

ARIZONA WATER FACTSHEET Greenlee County

Get to know water in your county

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COLLEGE OF AGRICULTURE & LIFE SCIENCES
COOPERATIVE EXTENSION

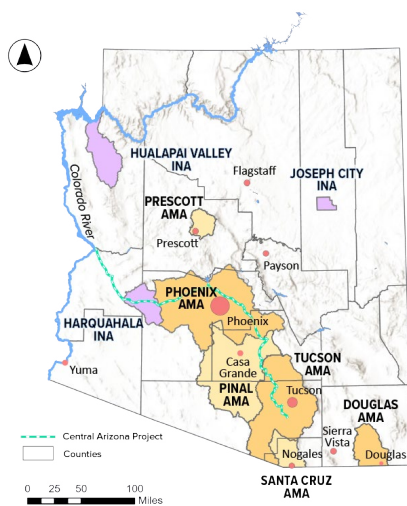
**WATER RESOURCES
RESEARCH CENTER**

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Water in Arizona

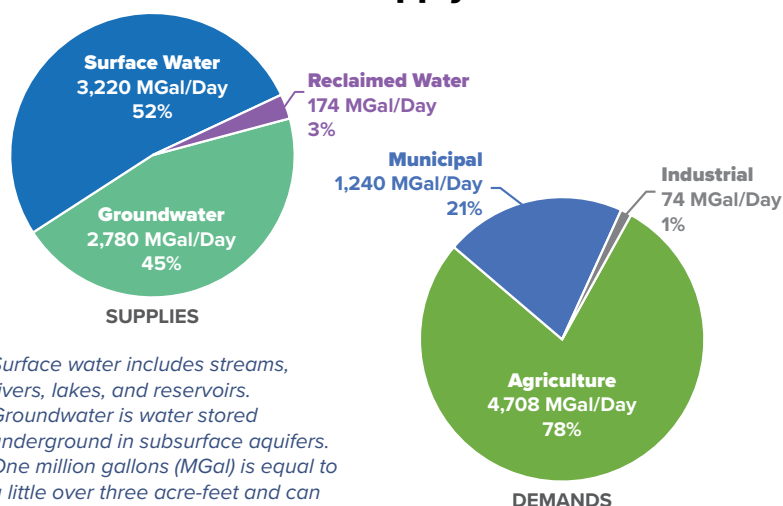
Arizona's future depends on sustainable water supplies, which in turn depend on vigilant and innovative management of those supplies. From low deserts to high mountains, counties and communities face different water challenges and take different approaches to addressing those challenges, while conforming with regional, state, and federal requirements. The Arizona Department of Environmental Quality (ADEQ) is responsible for water quality and tasked with enforcing federal environmental standards. The Arizona Department of Water Resources (ADWR) oversees the use of surface water and groundwater, which are legally distinct though physically interconnected. In general, ADWR regulates groundwater more strictly in Active Management Areas (AMAs) than in the rest of the state.

Statewide Context



County and AMA boundaries (WRRC 2023).

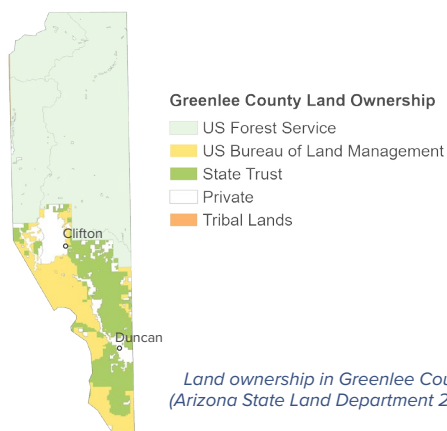
Arizona Water Supply and Demand



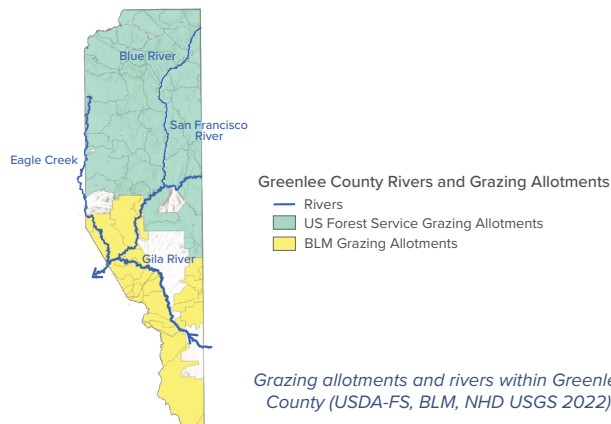
Surface water includes streams, rivers, lakes, and reservoirs. Groundwater is water stored underground in subsurface aquifers. One million gallons (MGal) is equal to a little over three acre-feet and can serve 13 Tucson households for a year (Tucson Water 2018, USGS 2015).

Water in Greenlee County

Along Arizona's southeastern border with New Mexico, Greenlee County's diverse natural geography spans riparian habitat, rocky desert outcrops, and mature forest. Low mountains and desert valleys meet middle-elevation conifer forests and high-altitude sub-alpine forests in the northern part of the county where elevations exceed 9,000 feet. Average annual precipitation ranges from 9-37 inches depending on elevation. The main population centers include Clifton and Duncan, with the remaining population - about 46% - residing in rural areas. More than three-quarters (77%) of the total land area in Greenlee County is federally managed, influencing water, land use, and management.



Land ownership in Greenlee County (Arizona State Land Department 2020).



Grazing allotments and rivers within Greenlee County (USDA-FS, BLM, NHD USGS 2022).

Frequently Asked Questions

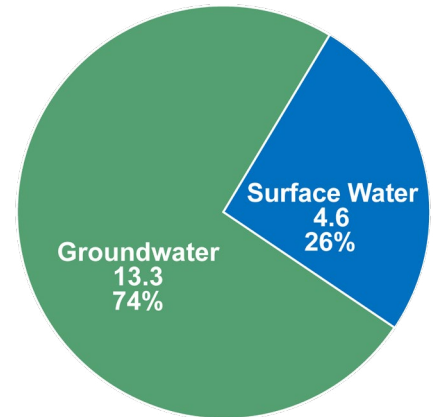
Where Does Greenlee County's Water Come From?

Greenlee County is located almost entirely within the Upper Gila River Watershed. The primary source of water in the county is groundwater (74%), supplemented by surface water (26%).

Groundwater

Groundwater is found in the pore spaces and fractures in rock and sediment below the earth's surface, known as aquifers.

- Groundwater use is regulated by ADWR within **Active Management Areas (AMAs)**. Greenlee County is not located within an AMA, but certain regulations of the **1980 Arizona Groundwater Management Act (GMA)** still apply.
- ADWR administers the **Adequate Water Supply Program**. This program requires a water adequacy determination before land may be subdivided into more than five lots, and potential buyers of subdivided lots must be informed of the results of the determination. An "Adequate Water Supply" means that enough clean water for a development or water provider's service area will be legally and continuously available for 100 years.



Sources (Million Gallons/Day) for Greenlee County's water (USGS 2015).

Surface Water

Surface water rights in Arizona are determined by the doctrine of prior appropriation, otherwise known as "first in time, first in right."

- The main source of surface water in Greenlee County is the Gila River, including its tributaries and irrigation canals managed through the Franklin Irrigation District.
- Water settlements and adjudication processes affect water allocation throughout the region. The 1935 Globe Equity Decree allocates water rights to the Gila River for public, private, and Tribal entities and regulates the use of Gila River surface water from its headwaters in New Mexico to its confluence with the Salt River, west of Phoenix.

How Is Water Used in Greenlee County?

Water demand in Greenlee County is split among different water user groups, primarily agriculture (53%) and mining (29%). Municipal water uses, including domestic and commercial (10%), and livestock operations (8%) make up the remaining water demands.

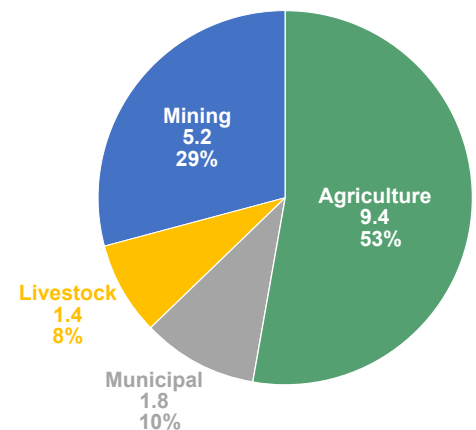
Cattle ranching and mining are important cultural and economic activities within Greenlee County dating back to the 1870's.

- Currently, 82% of the land in Greenlee County is grazed by livestock while 5.5% is under agricultural production. Grazing allotments on federal lands are managed by the US Forest Service or Bureau of Land Management (BLM) (refer to map on page 1).
- Water use associated with livestock involves growing feed, including hay and alfalfa, along with maintaining stock ponds.

Arizona is the source of half of the total copper produced in the US. Morenci Mine, in Greenlee County, is the largest copper mine in North America.

Mining has a long history within the county, beginning in 1856, based on the prolific deposits of copper, granite, sand, and gravel.

- Water is used in the extraction, treatment, and processing stages of mining operations, as well as for dust control at mining sites.



Water use (Million Gallons/Day) in Greenlee County (USGS 2015).

What Water Challenges Does Greenlee County Face?

Water Quality Challenges

Surface Water Pollution. ADEQ monitors surface water impairment. Impaired waters are rivers, streams, and lakes that fail to meet standards for various levels of designated use. There are three streams in Greenlee County that have been classified as impaired because *E. coli* exceeds the standard: the Blue River, San Francisco River, and sections of the Gila River. These exceedences are thought to be due to recreational use of waterways, livestock and wildlife watering, and old septic systems.

Emerging Contaminants. Per- and polyfluoroalkyl substances (PFAS) are contaminants of emerging concern found throughout Arizona waterways. They include ingredients found in pharmaceuticals, household items, fire retardant fabrics, and personal care products. The US Environmental Protection Agency (EPA) has set legally enforceable limits on some PFAS and water providers are responsible for monitoring and finding ways to limit or eliminate exposure.

Water Quantity Challenges

Climate Change. Climate and ongoing drought conditions impact the amount of water available for plants, animals, and human use. Groundwater pumping can intensify the decline of surface flows in natural channels by lowering water tables, disrupting flow among surface waterbodies. The long-term conservation of water and land is dependent on the connection between surface water and groundwater.

Legal Processes. Greenlee County water supplies are affected by a number state and federal laws, court orders, and water settlements, including the 1935 Globe Equity Decree, the San Carlos Apache Water Rights Settlements Act of 1992, Arizona Water Settlements Act of 2004, and the ongoing Gila River General Stream Adjudication. Legal proceeding continue to impact agricultural, industrial, and municipal water use within the county.

Resources. As Arizona's least populous county, Greenlee County lacks the large population base useful for water planning. Groundwater dependent communities in rural areas face challenges with few capital and personnel resources to develop new supplies.



County Water Challenges
— Impaired Stream
— Non-Attaining Stream

Impaired waters (ADEQ 2022).

How Is Greenlee County Moving Toward Sustainable Water Management?

As water resources in the state become more strained, people continue to study ways to stretch or increase supplies.

Rangeland Monitoring. These programs gather information about rangeland conditions (i.e., species composition, ground cover, precipitation, etc.) through coordinated efforts of the University of Arizona Cooperative Extension, private landowners, and state and federal agencies. Over time, monitoring data can be used to inform management decisions to improve rangeland and watershed health.

Water Quality Improvements. The Gila Watershed Partnership, whose efforts in regional watershed restoration and education are focused within the Upper Gila River, is working to reduce *E. coli* impairment in the Blue and San Francisco Rivers. The project, supported by ADEQ, engages the community through volunteer clean-up events, installation of public restrooms, and signage at high-use recreation sites.

Audubon Arizona estimates that \$49 million is generated annually from recreation on or along rivers, lakes, and streams in Greenlee County.

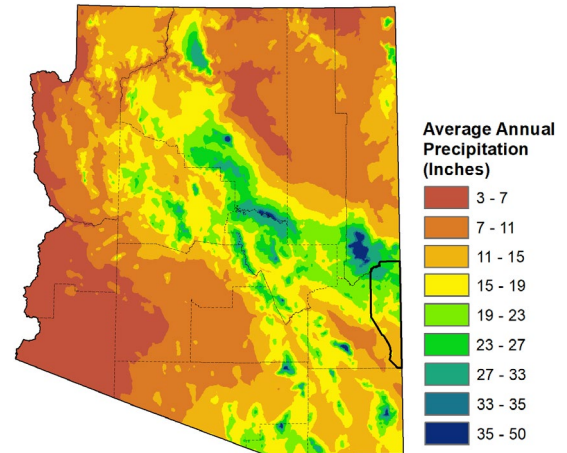
What Does Greenlee County's Future Water Situation Look Like?

The state of Arizona has been experiencing persistent drought conditions for over 20 years. A hotter and drier future means increased pressure and competition for county water resources. Drought and climate change pose significant risks to Greenlee County, including:

- Unpredictable weather patterns, more severe storms, flooding, and increasing temperatures create challenges for communities and agriculture.
- Frequency and intensity of fires may increase as air temperatures continue to rise, drying out fuel sources. While low-severity fires are important for maintaining healthy forests, severe fires can alter soil composition and infiltration processes, leading to erosion, water quality issues, and decreased groundwater recharge.

The General Stream Adjudication has serious implications for the future of communities and industries reliant on water from the Gila River. The Adjudication will determine the nature, extent, and priority of water rights within the watershed. The question of who has the rights to access this water resource is a yet unresolved legal question.

In a sparsely populated county, stakeholder and funding capacity can be strained by the need to coordinate among the various private and public landowners in order to address aging infrastructure and landscape scale management issues. Collaboration among stakeholders, such as led by the Gila Watershed Partnership, are integral to a holistic approach to healthy water resources.



Mean Precipitation 1981-2010 (PRISM Climate Group 2016).

Additional Resources

The WRRC compiles and periodically updates a list of additional resources related to water in Arizona. These resources range from statewide information to information available from local watershed groups and non-profits. Visit the **WRRC website** to see a complete list. The resources used for this factsheet are listed below.

WRRC Water Map

A reliable and concise visual representation of Arizona's water resources. This map includes information on land ownership, water use by groundwater basin, annual precipitation, subsidence and groundwater storage, annual water use by region, supply and demand, Colorado River apportionment, and more. **Map Info**

Statewide Water Resources

- **ADEQ Emerging Contaminants Report:** An assessment of the emerging contaminants in Arizona's water supplies.
- **ADEQ Impaired Water Information:** Maps and information about the impaired surface waters in the state.
- **Adequate Water Supply Program:** Information on AWS program as part of the 1980 Groundwater Management Act.
- **ADWR Community Water System Map:** A map of water providers and their service areas.
- **Cooperative Extension Water Wise:** Information on water saving techniques for Arizona relating to irrigation, gray water, and rainwater harvesting.
- **Desert Water Harvesting Initiative:** Resources for local water harvesting and Green Infrastructure.
- **PRISM database:** Data on historic and current climate patterns, used for the precipitation map of Arizona.
- **USGS Ground Water Atlas of the United States:** Information about aquifers throughout the US.
- **Tribal Water Rights:** Information on Tribal water usage in the Colorado River basin and the barriers to that usage.

Regional Management and Planning

- **Atlas of Upper Gila River Watershed:** Information on the natural, water, and cultural resources of the Upper Gila River Watershed
- **Audubon Arizona:** Impact of recreation on Arizona's rivers, lakes, and streams on statewide and local economies.
- **Cooperative Extension Rangeland Monitoring:** Information on resources on cooperative rangeland monitoring programs.
- **General Stream Adjudication:** Ongoing legal proceedings of the Gila and Little Colorado Rivers.
- **Gila Watershed Partnership of Arizona:** A nonprofit organization focused on conservation, restoration, and education efforts within the Upper Gila River Watershed.

County Specific Water Resources

- **A Guide for Landowners on the Upper Gila River:** Guide on activities legally allowable on land adjacent to the Gila River.
- **Agriculture in Graham and Greenlee Counties:** A summary of agricultural production and analysis of its economic contribution in Graham and Greenlee counties.
- **Arizona County Agricultural Economy Profiles:** Agriculture, water use, and regional economic data by county.
- **Wet Water and Paper Water in the Upper Gila River Watershed:** Overview of the legal framework governing water allocation and use in the Upper Gila River Watershed.