Upper Gila Planning Area

Background

The Upper Gila Planning Area is comprised of portions of Greenlee and Graham counties and located in the east central portion of the State. The Upper Gila Planning Area is contained within the Upper Gila River Watershed and encompasses large portions of the Safford and Morenci groundwater basins, nearly all of Duncan Valley Groundwater Basin, and a very small portion of Bonita Creek Groundwater Basin. The largest communities within the Planning Area are Safford, Thatcher, Clifton, and Morenci.

The majority of the land in the Planning Area is owned and managed by the federal government. The two largest federal landowners in the Planning Area are the US Bureau of Land Management (BLM) and USDA Forest Service (Forest Service) (*see Figure P.A. 17-1*). BLM manages multiple conservation areas for resource protection and has other lands where the primary land uses are livestock grazing and recreation. Forest Service lands include portions of two national forests, the Apache-Sitgreaves and Coronado. The primary land uses on Forest Service lands are timber production, livestock grazing and recreation. A US Military Reserve is located near Swift Trail Junction. A significant portion of land is held as State Trust Lands. Most of these lands are located in the Safford and Duncan Valley groundwater basins. Livestock grazing is the primary land use.

Large continuous blocks of private land are located along Highway 70 in vicinity of Safford and Highway 75 in Greenlee County north of Duncan. Land uses include irrigated agriculture, livestock grazing, domestic, commercial and mining.

Water Supply Conditions

Groundwater

The majority of the Planning Area is located within the Basin and Range physiographic province, which is characterized by northwest-southeast trending mountain ranges separated by broad alluvial valleys. The Mexican Highland section is a higher elevation area of the province with valleys ranging from 2,500 to 4,000 feet above sea level. The extreme northern portion of the Planning Area falls within the Transition Zone Physiographic Province. The mountainous terrain of this region have aquifers that consist of relatively thin alluvial aquifers, and in fractured crystalline, sedimentary, and volcanic rock.

Most of the groundwater development in the Safford Basin is in the Gila Valley Sub-basin, which contains the Basin's major population and agricultural centers. The boundaries of the Gila Valley Sub-basin generally correspond to those of the Safford Basin portion of the Planning Area. Water level changes for the period from 1990 to 2008 in the Gila Valley Sub-basin ranged from a maximum decline in one well of 11 feet to a maximum rise in another well of about 28 feet (*see Figure P.A. 17-2*). In general, most wells measured were near the Gila River and showed water level changes that were in the range of +/- 5 feet over the same time period. Water quality conditions vary in the Safford Basin, although fluoride and arsenic concentrations consistently exceed drinking water standards. Other parameters commonly equaled or exceeded are TDS, nitrates, and lead.

In the Morenci Basin, water level measurements in single well between Morenci and Alpine indicate water levels have slightly increased over the past 30 to 40 years. Water quality data shows metal contamination in the vicinity of the Morenci Mine.

Water levels dropped slightly in a few wells measured in the Duncan Valley Basin over the period from 1990 to 2007 (*see Figure P.A. 17-2*). Groundwater conditions in the Duncan Valley Basin are mainly affected by variations in Gila River flows and the volume of groundwater pumping. Arsenic and fluoride concentrations exceeding drinking water standards have been measured at a number of wells in this Basin.

Water levels are relatively shallow in the few wells measured in the southern portion of the Bonita Creek Basin. Water quality and water level change data are lacking in this Basin.

Surface Water

The major surface water feature in the Upper Gila Planning Area is the Gila River, which originates in New Mexico (*see Figure P.A. 17-3*). Gila River water flows into the San Carlos Reservoir located downstream and outside of the Planning Area. An average of 160,000 acre-feet per year of Gila River water flows into Arizona from New Mexico. Flows in the Gila River become intermittent farther downstream due to diversions and seasonal variations in flow. The minimum and maximum annual flow in the Gila River near Solomon was 48,953 acre-feet (1956) and 1,559,116 acre-feet (1993), respectively. Tributary inflows from the San Francisco River are significant, typically over 150,000 acre-feet per year. The City of Safford uses water collected in an infiltration gallery along Bonita Creek in the Bonita Creek Basin, which typically provides 80 to 90 percent of the City's water supply[1].

In the Safford Basin, a six-mile reach of the Gila River exceeded the water quality standard for E.coli and turbidity. In the Morenci Basin, water quality standards were exceeded at Luna Lake and in a 13-mile reach of the San Francisco River near Alpine. A 15-mile reach of the Gila River in the Duncan Valley Basin is impaired due to elevated selenium concentrations.

Reclaimed Water

In the Upper Gila Planning Area, there are five wastewater treatment plants (WWTP) serving the communities of Safford, Thatcher, Pima, and the Arizona State Prison Complex in Safford. The City of Safford WWTP serves the largest population and delivers reclaimed water to the Mt. Graham Municipal Golf Course for irrigation. Other reported methods of disposal for the other WWTPs include evaporation ponds, discharge to Bennett Wash, and irrigation. The Town of Duncan operates a WWTP that serves a very small community population. The reported disposal method is through evaporation ponds. The Town of Clifton owns the municipal Clifton WWTP that disposes of reclaimed water through discharge to a watercourse. Reclaimed water at the Morenci Water and Electric Co. is generated by the copper mining process and is reused for industrial purposes.

Ecological Resources

There are extensive reaches of riparian vegetation throughout the Planning Area (*see Figure P.A. 17-3*). Riparian areas have been mapped along the Gila, San Francisco, and Blue Rivers, as well as, Bonita, Eagle, Willow and Cienga Creeks. The Upper Gila Planning Area contains one National Conservation Area and two Wilderness Areas. The 22,000 acre Gila Box Riparian National Conservation Area was established in November 1990 with the principle objective to "conserve, protect, and enhance" the

[1] http://www.eacourier.com/drought-forcing-water-conservation-move/article_ddc98a62-cae5-11e1-a663-0019bb2963f4.html?mode=jqm

riparian and associated values of the area. The Fishhooks and Santa Teresa Wilderness Areas are located in the northwest portion of the Planning Area and total approximately 37,280 acres. The Planning Area also contains the Cluff Ranch Wildlife Area, owned and managed by the Arizona Game and Fish Department for wildlife protection and recreation.

Water Demands

Table P.A. 17-1, below, presents the baseline and projected water demands for the Upper Gila Planning Area. Agriculture is the largest water demand sector and an important component of the regional economy and is projected to remain constant through 2060.

Industrial use related to mining operations totaled over 7,000 acre-feet in 2010. Freeport-McMoRan's Morenci and Safford Mines generated an estimated $365.4 million in economic benefits for Greenlee and Graham Counties in 2012[2]. Factors such as the price of metals in the marketplace, environmental regulations, and improved mining technology may affect the demands in this sector resulting in wide range (from a minimum of 14,800 acre-feet per year to a maximum of 64,800 acre-feet per year) in the projected demands through 2060.

Municipal use represents the third highest water use in the Upper Gila Planning Area. Some population growth is expected through 2060 that would increase municipal demand slightly from approximately 7,800 acre-feet in 2010 to an estimated 9,700 acre-feet in 2060.

Table P.A. 17-1. Projected Water Demands (in acre feet) - Upper Gila Planning Area

Sector	2010	2035	2060
Agriculture	127,340	127,340	127,340
Dairy	93	93	93
Feedlot	0	0	0
Municipal	7,875	8,408	9,713
Other Industrial	0	0	0
Mining	7,333		
High		64,800	64,800
Low		14,800	14,800
Power Plants	0		
High		0	0
Low		0	0
Rock Production	154		
High		563	648
Low		235	269
Turf	594		
High		597	599
Low		597	599
Total (High)	**143,389**	**201,801**	**203,193**
Total (Low)	**143,389**	**151,473**	**152,814**

[2] http://www.fcx.com/sd/pdf/fast_facts/2013/MorenciSafford_EI_2013.pdf

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 in this Planning Area will make it difficult to identify strategies for meeting the projected water demands.

Unresolved Indian Water Rights Claims

Claims of the San Carlos Apache Tribe to on-reservation Gila River tributary water currently remain unresolved. Until these claims are quantified and settled, uncertainty regarding the extent and priority of water rights in this Planning Area will make it difficult to identify strategies for meeting the projected water demands.

Water Rights

Several court determinations, including the Doan and Jenkes decrees, involve landowners, canal companies and irrigation water users in the Safford Valley. The Ling Decree in the San Francisco River Valley and Duncan Valley, and the Globe Equity No.59 Decree affect the legal availability of water supplies in the Upper Gila Planning Area. Most notable was the US District Court's consent decree (Globe Equity No. 59) lodged in 1935, which addressed all diversions of the mainstem of the Gila River from its confluence with the Salt River to the headwaters in New Mexico, including the Gila River and San Carlos Apache reservations, and non-Indian landowners below and above Coolidge Dam. The Globe Equity No. 59 Decree awarded rights to use water on lands within the Gila River Indian Community (located in the Basin and Range AMAs Planning Area) with a priority date of "time immemorial" and also awarded rights to the San Carlos Apache Tribe (Apache Planning Area) with a priority date of 1846. Rights and priority dates were established for non-Indian land in the San Carlos Project area including the Safford Valley, the Duncan Valley and the Winkelman Valley.

The Arizona Water Rights Settlement Act of 2004 (P.L. 108-45) includes settlement of the Gila River Indian Community's water rights claims in Title II of the Act. This settlement affects the volume and utilization of groundwater and surface water upstream from the Community in parts of the Upper Gila Planning Area.

Vulnerability to Drought

Nearly two decades of persistent drought conditions in the Southwest have significantly impacted the reliability of surface water supplies, resulting in increased demands and competition for locally available groundwater supplies. The Gila River is a primary source of water for the Upper Gila Valley, supplying water for agricultural, municipal and other water users. The Gila River and its tributaries originate in the higher elevations in western New Mexico and eastern Arizona in Apache and Greenlee Counties primarily as snow and rain. Due to severe drought conditions for the past 18 years, the Bonita Creek water source was cited by the University of Arizona's Climate Assessment for the Southwest (CLIMAS), in July of 2012, as being 18 percent below normal[3]. The need to switch to local groundwater supplies to meet demands has caused increased competition between the irrigators in the Gila Valley and the City of Safford as the wells used for groundwater production are in close proximity for both uses and forced the Mayor and City Council to declare a state of emergency requiring mandatory water use restrictions.

[3] http://www.climas.arizona.edu/swco/aug2012/arizona-drought-status

On August 22, 2013, the City issued a Stage 3 Emergency due to drought conditions, continuing its mandatory water restrictions[4]. The City is actively pursuing alternative sites for groundwater development to supplement its main source of water from Bonita Creek, but has faced obstacles. The City is surrounded by federal land (primarily BLM) and has been unsuccessful in securing consent for access from the federal government to allow groundwater development on these lands. The City is still exploring other options and continues to meet with BLM to resolve these issues.

Strategies for Meeting Future Water Demands

Water Supply Study

A comprehensive water supply study and development of a hydrological model for the Upper Gila Planning Area (including municipal, agricultural, environmental, and downstream tribal needs) is needed to address not only water demands in normal years but also drought vulnerabilities in shortage years.

Resolution of Indian and Non-Indian Water Rights Claims

Efforts to complete the San Carlos Apache Tribe's claims to the Gila River, as well as the Gila River General Stream Adjudication, is essential to not only provide a secure water supply for the tribe, but also to provide long-term certainty for water users in Arizona dependent on water supplies from the Gila River. A comprehensive focus on what is needed to complete the Adjudication is essential and could help provide guidance to ADWR so adequate funding can be identified and obtained to complete the necessary technical work to support completion of this process.

Reclaimed Water Reuse

Reclaimed water has been an important source of supply in this Planning Area. However, many areas are still reliant on septic systems, which reduce the amount of water that could be reclaimed and reused. In order to meet the long-term water needs in this Planning Area, efforts should focus on continuing to maximize the use of reclaimed water for non-potable uses and exploring opportunities for direct potable reuse. Additionally, moving customers currently on septic systems, where practical, to centralized reclaimed water systems and using artificial recharge in the winter months to store excess reclaimed water supplies will help stretch locally available supplies to meet future water needs.

Watershed/Forest Management

Watershed management practices aimed at increasing watershed yield have been evaluated in Arizona show promise for success. Due to the significant acreage of Ponderosa Pine forest in this area, continuation of this process and implementation of safe and effective strategies are important to water users within and outside of this Planning Area. Combining efforts with other management initiatives (such as the Four Forest Restoration Initiative) may be a cost-effective way to advance this option and provide multiple benefits to this Planning Area and those dependent on its resources. The Four Forest Restoration Initiative (4FRI) is a collaborative effort to restore forest ecosystems on portions of four National Forests - Coconino, Kaibab, Apache-Sitgreaves, and Tonto - along the Mogollon Rim in northern Arizona. The vision of 4FRI is restored forest ecosystems that support natural fire regimes, functioning populations of native plants and animals, and forests that pose little threat of destructive wildfire to thriving forest communities, as well as support sustainable forest industries that strengthen local economies while conserving natural resources and aesthetic values[5].

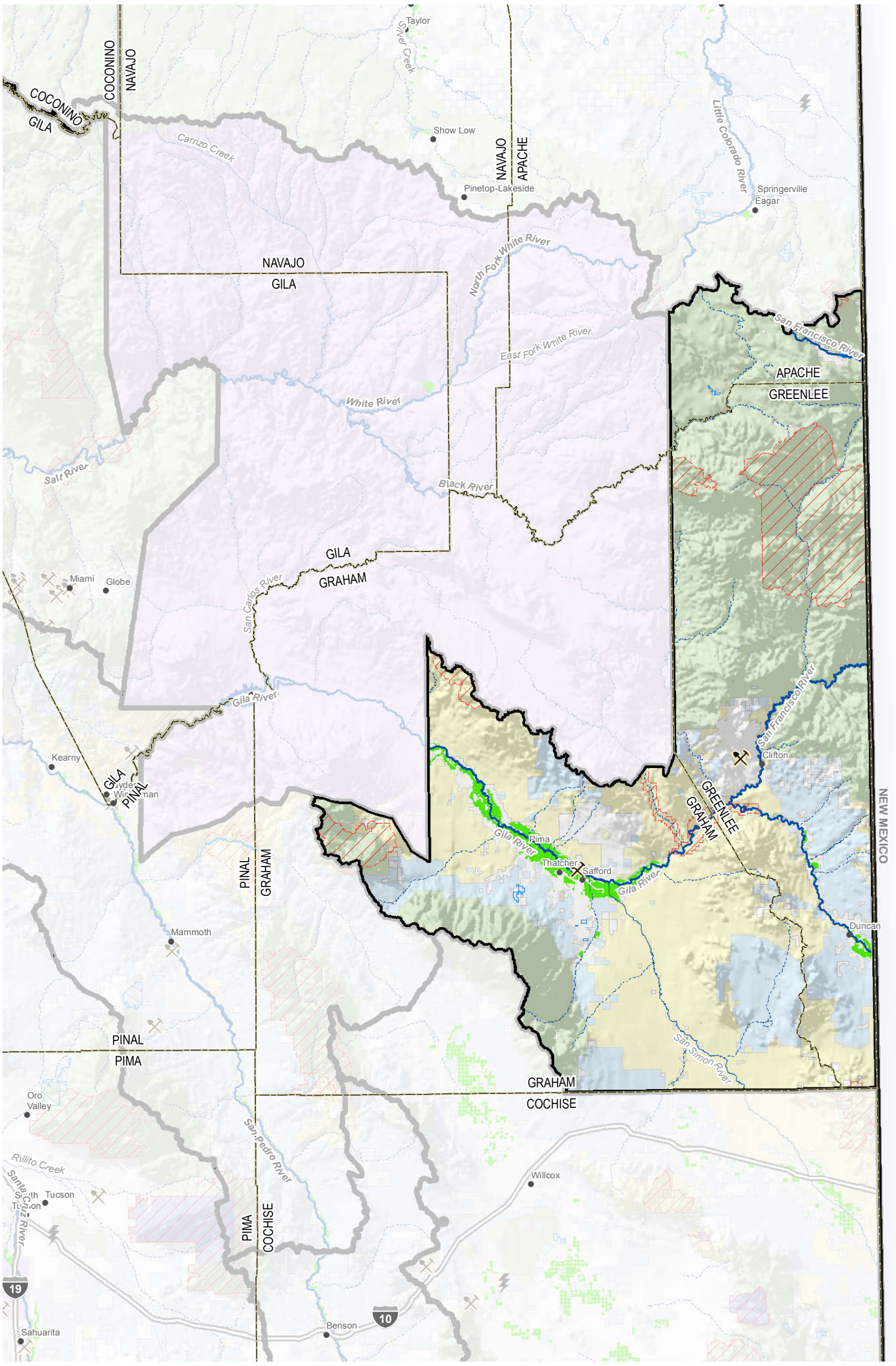
[4] http://www.cityofsafford.us/AlertCenter.aspx?AID=Mandatory-Water-Restrictions-Stage-3-Wat-5
[5] http://www.4fri.org/

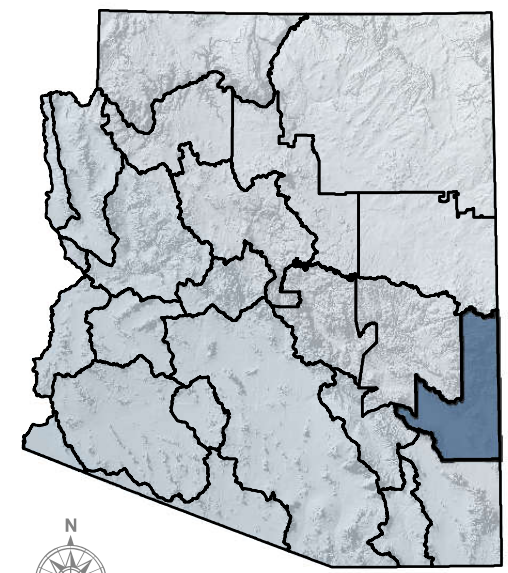
One possible strategy for this Planning Area includes joint exploration with the State of New Mexico and the Forest Service for a watershed management project at the headwaters of the Gila River in the Gila National Forest in New Mexico and the Apache-Sitgreaves National Forest in Arizona. Joint development of a project to increase the water yields into the Gila River could be used in New Mexico to meet local needs. At the same time, the strategy could also supplement water supplies in the Safford area and possibly provide water for other downstream water users including the San Carlos Apache Tribe to assist in settlement of their outstanding claims.

Weather Modification

Weather modification, or cloud seeding, is a potential strategy to either augment local water supplies or mitigate the impacts of groundwater development. Specifically, water developed through a joint weather modification project with the State of New Mexico and the Forest Service (in conjunction with a watershed management project, as described above, or as a stand-alone project) at the headwaters of the Gila River in the Gila National Forest in New Mexico could be employed to increase water yields in the Gila River to provide water in New Mexico. At the same time, water from this project could increase flows to the Safford area to supplement water supplies and possibly provide water for other downstream water users including the San Carlos Apache Tribe to assist in settlement of their outstanding claims.

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.





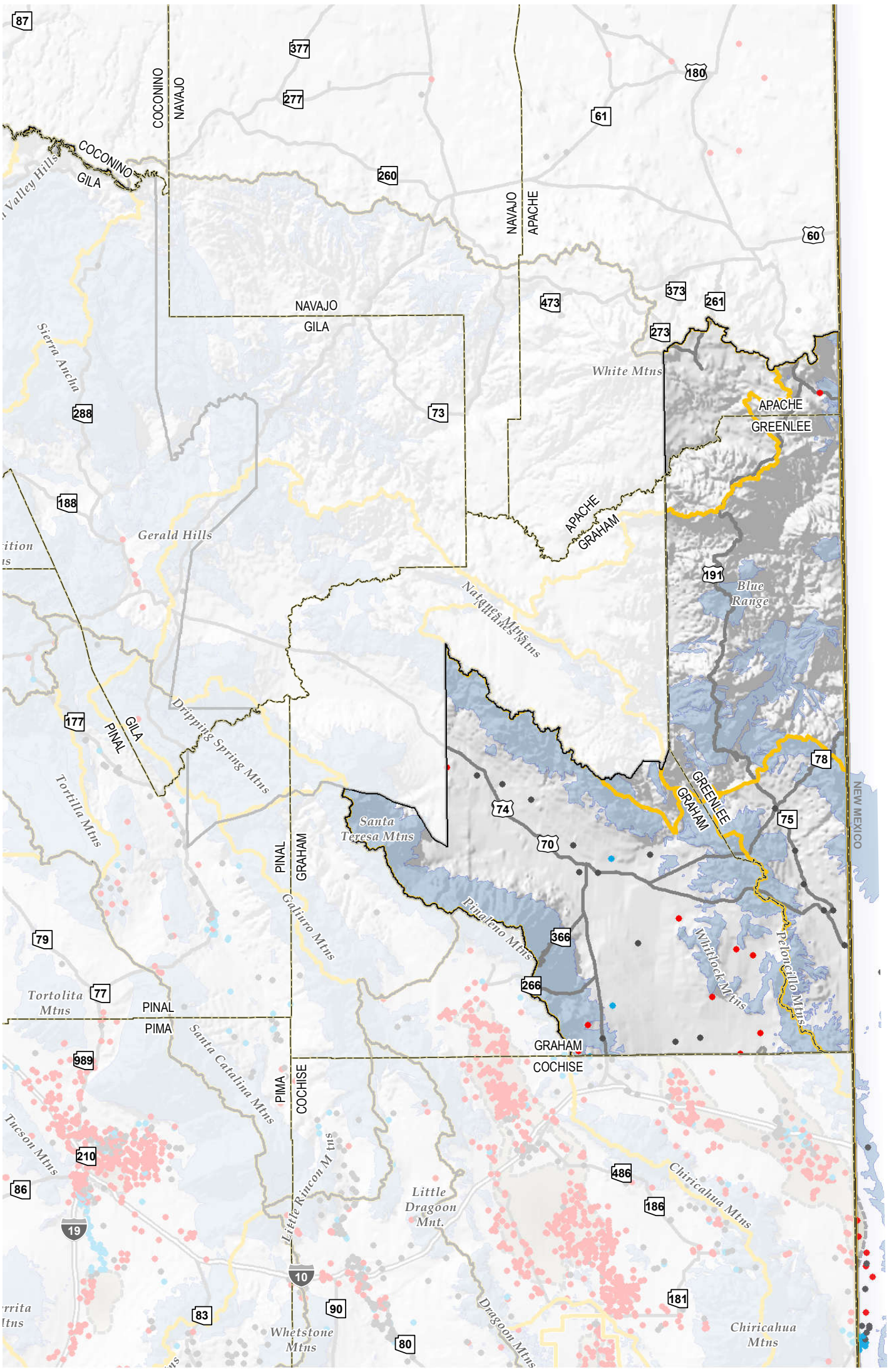
MAP LOCATION
(Planning Area Boundaries)

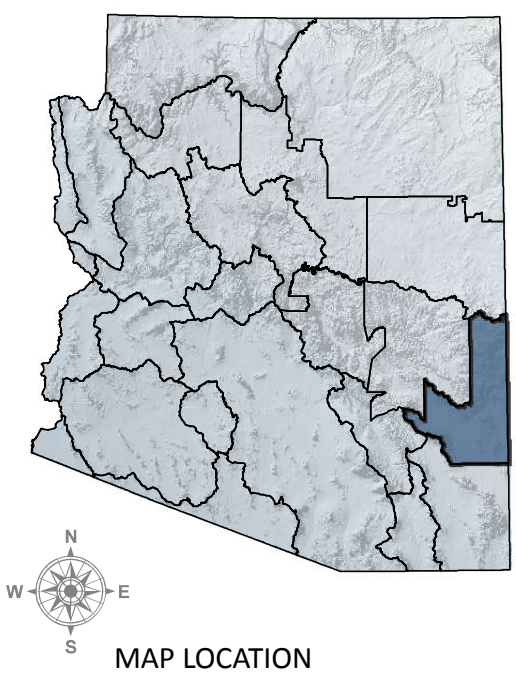
- Planning Area (ADWR)
- State (ALRIS)
- County (ALRIS)
- River or Stream (ASLD)
- Interstate (ADOT)
- Population Center (GNIS)
- Mine (ADMMR, ADWR)
- Hydroelectric Power Plant (ADEQ, ADWR)
- Thermoelectric Power Plant (ADEQ, ADWR)
- Agriculture (SWReGAP, 2004)
- Federal Conservation Land (USFS, BLM,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

Figure P.A.17-1

Upper Gila Land Ownership

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)

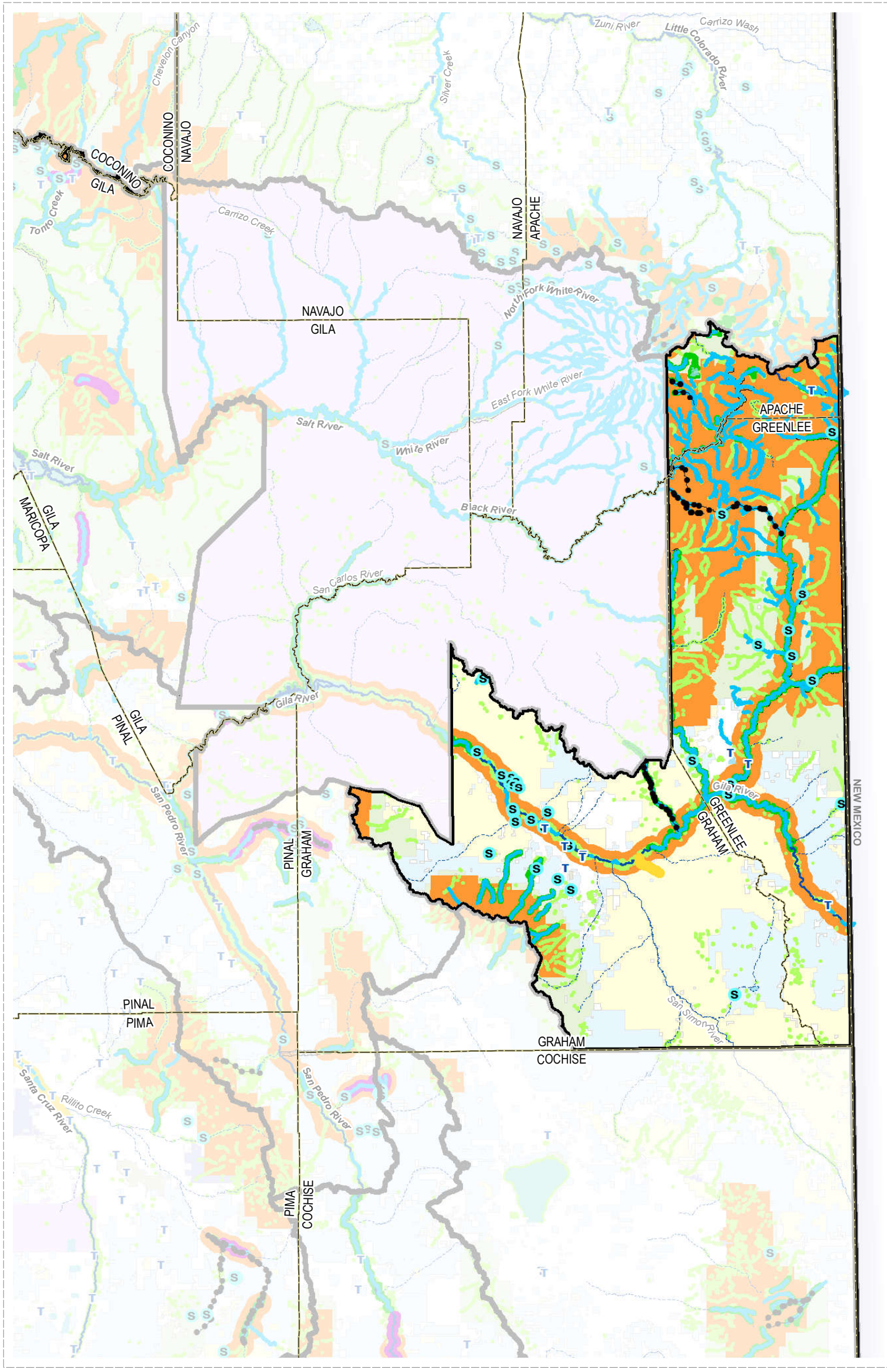
Recent Water Level Change * (1990's through 2000's)
- Minor WL Change +5' to -5'
- Negative
- Positive

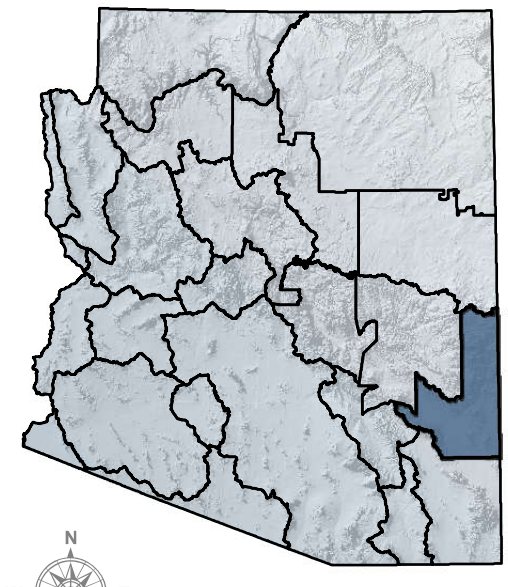
* Data provided by ADWR

Figure P.A.17-2

Upper Gila 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.





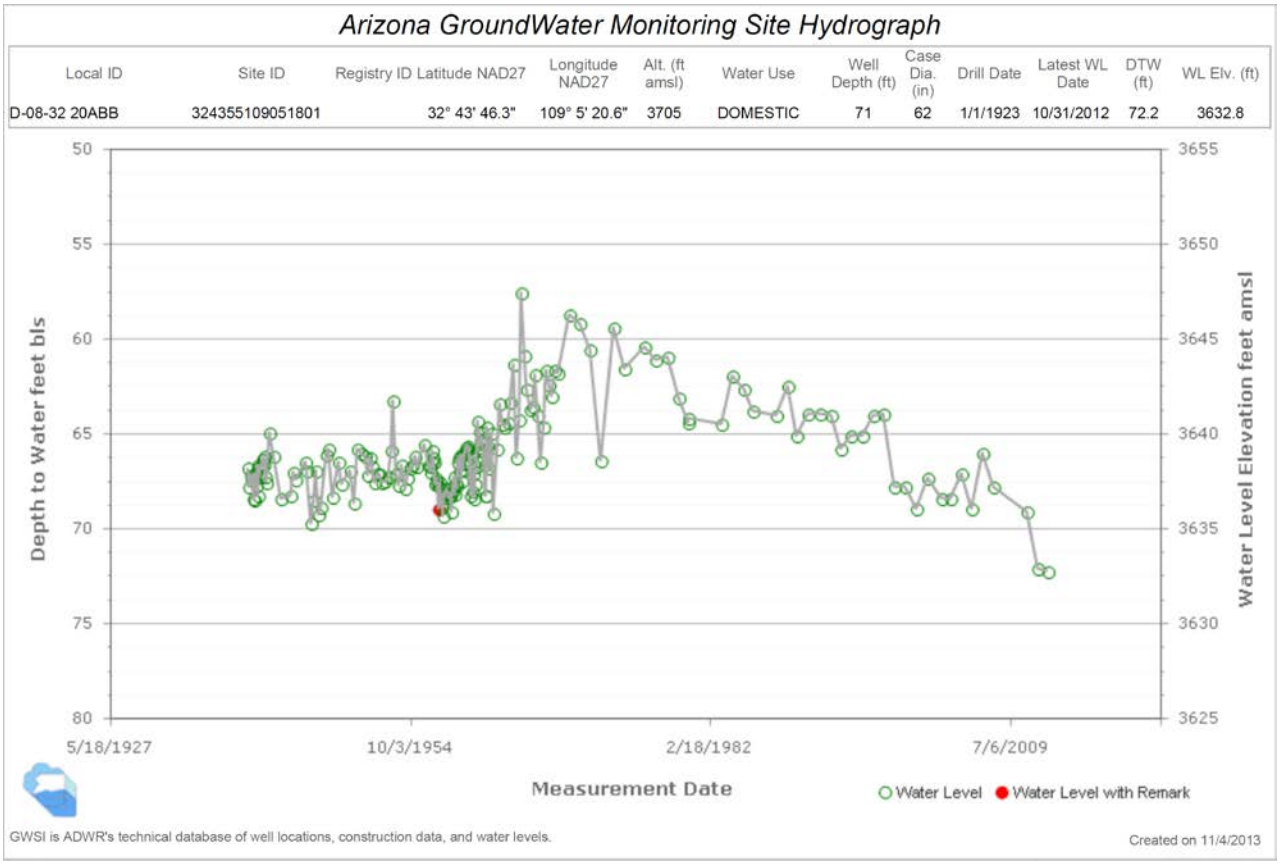
MAP LOCATION
(Planning Area Boundaries)

- 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.17-3

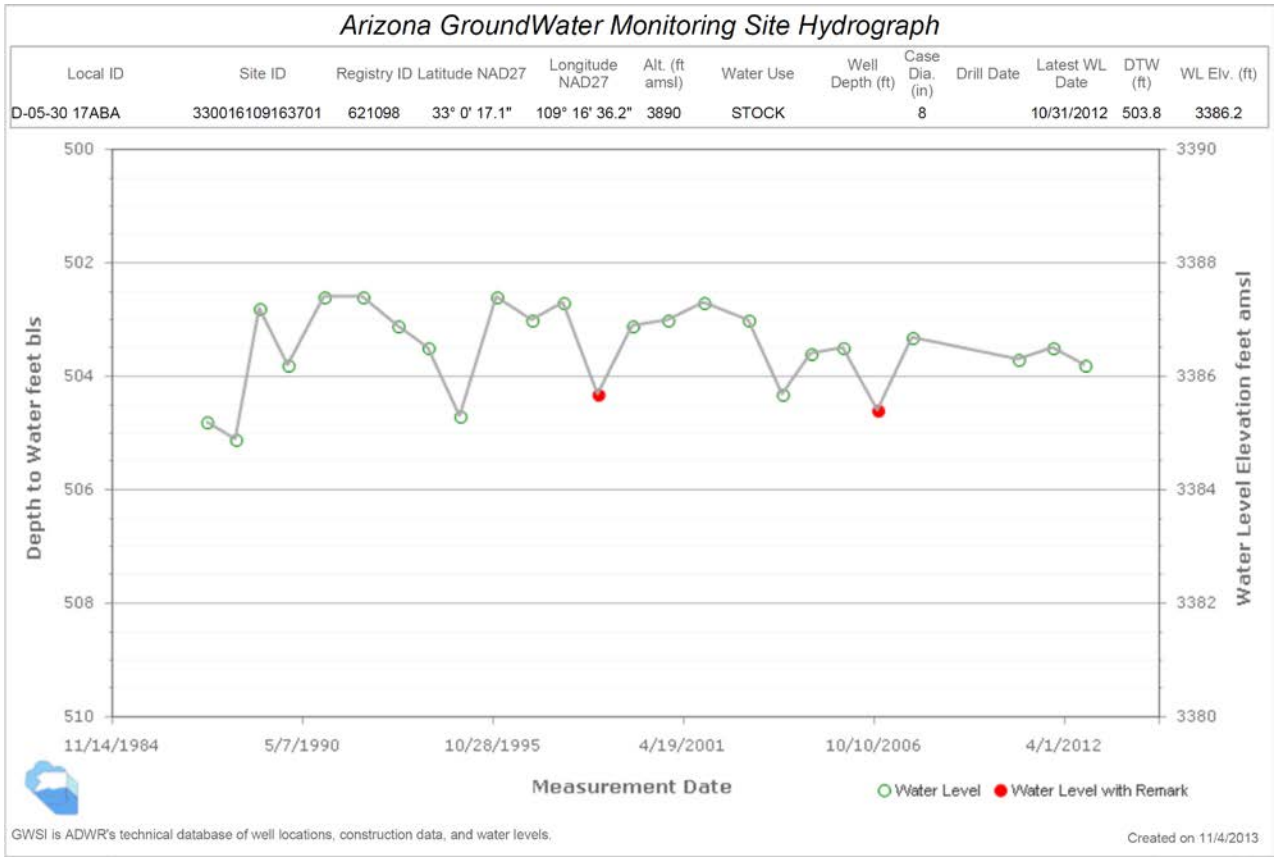
Upper Gila
Surface Water and Natural Features

Duncan Valley Basin – Upper Gila Planning Area

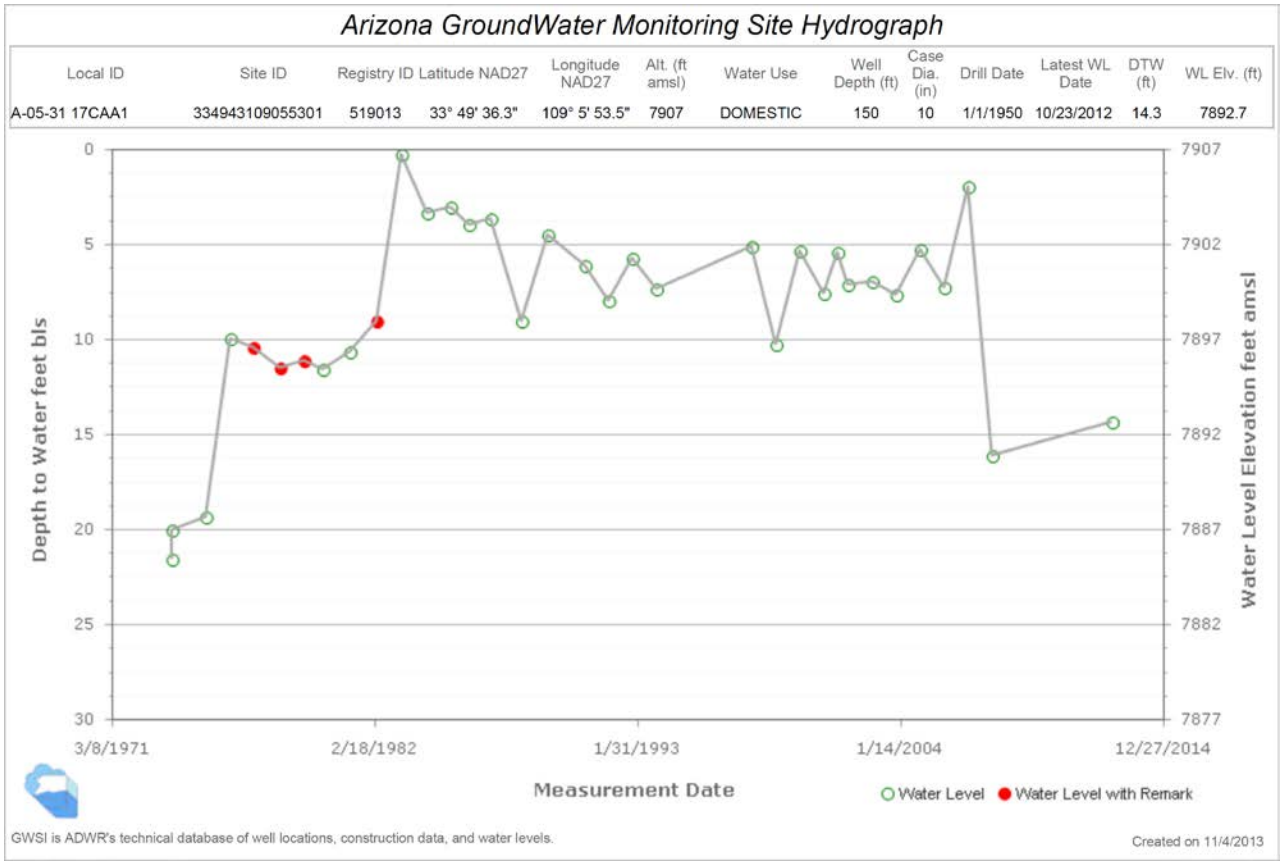


D-08-32 20ABB - Duncan Valley basin about 1 mile NE of Duncan and .5 mile east of Gila River.

Morenci Basin – Upper Gila Planning Area

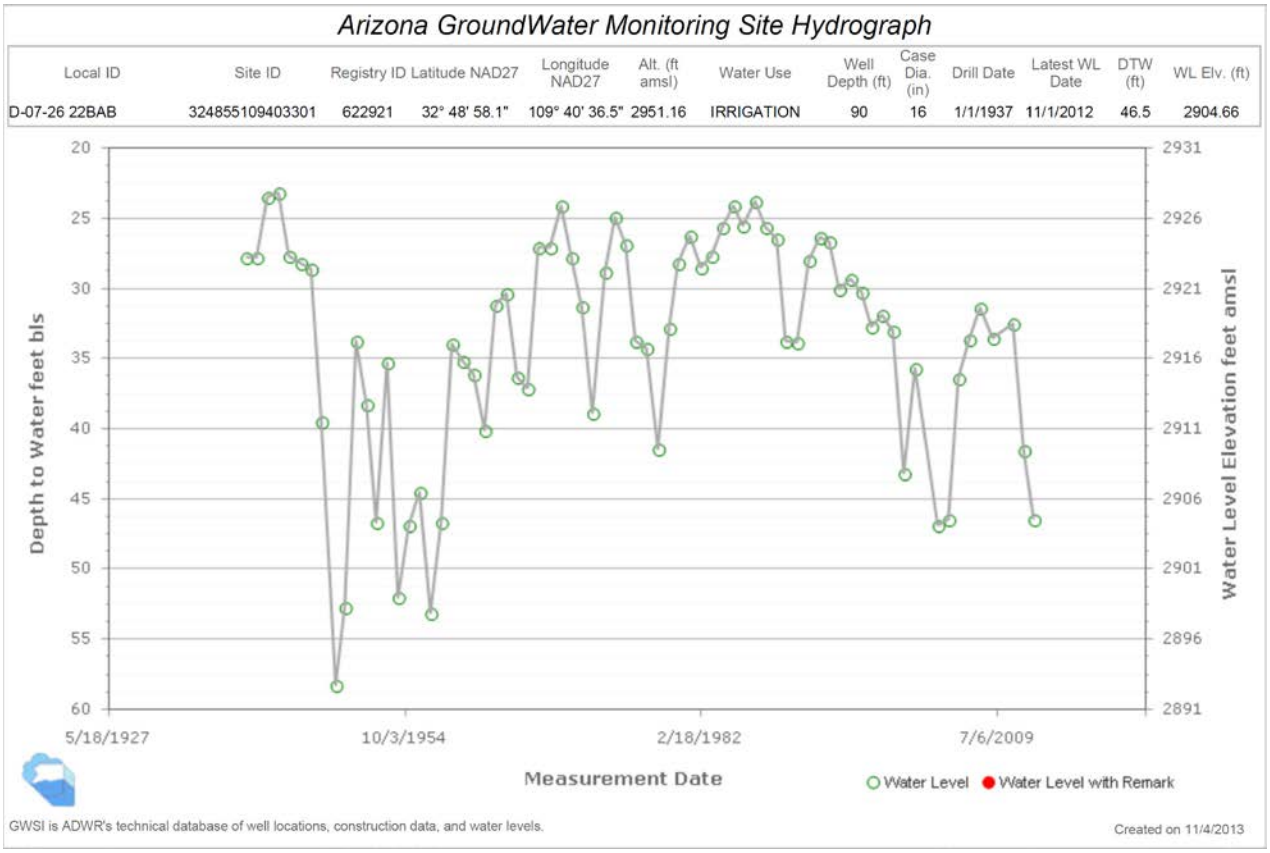


D-05-30 17ABA – Morenci basin about 3 miles south of Morenci.

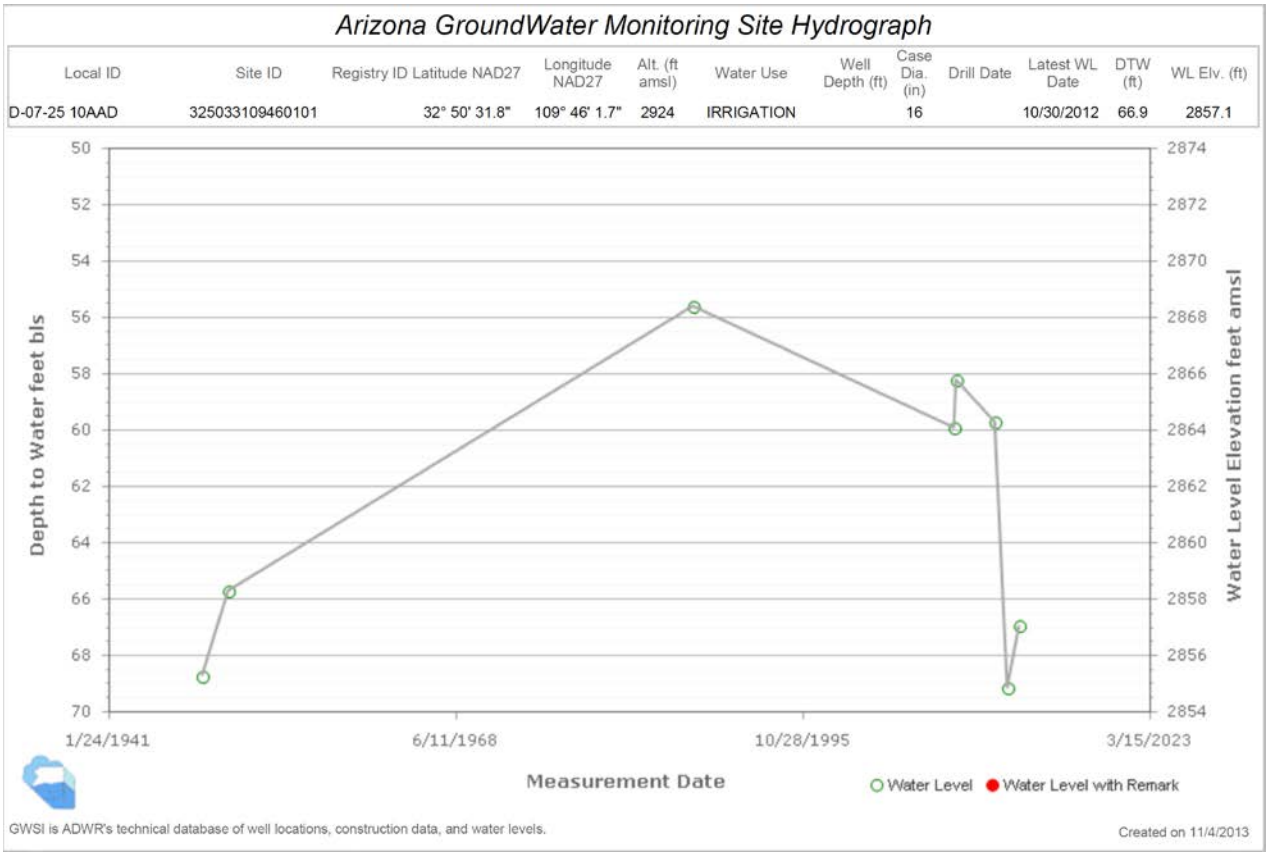


A-05-31 17CAA1 – Morenci basin about 3 miles SE of Alpine along the San Francisco River.

Safford Basin – Upper Gila Planning Area



D-07-26 22BAB – Safford basin – Gila Valley sub-basin about 2 miles SE of Safford and 1.5 miles south of Gila River.



D-07-25 10AAD -- Safford basin – Gila Valley sub-basin about 2 miles SW of Thacher and 3 miles SW of the Gila River.