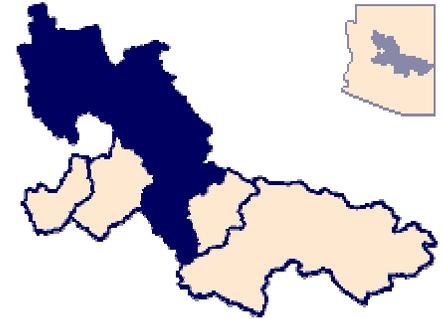


VERDE RIVER BASIN

The Verde River basin covers approximately 5,450 square miles of north-central Arizona and is divided into the Big Chino, Verde Valley and Verde Canyon sub-basins (Figure 3). The northern part of the basin is in the Plateau uplands province and the southern part is in the Central highlands province. Elevation ranges from over 12,000 feet above mean sea level in the San Francisco Mountains to about 1,600 feet above mean sea level in the south. The Mogollon Rim escarpment forms a topographic relief of as much as 2,000 feet and trends northwest across the basin.



Water quality is generally good. In the Verde Valley, several wells have been reported to have high levels of nitrate (Arizona Department of Environmental Quality, 1990).

BIG CHINO SUB-BASIN

The principal aquifer of the Big Chino sub-basin consists of widespread basin-fill sediments interbedded with basalt flows and alluvial sands and gravels in the major washes (Wallace and Laney, 1976). These deposits contain unconsolidated to moderately-consolidated silts, sands, gravel, and interbedded volcanics and clays, and are bounded by low-permeability crystalline and consolidated rocks. Groundwater occurs under both water-table (unconfined) and artesian (confined) conditions. Typically, confined conditions occur where buried lava flows are interbedded with clays and volcanic ash. Groundwater levels in wells range from above land surface due to confined conditions to over 200 feet below land surface. Wells can produce over 1,000 gallons per minute but most produce under 100 gallons per minute (Wallace and Laney, 1976).

Recharge to the Big Chino sub-basin is from runoff along the mountain fronts and the major washes; the amount of recharge is unknown. Discharges from the sub-basin include groundwater pumpage and surface water outflow. In 1984, 3,000 acre-feet were pumped for irrigation and domestic use. A total of 16,000 acre-feet per year leaves the basin as surface water baseflow (Owen-Joyce and Bell, 1983). About 1,500 acre-feet per year of that comes from the Del Rio Springs (Arizona Department of Water Resources, 1991) which is in the Prescott AMA. Groundwater outflow as underflow is negligible. Groundwater in storage in the Big Chino sub-basin to a depth of 1,200 feet below land surface has been estimated to be 8,000,000 acre-feet (Arizona Department of Water Resources, 1988). Groundwater declines of less than 23 feet have occurred from the early 1950's to the mid-1970's in the lower part of the Big Chino sub-basin near Paulden (Wallace and Laney, 1976).

VERDE VALLEY SUB-BASIN

The Verde Valley sub-basin includes 2,600 square miles bounded by the Mogollon Rim to the northeast, Big Black Mesa to the northwest, the Black Hills to the southwest, and Fossil Creek to the southeast.

The shallow alluvial aquifer occurs within the floodplain of the Verde River and saturates gravels, sands, and silts to a thickness of less than 50 feet. The principal aquifer occurs in a thick sequence of flat-lying limestones and sandstones throughout the area. Groundwater, as does surface water, follows the surface gradient toward the Verde River and exits towards the southeast through the Verde Canyon. Groundwater levels in wells tapping the principal aquifer occur generally at a depth less than 800 feet below land surface (Owen-Joyce and Bell, 1983). In most areas groundwater occurs under unconfined conditions, however, confined conditions do exist locally within the Verde Formation. Generally, all aquifers are hydraulically connected. Wells produce an average of about 30-150 gallons per minute. Where present, faulting, fracturing, and solution cavities increase well yields which may exceed 1,000 gallons per minute (Owen-Joyce

and Bell, 1983). In many places, locally perched sources of water from fractured or decomposed granite, and volcanic rocks, provide lesser amounts to wells.

Owen-Joyce and Bell (1983) estimated average inflow to and outflow from the regional aquifer. No appreciable changes in water levels have occurred in the sub-basin. Outflow which is assumed to equal inflow in a steady-state system is essentially unchanged. Recharge to the regional aquifer is from infiltration of precipitation in the higher elevations with small contributions from surface water in lakes and streams. Total recharge to the sub-basin is estimated at 138,000 acre-feet per year. Groundwater underflow from the Big Chino sub-basin and outflow to the Verde Canyon sub-basin is assumed to be negligible (Owen-Joyce and Bell, 1983). Current pumpage is approximately 8,000 acre-feet per year. Groundwater which discharges to tributaries of the Verde River maintains a base flow of about 80,000 acre-feet per year on the Verde River at the gaging station, Verde River near Camp Verde (Owen-Joyce and Bell, 1983). Evapotranspiration and irrigation consumptive use are estimated at 35,000 and 31,000 acre-feet, respectively. Water that is not diverted for irrigation or infiltrates back to the regional aquifer leaves the basin as surface water outflow.

In Sedona, the main source of groundwater supply is from the sandstone of the Supai Formation and the underlying Redwall and Martin Limestones. Depth to water varies from about 180 to 1,000 feet below land surface. Wells produce an average of about 70-80 gallons per minute. Groundwater level declines of less than one foot per year have been recorded in the Sedona area (Arizona Department of Water Resources, 1992). Groundwater underflow through the Sedona area is estimated to be about 12,000 acre-feet per year. Current withdrawals are about 2,350 acre-feet per year. Committed additional demands amount to about 3,227 acre-feet per year (Arizona Department of Water Resources, 1992).

The main water supply for the Town of Payson is groundwater withdrawn from weathered and fractured granite. Some wells near the center of town have experienced water-level declines of four to five and one-half feet per year. Wells in other areas of Payson show water level fluctuations but no trend of progressive declines (Arizona Department of Water Resources, 1990).

Groundwater is of acceptable quality for most uses in the sub-basin except near Camp Verde. Owen-Joyce and Bell (1983) reported dissolved solids, sulfate, arsenic, and fluoride concentrations in groundwater withdrawn from the Verde Formation and alluvium exceeding the maximum contaminant levels for drinking water as recommended by the U.S. Environmental Protection Agency.

VERDE CANYON SUB-BASIN

Groundwater development is small in the Verde Canyon sub-basin. Water from wells and springs is used mainly for domestic and stock purposes. Water-bearing characteristics of the units which make up the aquifers varies greatly because of the variable topographic relief and geologic diversity. The unconsolidated sediments which are as much as a few tens of feet thick along the stream courses may yield from 50 to several hundred gallons per minute to wells (Ross, 1977). Basalt flows, conglomerates, and semiconsolidated silt units, which cover a large portion of the sub-basin, may yield up to 100 gallons per minute to wells and springs where sufficiently fractured (Ross, 1977). Sandstones and limestones near Payson and Strawberry in the northern parts of the sub-basin can yield between 10 and 1,000 gallons per minute to wells and springs, but most produce under 100 gallons per minute. Mountains around the perimeter of the sub-basin are virtually void of groundwater (Ross, 1977).

When last reported by the U.S. Geological Survey in 1977, there was little or no change in water levels in wells (Ross, 1977); however, below normal precipitation during the mid- to late 1980's has resulted in water-level declines in public supply wells in the Pine-Strawberry area. Pumpage for the entire sub-basin is around 2,000 acre-feet per year and the water quality is good.