MIDDLE GILA RIVER

The Middle Gila River watershed encompasses the area from below Coolidge Dam at San Carlos Reservoir to Gillespie Dam southwest of Phoenix. The San Pedro River drainage encompasses the vast majority of this watershed. This section only focuses on that portion of the watershed, below Coolidge Dam and above Ashurst-Hayden Diversion Dam, which is within the southeastern Arizona planning area. Within the planning area, the watershed generally encompasses the following basin boundaries: Dripping Springs, Aravaipa Canyon, Donnelly Wash, Upper and Lower San Pedro, Cienega Creek, and San Rafael.

Streamflow Characteristics

Flow in the Gila River between Coolidge Dam and Ashurst-Hayden Diversion Dam can be attributed to releases from the San Carlos Reservoir and to natural flow in the river. Table 28 lists average annual flows for selected gaging stations in the watershed.

The San Pedro River is the only major tributary to the Gila River between Coolidge Dam and Ashurst-Hayden Diversion Dam. Of the 5,425 square miles drained between the two dams, 4,485 square miles are drained by the San Pedro River. Only a portion of the flows originating in the San Pedro watershed are beneficially used due to their magnitude, unpredictable nature, and sediment load. The floodwaters of the San Pedro River are the only remaining undeveloped surface-water resources available within the area.

The headwaters of the San Pedro River originate near Cananea, Mexico. The average annual runoff entering Arizona from Mexico is approximately 23,000 acre-feet (Earthinfo, Inc., 1991). Intermittent as it crosses the International Boundary, the river flows northerly until it empties into the Gila River near Winkelman.

There are several reaches on the San Pedro River that are perennial (Table 29). The location of these reaches are shown in Figure 18. The majority of the river is considered intermittent with a seasonal appearance and disappearance of surface water. Some reaches may have been perennial prior to development (Arizona Department of Water Resources, 1990). Perennial flow in the San Pedro River can be attributed to discharges of groundwater to the stream, and geologic restrictions which force the groundwater to the surface. The Babocomari River and Aravaipa Creek are the major tributaries to the San Pedro River. Aravaipa Creek has perennial flows in its upper reaches, but is ephemeral at its confluence with the San Pedro River. The Babocomari River is perennial at its confluence with the San Pedro River.

TABLE 28
ANNUAL FLOWS FOR USGS STREAMGAGING STATIONS IN THE MIDDLE GILA RIVER WATERSHED (SOUTHEASTERN ARIZONA PLANNING AREA)

Station Name	Station Number	Period of Record	Mean Annual Flow (ac-ft)	Median Annual Flow (ac-ft)	Record Annual High Flow (ac-ft)	Record Annual Low Flow (ac-ft)
Gila River at Winkelman	9470000	1942-1980 1985-1990	239,580	224,380	810,660	39,090
San Pedro River at Winkelman	9473500	1967-1978	31,850	22,180	75,280	9,410
San Pedro River at Palominas	9470500	1931-1933 1936-1940 1951-1981	23,160	16,940	67,310	5,140
San Pedro River at Charleston	9471000	1905, 1913-1926 1929-1933	42,700	34,160	149,100	9,410

		1936-1990				
San Pedro River near Tombstone	9471550	1968-1986	40,530	29,970	113,640	9,430
San Pedro River near Benson	9471800	1967-1976	23,160	19,900	44,150	10,860
San Pedro River near Redington	9472000	1944-1947 1951-1990	32,570	20,410	129,560	2,240
Aravaipa Creek near Mammoth	9473000	1932-1940, 1942 1967-1990	23,890	28,880	101,330	6,950
Gila River at Kelvin	9474000	1912-1990	356,830	324,260	2,243,780	56,460
Gila River below Coolidge Dam	9469500	1901, 1904 1916-1990	251,160	223,650	1,346,270	16,650

Source: U.S. Geological Survey, 1992, National Water Information System

TABLE 29
PERENNIAL STREAM REACHES IN THE MIDDLE GILA RIVER WATERSHED (SOUTHEASTERN ARIZONA PLANNING AREA)

Perennial Stream Reaches	Length (miles)
unnamed reach	2
Ash Creek	15
Mineral Creek	15
Devils Canyon	7
(Source: Brown and others, 1981)	
Tributaries to the San Pedro	
San Pedro River (2 reaches)	40
Babocomari (4 reaches)	12
Miller Canyon	1
O'Donnell Canyon Cienega	2
Ramsey Canyon	2
Turkey Creek Cienega	2
Bass Canyon	3
Buehman Canyon	3
Hot Springs Canyon	7
Redfield Canyon	6
Swamp Springs Canyon	1
Aravaipa Creek (2 reaches)	23

TOTAL PERENNIAL STREAM REACHES	140
Source: Arizona Department of Water Resources, 1990	

Most springs found throughout the watershed only yield several gallons per minute; however, in the Huachuca Mountains a few large springs can be found yielding several hundred gallons per minute (Arizona Department of Water Resources, 1990). Historically, Fort Huachuca has relied upon spring flow to supplement its water supply. Tombstone relies upon springs in Miller's Canyon for the majority of its public water supply. Springs in the Dripping Springs area can be found yielding from less than one gallon per minute to two gallons per minute and many are only seasonal (Coates, 1955).

A hydraulic connection exists between the younger alluvium and the river in a relatively narrow strip of land which conforms to the San Pedro River, Babocomari River, and Aravaipa Creek. The pumping of groundwater from the younger alluvium interferes with the streamflow by reducing the amount of groundwater discharged to the stream or by inducing surface water to move away from the rivers (Arizona Department of Water Resources, 1990).

Irrigated agriculture, grazing, and mining are the main water uses in the watershed. Approximately 20,220 acres are irrigated in the San Pedro subwatershed of which 3,330 acres are supplied by surface water (Arizona Department of Water Resources, 1990). It is estimated that 10,000 acre-feet per year are diverted for irrigation. Nearly all of the flows between Coolidge Dam and Ashurst-Hayden Diversion Dam are appropriated. The only water available is flood flows and small tributary inflows (U.S. Department of the Interior, 1963). Water released by San Carlos Reservoir is stored and regulated by the Gila Decree of 1936 for San Carlos Project lands. There are no reservoirs between Coolidge Dam and Ashurst-Hayden Diversion Dam.

Water Quality

The water of the tributaries entering the Gila River between Coolidge Dam and Ashurst-Hayden Diversion Dam are of the calcium-bicarbonate type. A 1977 sampling of the San Pedro River showed median total dissolved solids as measuring 250 milligrams per liter (mg/l) from the International Boundary to Curtis Siding, about 35 miles north of the Border. The total dissolved solids level downstream rises to 400 mg/l at "the Narrows", approximately 13 miles upstream from Cascabel (Putman and others, 1988). The total dissolved solids in the San Pedro River near Winkelman had an annual average concentration of 676 mg/l and total dissolved solids in the Gila River at Kelvin had an annual average concentration of 929 mg/l (Earthinfo, Inc., 1991).

The Arizona Department of Environmental Quality (1990) has reported exceedances of water quality standards for turbidity, metals, bacteria, total dissolved solids, and nutrients along the Gila River from the San Carlos River to the Phoenix area.

Additional water-quality problems include San Pedro River water entering from Mexico which does not meet water-quality standards for metals, turbidity, and ammonia (Arizona Department of Environmental Quality, 1990). Acid mine drainage from Cananea, Mexico, historically has occurred in the form of periodic heavy metal contamination in the river from wastewater spills at the mines (Putman and others, 1988). The San Pedro River from Palominas to Benson also has persistent problems with turbidity, ammonia, metals, and low dissolved oxygen. Most significant of these problems is severe nitrate contamination in the St. David area; the Apache Powder Company is now designated as a Federal Superfund site. Mining, inadequate rangeland management, and agriculture irrigation return flows are other potential causes of the water-quality problems (Arizona Department of Environmental Quality, 1990).

Copper Creek downstream from San Manuel has exceedances of water quality standards caused by mining for metals, ammonia, turbidity, and low dissolved oxygen (Arizona Department of Environmental Quality, 1990).