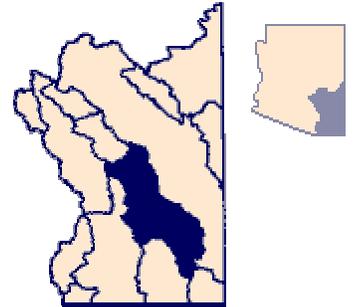


WILLCOX BASIN

Willcox basin is located in southeastern Arizona and covers approximately 1,911 square miles in the northern part of Sulphur Springs Valley (Figure 17). The Willcox basin is in the Basin and Range physiographic province. The basin is bounded by the Pinaleno Mountains to the northeast, the Dos Cabezas and Chiricahua Mountains to the east, the Pedregosa Mountains to the south and the Swisshelm, Dagoon, and Winchester Mountains to the west. This area of the valley is hydrologically and topographically separate from the southern part of Sulphur Springs Valley.



Perennial flow occurs in upper Grant Creek and in other small streams in the Pinaleno Mountains. Remaining streams in the basin are ephemeral and only flow in response to precipitation. Willcox basin is a closed basin. All drainage is internal and flows to the Willcox Playa in the south-central part of the basin.

The principal source of groundwater in the Willcox basin is the alluvial deposits of the valley. These deposits consist of stream deposits and lake-bed deposits (Brown and Schumann, 1969). Stream deposits, the most productive water-bearing unit, are composed of gravel, sand, silt, and clay. Wells which tap the stream deposits yield from a few tens of gallons per minute from domestic and livestock wells to more than 2,000 gallons per minute from irrigation wells (Mann and others, 1978).

Lake-bed deposits mainly consist of clay. These deposits outcrop in the Willcox Playa and are interbedded with the stream deposits at depths of 200 to 300 feet in other parts of the basin. Close to the playa, these fine-grained sediments act as a confining layer to the water in the underlying stream deposits creating localized artesian conditions. Where the coarse-grained stream deposits are underlain by the lake-bed deposits, perched groundwater conditions may occur (Mann and others, 1978).

In 1989, an estimated 45.3 million acre-feet of groundwater were in storage to 1,200 feet (Arizona Department of Water Resources, 1989). Natural recharge in the Willcox basin has been estimated to be approximately 15,000 acre-feet per year (Arizona Water Commission, 1978).

The direction of groundwater movement in the sedimentary deposits has been altered significantly by large-scale withdrawal of groundwater. Prior to extensive withdrawal, the general direction of groundwater movement was from the perimeter of Sulphur Springs Valley toward the Willcox Playa and possibly south toward the Douglas basin. The general direction of groundwater movement in 1975 was toward several pumping centers in the main agricultural areas along the valley floor. One of the two large cones of depression is located approximately three miles northeast of Three Sister Buttes in the southern part of the basin. The other large cone of depression is located approximately six miles northwest of the Town of Willcox (Mann and others, 1978).

The main use of groundwater in the Willcox area is for irrigation. Groundwater pumpage averaged about 300,000 acre-feet per year between 1967 and 1975 (Mann and others, 1978). Groundwater withdrawals have resulted in water level declines in the developed areas of the basin. The Arizona Water Commission (1978) reported water level declines of one to nine feet per year.

Total dissolved solids concentrations, determined from specific conductance values and fluoride concentrations were obtained from groundwater samples collected by the Arizona Department of Water Resources between 1987 and 1991. Total dissolved solids concentrations ranged from 72 to 2,160 milligrams per liter (mg/l) in the Willcox basin. In the Willcox Playa and in a small area north of Pearce, the concentrations exceeded the recommended secondary maximum contaminant level of 500 mg/l. Fluoride concentrations ranged from 0.2 to 23 mg/l. Sources of the fluorides in the basin

are the lake-bed deposits, as well as, the volcanic rocks and older metamorphic rocks surrounding the basin (Montgomery Engineers of Nevada, 1969).