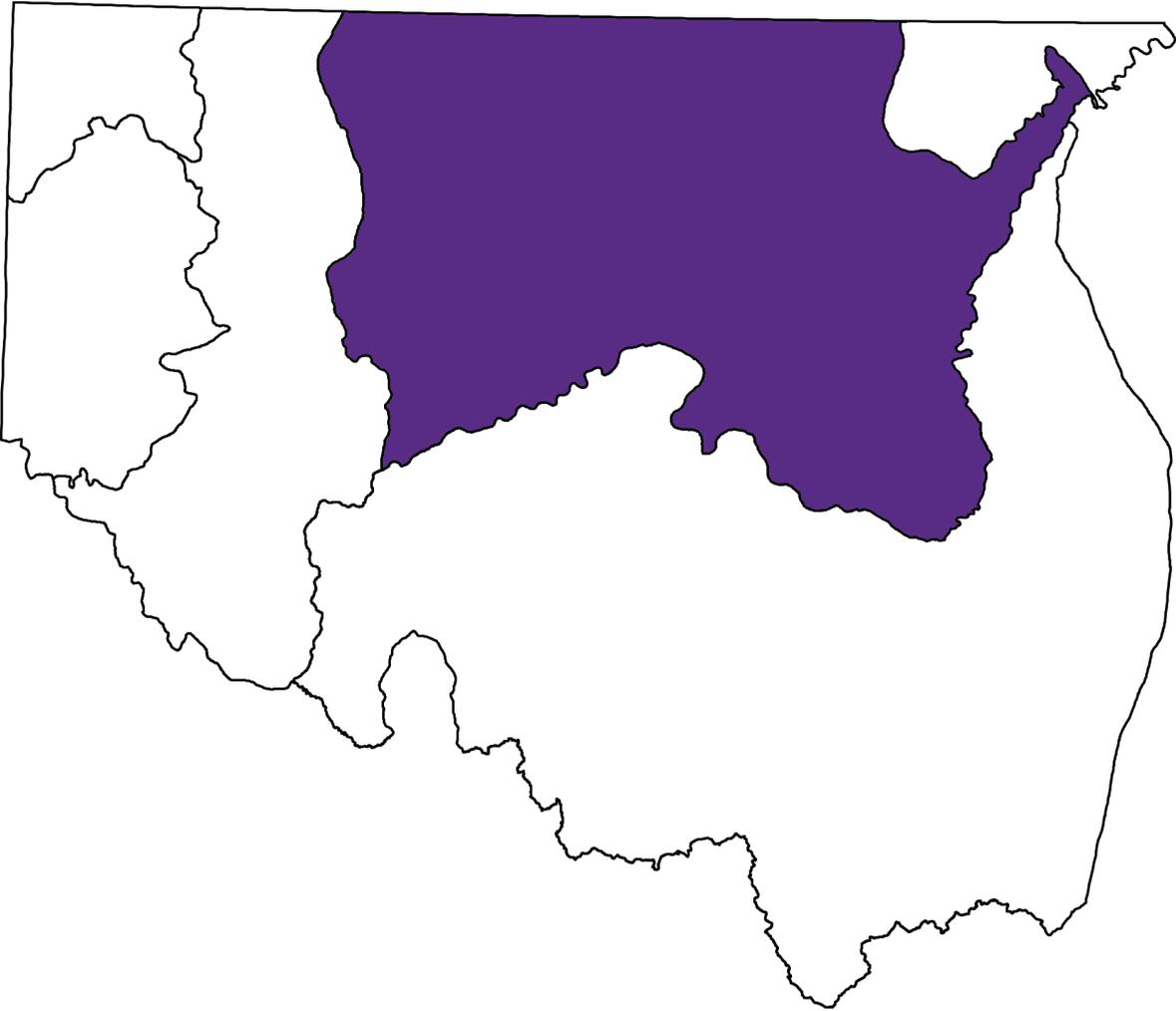


Section 6.3

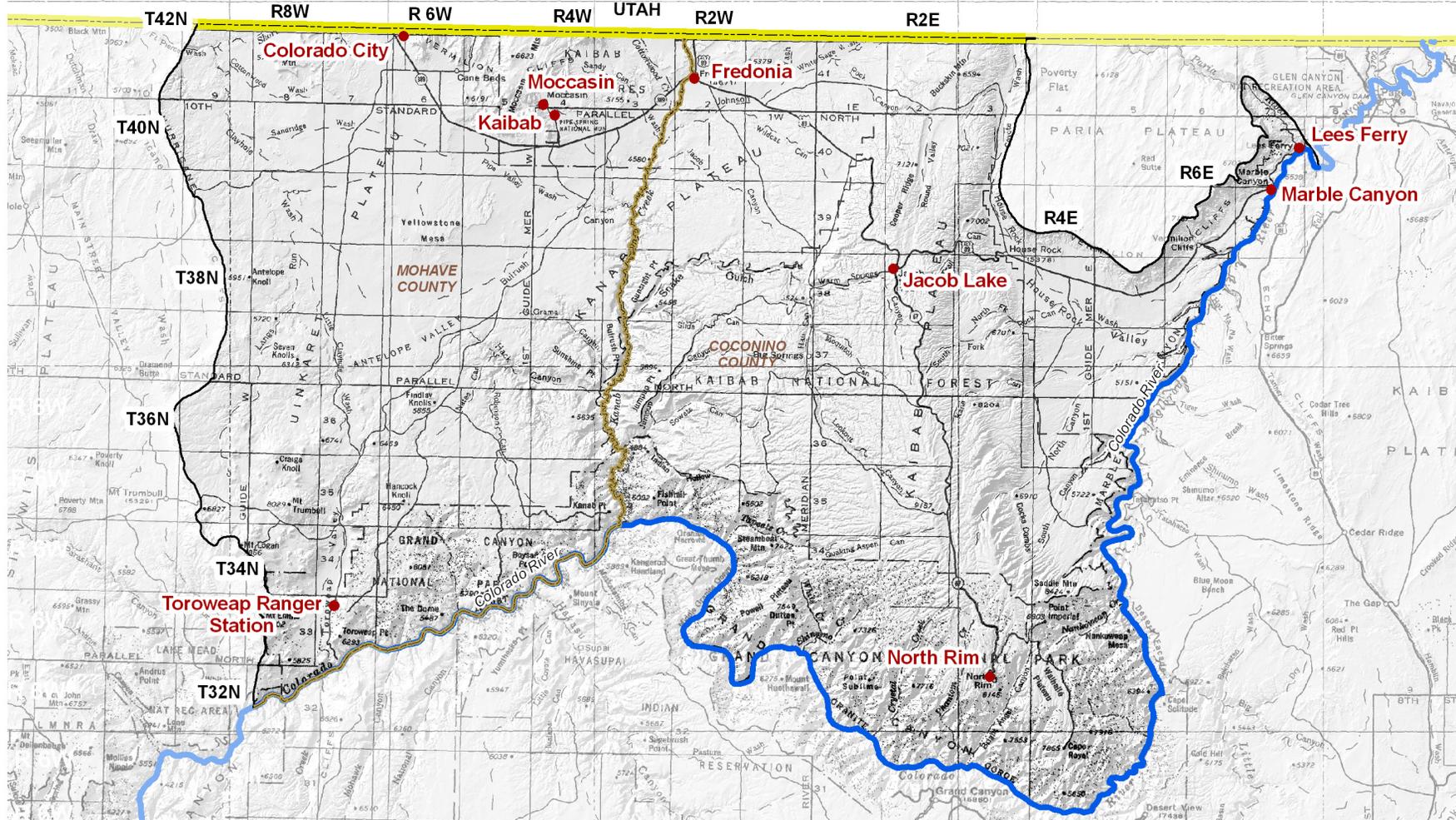
Kanab Plateau Basin



6.3.1 Geography of the Kanab Plateau Basin

The Kanab Plateau Basin, located in the north central part of the planning area is 4,247 square miles in area. Geographic features and principal communities are shown on Figure 6.3-1. The basin is characterized by plateaus and canyons. Vegetation types include Mohave and Great Basin desertscrub, Plains and Great Basin grassland, Great Basin conifer woodland, Great Basin subalpine conifer forest and Rocky Mountain and madrean montane conifer forest. There are small areas of subalpine grassland on the Kaibab Plateau south of Jacob Lake. (See Figure 6.0-11)

- Principal geographic features shown on Figure 6.3-1 are:
 - The Colorado River and Grand Canyon forming the southern basin boundary and the lowest point at 1,600 feet where the river exits the basin.
 - A series of plateaus running north-south; the Kaibab, Kanab and Uinkaret plateaus
 - Vermillion Cliffs in the northeast portion of the basin, Hurricane Cliffs on the northwestern basin boundary and Marble Canyon on the eastern basin boundary.
 - Granite Gorge on the southeastern basin boundary
 - Antelope Valley between the Uinkaret and Kanab Plateaus
 - Point Imperial, the highest point in the basin at 8,803 feet, located northeast of the North Rim



Base Map: USGS 1:500,000, 1981

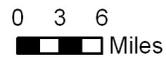


Figure 6.3-1
Kanab Plateau Basin
Geographic Features

Utah State Boundary
COUNTY
City, Town or Place



6.3.2 Land Ownership in the Kanab Plateau Basin

Land ownership, including the percentage of ownership by category, for the Kanab Plateau Basin is shown in Figure 6.3-2. Principal features of land ownership in this basin are the large parcels of U.S. Bureau of Land Management (BLM), National Forest Service and National Park Service (NPS) lands. Three percent is managed as the Vermilion Cliffs National Monument by the BLM and 2% is managed as the Grand Canyon-Parashant National Monument by the BLM and NPS. A description of land ownership data sources and methods is found in Volume 1, Appendix A. More detailed information on protected areas is found in Section 6.0.4. Land ownership categories are discussed below in the order from largest to smallest percentage in the basin.

U.S. Bureau of Land Management (BLM)

- 41.6% of the land is federally owned and managed by the Arizona Strip Field Office of the Bureau of Land Management.
- BLM land in the basin includes portions of the Grand Canyon-Parashant and Vermilion Cliffs National Monuments as well as the 7,880 acre Mt. Trumbull Wilderness, 6,860 acre Cottonwood Point Wilderness and a portion of the 79,000 acre Paria Canyon Wilderness. (see Figure 6.0-14)
- Land uses include grazing, recreation and resource conservation.

National Forest

- 24.1% of the land is federally owned and managed by the United States Forest Service (USFS).
- Forest lands are part of the Kaibab National Forest and include the 40,610-acre Saddle Mountain Wilderness and the 68,340 acre Kanab Creek Wilderness. (see Figure 6.0-14)
- Land uses include recreation, resource conservation, grazing and timber production.

National Park Service (NPS)

- 22.2% of the land is federally owned and managed by the National Park Service.
- This basin includes portions of Grand Canyon National Park, Grand Canyon-Parashant National Monument and Glen Canyon National Recreation Area.
- Land uses include resource conservation and recreation.

Indian Reservation

- 4.4% of the land is under tribal ownership of the Kaibab-Paiute Indian Tribe.
- Land uses include domestic, commercial, agricultural and ranching.

State Trust Land

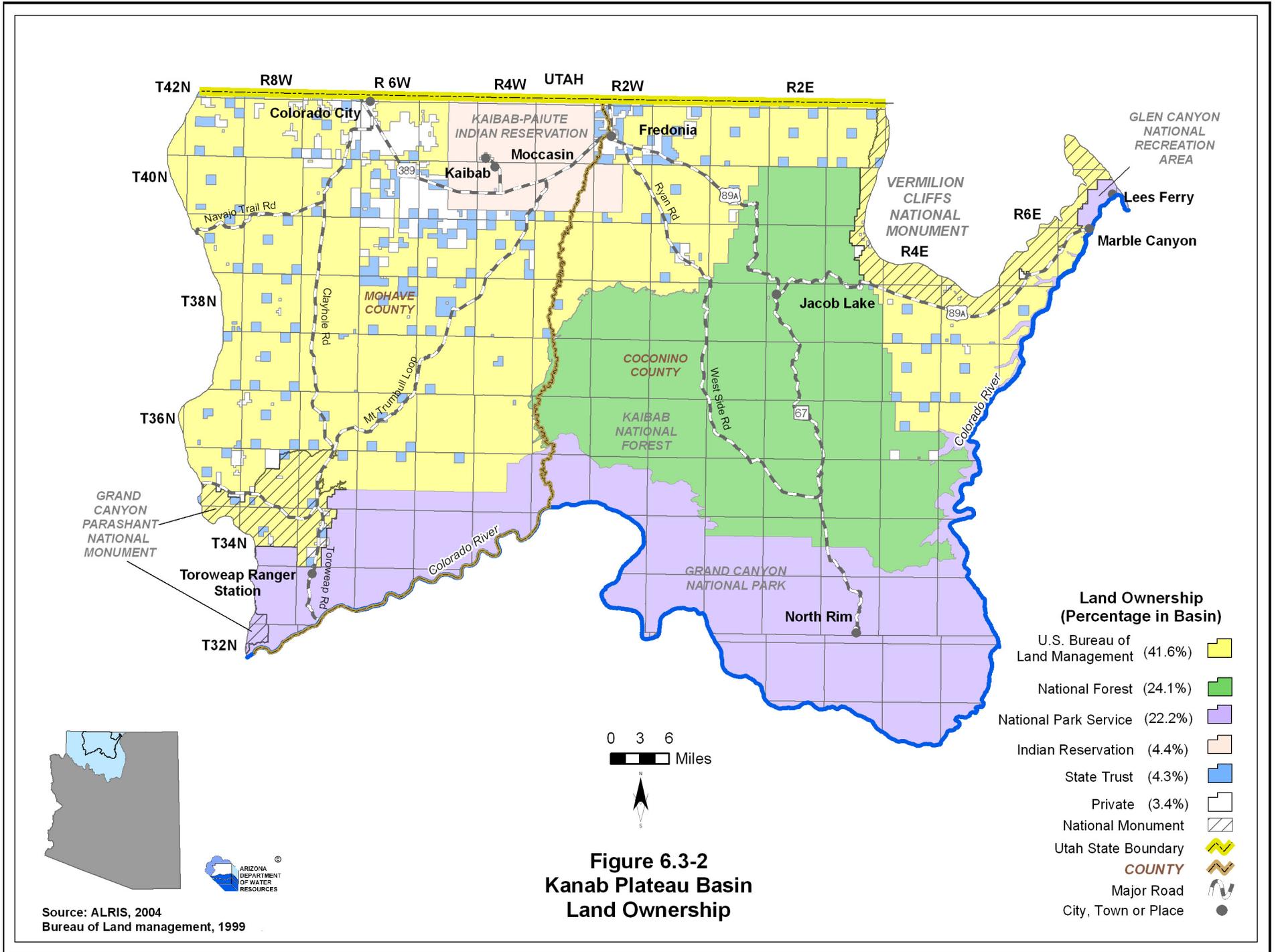
- 4.3% of the land is held in trust for the public schools under the State Trust Land system.
- State land is located throughout the basin interspersed with BLM and private land.
- Primary land use is grazing.

Private

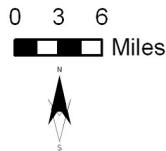
- 3.4% of the land is private.
- The majority of the private land is in the northern portion of the basin in the vicinity of

Colorado City and Fredonia.

- Land uses include domestic, commercial, agriculture and ranching.



Source: ALRIS, 2004
Bureau of Land management, 1999



6.3.3 Climate of the Kanab Plateau Basin

Climate data from NOAA/NWS Co-op Network and SNOTEL/Snowcourse stations are compiled in Table 6.3-1 and the locations are shown on Figure 6.3-3. Figure 6.3-3 also shows precipitation contour data from the Spatial Climate Analysis Service (SCAS) at Oregon State University. The Kanab Plateau Basin does not contain Evaporation Pan or AZMET stations. More detailed information on climate in the planning area is found in Section 6.0.3. A description of the climate data sources and methods is found in Volume 1, Appendix A.

NOAA/NWS Co-op Network

- Refer to Table 6.3-1A
- There are nine NOAA/NWS Co-op network climate stations in the basin. The average monthly maximum temperature occurs in July and ranges between 91.5°F at Inner Canyon USGS and 61.8°F at Bright Angel Ranger Station. The average monthly minimum temperature occurs in January or December and ranges between 23.2°F at Colorado City and 47.0°F at Phantom Ranch.
- Highest average seasonal rainfall occurs in the summer (July-September) or winter (January-March). For the period of record used, the highest annual rainfall is 25.70 inches at Bright Angel Ranger Station and the lowest is 6.55 inches at Lees Ferry

SNOTEL/Snowcourse

- Refer to Table 6.3-1D
- There is one SNOTEL/Snowcourse station (Bright Angel) in the basin located at the north rim of the Grand Canyon.
- The highest average monthly snowpack is in March with an average of 9.9 inches.

SCAS Precipitation Data

- See Figure 6.1-3
- Additional precipitation data shows average annual rainfall as high as 30 inches north of the North Rim and as low as four inches along the Colorado River.

Table 6.3-1 Climate Data for the Kanab Plateau Basin

A. NOAA/NWS Co-op Network:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Temperature Range (in F)		Average Precipitation (in inches)				
			Max/Month	Min/Month	Winter	Spring	Summer	Fall	Annual
Bright Angel Ranger Station	8,400	1971-2000	61.8/Jul	27.2/Jan	10.79	2.80	5.76	6.35	25.70
Colorado City	5,010	1971-2000	76.8/Jul	23.2/Jan, Dec	4.41	2.70	4.04	3.02	14.17
Fredonia	4,680	1948-2005 ¹	74.2/Jul	32.4/Jan	2.79	1.40	2.79	3.34	10.32
Inner Canyon USGS	2,570	1948-1966	91.5/Jul	45.8/Jan	2.13	1.23	3.21	1.82	8.38
Jacob Lake	7,830	1950-1987 ¹	64.9/Jul	27.9/Jan	5.71	3.64	7.08	6.67	23.10
Lees Ferry	3,210	1971-2000	87.3/Jul	37.8/Jan, Dec	1.64	0.91	2.33	1.67	6.55
Phantom Ranch	2,570	1971-2000	91.4/Jul	47.0/Jan	3.12	1.09	3.13	2.43	9.77
Pipe Springs National Monument	4,920	1971-2000	76.7/Jul	34.8/Jan	3.81	1.59	3.30	2.56	11.26
Tuweep	4,780	1948-1985 ¹	79.6/Jul	38.5/Jan	3.93	1.46	3.97	2.98	12.34

Source: WRCC, 2005

Notes:

¹ Average temperature for period of record shown; average precipitation from 1971-2000

B. Evaporation Pan:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Avg. Annual Evap (in inches)
None			

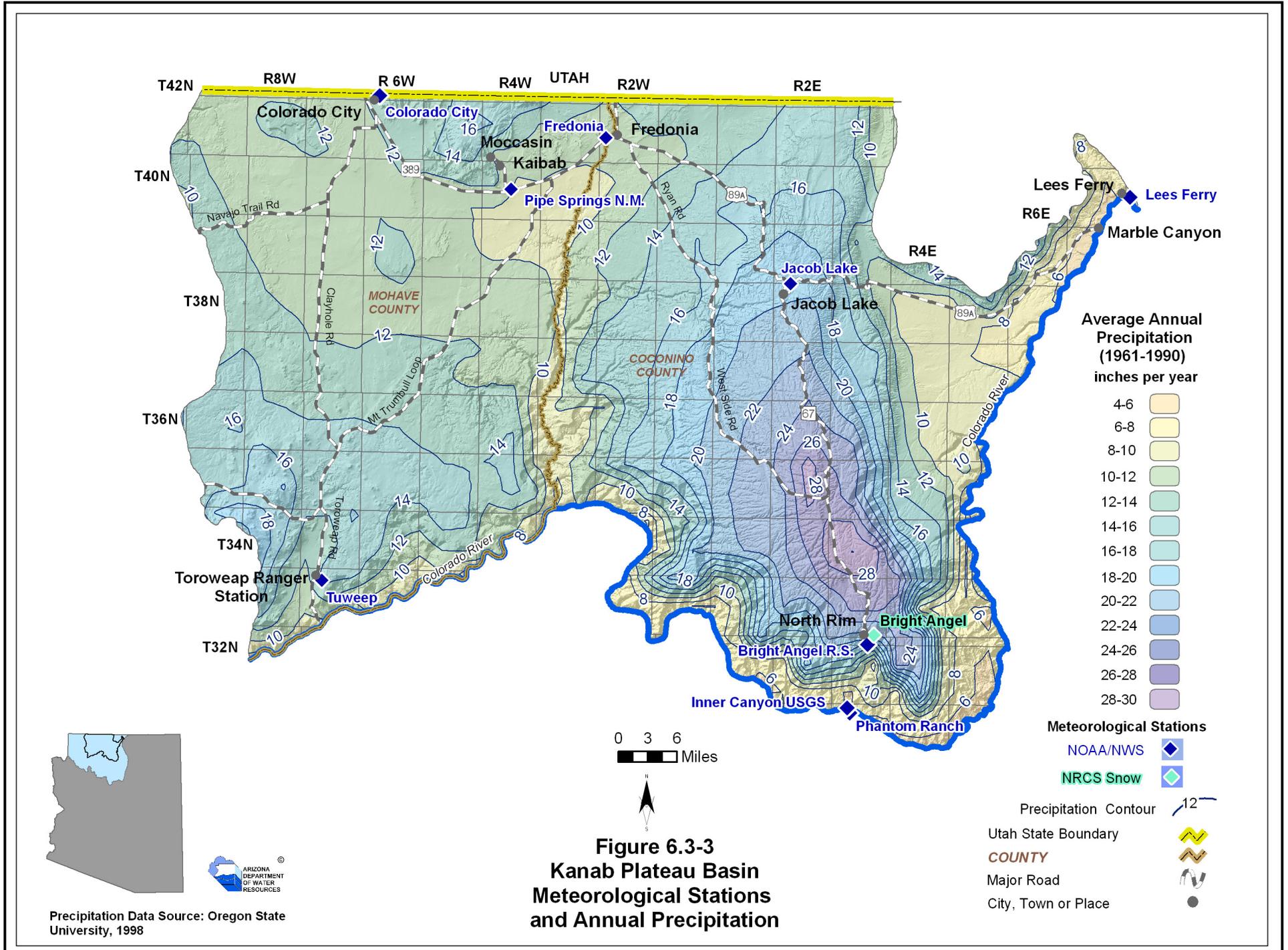
C. AZMET:

Station Name	Elevation (in feet)	Period of Record	Average Annual Reference Evapotranspiration, in inches (Number of years to calculate averages)
None			

D. SNOTEL/Snowcourse:

Station Name	Elevation (in feet)	Period of Record	Average Snowpack, as Snow Water Content, at the Beginning of the Month, in Inches (Number of measurements to calculate average)					
			Jan.	Feb.	March	April	May	June
Bright Angel	8,400	1947 - current	3.3 (28)	7.0 (50)	9.9 (49)	9.1 (44)	16.2 (1)	0 (0)

Source: Natural Resources Conservation Service, 2006



6.3.4 Surface Water Conditions in the Kanab Plateau Basin

Streamflow data, including average seasonal flow, average annual flow and other information are shown in Table 6.3-2. Flood ALERT equipment in the basin is shown in Table 6.3-3. Reservoir and stockpond data, including maximum storage or maximum surface area, are shown in Table 6.3-4. The location of streamflow gages identified by USGS number, flood ALERT equipment, USGS runoff contours and large reservoirs are shown on Figure 6.3-5. Descriptions of stream, reservoir and stockpond data sources and methods are found in Volume 1, Appendix A.

Streamflow Data

- Refer to Table 6.3-2.
- Data from six stations located at three watercourses are shown in the table and their location is shown on Figure 6.3-5. Three stations have been discontinued and two stations are real-time stations.
- The Colorado River near Grand Canyon station receives highest seasonal flow in the spring (April-June). Unlike the other two stations on the Colorado River in this basin, the period of record for this station predates Glen Canyon Dam upstream on the Colorado River, and therefore more closely reflects the river's unaltered average seasonal flow.
- The largest annual flow recorded in the basin is 20.6 million acre feet (maf) in 1984 at the Colorado River near Grand Canyon station with a contributing drainage area of 141,600 square miles.
- The Colorado River in the basin has a mean and median annual flow of over eight maf at all three gages. The Paria River is a major tributary to the Colorado River, with a median annual flow of over 18,000 acre-feet.
- Figure 6.3-4 shows the annual flow in the Colorado River near Grand Canyon station. Flood events/Glen Canyon Dam releases are shown in 1983-84 and in 1998. Otherwise, the data show below average flow, and less variability in year-to-year flow after construction of Glen Canyon Dam in 1964.

Flood ALERT Equipment

- Refer to Table 6.3-3.
- As of October 2005 there was one station in the basin.

Reservoirs and Stockponds

- Refer to Table 6.3-4.
- The basin contains three large reservoirs. Two of the three large reservoirs are dry or intermittent lakes.
- Surface water is stored or could be stored in ten small reservoirs.
- There are 705 registered stockponds in this basin.

Runoff Contour

- Refer to Figure 6.3-5.
- Average annual runoff is highest, two inches per year or 106.6 acre-feet per square mile, below the Kaibab Plateau in the western portion of the basin and decreases to 0.1 inches, or 5.33 acre-feet per square mile, east and west of the Kaibab Plateau.

Figure 6.3-4 Annual Flows (acre-feet) Colorado River near Grand Canyon 1923-2005 (Station # 9402500)

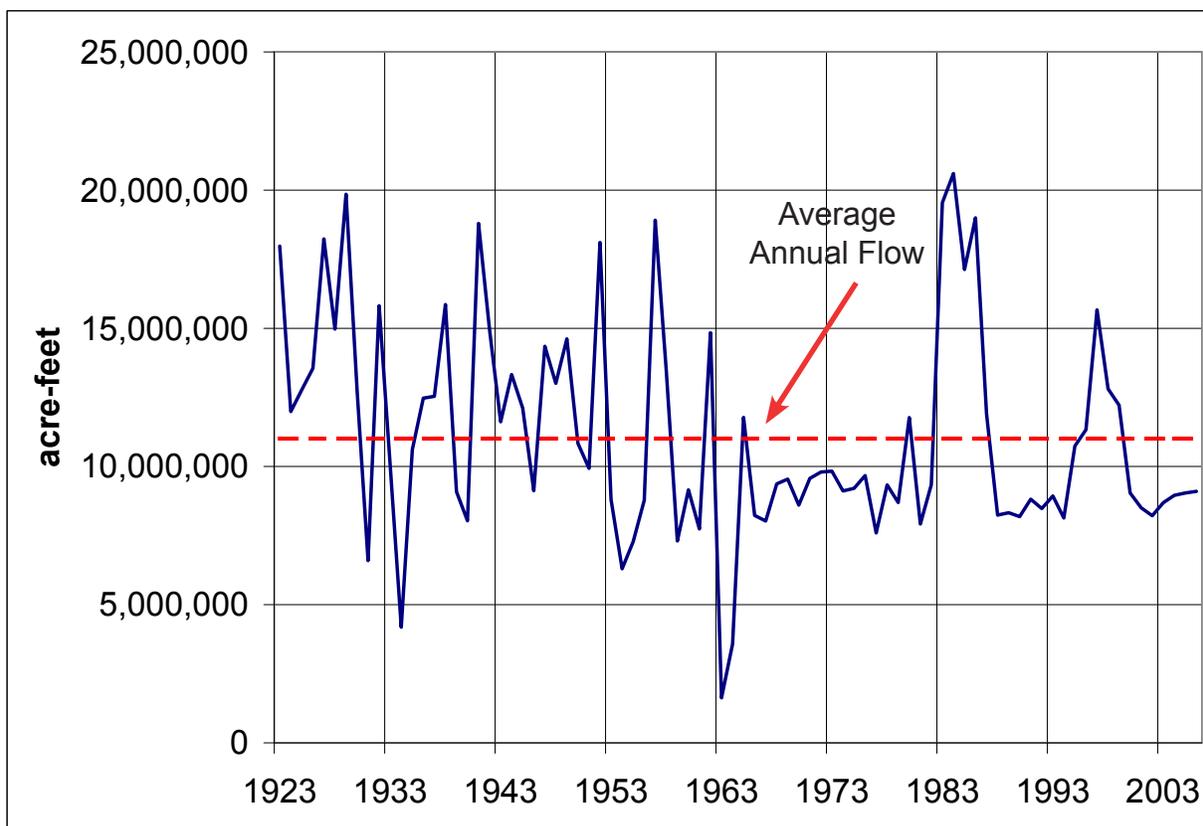


Table 6.3-2 Streamflow Data for the Kanab Plateau Basin

Station Number	USGS Station Name	Drainage Area (in mi ²)	Gage Elevation (in feet)	Period of Record	Average Seasonal Flow (% of annual flow)				Annual Flow/Year (in acre-feet)				Years of Annual Flow Record
					Winter	Spring	Summer	Fall	Minimum	Median	Mean	Maximum	
9382000	Paria River at Lees Ferry	1,410	3,124	10/1923-current (real time)	29	11	38	22	9,052 (1977)	18,104	20,606	47,867 (1980)	79
9383000 ¹	Colorado River at Compact Point near Lees Ferry	112,000	NA	10/1980-9/2007	24	25	28	22	7,833,437 (1988)	8,383,659	9,876,067	18,699,615 (1986)	20
9383100	Colorado River above Little Colorado River near Desert View	114,272	2,687	9/1989-1/2002 (discontinued)	25	25	27	23	8,188,186 (1990)	9,610,439	10,357,150	15,420,721 (1997)	10
9402500	Colorado River near Grand Canyon	141,600	2,419	10/1922-current (real time)	17	43	24	16	1,629,360 (1963)	9,884,422	11,234,437	20,551,661 (1984)	79
9402501	Colorado River near Grand Canyon (Stonehouse)	NA	2,419	11/2001- 1/2006 (discontinued)	27	25	28	20	No statistics run; less than 3 years data				2
9403780	Kanab Creek near Fredonia	1,085	4,500	10/1963-9/1980 (discontinued)	40	27	20	14	608 (1964)	3,743	4,603	11,728 (1979)	16

Source: USGS (NWIS) 2005 & 2008

Notes:

¹ This gage is not an actual gage but a compilation of data from the Paria River gage 09392000 and the Lees Ferry gage 09380000 in the Little Colorado River Basin and is used for accounting purposes.

NA = Not available

Average seasonal flow and annual flow/year data are current as of water year 2003

Statistics based on Calendar Year

Annual Flow statistics based on monthly values

Summation of Average Annual Flows may not equal 100 due to rounding

Period of record may not equal Year of Record used for annual Flow/Year statistics due to only using years with a 12 month record

In Period of Record, current equals November 2008

Seasonal and annual flow data used for the statistics was retrieved in 2005

Table 6.3-3 Flood ALERT Equipment in the Kanab Plateau Basin

Station ID	Station Name	Station Type	Install Date	Responsibility
7580	Colorado City	Weather Station	NA	Mohave County FCD

Source: ADWR 2005a

Notes:

FCD = Flood Control District

NA = Information is not available at this time

Table 6.3-4 Reservoirs and Stockponds in the Kanab Plateau Basin

A. Large Reservoirs (500 acre-feet capacity and greater)

MAP KEY	RESERVOIR/LAKE NAME (Name of dam, if different)	OWNER/OPERATOR	MAXIMUM STORAGE (AF)	USE ¹	JURISDICTION
1	Fredonia ²	Fredonia	2,710	C	State

Source: U.S. Army Corps of Engineers 2005

B. Other Large Reservoirs (50 acre surface area or greater)³

MAP KEY	RESERVOIR/LAKE NAME (Name of dam, if different)	OWNER/OPERATOR	MAXIMUM SURFACE AREA (acres)	USE ¹	JURISDICTION
2	Lakes of Short Creek	Short Creek Southside Irrigation Co.	200	I	State
3	Toroweap ⁴	National Park Service	83	P	Federal

Source: Compilation of databases from ADWR & others

C. Small Reservoirs (greater than 15 acre-feet and less than 500 acre-feet capacity)

Total number: 1

Total maximum storage: 104 acre-feet

D. Other Small Reservoirs (between 5 and 50 acres surface area)³

Total number: 9

Total surface area: 112 acres

E. Stockponds (up to 15 acre-feet capacity)

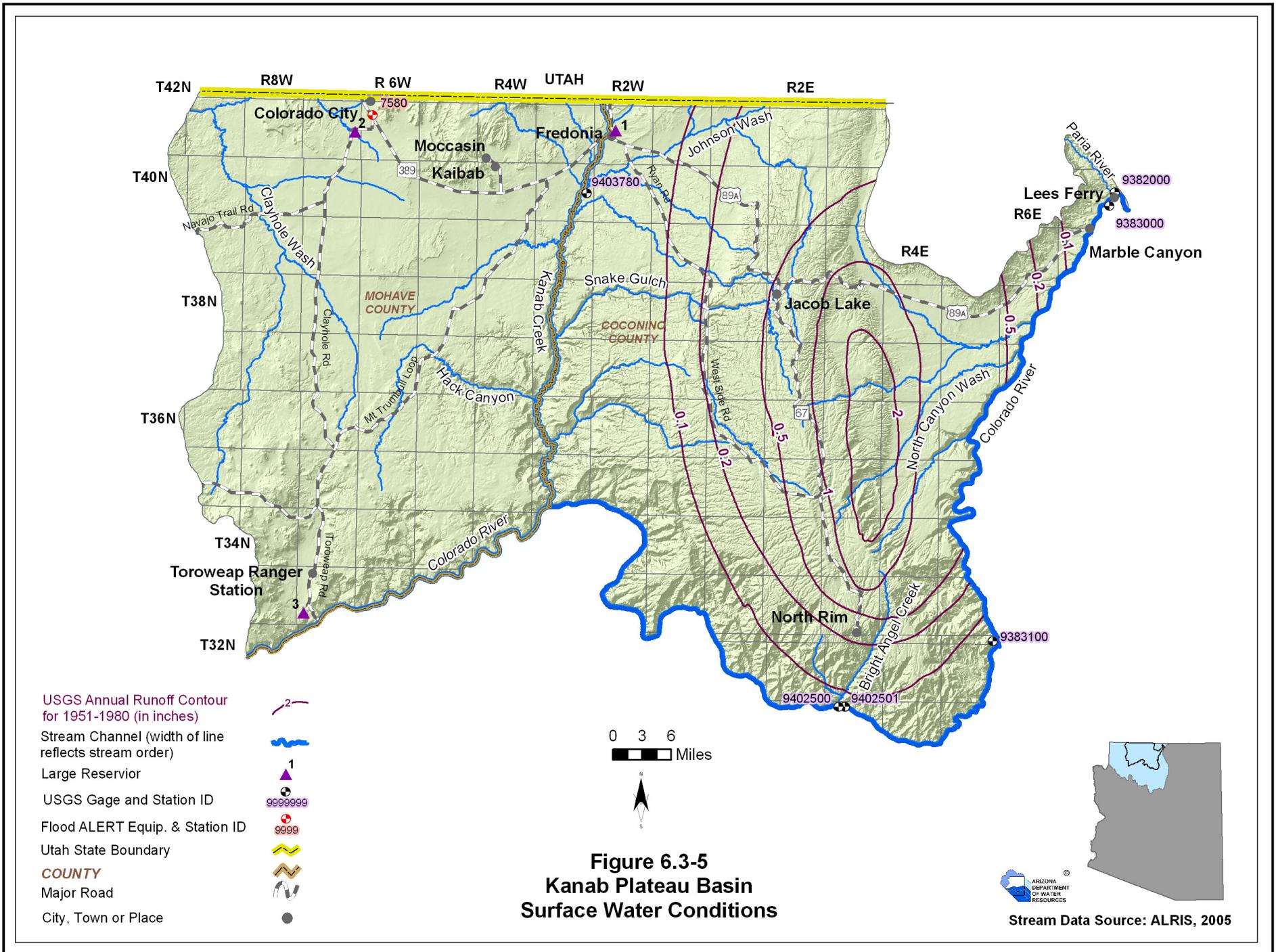
Total number: 705

¹ C=flood control; I=irrigation, P=fire protection, stock or farm pond

² Intermittent lake

³ Capacity data not available to ADWR

⁴ Dry lake



6.3.5 Perennial/Intermittent Streams and Major Springs in the Kanab Plateau Basin

Major and minor springs with discharge rates and date of measurement, and the total number of springs in the basin are shown in Table 6.3-5. The locations of major springs and perennial and intermittent streams are shown on Figure 6.3-6. Descriptions of data sources and methods for intermittent and perennial reaches and springs are found in Volume 1, Appendix A.

- The basin contains numerous perennial streams; most are located along and in the vicinity of the southern basin boundary. Significant perennial streams include the Colorado River, the Paria River and Kanab Creek.
- Intermittent streams are found south of Jacob Lake and in the vicinity of the Colorado River. Most of Kanab Creek is also intermittent in the basin.
- There are 39 major springs with a measured discharge of 10 gallons per minute (gpm) or greater at any time.
- Springs with measured discharge of 1 to 10 gpm are not mapped but coordinates are given in Table 6.3-5B. There are 23 minor springs in this basin.
- Listed discharge rates may not be indicative of current conditions. Many of the measurements were taken during or prior to 1996.
- The total number of springs, regardless of discharge, identified by the USGS varies from 181 to 190, depending on the database reference.

Table 6.3-5 Springs in the Kanab Plateau Basin

A. Major Springs (10 gpm or greater):

Map Key	Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
		Latitude	Longitude		
1	Tapeats (above Thunder)	362425	1122546	18,763	11/9/2003
2	Thunder at Tapeats	362346	1122728	9,741	11/9/2003
3	Angel	361317	1120040	7,810	10/14/92
4	Shinumo	361808	1121808	4,058	4/27/2002
5	Deer Creek	362322	1123027	3,542	5/31/2000
6	Roaring	361143	1120207	1,952	7/13/2003
7	Kanab Creek	362335	1123745	1,619	10/5/1993
8	Clear Creek	360454	1120208	772	4/24/2002
9	Dragon	361043	1121055	627	7/30/1969
10	Haunted	360935	1120636	430	8/15/1969
11	Abyss River	361721	1121528	403	7/13/1969
12	Fence Fault North	363139	1115044	300	3/26/2001
13	Stone Creek (below falls)	362050	1122708	265	3/1/2002
14	At Last	361716	1115745	260	7/29/1969
15	Crystal	361153	1121215	247	3/18/2004
16	Emmett ²	361257	1120135	215	7/22/1969
17	Nankoweap Creek	361809	1115205	193	4/22/2002
18	Big	363608	1122054	185	7/2/2000
19	Ribbon ²	361012	1120435	184	8/16/1969
20	Clear Water	364606	1123712	155	1/25/1997
21	Kwagunt Creek near Colorado R.	361542	1114948	137	10/14/1995
22	Vasey's Paradise	362957	1115126	119	3/14/2004
23	North Canyon (multiple)	362354	1120500	108	6/28/2000
24	Chuar Creek ²	361000	1115147	100	10/12/1997
25	Long Res	365438	1124535	90	9/9/1976
26	Sand	365424	1124429	81	6/18/1997
27	Butte Fault-Upper	361658	1115318	76	3/27/2001
28	Phantom	360906	1120749	72	8/15/1969
29	Robber's Roost	361650	1120516	56 ³	7/7/1998
30	Noble ²	361740	1121755	54	7/13/1969
31	Transcept ²	361125	1120340	54	8/17/1969
32	Pipe	365149	1124422	35 ³	7/27/1976
33	Cottonwood	365829	1123601	25	11/15/1996
34	Mangum	363720	1122022	25	8/8/1976

Table 6.3-5 Springs in the Kanab Plateau Basin (Cont)

Map Key	Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
		Latitude	Longitude		
35	Two Mile Seep	365047	1123942	21	11/14/1996
36	Mocassin	365437	1124546	20	During or Prior to 1997
37	Soap Creek ²	364645	1114613	18	8/4/1976
38	Tunnel	365147	1124420	11	8/8/2000
39	Kanabownits	361714	1121246	10	6/1/1976

B. Minor Springs (1 to 10 gpm):

Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
	Latitude	Longitude		
South Big	361906	1121537	9	06/1975
Sprayfield	361302	1120405	8	06/1975
Warm	364141	1121842	6	7/3/2000
Unnamed	362044	1124015	5	4/4/2001
Castle	363509	1122027	4	7/2/2000
Sowats	363139	1122718	4	7/1/2000
Cliff Dweller	361221	1120340	3	07/1976
Unnamed ^{2,4}	361257	1120403	3	6/1/1976
Riggs	365655	1123729	2	11/15/1996
Little	362038	1130901	2	8/16/1950
Quaking Aspen	362243	1121654	2	6/29/2000
Milk Creek	361616	1120835	2	8/5/2000
Fern Glen ²	361543	1125503	2	5/8/1976
Nixon	362408	1130846	1	6/20/2000
Sowats B	363127	1122718	1	7/1/2000
Timp	362316	1121743	1	8/8/2000
Coyote	365707	1120203	1	8/6/1976
Watts	362247	1121631	1	6/29/2000
Wolf	365853	1123809	1	11/15/1996
Saddle Horse	361345	1130317	1	8/9/1976
Unnamed	362047	1124329	1	5/7/1976
Yellowstone	364352	1125633	1	8/15/1951
Point	365516	1124322	1	11/15/1996

Source: Compilation of databases from ADWR & others

C. Total number of springs, regardless of discharge, identified by USGS (see ALRIS, 2005a and USGS, 2006b): 181 to 190

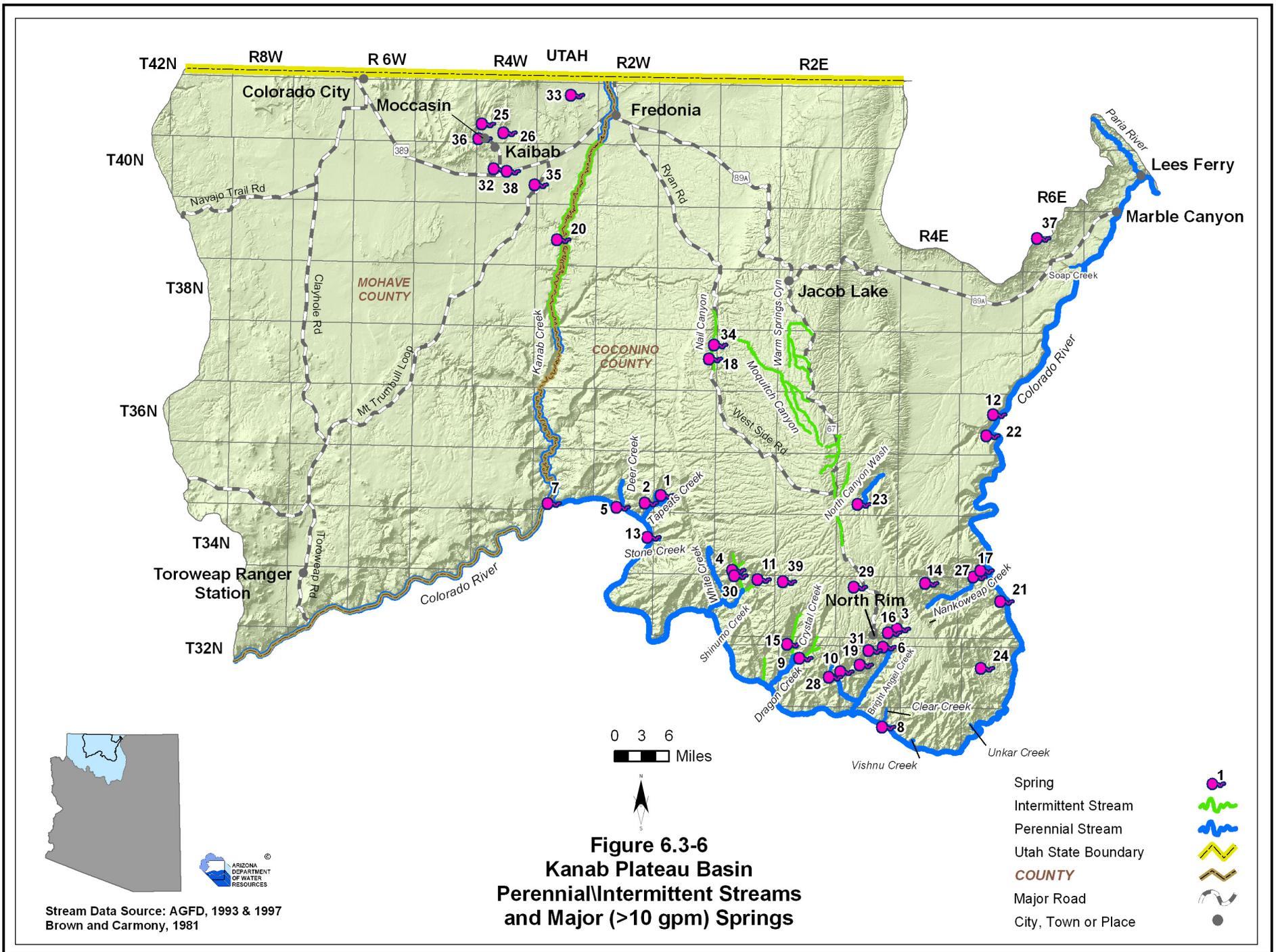
Notes:

¹ Most recent measurement identified by ADWR

² Spring is not displayed on current USGS topo map

³ Discharge measurements vary. Shown is greatest measured discharge; most recent measurement < 10 gpm

⁴ Location approximated by ADWR



6.3.6 Groundwater Conditions of the Kanab Plateau Basin

Major aquifers, well yields, number of index wells and date of last water-level sweep are shown in Table 6.3-6. Figure 6.3-7 shows water-level change between 1990-1991 and 2003-2004. Figure 6.3-8 contains hydrographs for the wells shown on Figure 6.3-7. Figure 6.3-9 shows well yields in three yield categories. A description of aquifer data sources and methods as well as well data sources and methods, including water-level changes and well yields are found in Volume 1, Appendix A.

Major Aquifers

- Refer to Table 6.3-6 and Figure 6.3-7.
- Major aquifers in the basin include recent stream alluvium and sedimentary rock.
- Almost all of the basin geology consists of consolidated crystalline and sedimentary rock.
- Data on natural recharge, groundwater in storage and groundwater flow direction are not available for this basin.

Well Yields

- Refer to Table 6.3-6 and Figure 6.3-9.
- As shown on Figure 6.3-9, well yields in this basin range from less than 100 gallons per minute (gpm) to 1,000 gpm.
- One source of well yield information, based on 10 reported wells, indicates that the median well yield in this basin is 70 gpm.

Water Level

- Refer to Figure 6.3-7. Water levels are shown for wells measured in 2003-2004.
- The Department annually measures three index wells in this basin. Hydrographs for two of these wells are shown in Figure 6.3-8.
- For the two wells shown on Figure 6.3-7 depth to water was 87 feet at one well and 611 feet at the other. Water level change was minimal between 1990-1991 and 2003-2004.

Table 6.3-6 Groundwater Data for the Kanab Plateau Basin

Basin Area, in square miles:	4,247	
Major Aquifer(s):	Name and/or Geologic Units	
	Recent Stream Alluvium	
	Sedimentary Rock	
Well Yields, in gal/min:	Range 236-480 Median 358 (2 wells measured)	Measured by ADWR (GWSI) and/or USGS
	Range 3-500 Median 70 (10 wells reported)	Reported on registration forms for large (>10-inch) diameter wells (Wells55)
	Range 30-200	ADWR (1990 and 1994b)
	Range 0-500	Anning and Duet (1994)
Estimated Natural Recharge, in acre-feet/year:	N/A	
Estimated Water Currently in Storage, in acre-feet:	N/A	
Current Number of Index Wells:	3	
Date of Last Water-level Sweep:	1976 (62 wells measured)	

N/A = Not Available

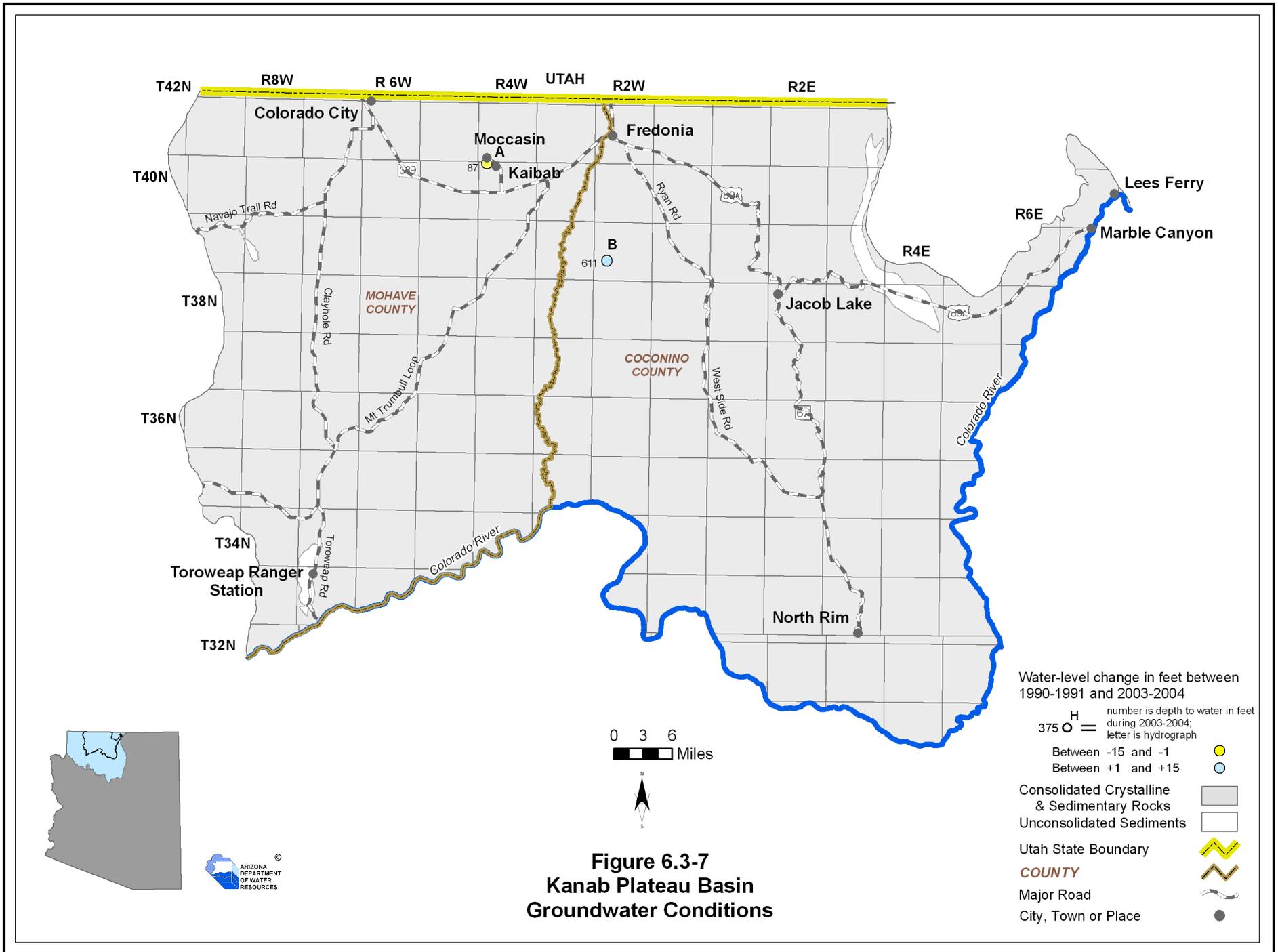
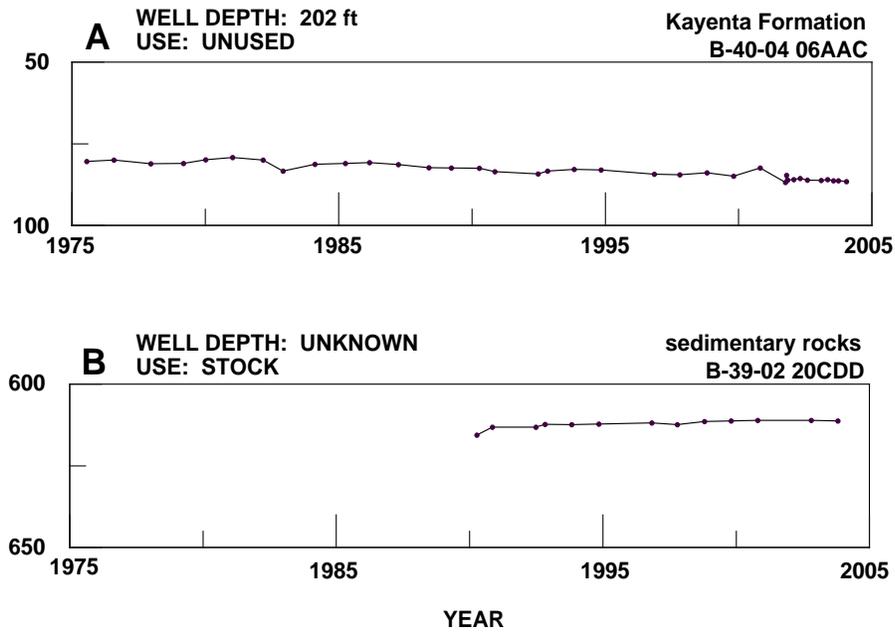


Figure 6.3-8
Kanab Plateau Basin
Hydrographs Showing Depth to Water in Selected Wells

Depth To Water In Feet Below Land Surface



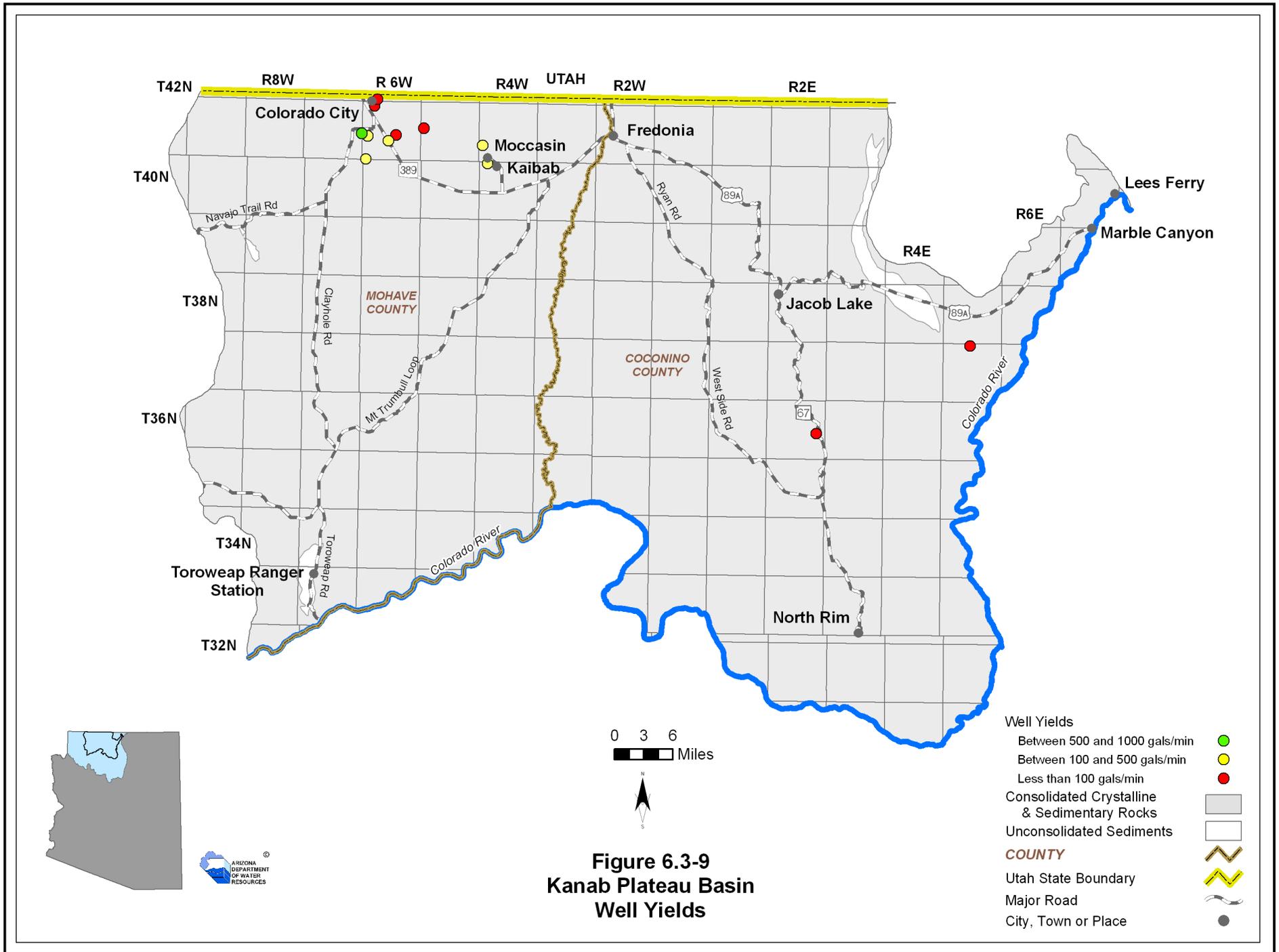


Figure 6.3-9
Kanab Plateau Basin
Well Yields

6.3.7 Water Quality of the Kanab Plateau Basin

Wells, springs and mine sites with parameter concentrations that have equaled or exceeded drinking water standard(s), including location and parameter(s) are shown in Table 6.3-7A. Impaired lakes and streams with site type, name, length of impaired reach, area of impaired lake, designated use standard and parameter(s) exceeded is shown in Table 6.3-7B. Figure 6.3-10 shows the location of water quality occurrences keyed to Table 6.3-7. A description of water quality data sources and methods is found in Volume 1, Appendix A. Not all parameters were measured at all sites; selective sampling for particular constituents is common.

Well, Mine or Spring sites that have equaled or exceeded drinking water standards (DWS)

- Refer to Table 6.3-7A.
- Eight wells or springs have parameter concentrations that have equaled or exceeded drinking water standards.
- The parameter most frequently equaled or exceeded in the sites measured was total dissolved solids. Other parameters equaled or exceeded are lead and nitrates.

Lakes and Streams with impaired waters

- Refer to Table 6.3-7B and Figure 6.3-9
- The water quality standard for suspended sediment concentration was exceeded in one 29-mile stream reach, the Paria River from the Utah border to the Colorado River. A portion of this impaired reach is located in the Paria Basin.
- This reach is not part of the ADEQ water quality improvement effort called the Total Maximum Daily Load (TMDL) Program at this time.

Effluent Dependent Reaches

- Refer to Figure 6.3-9
- There is one effluent dependent reach in this basin, Transect Canyon. This reach receives effluent from the North Rim Wastewater Treatment Plant.

Table 6.3-7 Water Quality Exceedences in the Kanab Plateau Basin¹

A. Wells, Springs and Mines

Map Key	Site Type	Site Location			Parameter(s) Concentration has Equaled or Exceeded Drinking Water Standard (DWS) ²
		Township	Range	Section	
1	Well	37 North	5 East	4	TDS
2	Well	41 North	1 West	15	TDS
3	Well	41 North	4 West	31	Pb
4	Well	41 North	7 West	23	NO3
5	Spring	40 North	4 West	17	Pb
6	Well	40 North	7 West	4	TDS
7	Well	40 North	8 West	17	TDS
8	Well	39 North	4 West	24	TDS

Source: Compilation of databases from ADWR & others

B. Lakes and Streams

Map Key	Site Type	Site Name	Length of Impaired Stream Reach (in miles)	Area of Impaired Lake (in acres)	Designated Use Standard ³	Parameter(s) Exceeding Use Standard
a	Stream	Paria River (Utah border to Colorado River)	29 ⁴	NA	A&W	suspended sediment concentration

Source: ADEQ 2005e

Notes:

NA = Not Applicable

¹ Water quality samples collected between 1976 and 2001.

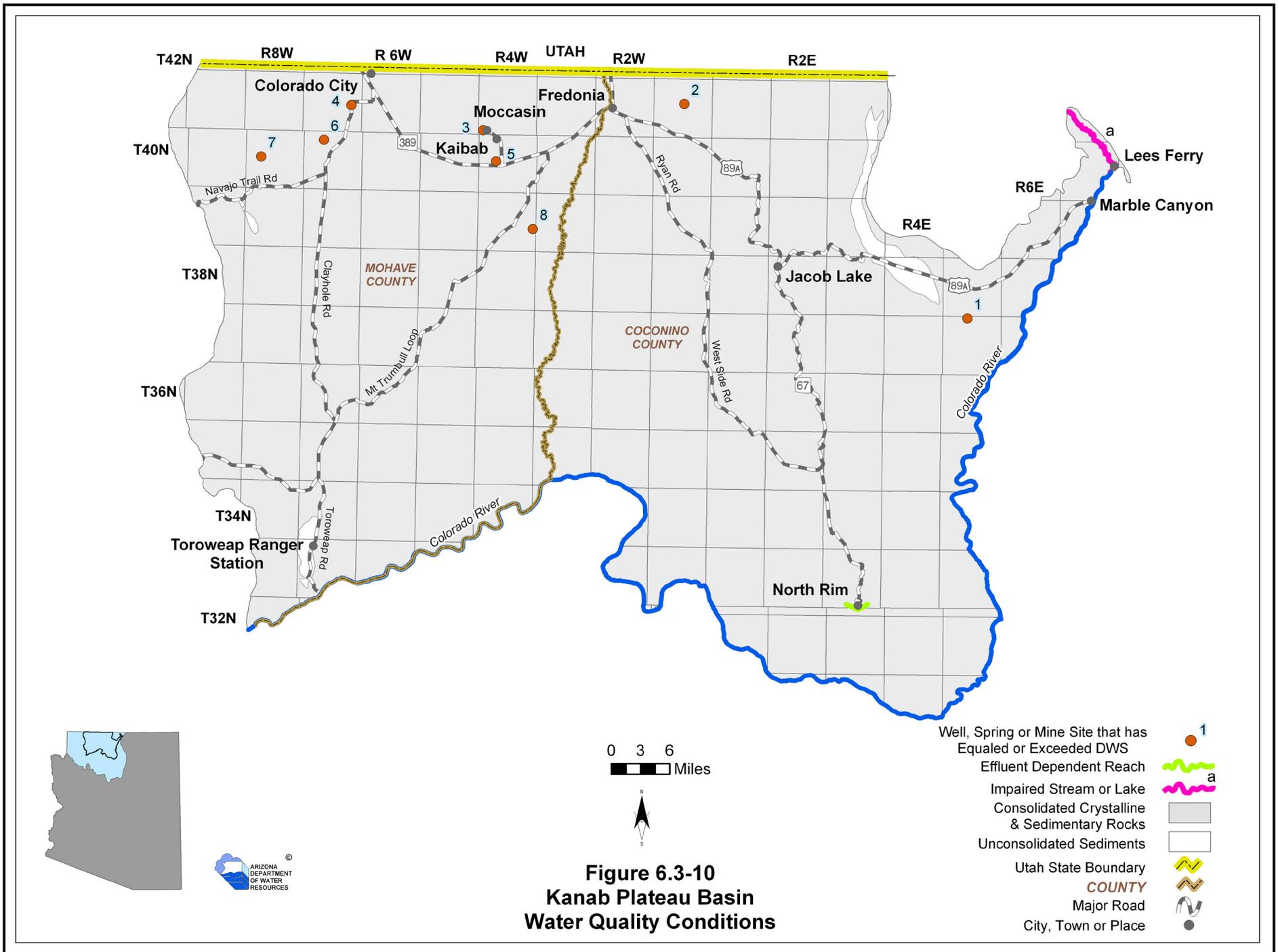
² Pb = Lead

NO3 = Nitrate

TDS = Total Dissolved Solids

³ A&W = Aquatic and Wildlife

⁴ Total length of the impaired reach. A portion of this reach is in the Paria Basin.



6.3.8 Cultural Water Demand in the Kanab Plateau Basin

Cultural water demand data including population, number of wells and the average well pumpage and surface water diversions by the municipal, industrial and agricultural sectors are shown in Table 6.3-8. Effluent generation including facility ownership, location, population served and not served, volume treated, disposal method and treatment level is shown in Table 6.3-9. Figure 6.3-11 shows the location of demand centers. A description of cultural water demand data sources and methods is found in Volume 1, Appendix A. More detailed information on cultural water demand is found in Section 6.0.7.

Cultural Water Demand

- Refer to Table 6.3-8 and Figure 6.3-11.
- Population in this basin increased from 2,815 in 1980 to 6,233 in 2000 and is projected to reach 14,688 by 2030.
- Groundwater demand has decreased in this basin and was less than 2,600 acre-feet in 2001-2005.
- Groundwater is used for both municipal and agricultural demand. Municipal and agricultural demand centers are located in the vicinity of Fredonia, Colorado City, Moccasin and Kaibab.
- Data on surface water use prior to 1991 is not available. The table includes approximately 600 acre-feet of surface water diverted from Roaring Spring in this basin for use at the Grand Canyon South Rim in the Coconino Plateau Basin. Less than 1,000 acre-feet of water is diverted from Kanab Creek for agriculture in the Fredonia area.
- As of 2009 there were no active mines in the basin, however, exploration for uranium is on going.
- As of 2005 there were 220 registered wells with a pumping capacity of less than or equal to 35 gpm and 119 wells with a pumping capacity of more than 35 gpm.

Effluent Generation

- Refer to Table 6.3-9.
- There are five wastewater treatment facilities in this basin.
- Information on population served was available for two facilities and information on effluent generation was available for four facilities. These facilities serve almost 2,900 people and generate over 400 acre-feet of effluent per year. At one time Colorado City operated a wastewater treatment facility that served over 5,000 people and generated 403 acre-feet per year. The plant closed in 2002 and Colorado City now sends sewage to Hildale, Utah for treatment.
- Of the four facilities with information on the effluent disposal method: one discharges to evaporation ponds; two discharge for irrigation; and one discharges to unlined impoundments that recharge the aquifer.

Table 6.3-8 Cultural Water Demand in the Kanab Plateau Basin¹

Year	Estimated and Projected Population	Number of Registered Water Supply Wells Drilled		Average Annual Demand (in acre-feet)						Data Source		
				Well Pumpage			Surface-Water Diversions					
		Q ≤ 35 gpm	Q > 35 gpm	Municipal	Industrial	Agricultural	Municipal	Industrial	Agricultural			
1971		149 ³	66 ³	<500			NR ⁴			ADWR (1994a)		
1972												
1973												
1974												
1975												
1976												
1977												
1978												
1979												
1980	2,815	3	4	2,000			NR					
1981	2,985											
1982	3,155											
1983	3,324											
1984	3,494											
1985	3,664	10	17	2,000			NR					
1986	3,834											
1987	4,004											
1988	4,174											
1989	4,343											
1990	4,513	9	6	900	<300	1,500	700	NR	<1,000	USGS (2007) ADWR (2008b)		
1991	4,655											
1992	4,797											
1993	4,938			20	19	1,200	<300	1,500	700		NR	<1,000
1994	5,080											
1995	5,222											
1996	5,364											
1997	5,505											
1998	5,647			29	7	1,600	<300	<1,000	700		NR	<1,000
1999	5,789											
2000	6,233											
2001	6,602											
2002	6,971											
2003	7,339											
2004	7,708											
2005	8,077											
2010	9,921											
2020	12,552											
2030	14,688											
WELL TOTALS:		220	119									

¹ Does not include effluent or evaporation losses from stockponds and reservoirs.

² Surface water diverted in the Kanab Plateau Basin is delivered to the Coconino Plateau Basin for use at the Grand Canyon South Rim.

³ Includes all wells through 1980.

⁴ Surface water diversions for irrigation occurred in the Fredonia area prior to 1990 however data on the volume of recent surface water diversions is not available.

NR - Not reported

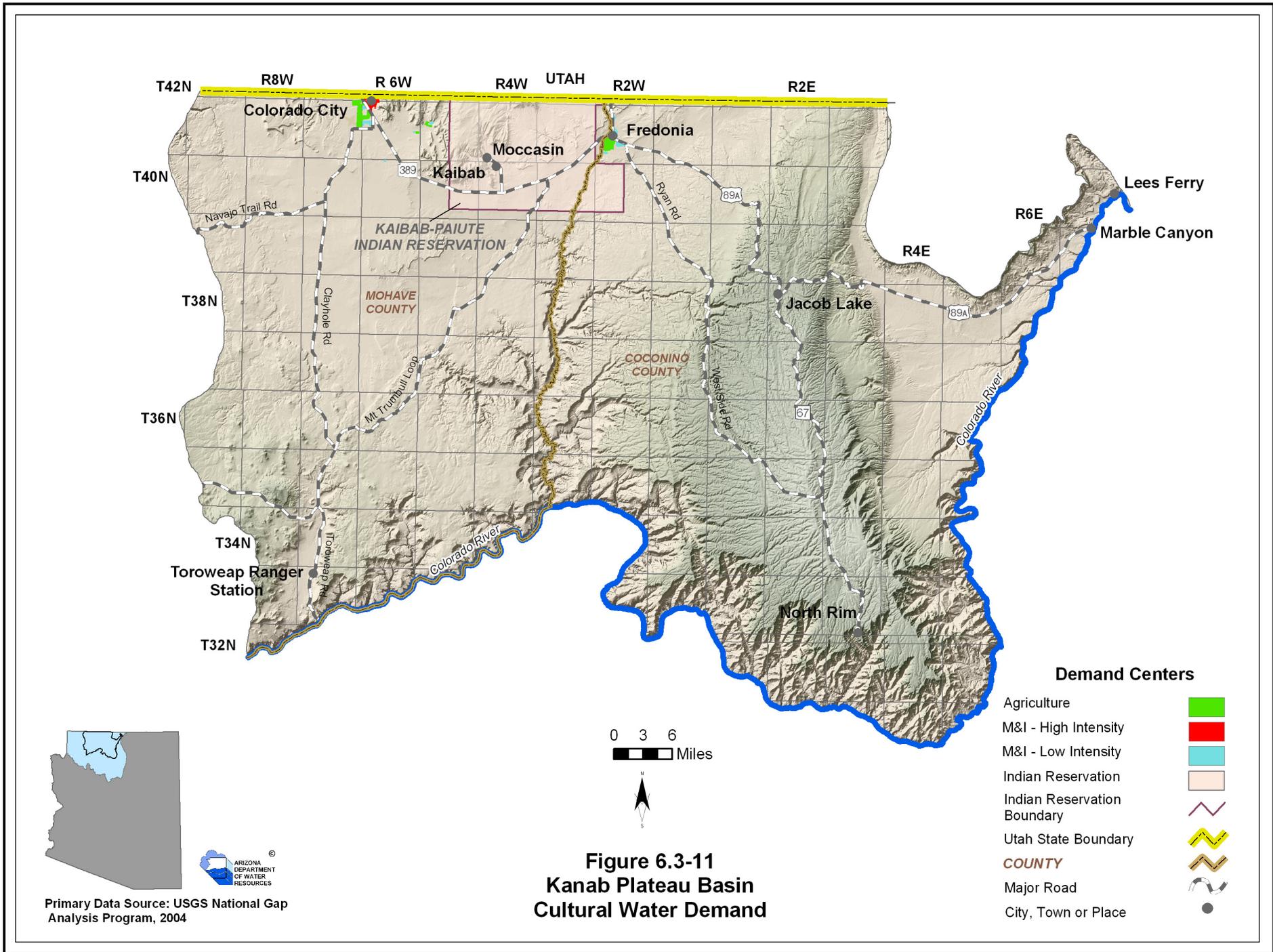
Table 6.3-9 Effluent Generation in the Kanab Plateau Basin

Facility Name	Ownership	City/Location Served	Population Served	Volume Treated/Generated (acre-feet/year)	Disposal Method									Current Treatment Level	Population Not Served	Year of Record
					Water-course	Evaporation Pond	Irrigation	Wildlife Area	Golf Course/Turf/Landscape	Municipal Reuse	Discharged to Another Facility	Infiltration Basins	Other			
Fredonia WWTF	Fredonia	Fredonia	1,395	157		X								Secondary w/ Nutrient Removal	1,025	1998
Jacob Lake	Private	Jacob Lake	NA													
Kaibab Lagoons	NA	NA	1,500	168							X		Secondary	NA	2000	
North Rim-Grand Cayon WWTP	National Park Service	Park	NA	112	Trancept Canyon		X						NA		2002	
Phantom Ranch	National Park Service	Park	NA	10			X						NA		2002	
Total			2,895	447												

Source: Compilation of databases from ADWR & others

Notes:

Year of Record is for the volume of effluent treated/generated



Primary Data Source: USGS National Gap Analysis Program, 2004

Figure 6.3-11
Kanab Plateau Basin
Cultural Water Demand

6.3.9 Water Adequacy Determinations in the Kanab Plateau Basin

Water adequacy determination information including the subdivision name, location, number of lots, adequacy determination, reason for the inadequacy determination, date of determination and subdivision water provider are shown in Table 6.3-10. Figure 6.3-12 shows the locations of subdivisions keyed to the Table. A description of the Water Adequacy Program is found in Volume 1, Appendix C. Adequacy determination data sources and methods are found in Volume 1, Appendix A.

- Nine water adequacy determinations for 360 lots have been made in this basin through December 2008.
- Six determinations of inadequacy have been made; the most common reason for a determination of inadequacy was because the applicant chose not to submit the necessary information and/or the available hydrologic data were insufficient to make a determination.
- The number of lots receiving a water adequacy determination, by county, are:

County	Number of Subdivision Lots	Number of Lots Determined to be Adequate	Percent Adequate
Coconino County	229	70	31%
Mohave County	131	131	100%

Table 6.3-10 Adequacy Determinations in the Kanab Plateau Basin¹

Map Key	Subdivision Name	County	Location			No. of Lots	ADWR File No. ²	ADWR Adequacy Determination	Reason(s) for Inadequacy Determination ³	Date of Determination	Water Provider at Time of Application
			Township	Range	Section						
1	Centennial Park Unit 1	Mohave	41 North	6 West	18	66	53-300320	Adequate		08/16/99	Centennial Park Utilities
2	Cliff Dweller's Homelands	Coconino	39 North	6 East	28, 33	6	53-500473	Inadequate	A1	07/11/88	Dry Lot Subdivision
3	Cowboy Butte Estates	Coconino	41 North	2 West	5, 8	13	53-500539	Inadequate	A1	06/23/88	Town of Fredonia
4	Gateway Mobile Home Park	Mohave	41 North	2 West	17, 21	65	53-500701	Adequate		03/17/78	Town of Fredonia
5	Gateway Mobile Park	Coconino	41 North	2 West	17	70	53-500702	Inadequate	A1, B	4/24/1986	Town of Fredonia
6	Heaton Subdivision	Coconino	41 North	2 West	16	28	53-500779	Inadequate	A1	03/18/85	Town of Fredonia
7	Lewis Estates Subdivision	Coconino	41 North	2 West	16, 21	16	53-400613	Inadequate	C	10/29/01	Town of Fredonia
8	Roadrunner Estates	Coconino	41 North	2 West	20	26	53-501339	Inadequate	A1	03/26/84	Town of Fredonia
9	Shiprock Estates	Coconino	41 North	2 West	17, 21	70	53-501389	Adequate		03/17/78	Town of Fredonia

Source: ADWR 2008a

Notes:

¹ Each determination of the adequacy of water supplies available to a subdivision is based on the information available to ADWR and the standards of review and policies in effect at the time the determination was made. In some cases, ADWR might make a different determination if a similar application were submitted today, based on the hydrologic data and other information currently available, as well as current rules and policies.

² Prior to February 1995, ADWR did not assign file numbers to applications for adequacy. Between 1995-2006 all applications for adequacy were given a file number with a 22 prefix. In 2006 a 53 prefix was assigned to all water adequacy reports and applications regardless of their issue date.

³ A. Physical/Continuous

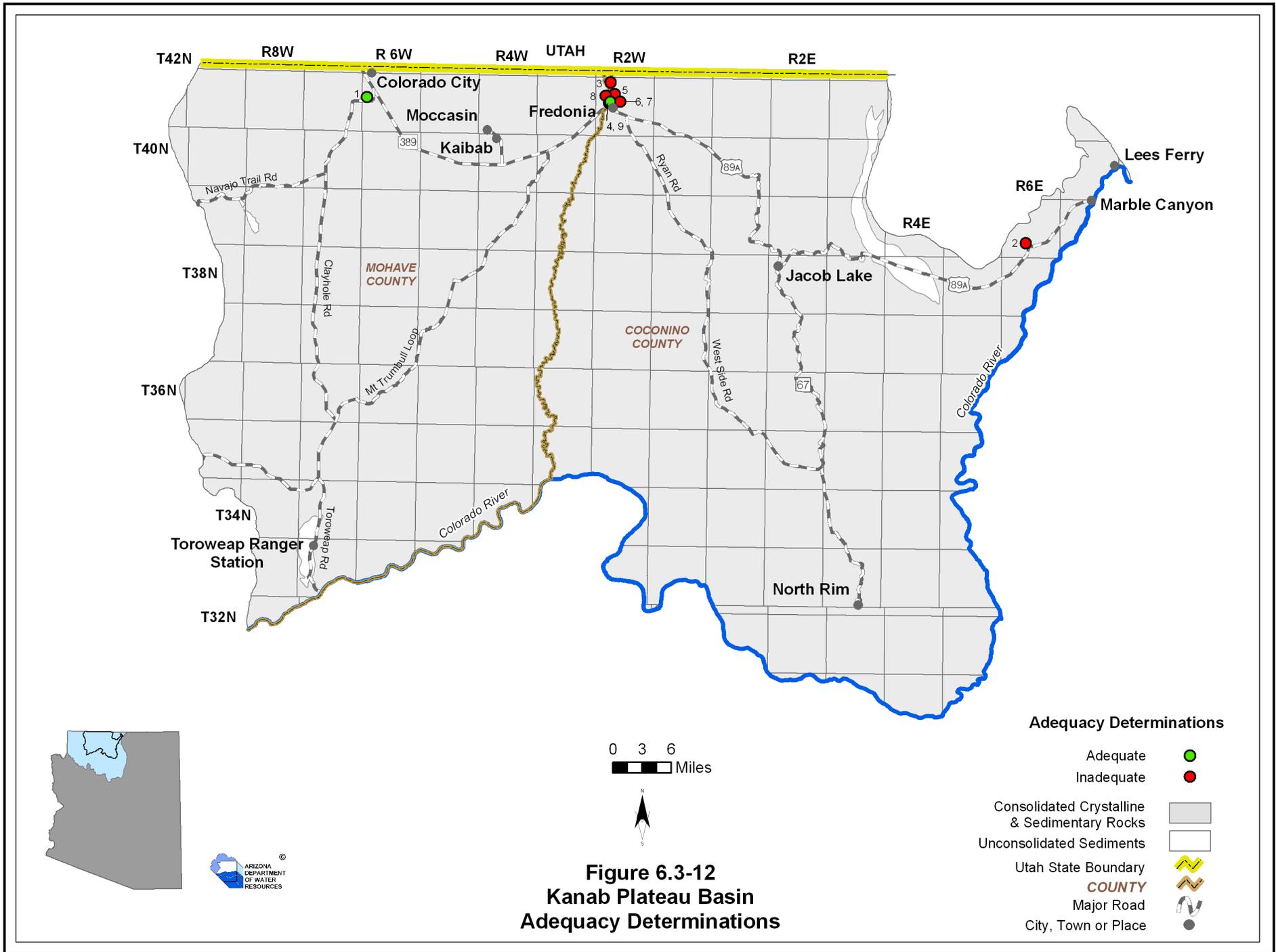
- 1) Insufficient Data (applicant chose not to submit necessary information, and/or available hydrologic data insufficient to make determination)
- 2) Insufficient Supply (existing water supply unreliable or physically unavailable; for groundwater, depth-to-water exceeds criteria)
- 3) Insufficient Infrastructure (distribution system is insufficient to meet demands or applicant proposed water hauling)

B. Legal (applicant failed to demonstrate a legal right to use the water or failed to demonstrate the provider's legal authority to serve the subdivision)

C. Water Quality

D. Unable to locate records





Kanab Plateau Basin

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