Groundwater Hydrology of the Salt River Basin

Highland Basins

The Highland Basins include the Salt River, Tonto Creek and Verde River basins, and the northern half of the Agua Fria Basin. Basin-fill aquifers in the highlands are limited in areal extent and are hydrologically connected with stream alluvium. Consolidated rock aquifers surround and underlie the basin-fill aquifers and contribute underflow. Basin-fill aquifers also receive inflow from stream infiltration and mountain front recharge. Where the basin-fill aquifers are discontinuous, underflow between them may be restricted (Anderson, et al., 1992).

Table 5.2-6 Groundwater Data for the Salt River Basin

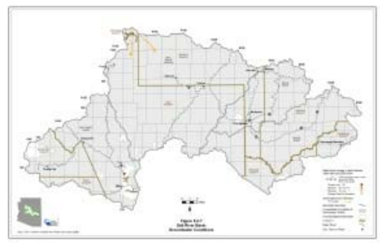
Basin Area, in square miles:	5,232	
Major Aquifer(s):	Name and/or Geologic Units	
	Recent Stream Alluvium	
	Volcanic Rock (Pinetop-Lakeside Aquifer)	
	Sedimentary Rock (Gila Conglomerate)	
	Sedimentary Rock (C and R Aquifers)	
Well Yields, in gal/min:	60 (1 well measured)	Measured by ADWR and/or USGS
	Range 2-2,000 Median 170 (140 wells reported)	Reported on registration forms for large (> 10-inch) diameter wells
	Range 10-300	ADWR (1990 and 1994)
	Range 0-500	USGS (1994)
Estimated Natural Recharge, in acre-feet/year:	178,000	Freethey and Anderson (1986)
Estimated Water Currently in Storage, in acre-feet:	>8,700,000 (to 1,200 ft)	ADWR (1992)
Current Number of Index Wells:	1	
Date of Last Water-level Sweep:	NA	

NA - Not available

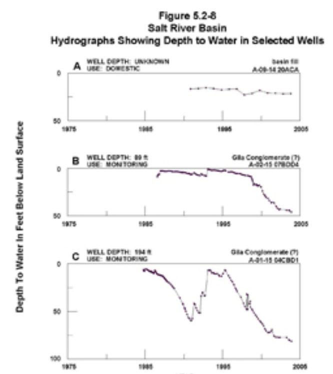
Click for Table 5.2-6 Groundwater Data for the Salt River Basin

Salt River Basin

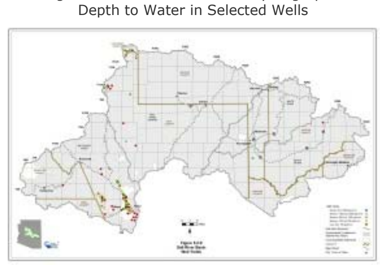
The Salt River Basin is bounded on the west and southwest by the Sierra Ancha and Superstition Mountains, on the south by the Natanes Plateau and on the east by the White Mountains (see Figure 5.2-1). The Mogollon Rim, a 2,000-foot high escarpment, forms a natural groundwater divide along much of the basin's northern boundary. The Salt River Basin contains four sub-basins shown on **Figure 5.2-7** and **Figure 5.2-9**: Salt River Lakes, Salt River Canyon, Black River and White River. Principal aquifers differ between the sub-basins, with basin-fill and alluvial aquifers found in the western portion of the basin and limestone and volcanic aquifers in the eastern portion.



Click for Figure 5.2-7 Salt River Basin Groundwater Conditions



Click for Figure 5.2-8 Salt River Basin Hydrographs Showing Depth to Water in Selected Wells



Click for Figure 5.2-9 Salt River Basin Well Yields

In the northern part of the basin, groundwater flow in the C-aquifer is from north to south. Groundwater flow has not been characterized in the rest of the basin. Groundwater data are shown in Table 5.2-6. Groundwater recharge is estimated at 178,000 AFA. The only estimate of groundwater in storage is 8.7 maf or more to a depth of 1,200 feet below land surface (bls). Water level change data are available for the Globe-Miami area and near Young, in the Salt River Lakes and Salt River Canyon sub-basins, respectively. Water levels in these measured wells are relatively shallow, at less than 100 feet bls. Water levels declined in all wells for which change data were available during the period 1990-'91 and 2003-'04 (**Figure 5.2-7**). The median well yield from large (>10-inch diameter) wells is 170 gpm. Most of the water quality measurements in the basin are in the vicinity of Globe-Miami, a copper mining center. The most commonly exceeded drinking water standard was cadmium, although other metals and fluoride concentrations were also elevated in measured wells (**Table 5.2-7**). Groundwater conditions in each sub-basin, from west to east, are discussed below.

Salt River Lakes Sub-basin

The Salt River Lakes Sub-basin occupies the western part of the Salt River Basin. Unconsolidated sands and gravels within the floodplains of streams and washes form an alluvial aquifer that is generally the most productive aquifer. A basin-fill aquifer underlies a large part of the sub-basin including the area around Globe, lower Tonto Creek, the Salt River reservoirs and Pinto Valley west of Miami. Along the Salt River and around Roosevelt Lake, the basin fill is up to 2,000 feet thick (ADWR, 1992). Recharge to the basin-fill aquifer occurs primarily along mountain fronts and from streams and lake infiltration. Within the sub-basin groundwater is found in granitic, metamorphic and sedimentary rocks.

In the Globe-Miami area the Gila Conglomerate, composed of semi-consolidated to consolidated basin-fill sediments, forms a local aquifer. The Gila Conglomerate is up to 4,000 feet thick in this area and provides most of the area's municipal and industrial water supply. A limestone aquifer also supplies water in the Globe-Miami area, and west of Globe several small basin-fill deposits form isolated groundwater aquifers (ADWR, 1992). Well yields are generally low in the southeast part of the sub-basin near Globe, and higher north of Globe. Granitic rocks provide small amounts of water for domestic and stock use in the sub-basin.

Mining activities in the Globe-Miami area have impacted water quality in the alluvial aquifer along Pinal Creek and Miami Wash including elevated concentrations of sulfate and metals. Drinking water standards for cadmium, chromium, fluoride, lead, other metals and for total dissolved solids (TDS) have been equaled or exceeded in a number of wells in the area.

Salt River Canyon Sub-basin

In the western portion of the Salt River Canyon Sub-basin, sedimentary and igneous rocks, similar to those in the adjacent Salt River Lakes Sub-basin, are found. The groundwater flow system is complex with disconnected recharge areas and many water-bearing zones (USGS, 2005a). The rest of the sub-basin is composed primarily of sedimentary rocks, including limestones, sandstones, siltstones, shales and thin conglomerates. These rocks are exposed along the Mogollon Rim and at other locations in the sub-basin. The Natanes Plateau, along the southern boundary of the sub-basin, is composed of volcanic rock. There is little aquifer data for the area, but based on similar rock units in other areas, there may be useable amounts of water in the Supai Formation, Redwall Limestone, Coconino Sandstone and the undivided sandstones in the sub-basin. These formations may yield moderate amounts of water, up to 100 gpm, however yields can vary widely depending on sub-surface geology (ADWR, 1992). Recharge to the sedimentary rocks occurs mainly along the Mogollon Rim.

Basin-fill and floodplain alluvial deposits are present along Cherry Creek near the western boundary of the sub-basin. The depth of basin-fill deposits in this sub-basin was estimated to be less than 400 feet thick (ADWR, 1992). The only water level change data for the 1990-'91 to 2003-'04 time-period showed a modest water level decline in a shallow well near Young. Well yield data for the sub-basin show yields of less than 100 gpm to up to 2,000 gpm in the western part of the sub-basin (**Figure 5.2-9**). Water quality data are lacking for this sub-basin.

White River Sub-basin

The eastern portion of the White River Sub-basin is covered with volcanic rocks and the western portion contains sedimentary rocks similar to those found in the Salt River Canyon Sub-basin. Groundwater occurs in fracture zones and the various volcanic flows, including cinder beds. Groundwater flow in the volcanic aquifer is discontinuous and well yields and water levels may vary widely over short distances. Precipitation in the area is relatively high and recharges the volcanic aquifer through infiltration into the fractured rock. Groundwater discharged from the volcanic aquifer contributes to the baseflow of the White River. Groundwater level and water quality data are lacking for the sub-basin. The only well yield data shows a yield between 100 and 500 gpm in a well between Whiteriver and Hon-dah (**Figure 5.2-9**).

Black River Sub-basin

The Black River Sub-basin is covered almost entirely by volcanic rocks that include basalt flows, rhyolitic ash flows, tuffs and tuffaceous agglomerates that form layers over 3,000 feet thick in some areas. Wells in this area are generally low-yield and well depths of 400 to 800 feet are common. As in the White River Sub-basin, the volcanic aquifer is recharged through infiltration of precipitation. Discharge from the aquifer contributes to baseflow in the Black River. Groundwater level data are lacking for this sub-basin. Well yield data for two wells shows yields of less than 100 gpm in the northeastern part of the sub-basin and between 500 to 1,000 gpm south of Fort Apache. A single groundwater quality measurement taken at Hannagan Meadow showed a nitrate concentration exceeding drinking water standards.

For surface water hydrology in the **Salt River Basin click here.**

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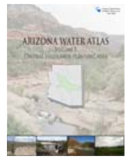

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References and Supplemental Reading for the Salt River Basin