

Gila Bend Planning Area

Background

The Gila Bend Planning Area is located entirely within Maricopa County in the southwest portion of the state, contiguous to the southwest boundary of the Phoenix Active Management Area (AMA) and the western boundary of the Pinal AMA. The Planning Area contains the entire Gila Bend Groundwater Basin; an area of approximately 1,284 sq. miles, and encompasses a small portion of the Agua Fria River-Lower Gila River watershed (the southern part of the Lower Gila-Painted Rock Reservoir Watershed). There is limited population in the Planning Area and the Town of Gila Bend is the largest population center in the Planning Area.



Approximately 78 percent of the land in the Gila Bend Planning Area is under federal ownership (see *Figure P.A. 10-1*). The US Bureau of Land Management (BLM) owns and manages just over 41 percent, including portions of the Sonoran Desert National Monument and Woolsey Peak Wilderness Area. The primary land uses on BLM lands are resource conservation, recreation and livestock grazing. The US military owns and operates approximately 34 percent of the land in the Planning Area as the Barry M. Goldwater Air Force Range. Roughly 16 percent of the land is under private ownership, with land uses that include domestic, commercial, irrigated agriculture and livestock grazing. Small portions of land within the Planning Area are held as State Trust Lands or under tribal ownership. The primary land use on the State Trust Lands is livestock grazing.

Water Supply Conditions

Groundwater

The Gila Bend Planning Area is located in the Basin and Range Physiographic Province. This province is characterized by long broad alluvial valleys separated by mountain ranges, with thick productive regional alluvial aquifers. The most productive wells are generally located along the alluvium in the floodplain of the Gila River. Groundwater formations are well-suited for artificial underground water storage and recovery.

The Gila Bend Planning Area has generally experienced water level declines throughout the Basin (see *Figure P.A. 10-2*). In some areas, significant declines have been observed and cones of depression have formed due to historic groundwater pumping. Groundwater levels declined significantly ranging from 0.06 to greater than 7 feet per year between 1993 and 2013. During that period, the mean annual water level decline rate was the greatest, on average, of any Basin in the state. In one location along the Gila River approximately eight miles north of the Town of Gila Bend, the water level has declined approximately 146 feet between 1992 and 2012.

Annual natural recharge estimates range from 10,000 to 37,000 acre-feet per year. The largest source of natural recharge in the Planning Area occurs from Gila River flood events and infiltration of water impounded behind Painted Rock Dam. Incidental recharge from agricultural irrigation also contributes to available groundwater in the Planning Area. Groundwater storage estimates range widely from 17 to 61 MAF.

Within the Gila Bend Basin notable land subsidence has occurred and is likely to be an ongoing process. Land subsidence develops where fine-grained sediments have compacted as water tables are drawn down by groundwater pumping. Current land subsidence of 0.5 to 1.5 cm over a two year period (2006 to 2008) has occurred within some areas of the Basin, however a maximum of 3 to 4 cm has been observed in some areas with significant water level declines.

Groundwater quality is generally poor across the Basin, with naturally occurring arsenic and fluoride levels exceeding drinking water standards. High concentrations of total dissolved solids (TDS) and nitrate exceeding drinking water standards have been detected in many wells. There are no identified water quality mitigation sites within the Planning Area.

Surface Water

The Gila River is the only major surface water supply in the Planning Area (*see Figure P.A. 10-3*). Gila River water, combined with reclaimed water discharged from the Phoenix AMA, is used for agricultural water supplies in the northern part of the Planning Area where they are diverted at Gillespie Dam into the Gila Bend and Enterprise canals. The Gila River is intermittent in the Planning Area and the volume available for use is a mixture of upstream releases of water from dams, storm runoff from precipitation events, irrigation return flows, water pumped from dewatering wells located in the Phoenix AMA Basin (wells used to manage groundwater levels beneath irrigated areas), and reclaimed water discharges from the 23rd Avenue and 91st Avenue Wastewater Treatment Plants (WWTPs) located in the Phoenix AMA. The Planning Area contains one large reservoir, Painted Rock Reservoir, with a maximum storage of 4,831,500 acre-feet. This reservoir is used for flood control and has only filled during large flood events. Flow records collected from stream gauges in the Planning Area indicate high variable annual flows ranging from 0 acre-feet per year to a maximum of 5,675,984 acre-feet per year in flood years.

Reclaimed Water

Reclaimed water discharged to the Gila River from the Phoenix AMA Basin is an agricultural water supply in the Gila Bend Planning Area, but the volume used is not quantified. The reuse of reclaimed water generated from within the Planning Area is minimal. There are only a few WWTPs in the Planning Area and reported disposal methods include evaporation ponds and discharge to a watercourse, about 400 acre-feet of reclaimed water is generated at the Gila Bend WWTP in the Town of Gila Bend and all is discharged to a watercourse north of the town.

Ecological Resources

There are no critical habitats designated in the Gila Bend Basin (*see Figure P.A. 10-3*). However, many bird species may be present in Painted Rock Reservoir after floods serving as temporary habitat. There are several conservation lands within the Planning Area: Sonoran Desert National Monument, (BLM); North Maricopa Mountains Wilderness, (BLM); South Maricopa Mountains Wilderness; (BLM); Woolsey Peak Wilderness, (BLM); Buckeye Hills Regional Park; Maricopa County Park; and Painted Rock Wildlife Area (Arizona Game and Fish Department).

Water Demands

Table P.A. 10-1 below presents the baseline and projected water demands for the Gila Bend Planning Area. Currently, over 98 percent of the water demands in the Planning Area are associated with

irrigated agriculture. These demands are projected to remain consistent throughout the projection period. Dairy demands are expected to increase significantly compared to 2010 use for this category due to development pressures and land costs in the adjacent urban centers of the state and migration of dairies from the Phoenix AMA Basin.

Large increases are also projected for water uses associated with power production. Significant power transmission resources are present in the Gila Bend Planning Area, which is attracting electrical generation activity including natural gas and solar production. Concentrating solar production (CSP) typically requires water use during construction for dust control and boiler cooling. The Solana Generating Station, a 280-megawatt solar thermal power plant using concentrated solar power (CSP) technology, was constructed west of the Town of Gila Bend and recently began operation. Solar Reserve is permitting the Crossroads Generating Station, a solar tower CSP, displacing farmland north of Gila Bend. Western Arizona has high potential for solar energy production which, depending on the selected technology, may lead to increased water use in the Planning Area. Concentrated solar technologies require an average of 900 gallons of water per Megawatt hour (MWh) generated or about 2,000 acre-feet per year. The increased industrial uses are also projected to result in increases in local populations and municipal demands.

Table P.A. 10-1. Projected Water Demands (in acre feet) - Gila Bend Planning Area

Sector	2010	2035	2060
Agriculture	351,500	351,500	351,500
Dairy	173	5,281	13,814
Feedlot	0	0	0
Municipal	867	1,332	1,672
Other Industrial	0	0	0
Mining	0		
High		0	0
Low		0	0
Power Plants	5,400		
High		26,147	33,434
Low		19,102	23,435
Rock Production	0		
High		136	171
Low		57	71
Turf	0		
High		0	0
Low		0	0
Total (High)	357,940	384,396	400,591
Total (Low)	357,940	377,272	390,492

Characteristics Affecting Future Demands and Water Supply Availability

General Stream Adjudication

The general stream adjudications are judicial proceedings to determine or establish the extent and priority of water rights in the Gila and Little Colorado River systems. Over 84,000 claimants and water users are joined in the Gila River Adjudication that will result in the Superior Court issuing a comprehensive final decree of water rights. Until that process is complete, uncertainty regarding the extent and priority of water rights, particularly in the eastern portion of this Planning Area, will make it difficult to identify strategies for meeting the projected water demands.

Land Use

Because less than 22 percent of the area is in private or State Trust ownership, development of this area is limited, although municipal demands are projected to almost double to 1,867 acre feet in 50 years. The remaining land is federally controlled and a large portion of that is either military or national monument, which will not likely be developed beyond its existing uses. The potential for expansion of power facilities by nearly 30,000 acre feet and a projected increase in dairy operations is a factor that needs to be considered and a projected demand for which water supplies are important.

Limited Renewable Water Supplies

Below Painted Rock Dam, the Gila River is mostly dry and, therefore, does not provide a secure water supply for future growth. Prior to 1993, when Gillespie Dam was breached during a flood, more surface water was diverted for agricultural purposes. Surface water has been a less reliable supply than groundwater due to upstream dams and diversions and the unpredictability of flow even under pre-development conditions. However, water users have enjoyed the benefit of discharges of reclaimed water and dewatering pumping from the southwest portions of the Phoenix AMA Basin.

Outside of the agricultural area in the north central portion of the Planning Area (Gila Bend Canal and Enterprise Canal Companies), water use is primarily dependent on groundwater supplies. Groundwater quality is generally poor across the Planning Area with several measurements of arsenic and fluoride concentrations meeting or exceeding drinking water standards as well as high concentrations of TDS and nitrate. Water quality is generally acceptable for non-potable uses but treatment for potable uses will need to be addressed for future municipal expansion.

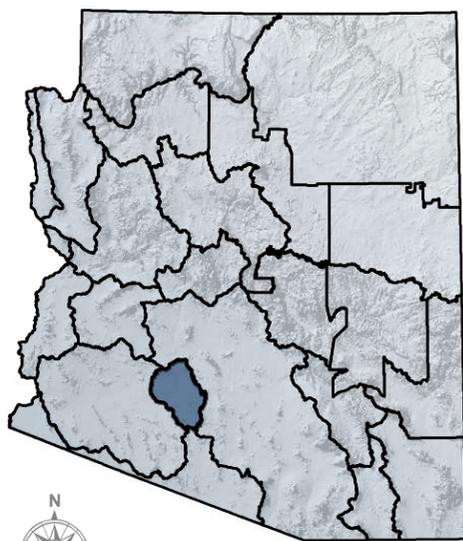
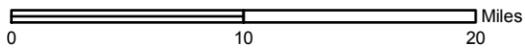
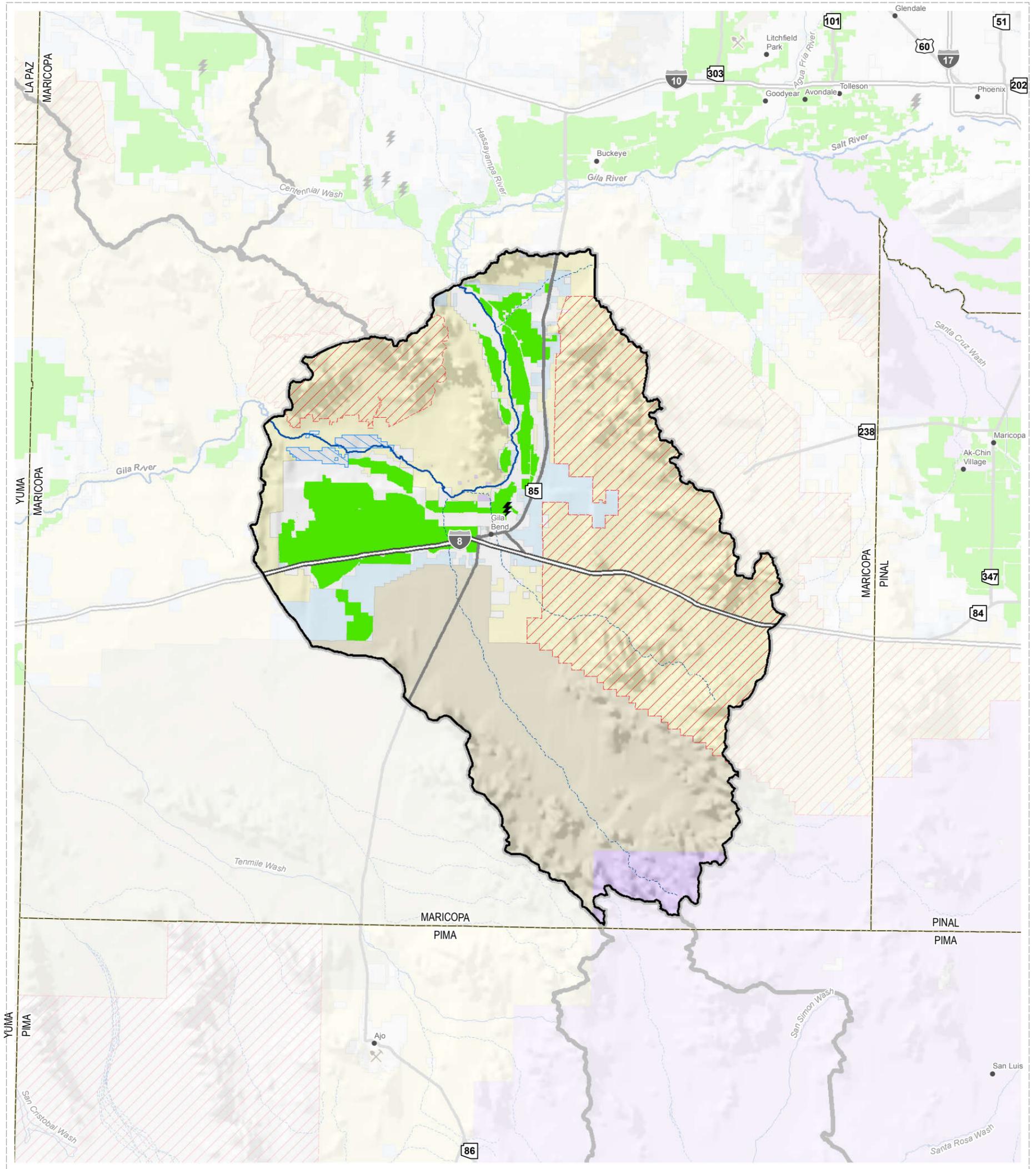
The limited availability of renewable water supplies for uses other agriculture (and the unknown quantity of reclaimed water availability and use) puts additional demands on groundwater supplies to meet projected demands.

Strategies for Meeting Future Water Demands

In general, groundwater supplies may be sufficient to meet the projected increases in municipal water demands, although water quality will likely require increased treatment as water use increases. Additionally, the availability of reclaimed water in the region will grow as population grows. Currently, reclaimed water generated in the municipal system is discharged but could be treated in mechanical plants to standards that allow for either direct deliveries to non-potable uses or utilized through artificial recharge and recovery to mitigate increases in future demands.

Meeting the needs of expanded electrical generation in the Planning Area will need to be evaluated. Currently groundwater level declines raise concerns in select areas. If expanded electrical generation is the primary expansion of projected water use, the need for more information on actual water demands in the area needs to be addressed. Additionally, groundwater modeling could be a good tool to identify the most appropriate colocation of sustainable groundwater development and sustainable energy development in the region. Increased water use metering and reporting would serve to improve the accuracy of future groundwater models. Finally, resolution of the Gila River General Stream Adjudication will support long-term certainty of water supply availability in this Planning Area.

NOTE: Because GIS data for this project were acquired from multiple sources employing different land base grids and varying accuracy standards, some inconsistencies were encountered. The user is responsible for understanding the accuracy limitations of GIS data layers and is responsible for the results of any application of the data for other than their intended purpose.



MAP LOCATION
(Planning Area Boundaries)

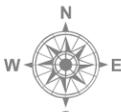
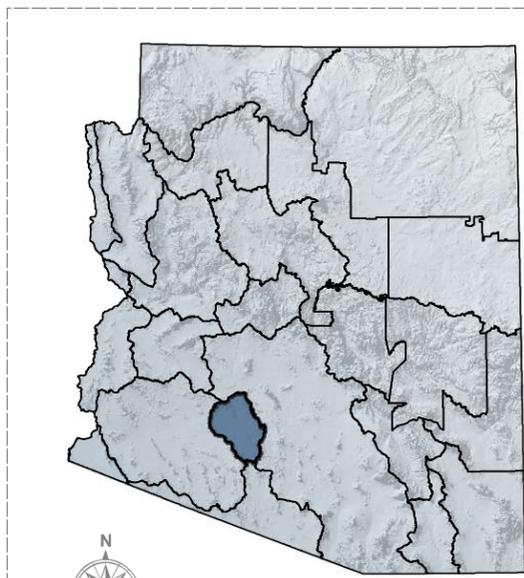
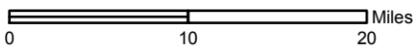
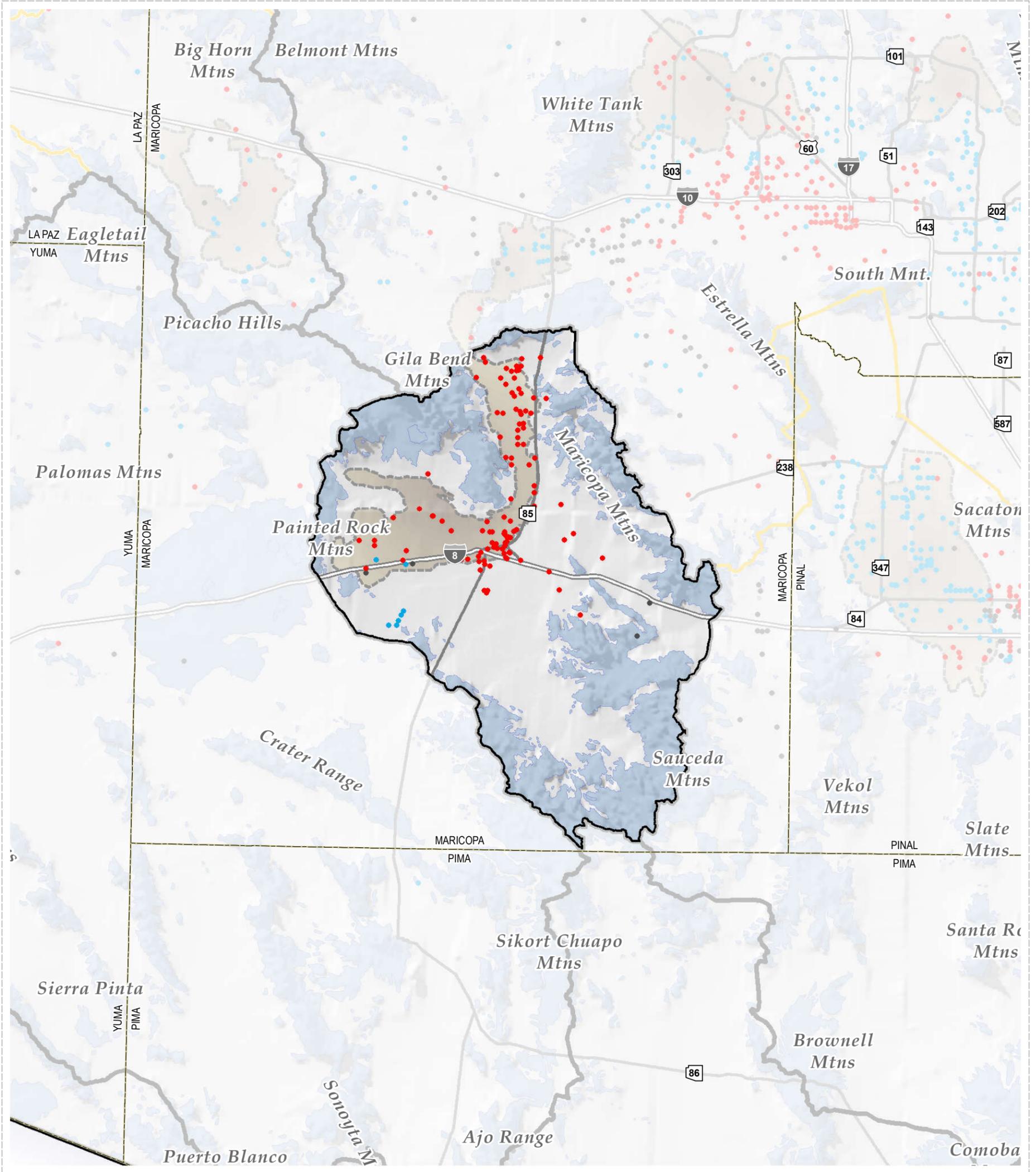
- Planning Area (ADWR)
- State (ALRIS)
- County (ALRIS)
- River or Stream (ASLD)
- Interstate (ADOT)
- Population Center (GNIS)
- Mine (ADMMR, ADWR)
- Hydroelectric Power Plant (ADEQ, ADWR)
- Thermoelectric Power Plant (ADEQ, ADWR)
- Agriculture (SWReGAP, 2004)
- Federal Conservation Land (USFS, BLM, NPS)
- State Managed Conservation Land (AZGFD, AZSP)
- BLM Land
- National Forest
- National Park
- Military Reserve
- Private and Other Land
- State Trust Land
- Tribal Land



Gila Bend Land Ownership

Figure P.A.10-1

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MAP LOCATION
(Planning Area Boundaries)

- Planning Area (ADWR)
- State (ALRIS)
- County (ALRIS)
- Groundwater Basin (ADWR)
- Area of Active Land Subsidence (ADWR)
- Hard Rock Geology (AZ Bureau of Mines, UofA)
- Interstate (ADOT)

- Recent Water Level Change * (1990's through 2000's)
- Minor WL Change +5' to -5'
- Negative
- Positive

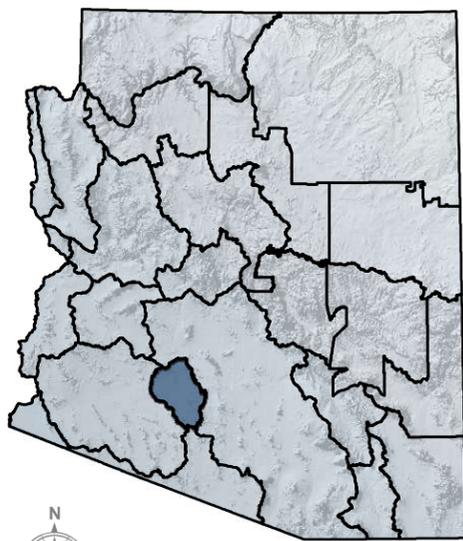
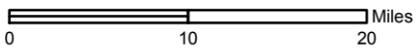
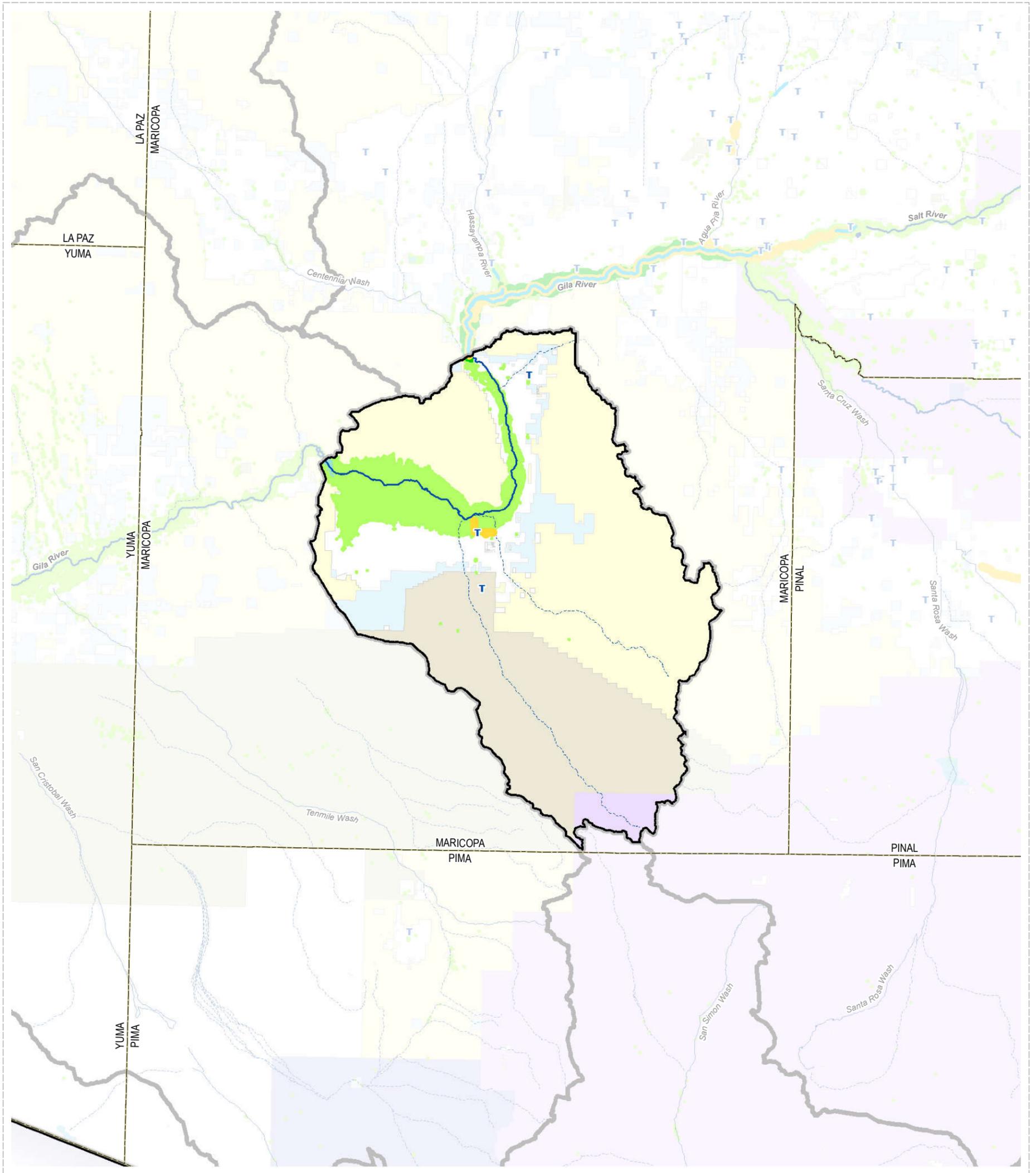
* Data provided by ADWR



Gila Bend Groundwater Hydrology

Figure P.A.10-2

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MAP LOCATION
(Planning Area Boundaries)

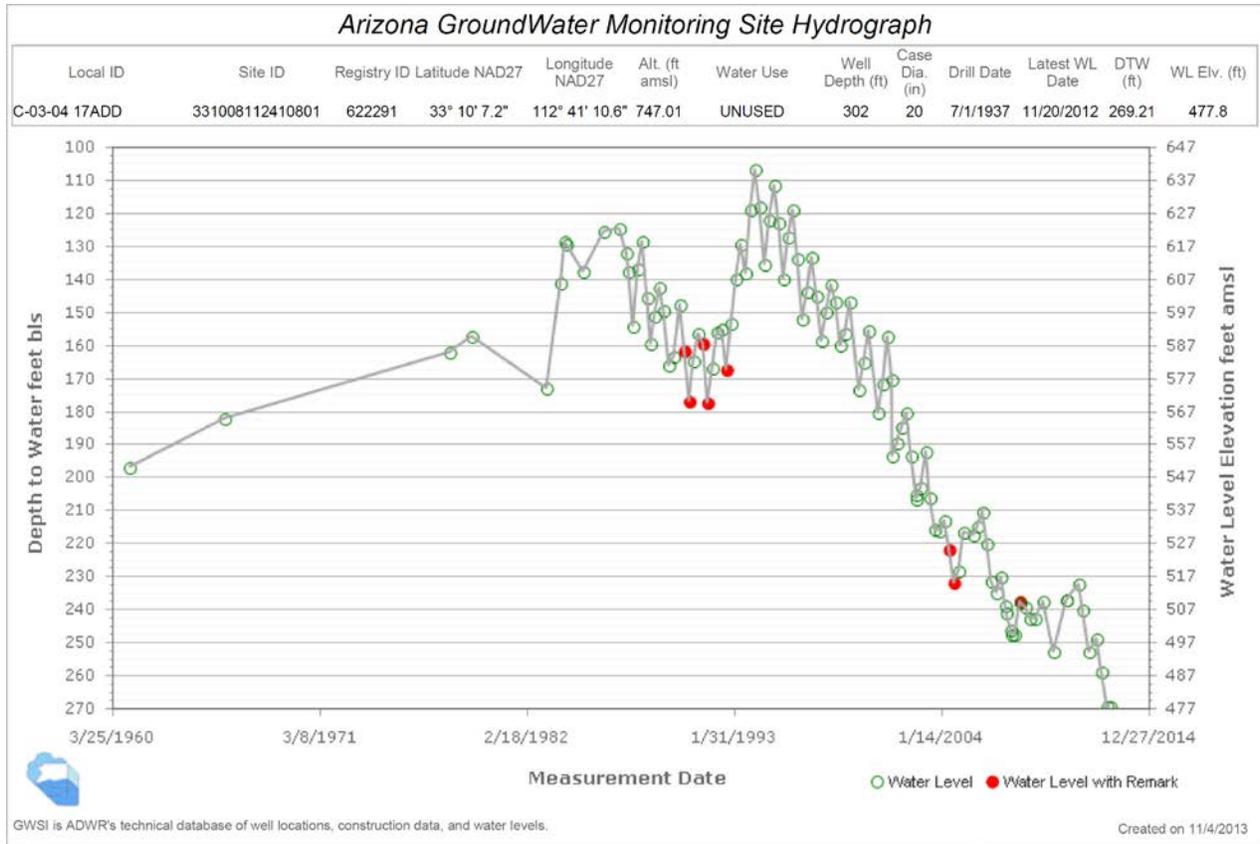
- Planning Area (ADWR)
- State (ALRIS)
- County (ALRIS)
- Reservoir or Lake (NHD)
- Waste Water Treatment Plant (ADEQ)
- Major Spring (ADWR, Pima County)
- Perennial Flow (ADEQ, USGS)
- River or Stream (ASLD)
- Outstanding Arizona Water (ADEQ)
- Effluent Dependent Stream (ADWR, NEMO)
- Instream Flow Certificate (ADWR)
- 1993 Riparian Inventory (AZGFD)
- Modeled Riparian Habitat (AZGFD)
- Designated ESA Critical Habitat (USFWS)
- Proposed ESA Critical Habitat (USFWS)
- Federally Designated Wild and Scenic River (USFS)
- BLM Land
- National Forest
- National Park
- Military Reserve
- Private and Other Land
- State Trust Land
- Tribal Land



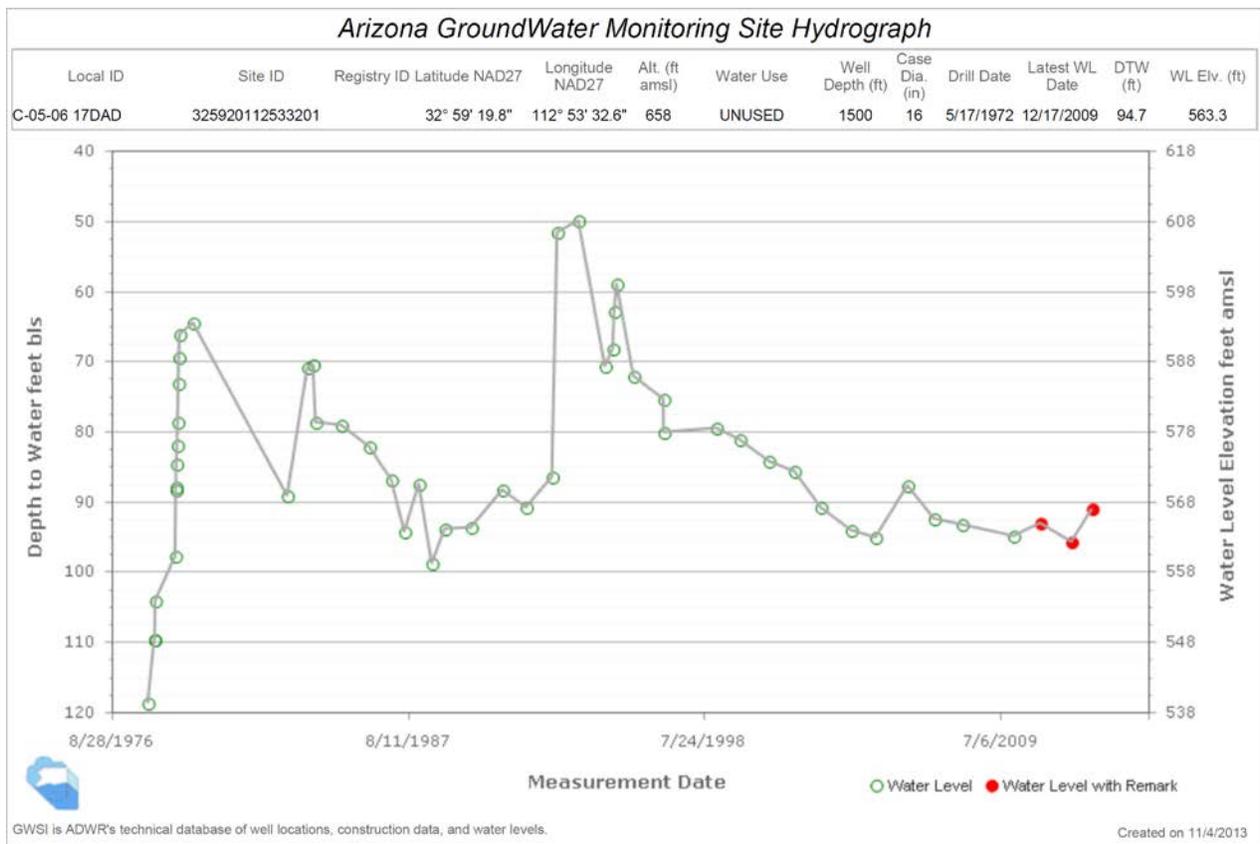
Figure P.A.10-3

Gila Bend Surface Water and Natural Features

Gila Bend Basin – Gila Bend Planning Area



C-03-04 17 ADD – Gila bend basin. -- about 8 miles N of Gila Bend along Gila River.



C-05-06 17DAD – Gila Bend basin -- 5 miles north of Theba in the Paloma Ranch area near the Gila River.