

## East Plateau Planning Area

### Background

The East Plateau Planning Area is located in the east central portion of the State, immediately south of the Navajo/Hopi Planning Area. The Planning Area is comprised of portions of Navajo and Apache counties and is sparsely populated. The East Plateau Planning Area also contains a portion of the Little Colorado River Plateau Groundwater Basin and encompasses a portion of the Little Colorado River Watershed. Primary population centers include Show Low, Pinetop-Lakeside, Springerville, Winslow, and Holbrook. The Planning Area also includes the Joseph City Irrigation Non-expansion Area (INA), west of Holbrook in Apache County, designated under the 1980 Groundwater Management Act to provide a reasonably secure water supply for irrigation (A.R.S. § 45-431).



Principal features of land ownership are the continuous band of USDA Forest Service (Forest Service) lands along the southern boundary of the Planning Area and the “checkerboard” pattern of land ownership throughout the Planning Area (see Figure P.A. 9-1). The checkerboard pattern includes State Trust Lands, US Bureau of Land Management (BLM) lands and private lands. Primary land uses on the private lands are domestic, electrical generation, livestock grazing and agricultural. Forest Service lands include part of the Apache-Sitgreaves National Forests, managed as a single unit from the Supervisors Office in Springerville. Primary land uses are livestock grazing, recreation, and timber. Other lands under federal ownership within the Planning Area include tribal lands, BLM lands and the Petrified Forest National Park located east and northeast of Holbrook which is used for recreational purposes. BLM lands are primarily used for livestock grazing. Tribal lands include those of the Zuni (about 16 square miles) north of Concho and White Mountain Apache lands (about 4.5 square miles) southwest of Greer. There are a large tract of contiguous State Trust Lands between Springerville and St. Johns in the southeast portion of the Planning Area. Primary land use is livestock grazing. Small tracts of land in the vicinity of Springerville are owned by the Arizona Game and Fish Department including a few sections scattered among the checkerboard lands. Primary land uses on these lands is for wildlife conservation.

### Water Supply Conditions

#### Groundwater

The East Plateau Planning Area is located within the eastern portion of the Colorado Plateau Physiographic Province, characterized by mostly level, horizontally stratified sedimentary rocks that have been eroded into canyons and plateaus, and by some high mountains. The Mogollon Rim is an escarpment almost 2,000 feet high in some places, extending from central Arizona to the Mogollon Mountains in New Mexico. It forms a hydrologic divide between the East Plateau Planning Area and the basins of the Central Highlands.

The Joseph City INA was established in 1980 by the Arizona Groundwater Management Act. The area had previously been designated as a Critical Groundwater Area in 1974. Designation of an area as an INA recognizes that there is “insufficient groundwater to provide a reasonably safe supply for the irrigation of the cultivated lands at the current rate of withdrawal” (A.R.S. § 45-402(2)). Within an INA,

irrigation with groundwater is restricted to lands that were irrigated prior to designation of the INA. Groundwater withdrawals by irrigation and large non-irrigation users, such as cities, golf-courses, or power plants must be reported annually to ADWR. Irrigation use in the INA has generally been between 2,000 and 4,000 acre-feet a year, served by the Joseph City Irrigation Company.

Groundwater is withdrawn from both large regional aquifers and from local and perched aquifers within the Planning Area. Groundwater levels were generally stable in many areas along and north of the Mogollon Rim portion of the Little Colorado River basin, but declined in some wells that were used for municipal, agricultural, or industrial purposes (mainly for thermo-electric power generation and paper manufacturing) (see *Figure P.A. 9-2*). Areas that experienced varying levels of water level decline include Heber, Showlow, Pinetop-Lakeside, Snowflake, Springerville and St. Johns. A significant decline was observed in a well located about 2.5 miles east of Lyman Lake, between St. Johns and Springerville. Several wells in the Pinetop-Lakeside area have experienced significant declines in recent years. While ADWR has not conducted a formal investigation of water level conditions in these wells, they appear to reflect conditions in the spatially limited shallow volcanic aquifer system in the area, which has been impacted by limited natural recharge due to lower than normal precipitation and local pumping. Wells completed in the deeper aquifer system in the region do not reflect similar water level trends.

#### Surface Water

The entire East Plateau Planning Area is located within the larger Little Colorado River Watershed. The Little Colorado River is the major surface drainage in the watershed, originating in the White Mountains and flowing northwest to the Colorado River (see *Figure P.A. 9-3*). The river was formerly perennial throughout its length but now flows perennially only from its headwaters to Lyman Lake, north of Springerville, below its confluence with Silver Creek, and below Blue Springs near its confluence with the Colorado River<sup>1</sup>.

There are 32 total streamgage stations in the East Plateau Planning Area, of which, 15 are currently active. The maximum recorded annual flow in these stations was 197,646 acre-feet (1968) at the active gage on the Little Colorado River at Holbrook. The median flow at this station was 82,533 acre-feet. Within the watershed, reaches of the Little Colorado River and Nutrioso Creek have impaired water quality due to levels of turbidity, lead, copper and silver in excess of use standards.

#### Reclaimed Water

The majority of reclaimed water produced within the Planning Area is generated at several municipal, county and private wastewater treatment facilities. The primary disposal methods include evaporation ponds and irrigation. Other disposal methods include recharge through infiltration basins and discharge to a watercourse. A few communities, Pinetop Lakeside, Show Low and Springerville, report discharges to constructed wetlands that provide wildlife habitat.

#### Ecological Resources

The Planning Area contains several riparian areas that are usually narrow, often following relatively steep stream channels in restricted valleys (see *Figure P.A. 9-3*). This area also counts a number of high elevation wetlands and cienegas that host cattail, Bulrush, sedges, waterweed, Spike rushes, Quaking Aspen, and Colorado Blue Spruce. Critical habitat has been designated for Mexican Spotted Owl, Little

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<sup>1</sup> Tellman and others, 1997

Colorado Spinedace, Navajo Sedge, and the Southwestern Willow Flycatcher. The Little Colorado River Basin also contains all populations and habitat for the federally threatened Little Colorado Spinedace, which is endemic to the Little Colorado River Plateau Basin. The Planning Area also contains several important conservation lands including the Petrified Forest National Park and the Petrified National Forest Wilderness Area (see Figure P.A. 9-3).

### **Water Demands**

Table P.A. 9-1, below, presents the baseline and projected water demands for the East Plateau Planning Area. Energy production and agriculture are the two largest water using sectors in the Planning Area. Agricultural use, estimated at roughly 35,000 acre-feet annually, is projected to remain stable through 2060. Water use for power plant cooling was estimated to total 36,000 in 2010 and is projected to increase substantially to approach 77,000 and 128,000 in the low and high 2060 projections, respectively. The power plants are served by groundwater produced from local wells. Agricultural uses are supplied by groundwater and surface water supplies, largely derived from the Little Colorado River and its tributaries, including Silver Creek.

The Catalyst Paper Co. purchased and operated a paper mill located about 23 miles southwest of Holbrook. However, with newsprint demand down more than 10 percent annually since the end of 2008, Catalyst Paper permanently closed in 2012<sup>2</sup> and the Snowflake Power Plant shut its doors in March of 2013, largely as a result of the closure of Catalyst. Novo Power, LLC has acquired the idle Snowflake Power Plant and the Catalyst Paper Power plant in northern Arizona. Novo Power, LLC will assist with targeted forest thinning and the biomass plant will produce enough electricity from processing wood chips from pre-commercial thinning to power most of the residents in the White Mountains, approximately 20,000 homes<sup>3</sup>.

Municipal uses accounted for roughly 15 percent of the estimated water use in 2010. These uses are projected to almost double to nearly 26,000 acre-feet by 2060. These uses are anticipated to remain reliant on groundwater supplies through the projection period.

### **Characteristics Affecting Future Demands and Water Supply Availability**

#### General Stream Adjudication

The general stream adjudication is a judicial proceeding to determine or establish the extent and priority of water rights in the Gila and Little Colorado River systems. Over 14,000 claimants and water users are joined in the Little Colorado 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.

#### Resolution of Zuni Tribe Water Rights Claims

President George W. Bush signed P.L. 108-34, the Zuni Indian Tribe Water Rights Settlement Act, into law in June, 2003. The Act awards the tribe a right to annually use 5,500 acre-feet of surface water from the Little Colorado River and up to 1,500 acre-feet of underground water, both for wetland restoration

<sup>2</sup> <http://foresttalk.com/index.php/2012/07/31/catalyst-paper-is-permanently-closing-its-snowflake-mill-in-arizona/>

<sup>3</sup> [http://www.kcsg.com/view/full\\_story/23247802/article-State-Senator-Bob-Worsley-Leads-Investment-Effort-to-Repurchase-Idle-Snowflake-Power-Plants-that-Employed-Over-300-Arizonans](http://www.kcsg.com/view/full_story/23247802/article-State-Senator-Bob-Worsley-Leads-Investment-Effort-to-Repurchase-Idle-Snowflake-Power-Plants-that-Employed-Over-300-Arizonans)

at the Zuni Heaven Reservation. It also grandfathers existing surface and ground water uses in the area, restricts future wells near the reservation and facilitates local environmental programs.

**Table P.A. 9-1. Projected Water Demand (in acre feet) - East Plateau Planning Area**

Sector	2010	2035	2060
Agriculture	35,325	35,325	35,325
Dairy	20	20	20
Feedlot	0	0	0
Municipal	13,478	20,962	25,913
Other Industrial	8,690	8,806	8,827
Mining	240		
High		300	300
Low		300	300
Power Plants	36,006		
High		91,672	127,657
Low		62,829	76,907
Rock Production	132		
High		1,796	2,127
Low		748	886
Turf	529		
High		647	698
Low		615	699
<b>Total (High)</b>	<b>94,420</b>	<b>159,528</b>	<b>200,867</b>
<b>Total (Low)</b>	<b>94,420</b>	<b>129,605</b>	<b>148,877</b>

Uncertainty Outstanding Water Rights Claims

The unresolved claim of the Hopi Tribe and the Navajo Nation to waters of the Little Colorado River creates uncertainty not only for the tribes but for other water users in other parts of the State. Water rights settlement discussions with both of the tribes, the federal government and State parties had been the primary focus through 2012 in resolving these issues. Legislation was introduced in the fall of 2012 that would have provided groundwater projects for the Navajo and Hopi Tribes in exchange for dismissal of the tribes' claim to water from the Little Colorado River and providing for a future settlement to the tribes' claims to the Lower Colorado River. The legislation was removed at the request of the Navajo Nation and the Hopi Tribe as a result of further discussions with their respective Tribal Councils.

In June of 2013, the Navajo Nation re-initiated litigation originally filed on March 14, 2003. In this action, the Navajo Nation alleges that various federal agencies and entities have failed to consider the water rights of the Navajo Nation or protect their interests in the Lower Colorado River when operational decisions were made resulting in detriment to the Navajo Nation's water rights. Arizona is an intervener in this action. This re-initiation of litigation was a result of unsuccessful water settlement negotiations between the tribe, the federal government and State parties. As is typical in litigation, uncertainty

regarding the outcome of this case creates significant uncertainty for both the tribes and the State parties with respect to development of water supplies to meet both current and projected demands.

#### Wildfire

There were several major wildfires within this Planning Area that has altered the forest health and the possibly water yields in this area. The Rodeo-Chedeski Fire in 2002 consumed about 462,600 acres, much of it in the north-central part of the Salt River Basin and most recently, in 2011 the Wallow Fire burned 538,049 acres in the Apache-Sitgreaves National Forests, becoming Arizona's largest wildfire in recorded history.

In the Southwest, fire can be among the most significant watershed disturbance agents, particularly to peak stream flows. For example, in areas severely burned by the Rodeo-Chedeski Fire, peak flows were as much as 2,350 times greater than previously measured the highest known post-fire peak flow in the Southwest. Increased peak flows can degrade stream channels and make them unstable, increase sediment production and cause flood damage. Wildfire and drought can result in vegetative changes in the Planning Area with implications for runoff, infiltration and downstream water supplies.

#### Potash Mining

Recent analysis of subsurface data largely collected in the 1960s and 1970s indicates the presence of a potash resource south of Holbrook near and under the Petrified Forest National Park. The potash deposit is located many hundreds of feet underground. Worldwide potash prices have climbed in recent years as production has not been able to keep up with demand, increasing the potential economic viability of mining this deposit. Both solution and underground mining are being evaluated to extract this ore<sup>4</sup>. Either option will have local groundwater impacts as source water for the solution mining would likely be groundwater derived and the deposit would need to be dewatered to mine conventionally.

#### Protected Species and Habitat

The presence of a listed species may be a critical consideration in water resource management and supply development in a particular area.

#### Groundwater Availability

Localized groundwater declines are evident in wells in isolated locations throughout the East Plateau Planning Area. These include the areas around the large coal fired powers plants, the Coronado, Springerville, and Coronado Generating Stations. Additionally, groundwater levels in the vicinity of Pinetop-Lakeside have declined significantly in recent years in response to increased pumping and climate-forced reductions in recharge as a consequence of lower than normal precipitation.

The groundwater mining occurring in the East Plateau Planning Area, attributable to localized municipal and industrial uses, is consistent with State law. Use of groundwater outside of the AMAs is governed by the doctrine of reasonable and beneficial use<sup>5</sup>. While ADWR has no evidence that the existing water uses in the Planning Area would not meet this standard, dropping water tables result in reduced well yields and increased pumping costs, and can have other physical consequences, including, but not

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<sup>4</sup> Rauzi, 2008

<sup>5</sup> A.R.S. §45-453(1)

limited to: degradation of water quality, disruption of historic groundwater flow paths, land subsidence, and earth fissuring.

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.

## **Strategies for Meeting Future Water Demands**

### Resolution of Water Rights Claims

Reaching resolution regarding the water rights claims for the Navajo Nation and the Hopi Tribe is the single most important step in ensuring long-term water supply sustainability for this Planning Area. Currently, water rights settlement negotiations have stalled and the Navajo Nation has decided to proceed with its litigation against the United States on issues related to operations in the Lower Colorado River Basin. Settlement negotiations are typically more productive than litigation and result in outcomes that can provide federally financed infrastructure to deliver water to Indian communities or alternatives that guarantee water supplies are used within the state to benefit Arizona citizens. All efforts should be made to get back to water rights settlement discussions and resolution of claims that are beneficial to both tribal and non-tribal communities within Arizona.

Correspondingly, resolution of the Little Colorado River Adjudication is essential to provide long-term certainty for water users in Arizona dependent on water supplies from the Little Colorado 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.

### Watershed/Forest Management

Much of the East Plateau Planning Area drains to the either the Salt or Little Colorado River systems. Like much of the State, past land use and fire suppression practices have resulted in compromised watershed conditions. Watershed management practices aimed at increasing watershed yield have been evaluated in Arizona showing opportunities for success. Due to the significant acreage of forested lands 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) is a cost-effective way to progress this option and can provide multiple healthy 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<sup>6</sup>. Restoration of forest and range lands within the Planning Area may serve to improve wildlife forage and livestock grazing conditions, reduce wildfire threats, and provide increased water yields for local and downstream users.

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<sup>6</sup> <http://www.4fri.org/>

#### Weather Modification

Weather modification, or cloud seeding, is a potential strategy to either augment local water supplies or mitigate the impacts of groundwater development and should be explored in this Planning Area.

#### Reclaimed Water Reuse

Formal wastewater treatment in the East Plateau Planning Area is largely conducted in lagoon-based wastewater treatment plants, with evaporation as the principal disposal practice. Increasing the utilization of this resource would likely require upgrading wastewater treatment works throughout the Planning Area to produce reclaimed water of a quantity suitable for reuse or aquifer enhancement.

#### Expanded Monitoring & Data Collection

Monitoring of water use within the Eastern Plateau Planning Area is limited to the Community Water System Reports submitted by municipal water providers. 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, which 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.

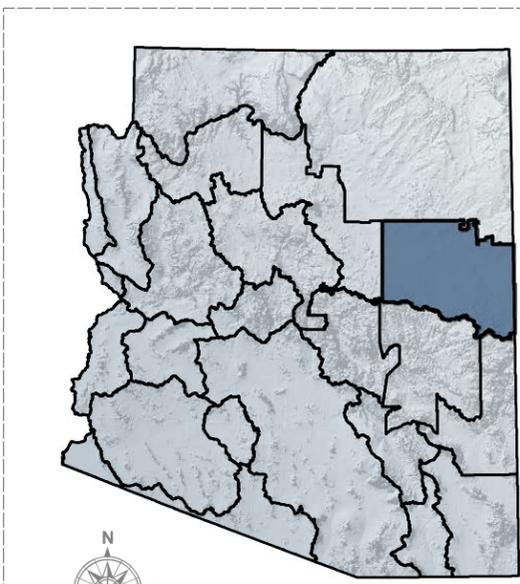
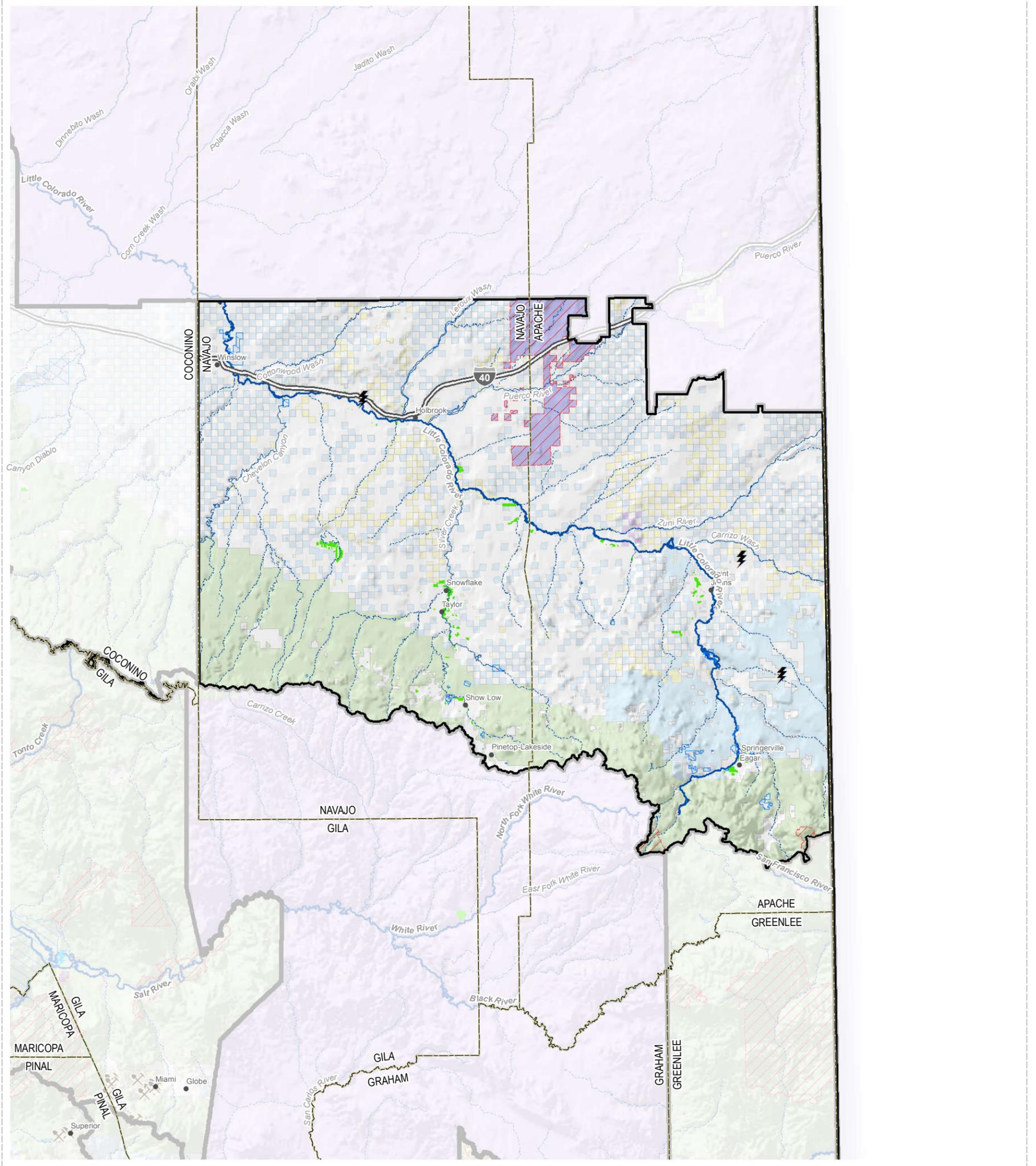
The exploration drilling and testing will increase knowledge of the local groundwater system will increase understanding of the local groundwater systems, in addition to mitigating local pumping impacts.

#### Increase Access to Locally Available Groundwater

Enhanced access to the groundwater resources within the East Plateau Planning Area can serve to meet current and projected water demands. Leveraging existing hydrogeologic information with additional studies, drilling and testing of wells, planning and development of water delivery and storage infrastructure, and monitoring and modeling will provide a basis for prudent use of this resource. Given the dispersed nature of the population throughout the Planning Area, this option will likely entail the development of many small to moderate scale groundwater production, transmission and distribution elements.



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)

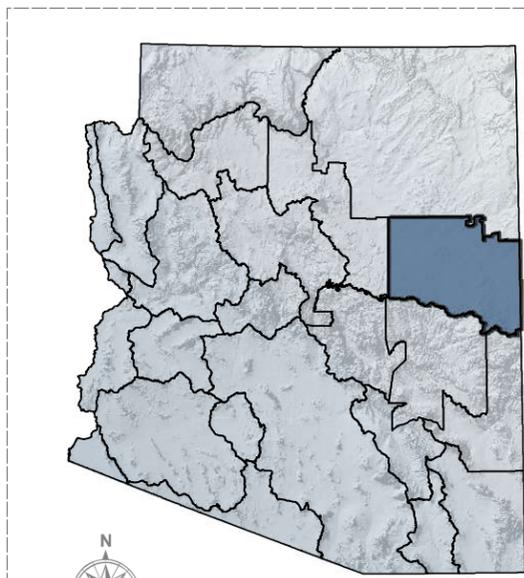
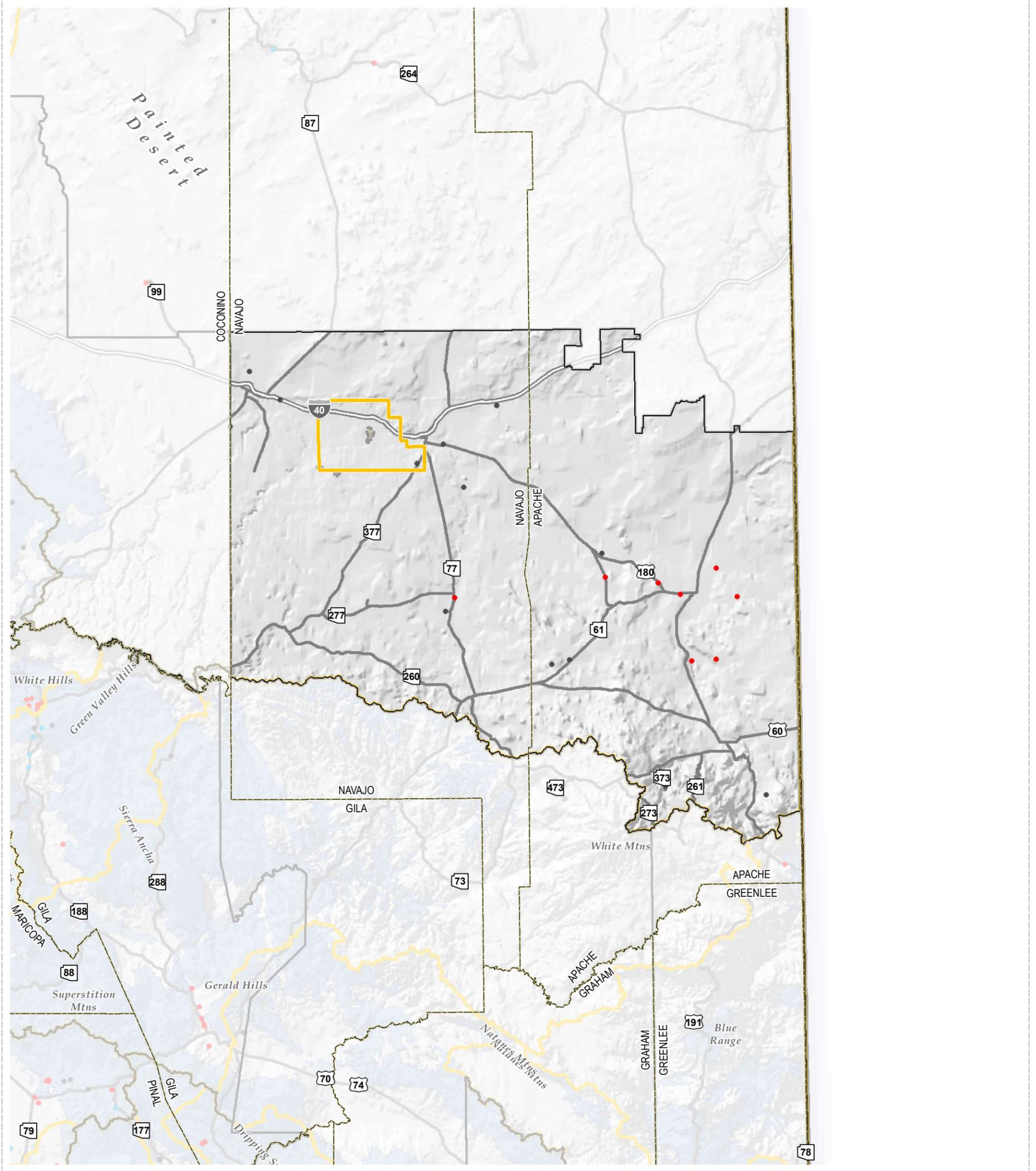
- |   |   |
|---|---|
| Planning Area (ADWR)                    | Agriculture (SWReGAP, 2004)                   |
| State (ALRIS)                           | Federal Conservation Land (USFS, BLM, NPS)    |
| County (ALRIS)                          | State Managed Conservation Land (AZGFD, AZSP) |
| River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



# East Plateau Land Ownership

Figure P.A.9-1

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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

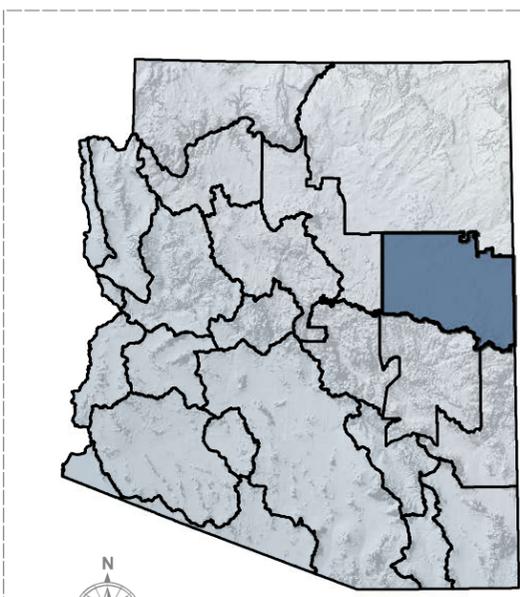
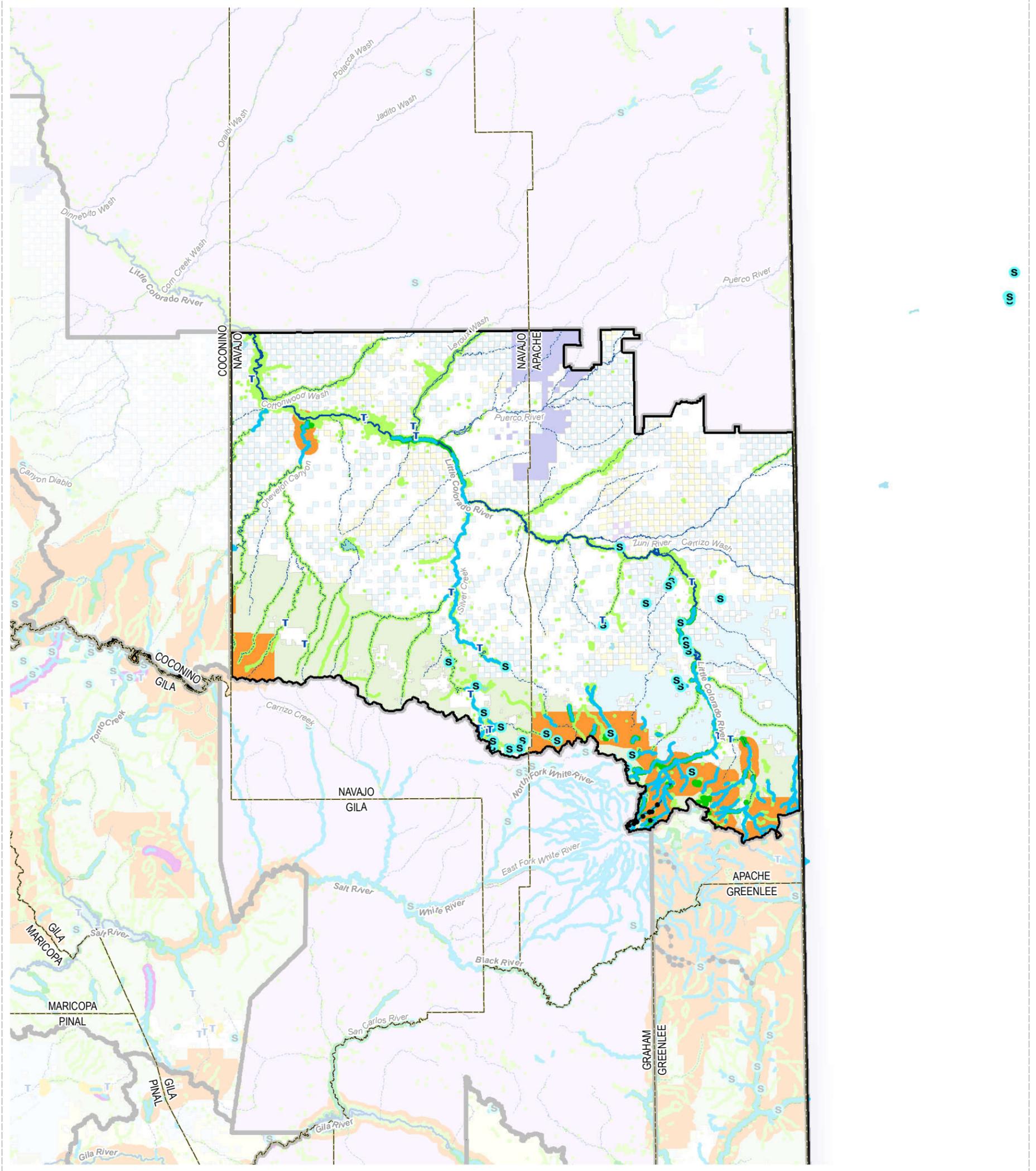
\* Data provided by ADWR



Figure P.A.9-2

# East Plateau Groundwater Hydrology

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MAP LOCATION  
(Planning Area Boundaries)

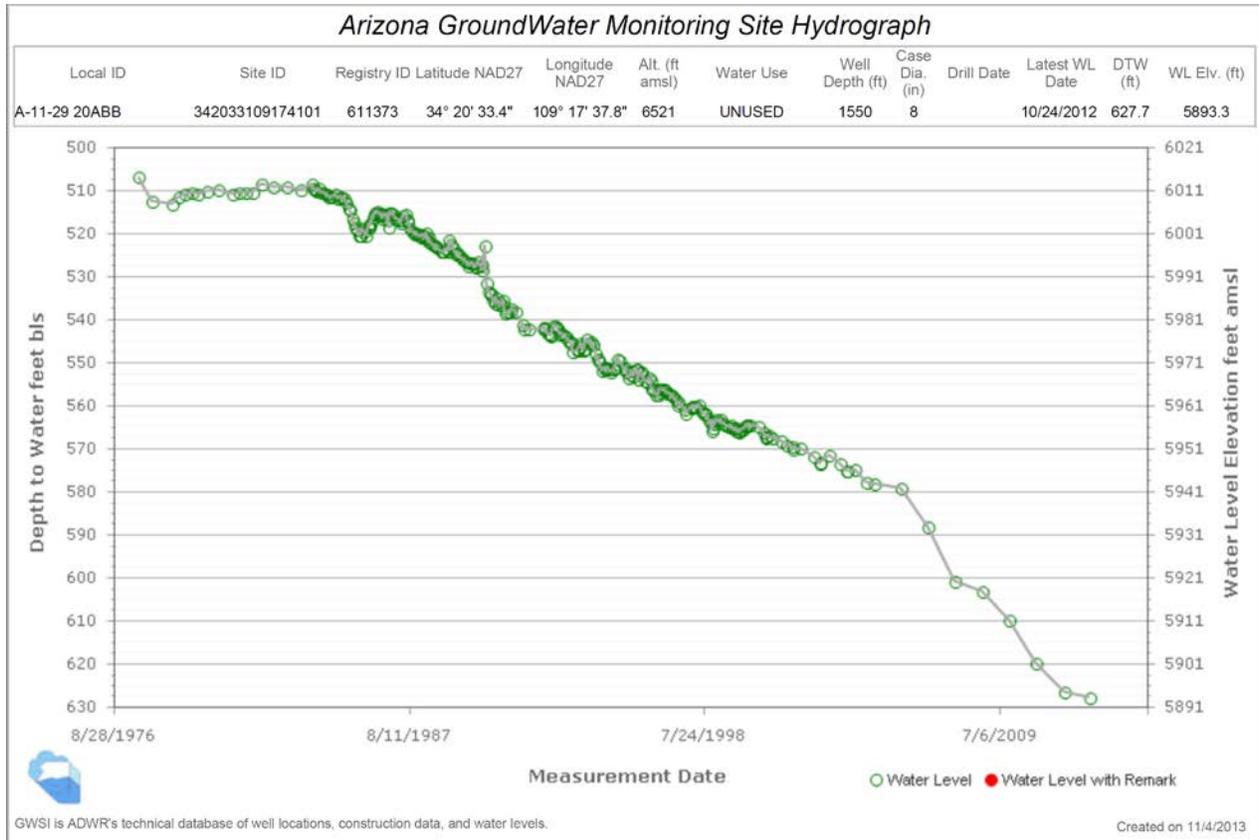
- Planning Area (ADWR)
- State (ALRIS)
- County (ALRIS)
- Reservoir or Lake (NHD)
- Waste Water Treatment Plant (ADEQ)
- Major Spring (ADWR, Pima County)
- Perennial Flow (ADEQ, USGS)
- River or Stream (ASLD)
- Outstanding Arizona Water (ADEQ)
- Effluent Dependent Stream (ADWR, NEMO)
- Instream Flow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



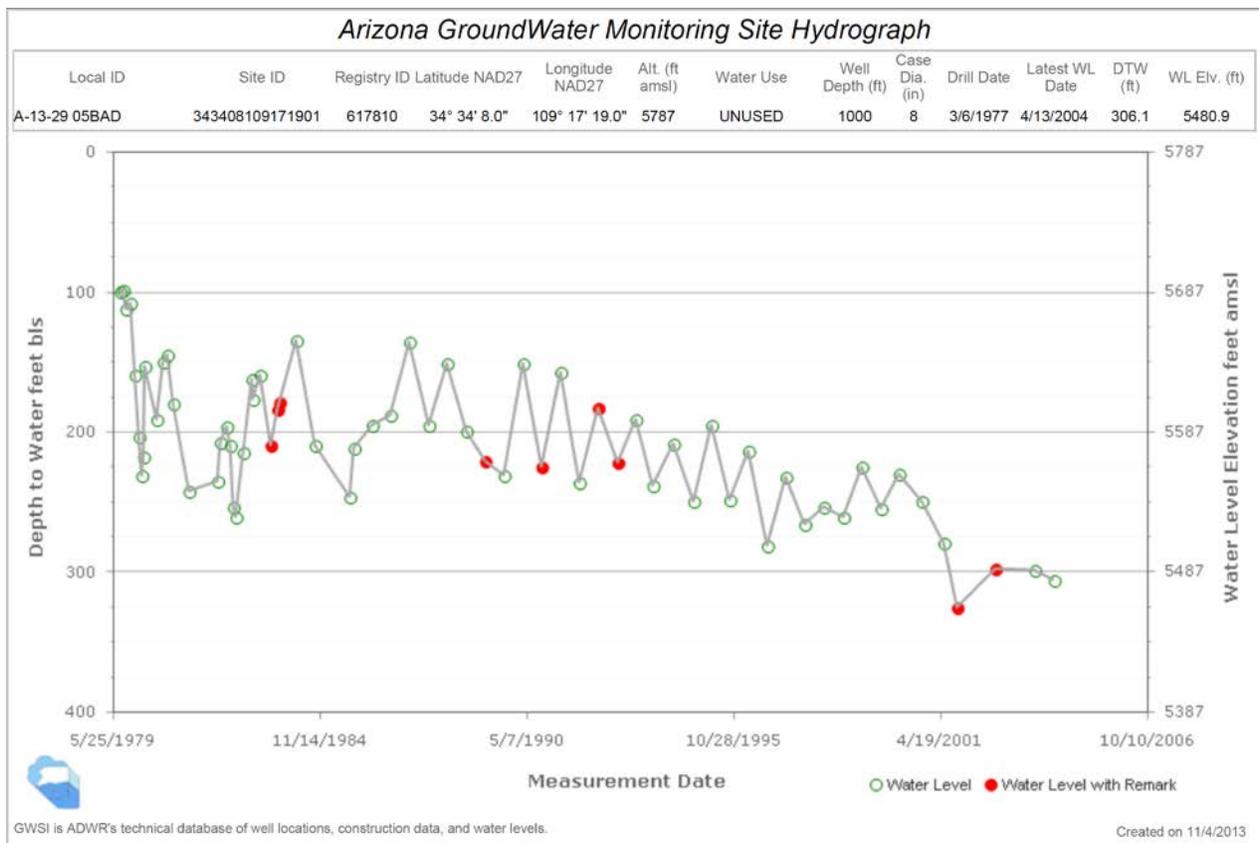
Figure P.A.9-3

## East Plateau Surface Water and Natural Features

# Little Colorado River Plateau – East Plateau Planning Area



A-11-29 20ABB Little Colorado River Plateau basin about 2.5 miles east of Lyman Lake.



A-13-29 05BAD Little Colorado River Plateau basin about 7 miles NE of St. Johns.