

Groundwater Conditions in the Little Colorado River Plateau Basin

Major aquifers, well yields, estimated natural recharge, estimated water in storage, number of index wells and date of last water-level sweep are shown in Table 2.1-6. Figure 2.1-7 shows aquifer boundaries, aquifer flow direction and water-level change between 1990-1991 and 2003-2004. Figure 2.1-8 contains hydrographs for selected wells shown on Figure 2.1-7. Figure 2.1-9 shows well yields in 5 yield categories. For a description of aquifer data sources and methods or well data sources and methods, including water-level changes and well yields click here. For more information on groundwater in the basin see [Section 2.0.2 - Hydrology Overview](#)

Major Aquifers

- Refer to [Table 2.1-6](#) and [Figure 2.1-7](#).
- Major aquifers include the Volcanic, Bidahochi, D-, N-, and C-aquifers.
- Recent stream alluvium aquifers include alluvial deposits along washes and stream channels, including along the Little Colorado River and its tributaries.
- Volcanic aquifers include the Lakeside-Pinetop aquifer and the smaller aquifer inside the caldera of the San Francisco Peaks, known as the "Inner Basin".
- The large regional aquifers are located in sedimentary formations of sandstone and limestone that are stacked on top of one another and are generally separated by impermeable shales and siltstones. In descending order, the regional aquifers are the D-, N-, and C-aquifers.
- The Bidahochi formation forms a local aquifer in the central part of Apache and Navajo Counties and near St. Johns.
- Undifferentiated sandstones west of Show Low along the Mogollon Rim and in the Springerville-Eagar area form local aquifers, known as the White Mountain and Springerville Aquifers, respectively.
- Flow directions are shown in [Figure 2.1-7](#). Flow directions in the D-aquifer are generally from east to west. Flow in the N-aquifer varies as shown on the map. Flow direction in the C-aquifer is south to north in the southern part of the basin and generally from east to west in the northern part of the basin. The Bidahochi Aquifer flows are not mapped in the area south of Keams Canyon. Flows in the Volcanic Aquifer are generally toward the north.

Well Yields

- Refer to [Table 2.1-6](#) and [Figure 2.1-9](#)
- Yields vary greatly in the basin. In general, well yields are greatest along the Little Colorado River and in alluvial areas north of Springerville and in the vicinity of Concho, Saint Johns and Snowflake. Areas of lower yield are found in the northern part of the basin and in the volcanic aquifers around Flagstaff and Greer.
- One source of well yield information, based on 386 reported wells, indicates that the median well yield from these wells is 500 gpm. An estimate that

Table 2.1-6 Groundwater Data for the Little Colorado River Plateau Basin

Basin Area, in square miles	Geologic Units and/or Name	
Major Aquifers	Recent Stream Alluvium	
	Volcanic Rock (Lakeside-Pinetop Aquifer)	
Well Yields, in gpm	Sedimentary Rock (Bidahochi Formation, C, D, N, Springerville, and White Mountain Aquifers)	Measured by ACDM and/or USGS or NTUA
	Range 0-1,000	Recorded on inspection forms for large 70-inch diameter wells
	Median 95	
	Range 0-3,000	
Range 30-300	ACDM (1990)	
Estimated Natural Recharge, in acre-feet/year	Range 0-3,000	USGS (1994)
	319,000 ¹ (C Aquifer)	USGS (2002)
	5,360 (D Aquifer)	Ge/Hens and Waterstone (1999)
Estimated Water Capacity in Storage, in acre-feet	2,400 - 20,240 (median 13,000) (D Aquifer)	OSM (1997)
	959,000,000 (Total)	ACDM (1990)
	415,000,000 (C Aquifer)	ACDM (1990)
	18,000,000 (D Aquifer)	ACDM (1990)
	526,000,000 (N Aquifer)	ACDM (2006)
Current Number of Index Wells	1,000	
Date of Last Water-level Sweep (MAY) (Only one measurement)	2004	

Notes:
¹ Figures already state conditions and may include parts of the Verde and Salt River Basins.
 NTUA = Navajo Tribal Utility Authority

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Click to view Figure 2.1-7 Little Colorado River Plateau Basin Groundwater Conditions

includes USGS and Navajo Tribal Utility Authority data found a median well yield of 95 gpm

Natural Recharge

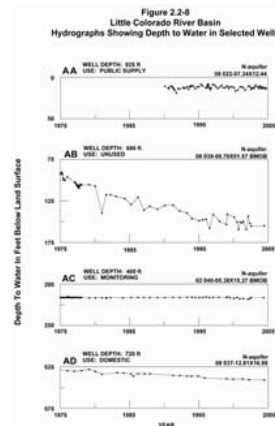
- Refer to [Table 2.1-6](#)
- Estimated natural recharge to the major regional aquifers is 319,000 acre-feet per year to the C-aquifer (aerial extent 21,655 square miles), 5,392 acre-feet per year to the D-aquifer (aerial extent 3,125 square miles) and between 2,600 acre-feet to 20,248 acre-feet with a median of 13,000 acre-feet to the N-aquifer (aerial extent 6,250 square miles). Main recharge areas are along the southern and eastern periphery of the basin.
- Recharge rates to other basin aquifers is unknown.

Water in Storage

- Refer to [Table 2.1-6](#)
- Storage volumes are based on rough estimates and more aquifer studies are needed.
- The only storage estimate for the entire basin is 508 million acre-feet.

Water Level

- Refer to [Figure 2.1-7](#). Water levels are shown for wells measured in 2003-2004.
- The Department annually measures 57 index wells in the basin. Hydrographs for 10 index wells, including one automated telemetry site (hydrograph #AZ), and other wells are shown in [Figure 2.1-8](#). More recent hydrographs of the index wells may be available through the Department's [GWSI online database](#).
- Deep water levels are found in areas near Flagstaff where water levels as deep as 1,572 feet below land surface (bls) were measured, and near Cottonwood and Piñon water levels were between 1,000 and 1,272 bls. Shallow water levels (<50 feet bls) are found along the Little Colorado River, in the Tuba City area, near Window Rock and near Dennehotso.
- Areas of most significant groundwater level decline were found in the vicinity of St. Johns, Piñon, Flagstaff and Kayenta. Few wells measured showed water level rises of more than a foot. Rises were noted in individual wells near Springerville, Concho, Chilchinbito and Flagstaff.



Click to view Figure 2.1-8 Little Colorado River Plateau Hydrographs Showing Depth to Water in Selected Wells



Click to view Figure 2.1-9 Little Colorado River Plateau Well Yields

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