 FEET ABOVE MEAN SEA LEVEL. DASHED WHERE INFERRED.

SUB-BASIN BOUNDARY

BOUNDARY OF PHOENIX AMA

HIGHWAY SYMBOL (Source: Jim Mossman, Data Deja Vu, 2002)

FOR READERS WHO PREFER TO USE METRIC UNITS RATHER THAN INCH-FEET UNITS, THE CONVERSION FACTORS FOR THE TERMS USED IN THIS REPORT ARE LISTED BELOW:

ENGLISH UNITS		METRIC UNITS	
1	INCH	25.4	MILLIMETERS
1	FOOT	0.3048	METERS
1	MILE	1.609	KILOMETERS
1	SQUARE MILE	2.59	SQUARE KILOMETERS
1	ACRE-FEET	0.001233	CUBIC HECTOMETERS

N W E S

SCALE BARS

5 0 5 STATUTE MILES

5 0 5 10 KILOMETERS

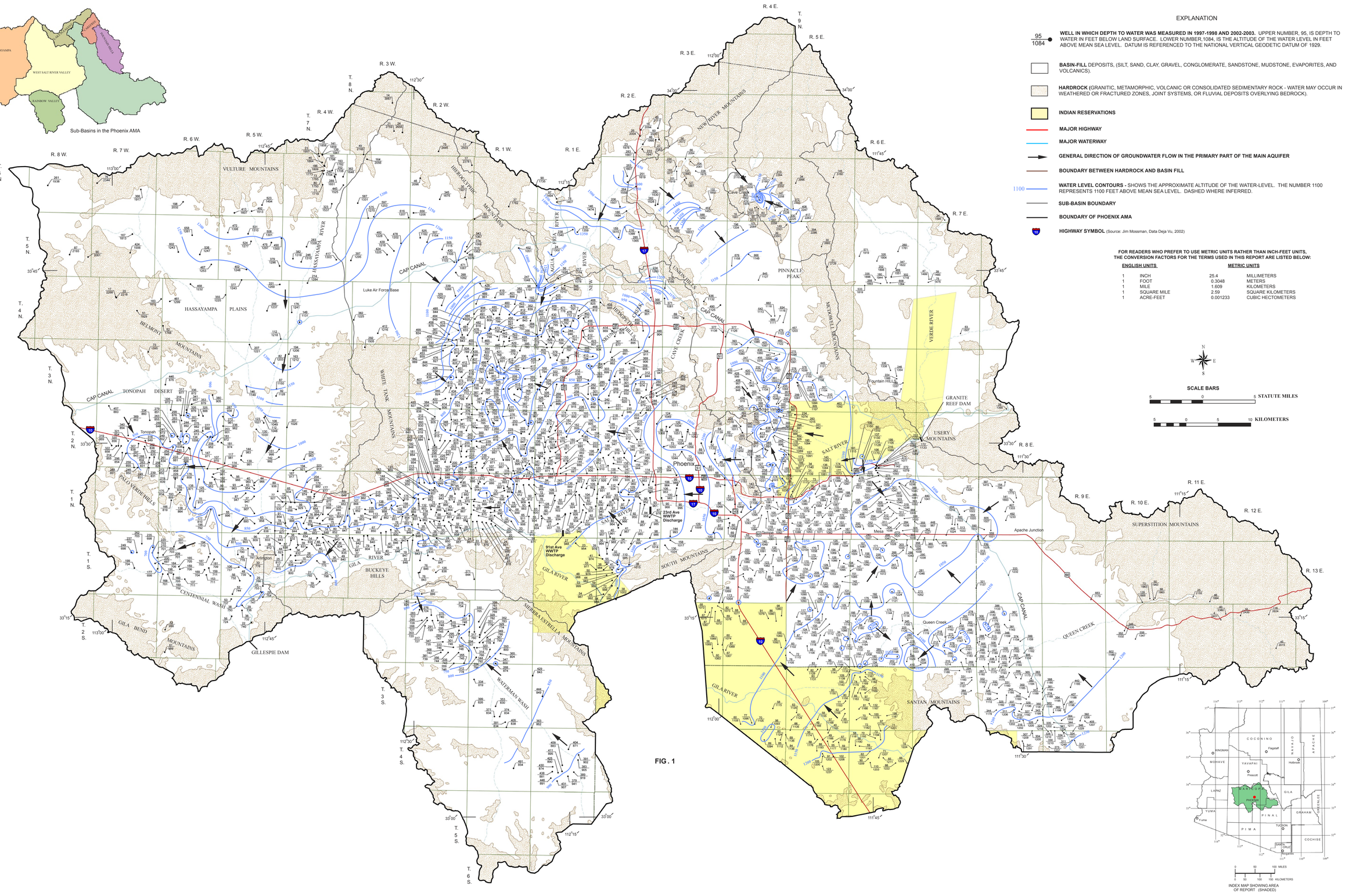


FIG . 1

INDEX MAP SHOWING AREA OF REPORT (SHADED)

BASE MAP FROM U.S. GEOLOGICAL SURVEY
PHOENIX, ARIZONA, 1954,REV.1969,1:250,000
MESA, ARIZONA, 1954, REV. 1978, 1:125,000
HOLBROOK, ARIZONA, 1954, REV. 1970, 1:250,000
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