

Cochise Planning Area

Background

The Cochise Planning Area is located in the far southeast corner of the State and is comprised of the Sulphur Springs, San Simon, and San Bernardino valleys. The Planning Area is comprised of portions of Cochise and Graham counties. The Cochise Planning Area encompasses all of the Douglas, Douglas INA, San Bernardino Valley, San Simon Valley, and Willcox groundwater basins and shares portions of the Duncan Valley and Safford groundwater basins with the Upper Gila Planning Area. The Planning Area encompasses the entire Rio de Bavispe Watershed and a portion of the San Pedro-Willcox Watershed. Douglas, Willcox, San Simon, and Bowie are the most notable communities in the Planning Area.



The highest elevations in the Planning Area are part of the Coronado National Forest (see *Figure P.A. 6-1*). Primary land uses on forest lands are recreation, livestock grazing and timber production. The US Bureau of Land Management (BLM), State Trust Lands, and private land comprise the majority of the balance of land ownership in the Planning Area. Irrigated agriculture and livestock grazing are the principal land uses on private land. The principal land use on BLM and State Trust Lands is livestock grazing. The National Park Service owns and manages the Chiricahua National Monument. The Arizona Game and Fish Department manages the Willcox Playa Wildlife Area.

Water Supply Conditions

Groundwater

The Cochise Planning Area is within the Basin and Range Physiographic Province, characterized by broad alluvial valleys filled with sediments eroded from the surrounding mountains. The Chiricahua Mountains are a notable interior feature of the Planning Area.

The Douglas Irrigation Non-Expansion Area (INA) was established within the Douglas Groundwater Basin by the 1980 Groundwater Management Act. In general, no additional lands can be put into agricultural production using groundwater within the Douglas INA beyond those legally irrigated at any time between January 1, 1975 and January 1, 1980. All persons withdrawing groundwater from non-exempt wells¹ within an INA must use a measuring device and measuring method to record water use, except for: (1) persons who withdraw 10 acre-feet or less for non-irrigation purposes only, and (2) persons who withdraw groundwater for an irrigation use if the Notice of Irrigation Authority for the land on which the groundwater is used includes 10 or fewer contiguous acres and the land is not part of a farming operation that includes more than 10 acres. Annual water use reports are required to be filed with the Department by March 31st each year. Individual water users in the Planning Area outside of the boundaries of the Douglas INA are not required to meter or report water use.

¹ A non-exempt well has a pump capacity greater than or equal to 35 gallons per minute or used to irrigate more than two acres.

Water levels in the basin-fill aquifers of the groundwater basins within the Planning Area exhibit similar declining trends in recent years in response to agricultural, industrial and municipal demands and reductions in regional recharge as a result of below normal precipitation (*see Figure P.A. 6-2*).

Within the Willcox Basin, 560 of 587 wells measured by ADWR exhibited declining water levels between 1990 and 2004, with the average annual decline rate of 2.0 feet per year. Total declines in wells of up to 90 feet were observed over this period in wells in the south-central portion of the Basin. Wells in the northern reaches of the Basin exhibited declines of 20 to 30 feet over this period. More recent water levels collected in the Willcox Basin confirm that these water level trends continue.

Wells in the San Simon Basin also exhibited water level declines, with 201 of 286 wells measured by ADWR exhibiting water level declines over the period 1987 to 2007. Declines averaged 1.2 feet per year in these wells, concentrated around the communities of Bowie and San Simon. Again, recent water level measurements generally confirm continuance of these water level trends in the San Simon Basin.

Water level declines in the Douglas Basin were generally less severe in the southern portion of the Basin than wells to the north. Wells near the City of Douglas exhibited declines of less than 10 feet over the period from 1990 to 2004, while further north, where agricultural uses are more intense, declines approached 50 feet in some wells. Within the Douglas Basin, 240 of the 272 wells measured by ADWR exhibited declines, which averaged 1.2 feet per year.

More modest declines were experienced in the less developed San Bernardino Basin, with 17 of 24 measured wells experiencing declines averaging 0.4 feet per year.

Surface Water

Precipitation is greater in the higher elevations, supporting perennial mountain streams. These flows are not adequate to support perennial flows in the basin-fill portions of the Planning Area, which quickly transition to ephemeral drainages upon exiting the consolidated bedrock of the mountains. The Rio de Bavispe watershed flows south into Mexico in the San Bernardino and Whitewater Draw drainages (*see Figure P.A. 6-3*). The San Pedro-Willcox Watershed portion of the Planning Area drains to the Willcox Playa, a closed basin, the most notable surface water feature in the Planning Area. The northeast portions of the Planning Area are drained by San Simon Wash, an ephemeral tributary to the Gila River.

There are two active streamgauge stations in the Rio de Bavispe Watershed. The streamgauge at Whitewater Draw near Douglas recorded maximum annual of flow of approximately 22,300 acre-feet in 1995 with a median flow of 5,960 acre-feet. There are no active streamgauge stations in the Cochise Planning Area portion of the San Pedro-Willcox Watershed.

Reclaimed Water

The lack of concentrated development limits the existence of centralized wastewater collection and treatment works and, likewise, limits the production of reclaimed water. Most users rely upon septic systems for wastewater treatment and disposal. The City of Willcox operates a lagoon wastewater treatment plant (WWTP) and reclaimed water from this facility is reused to irrigate the Twin Lakes Golf Course and provide water for recreational and wildlife uses. The City of Douglas WWTP has a reported disposal method of discharge to a watercourse from its mechanical plant. Fort Grant prison also has a lagoon WWTP.

Ecological Resources

The Willcox Playa is sparsely vegetated desert grassland that is best known to the public for its wintering population of Sandhill Cranes that migrate to the Willcox Playa in large numbers (see Figure P.A. 6-3). The Willcox Basin, especially the western slopes of the Chiricahuas, contains a broad diversity of wildlife. The Douglas Basin is also notable for the wildlife in the Whitewater Draw Wildlife Area and Leslie Canyon National Wildlife Refuge.

Water Demands

Table P.A. 6-1, below, presents the baseline and projected water demands for the Cochise Planning Area. Agricultural demands are over 250,000 acre-feet, accounting for over 90 percent of all water demands in the Planning Area through 2060. In addition, one of the largest commercial greenhouses in North America, EuroFresh Farms, is located north of Willcox. Agricultural demands are dispersed throughout the alluvial basins in the Planning Area and were projected by the WRDC to remain at current levels through 2060. This projected flat trend belies the recent increases in agricultural activity in the Planning Area, including permitting of wells with "irrigation" as a stated water use, and requires further examination.

Municipal uses comprise the second highest use sector in the Planning Area, projected to increase from just under 8,900 acre-feet per year to 13,900 in 2060. These uses are projected to remain reliant on groundwater supplies through the projection period.

The Arizona Electric Power Cooperative operates the Apache Generating Station, a coal-fired power plant, located immediately west of the Willcox Playa. Current water demand is 6,200 acre-feet per year and is projected to increase to between roughly 8,000 and 11,500 under the low and high projections from the WRDC, respectively. Groundwater is the primary source for cooling at the power plant.

Characteristics Affecting Future Demands and Water Supply Availability

Projected Demands

While providing evidence of a hydrologic system under stress (discussed below), the groundwater system within the Cochise Planning Area has, to date, supported these demands and allowed the growth in the agricultural sector to current levels.

Sustained groundwater declines in wells in each of the groundwater basins located in the Cochise Planning Area provides evidence that the rate of withdrawal to meet the demands of current uses is in excess of natural replenishment of these aquifers. Reversing these declining water tables would require either (1) reductions in the rate of groundwater extraction or (2) increasing the rate of replenishment of the groundwater system by either natural or artificial means.

The groundwater mining occurring in the Cochise Planning Area, largely attributable to a growing agricultural economy and, to a lesser degree, municipal and industrial uses, is consistent with State law. Dropping water tables result in reduced well yields and increased pumping costs, and can have other physical consequences, including, but not limited to: degradation of water quality, disruption of historic groundwater flow paths, land subsidence, and earth fissuring.

TABLE P.A. 6-1. Projected Water Demands (in acre feet) - Cochise Planning Area

Sector	2010	2035	2060
Agriculture	256,400	256,400	256,400
Dairy	584	584	584
Feedlot	130	130	130
Municipal	8,889	11,851	13,862
Other Industrial	0	0	0
Mining	0		
High		300	300
Low		300	300
Power Plant	6,200		
High		9,154	11,479
Low		6,657	7,969
Rock Production	0		
High		699	820
Low		291	343
Turf	21		
High		231	231
Low		20	20
Total (High)	272,224	279,349	283,806
Total (Low)	272,224	276,233	279,608

Land subsidence occurs when large amounts of groundwater have been withdrawn from certain types of aquifers such as those containing fine-grained sediments. These sediments are held up because the open pore spaces between the soil particles hold groundwater. When the water is withdrawn, the sediments collapse – causing in some cases the land surface to collapse. In some systems, when large amounts of water are pumped, this can result in a permanent reduction in the total storage capacity of the aquifer system. Uneven compaction of the soils overlying aquifer systems can lead to the formation of earth fissures (large cracks). Earth fissures form underground and can express themselves on the surface. Subsidence and fissures can damage infrastructure, including structures, roadways, railroads, and pipelines. Subsidence has altered the function of both natural and constructed drainage systems in portions of the state, redirecting floodwaters and causing property damage.

ADWR conducts a statewide land subsidence monitoring program. Active subsidence features have been observed and are being monitored in areas of concentrated pumping and associated water level decline in the Cochise Planning Area (see Figure P.A. 6-2). These include areas both north and south of the Town of Willcox in the Willcox Basin. Additional subsidence features are mapped in the northern reaches of the Douglas INA and a contiguous feature that has developed at and between the pumping centers of San Simon and Bowie. Active earth fissures have also been noted associated with these subsidence features. Continued groundwater mining may accelerate and exacerbate subsidence and fissuring in the Cochise Planning Area.

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 in this Planning Area may increase the difficulty in identifying strategies for meeting the projected water demands. Given that the Willcox Basin is a closed drainage and the Douglas Basin drains to Mexico, this uncertainty is largely a factor only in that portion of the Planning Area that drain to the Gila River, the San Simon Basin.

Land Ownership

This Planning Area has significant land holdings under federal ownership, including BLM, Forest Service, and National Park Service, who administers the Chiricahua National Monument. Arizona Game and Fish manages the Willcox Playa Wildlife Area. These designations have the potential to significantly impact water supply development and growth in this Planning Area.

Water Management

The Douglas INA encompasses a portion of the Cochise Planning Area in the northern reaches of the Douglas Basin. Within the INA, administered by ADWR, no new agricultural lands are permitted using groundwater supplies. Additionally, all owners of non-exempt wells (pumping capacity equal to or greater than 35 gallons per minute) must meter and report their groundwater production to the ADWR annually. Other lands within the Planning Area outside of the Douglas INA are not located within in State administered water management region. As such, individual water users are not required to meter or report water use to ADWR. Well impact analyses are not required for issuance of new well permits, the use of which is only governed by legal doctrine of reasonable and beneficial use².

Strategies for Meeting Future Water Demands

Modification to the water management program in the Cochise Planning Area may be warranted to: (1) protect existing water users from increasing harm from new pumping; (2) reduce or reverse the declining water levels experienced throughout the Planning Area's groundwater basins at current demand rates; (3) limit damage to structure and infrastructure from land subsidence and earth fissures; and (4) enhance the durability of the regions locally available water resources and the long-term economic viability of local land uses.

Specific actions offered for consideration of adoption to address water management challenges in the Cochise Planning Area include the following:

Expanded Monitoring of Water Use & Data Collection

With the exception of non-exempt water users in the Douglas INA, very few water users are required to meter water use and report that use to a central repository, such as ADWR or the Arizona Corporation Commission (ACC). Public water utilities regulated by the ACC are required to report gross water production and the number of service connections to the ACC each year. Community Water Systems

² A.R.S. §45-453(1).

are also required to file annual reports with ADWR and prepare and submit a System Water Plan, which are then updated every five years.

Metering and reporting across the Planning Area would serve to support and enhance analysis of current hydrologic conditions. Data collection is a crucial element of the development of groundwater models that have proven to be invaluable tools throughout the State in developing more thorough understandings of hydrologic systems and evaluating future conditions and potential impacts of new uses and/or alternative water management strategies.

Local Aquifer Management

At the present time, while agricultural irrigation uses in the Cochise Planning Area are served by individual wells, the largest water users are concentrated in a few areas, notably: north and south of the Willcox Playa, the northern portions of the Douglas INA, San Simon, and Bowie. There may be opportunities to lessen local impacts from concentrated pumping, such as continued water level declines and subsidence, by distributing pumping across the groundwater basins in the Planning Area. Doing so would likely require exploration and well drilling in previously undeveloped portions of these basins, securing rights of way, extension of power resources to these well sites, and construction of water conveyance (pipelines or canals) from the new viable well sites to existing irrigated acreage.

The exploration drilling and testing will increase knowledge of the local groundwater system will increase understanding of the local groundwater systems, in addition to mitigating local pumping impacts.

Enhanced Conservation Programs - Agricultural

Given the lack of reporting water monitoring and reporting in the Cochise Planning Area at the present time, it is difficult to assess the potential effectiveness of enhanced water conservation in managing and improving the stability of groundwater supplies. If consistent with other portions of the State, adoption of a comprehensive and effective water conservation program would have the potential to result in significant reductions in on-farm water use and relieve some of the pressure on the local groundwater system.

There are no state-coordinated or local water conservation requirements in the Cochise Planning Area. More detailed evaluation of current agricultural water conservation programs supported by state, county or local organizations (e.g., Natural Resource Conservation Districts) may provide additional insight into conservation potential in the region.

Enhanced Conservation Programs - Municipal

Municipal water use currently accounts for just over 3 percent of the total water use in the Cochise Planning Area. Examination of recent satellite images of the urbanized areas in the Planning Area provides limited evidence of significant exterior landscaping. While conservation can reduce municipal water demand and increase the viability of local water supplies, municipal conservation potential in the Planning Area appears to be limited and unlikely to materially impact water supply conditions across the Planning Area.

Reclaimed Water Reuse

The production of reclaimed water is generally limited to the larger urban centers in the Planning Area. Willcox and Douglas own and operate wastewater collection and treatment works. Willcox' reclaimed water is reused on a local golf course and provides wildlife habitat. Reclaimed water is a by-product of municipal water use, which is insufficient to materially impact the water supply conditions in the Cochise Planning Area.

Individual facilities operate on-site wastewater facilities, including, the Fort Grant Prison and the Apache Generating Station. These facilities may have potential to augment locally available water supplies with reclaimed water reuse or recharge. There may be challenges with finding suitable users for the quality of wastewater from the power plant. It is unlikely that enhanced water reclamation at these facilities would result in consequences of regional significance.

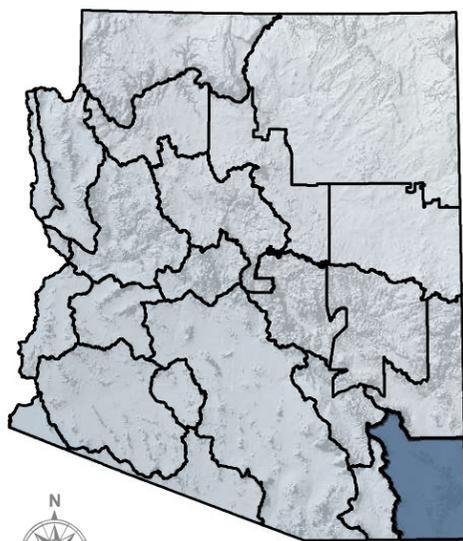
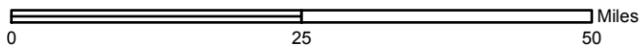
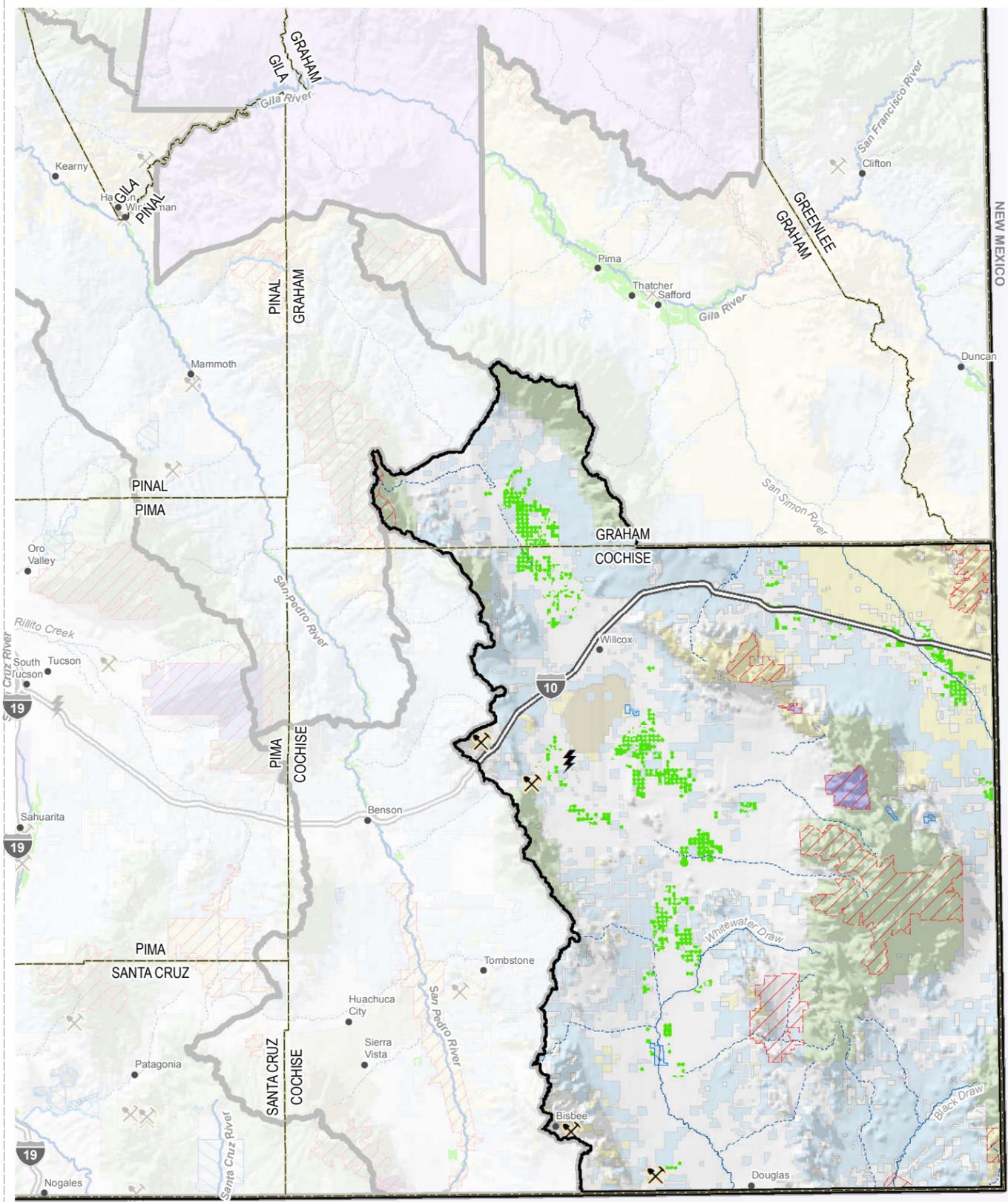
In general, reclaimed water reuse results in water management improvements throughout Arizona. However, the dominance of agricultural water use in the Cochise Planning Area limits its potential effectiveness in materially improving the supply and demand imbalance.

Enhanced Protection of Municipal Supplies

Irrigated agriculture accounts for over 90 percent of the water use in the Cochise Planning Area. Continued groundwater mining has the potential to reduce the viability of supplies for all use sectors. It may be prudent to explore limitations on pumping in close proximity to the production wells for the urbanized centers in the Planning Area in order to reduce the vulnerability of these water supplies. Evaluation of appropriate administrative vehicles to accomplish this protection is required and may include adoption of well spacing rules or groundwater protection zones, similar to those adopted in Indian water right settlements. ADWR believes that, in order to prevent economic disruption in both the agricultural and municipal sector in the Cochise Planning Area, a water management strategy that allows continued groundwater mining for agricultural activities, while protecting municipal water supplies for current uses and limited growth should be adopted.

Importation of supplies from outside the Cochise Planning Area to augment locally available supplies is not envisioned at this time.

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)

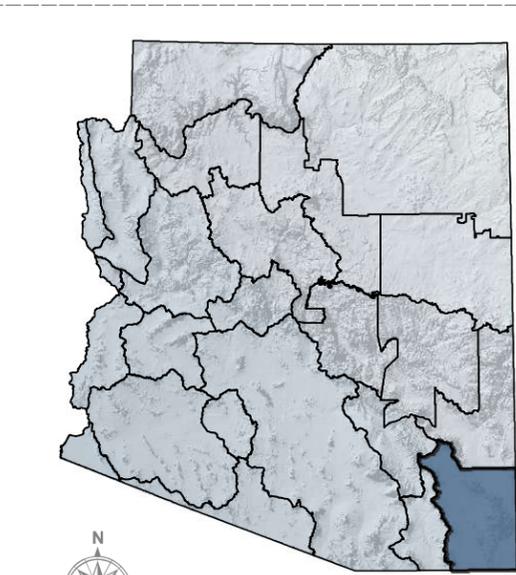
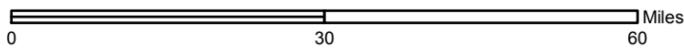
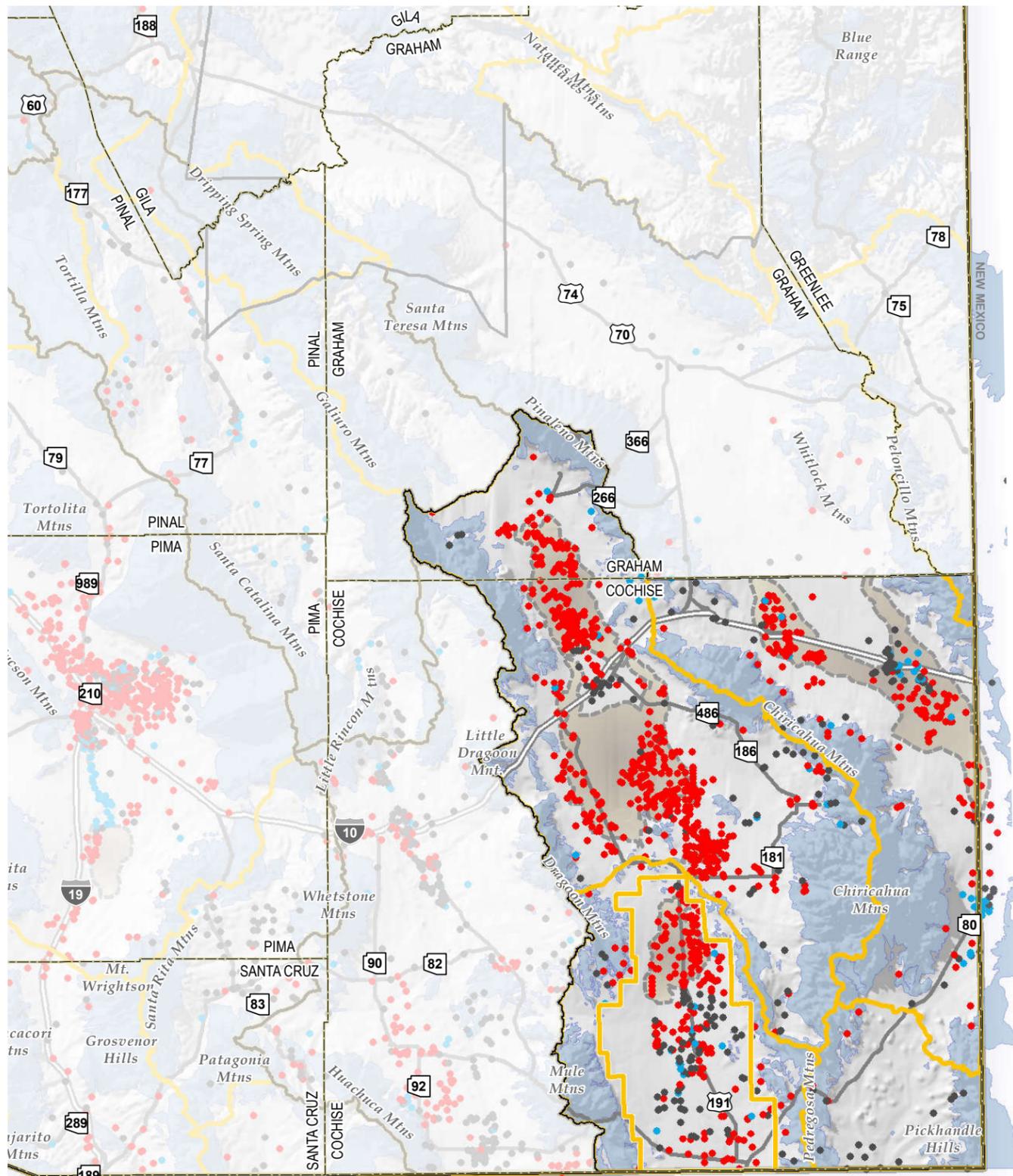
- Planning Area (ADWR)
- State (ALRIS)
- County (ALRIS)
- River or Stream (ASLD)
- Interstate (ADOT)
- Population Center (GNIS)
- Mine (ADMMR, ADWR)
- Hydroelectric Power Plant (ADEQ, ADWR)
- Thermoelectric Power Plant (ADEQ, ADWR)
- Agriculture (SWReGAP, 2004)
- Federal Conservation Land (USFS, BLM,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



Cochise Land Ownership

Figure P.A.6-1

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)
- 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

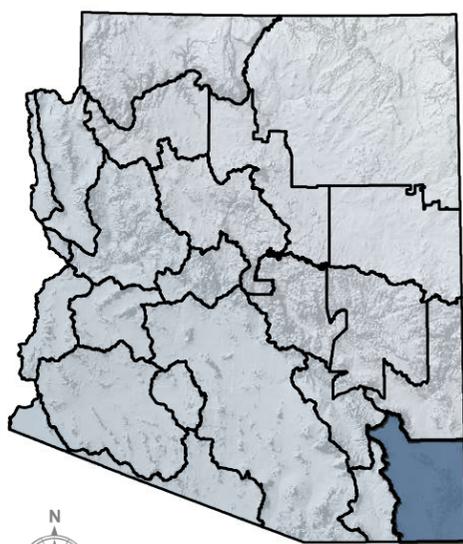
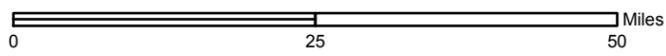
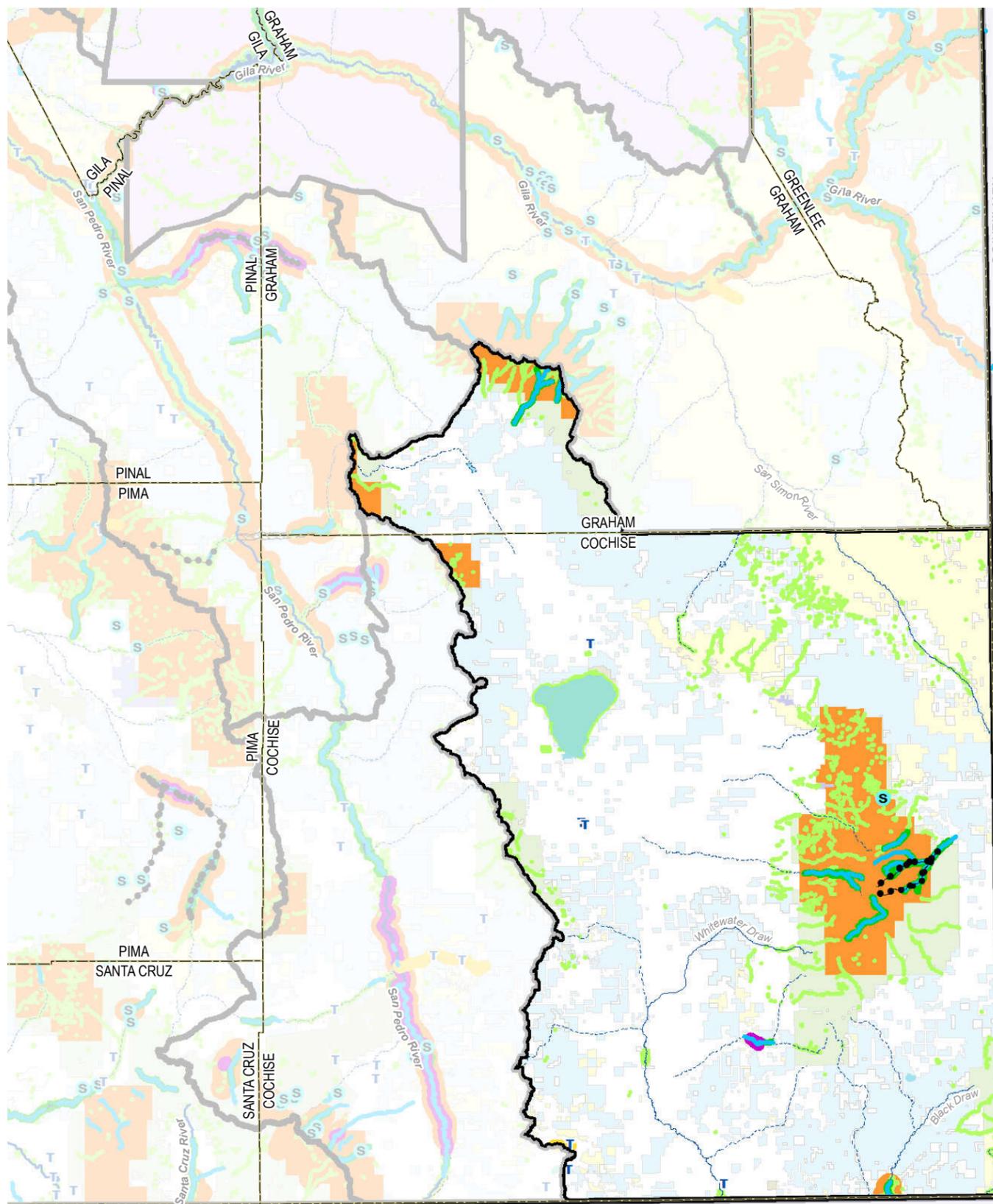
* Data provided by ADWR



Figure P.A.6-2

Cochise Groundwater Hydrology

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)

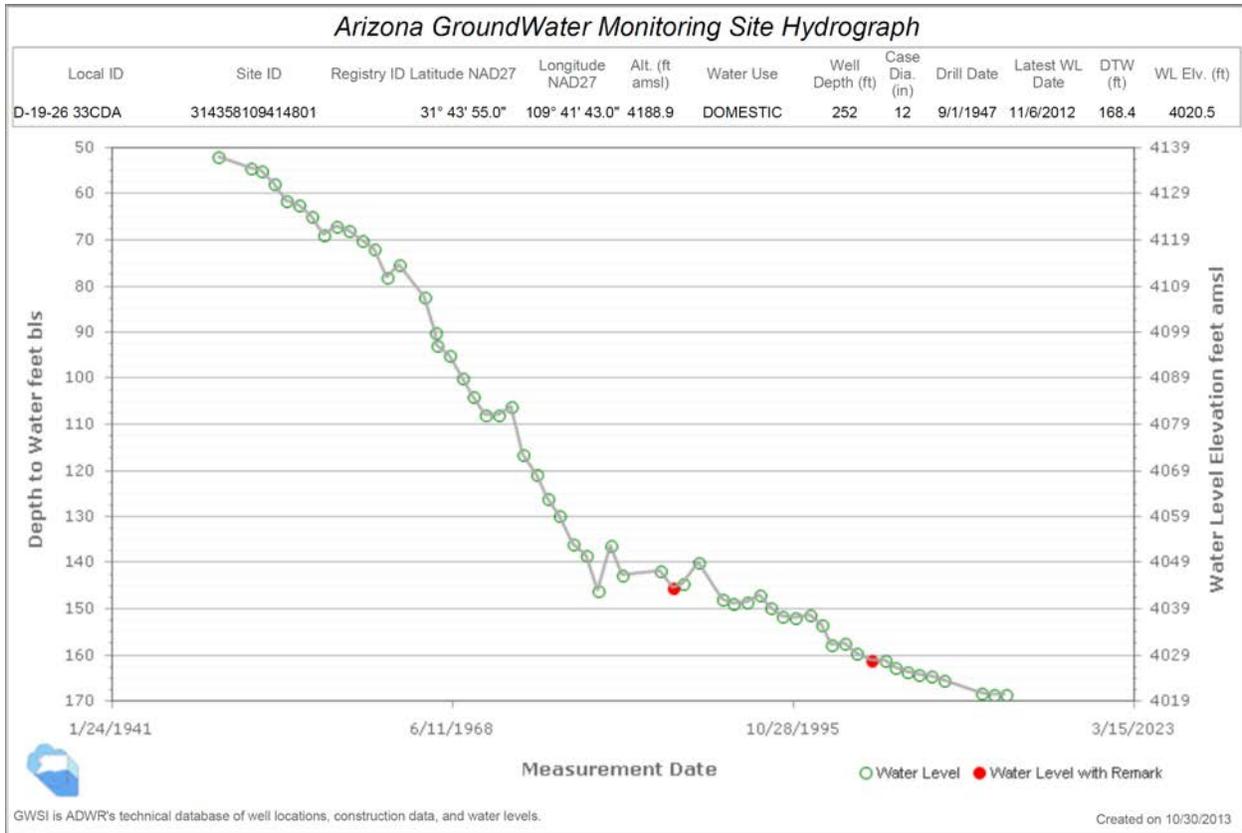
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-  State (ALRIS)
-  County (ALRIS)
-  Reservoir or Lake (NHD)
-  Waste Water Treatment Plant (ADEQ)
-  Major Spring (ADWR, Pima County)
-  Perennial Flow (ADEQ, USGS)
-  River or Stream (ASLD)
-  Outstanding Arizona Water (ADEQ)
-  Effluent Dependent 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



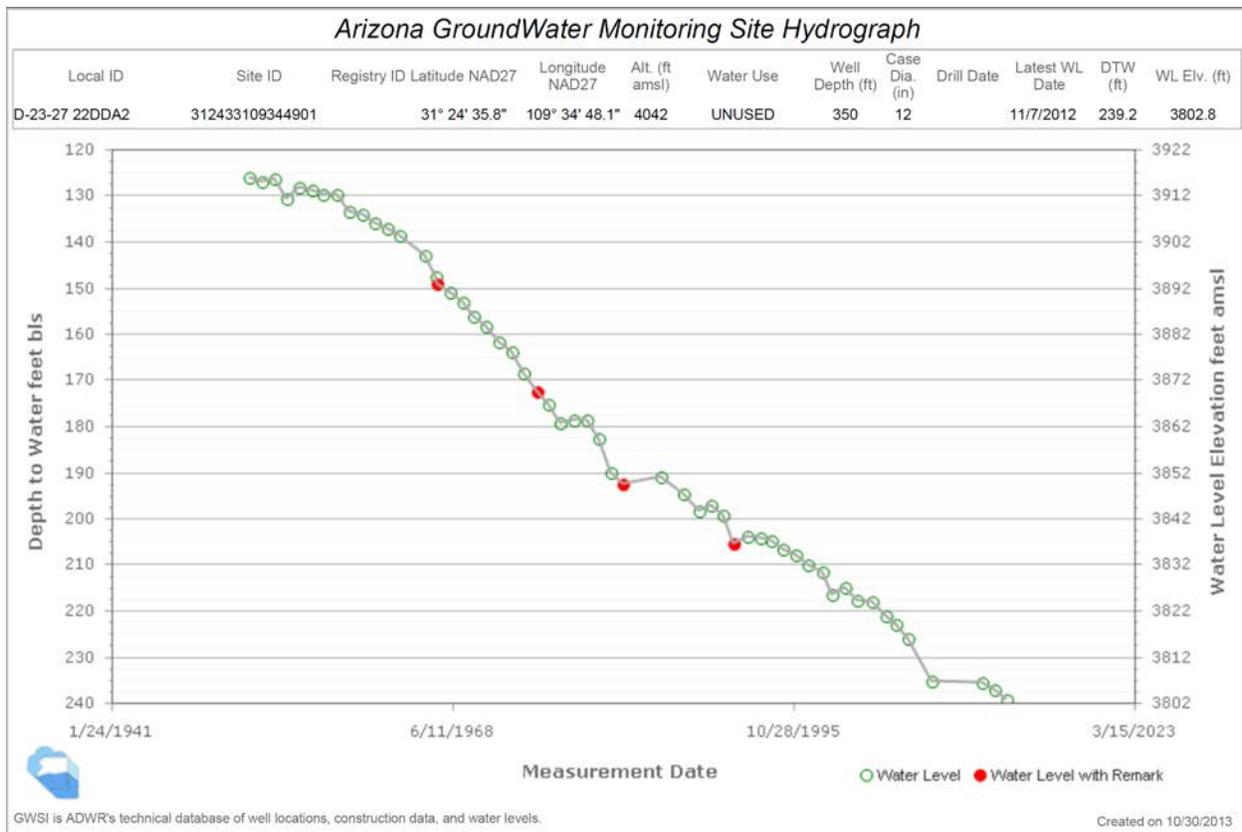
Figure P.A.6-3

Cochise Surface Water and Natural Features

Douglas Basin – Cochise Planning Area

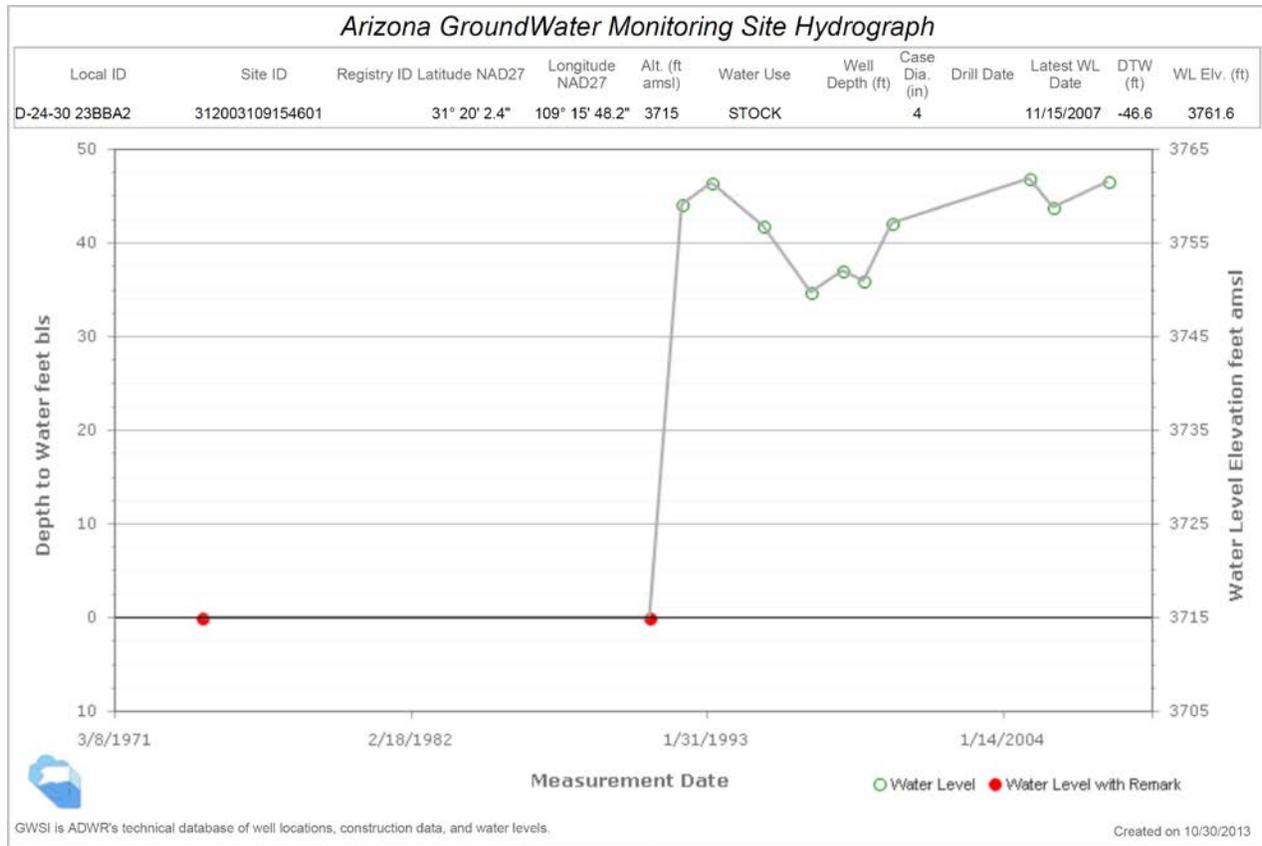


D-19-26 33CDA – Douglas basin - Douglas INA about 3 miles north of Elfrida.



D-23-27 22DDA2 Douglas basin – Douglas INA about 5 miles NW of Douglas.

San Bernardino Valley Basin – Cochise Planning Area

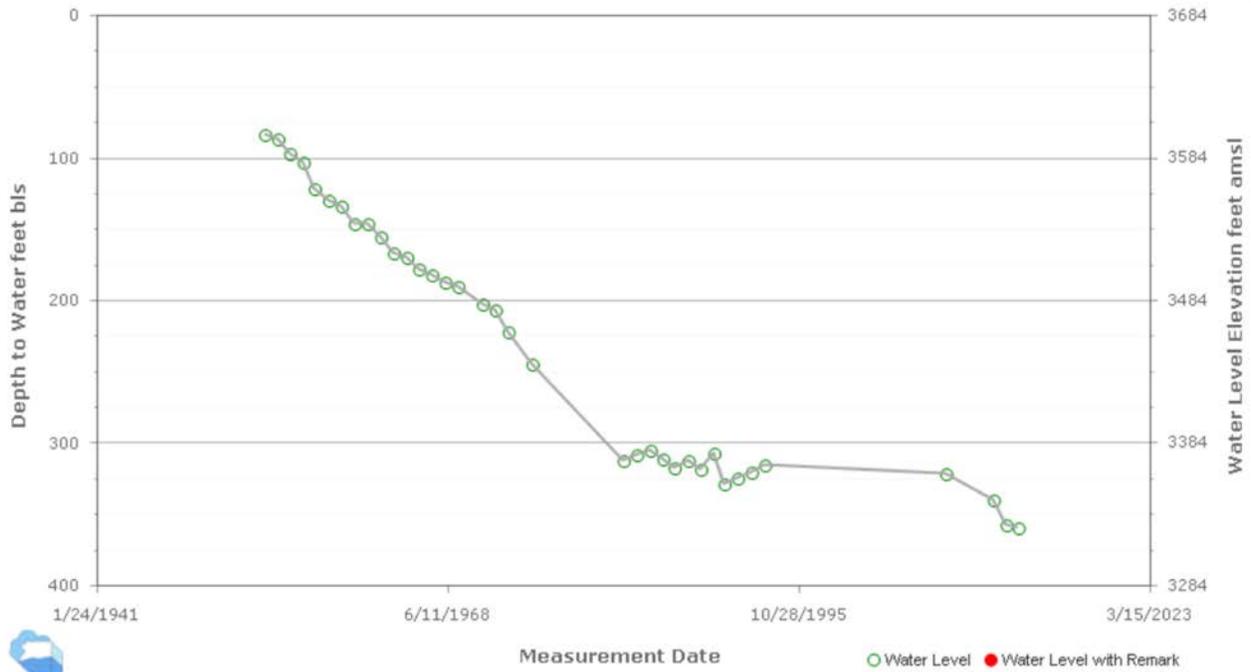


D-24-30 23BBA2 – San Bernardino Valley basin near San Bernardino National Wildlife Refuge. An artesian well that is measured using a pressure gage.

Safford Basin – Cochise Planning Area

Arizona GroundWater Monitoring Site Hydrograph

Local ID	Site ID	Registry ID	Latitude NAD27	Longitude NAD27	Alt. (ft amsl)	Water Use	Well Depth (ft)	Case Dia. (in)	Drill Date	Latest WL Date	DTW (ft)	WL Elev. (ft)
D-12-28 15BCB	322334109285801	625831	32° 23' 36.5"	109° 29' .9"	3684	IRRIGATION	1000	16	1/1/1952	11/6/2012	358.5	3325.5

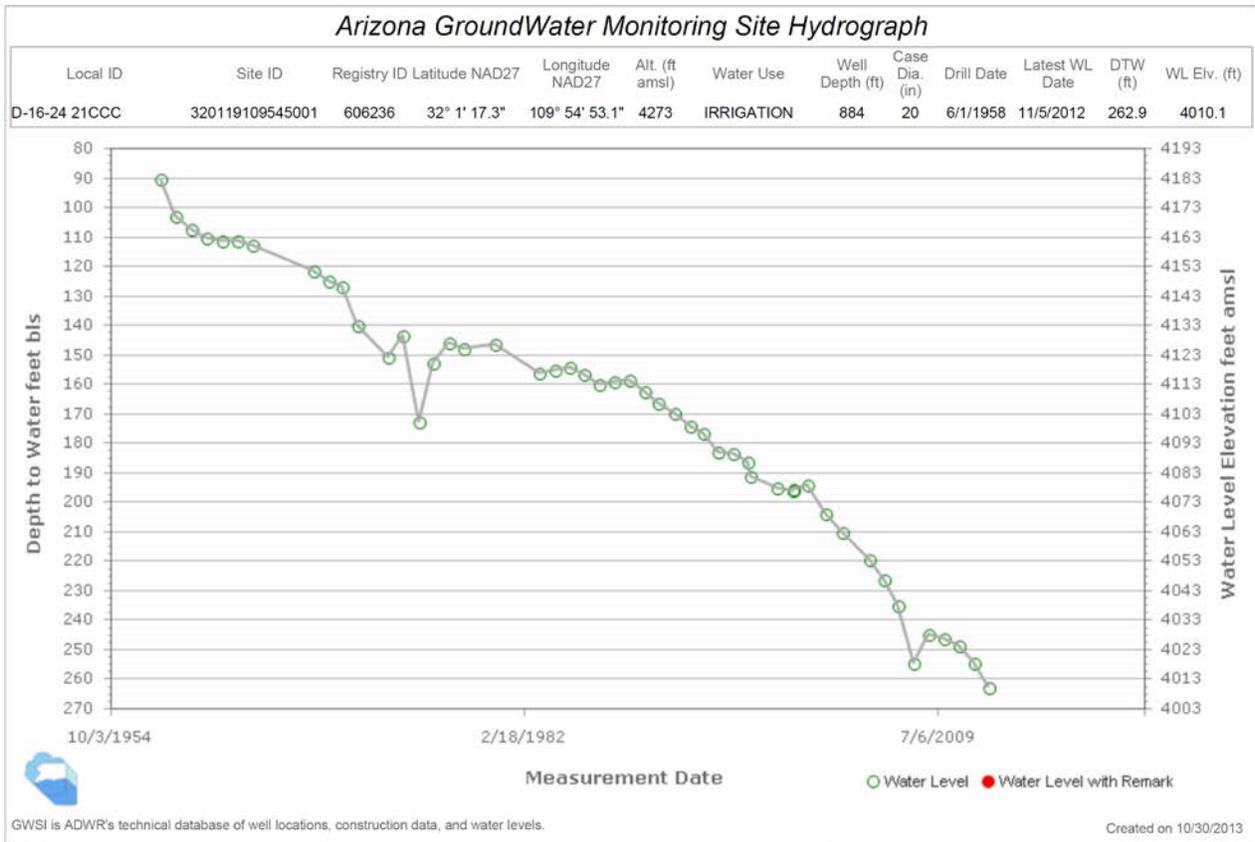


GWSI is ADWR's technical database of well locations, construction data, and water levels.

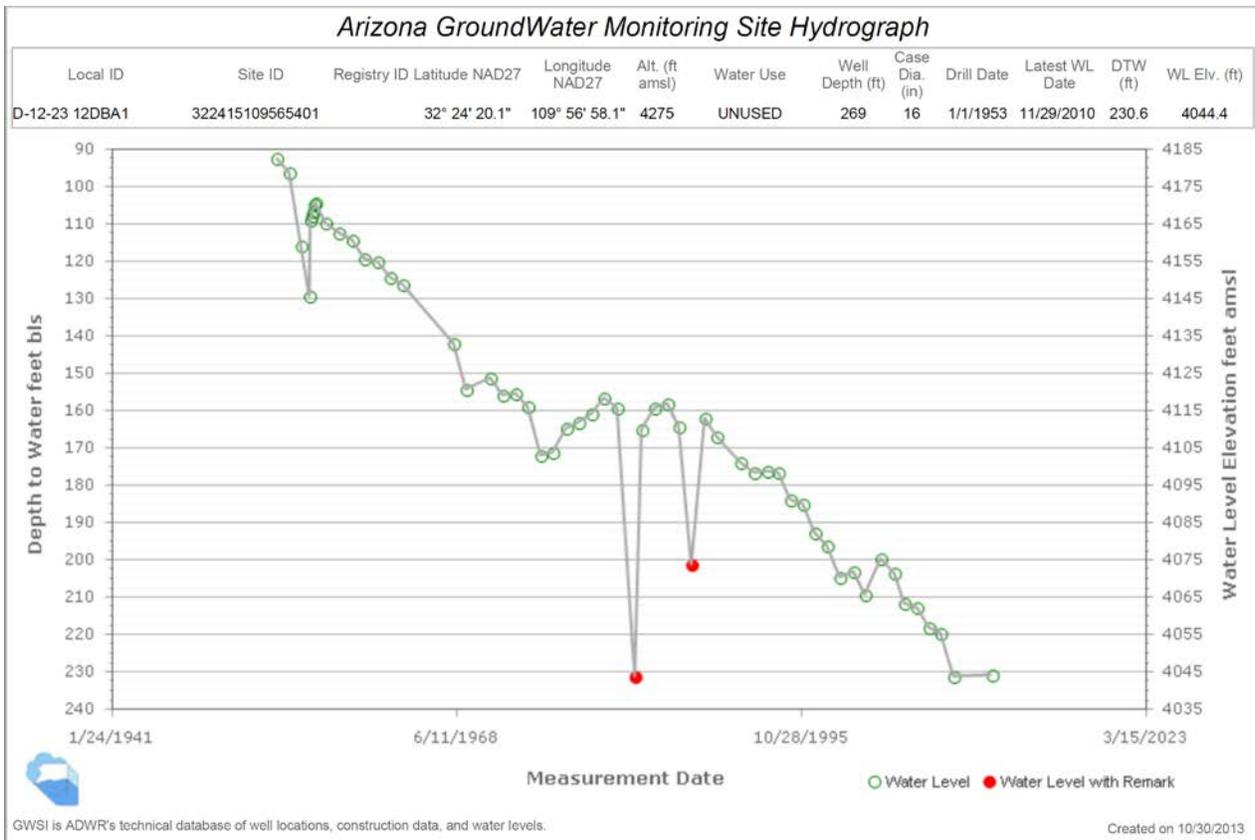
Created on 10/30/2013

D-12-28 15BCB -- Safford basin – San Simon Valley sub-basin about 4 miles north of Bowie.

Willcox Basin – Cochise Planning Area



D-16-24 21CCC Willcox basin about 6 miles NW of Sunsites.



D-12-23 12 DBA1 – Willcox basin about 12 miles NW of Willcox.