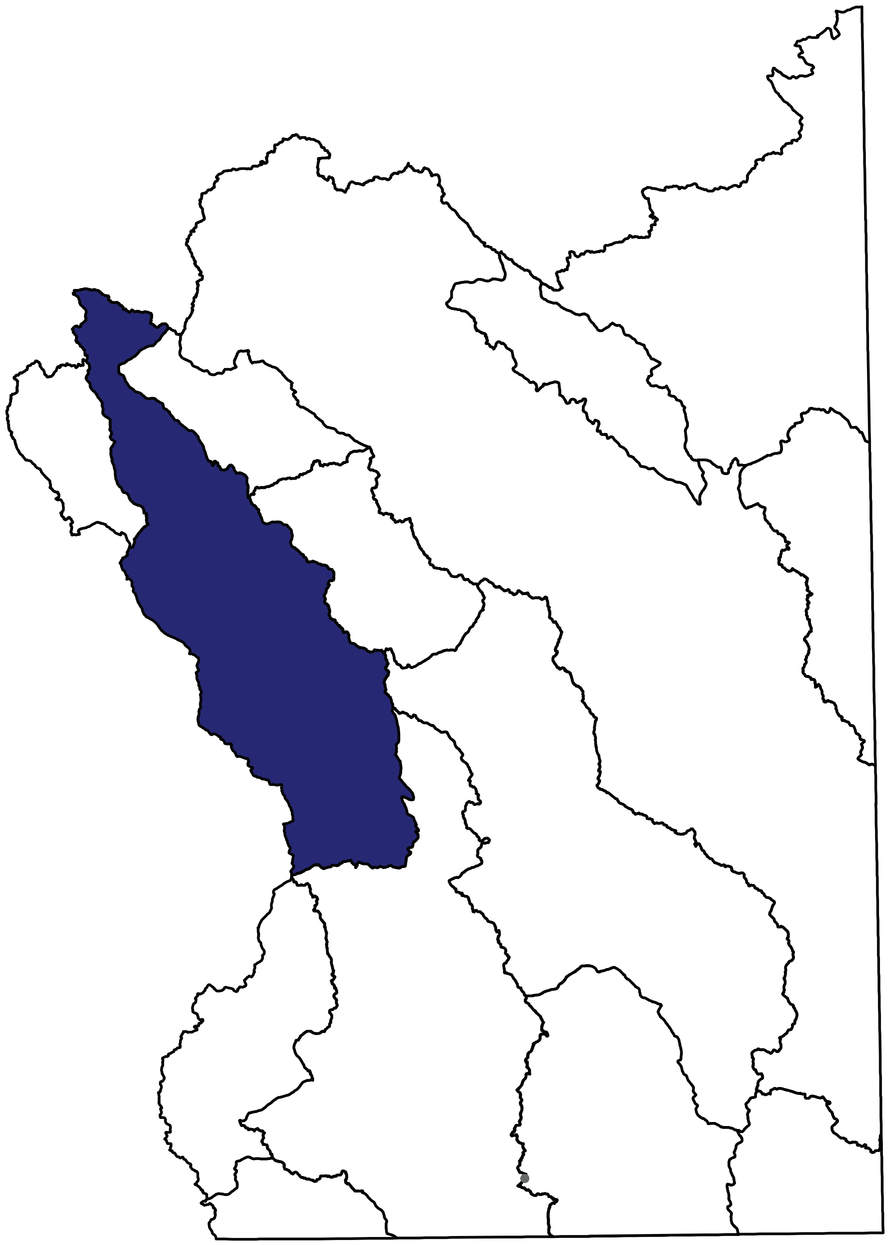
Section 3.8
Lower San Pedro Basin



3.8.1 Geography of the Lower San Pedro Basin

The Lower San Pedro Basin is a medium-size, 1,624 square mile basin on the western side of the planning area. Geographic features and principal communities are shown on Figure 3.8-1. The basin is characterized by high-elevation mountain ranges and washes. Vegetation is primarily Arizona uplands Sonoran desertscrub and semi-desert grassland with smaller areas of Chihuahuan desertscrub, madrean evergreen woodland, Rocky Mountain and montane conifer forest and interior chaparral. (see Figure 3.0-10) Riparian vegetation includes strand and mesquite on the San Pedro River and Aravaipa Creek.

- Principal geographic features shown on Figure 3.8-1 are:
  - San Pedro River running northward from south of Cascabel to Winkleman where it joins the Gila River
  - Gila River in the vicinity of Kearny and Hayden
  - Peppersauce, Hot Springs, Buehman, Redfield and Kielberg Canyons south of San Manuel
  - Tortilla Mountains to the west of Kearny and Hayden
  - Santa Catalina Mountains to the west and southwest of San Manuel
  - Dripping Springs Mountains to the northeast
  - Galiuro Mountains to the southeast.
  - Rincon Mountains along the southwestern boundary, which include the highest point in the basin at 7,960 feet
  - The lowest point at approximately 1,800 feet where the Gila River exits the basin.

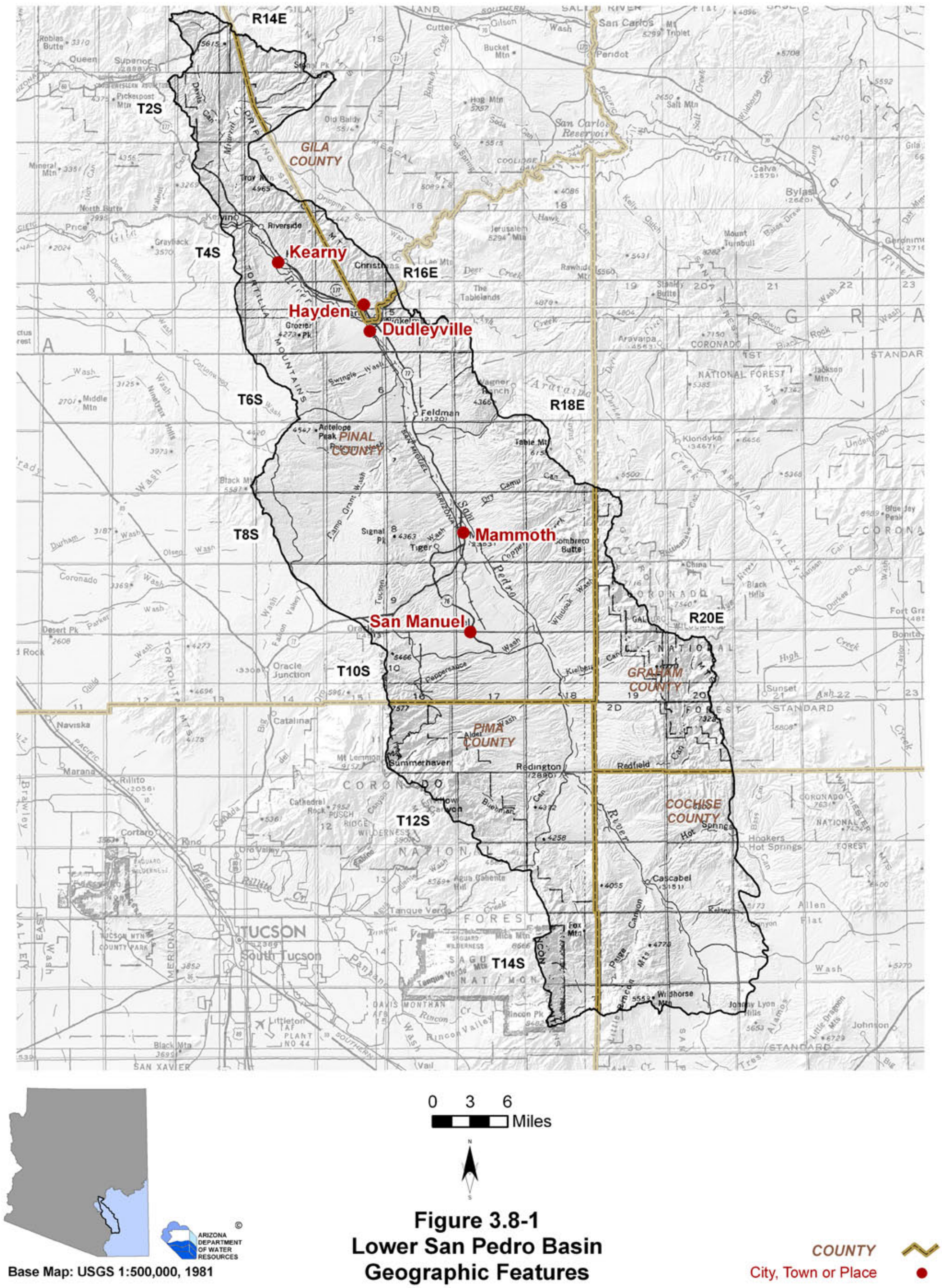


Figure 3.8-1
Lower San Pedro Basin
Geographic Features

3.8.2 Land Ownership in the Lower San Pedro Basin

Land ownership, including the percentage of ownership in each category, is shown for the Lower San Pedro in Figure 3.8-2. Principal features of land ownership in this basin include the large variety of land ownership types, seven total, and the high proportion of state trust lands. A description of land ownership data sources and methods is found in Volume 1, Appendix A. More detailed information on National Parks, Monuments, Riparian, Conservation, Wildlife and Wilderness Areas is found in Section 3.0.3. Land ownership categories are discussed below in the order of percentage from largest to smallest in the basin.

State Trust

- 51.9% of land in this basin is held in trust for public schools and 13 other beneficiaries under the State Trust Land system.
- The majority of the land in state ownership is contiguous and located throughout the basin.
- Primary land use is grazing.

Private

- 20.9% of land ownership is private.
- Private land is largely fragmented in this basin with one nearly continuous strip running along the two highways in the region, 177 and 77, and the San Pedro River. A sizable portion of private land ownership also exists around the town of San Manuel.
- There are a few private land in-holdings in the Coronado National Forest and U.S. Bureau of Land Management lands.
- Primary land uses are farming, mining, domestic and commercial.

National Forest

- 15.3% of the land is federally owned and managed by the United States Forest Service (USFS).
- The basin contains two forest districts and three ranger districts, the Tonto National Forest, Globe Ranger District and the Coronado National Forest, Santa Catalina Ranger District in the west and the Safford Ranger District in the east.
- The basin contains portions of two wilderness areas, the Rincon Mountain Wilderness area, which surrounds Saguaro National Park and the Galiuro Wilderness area in the Safford Ranger District. (see Figure 3.0-13)
- Primary land uses are recreation, grazing and timber production.

U.S. Bureau of Land Management (BLM)

- 9.3% of land is federally owned and managed by the Safford Field Office of the Bureau of Land Management.
- BLM ownership is dispersed in small parcels throughout most of the basin.
- The Redfield Canyon Wilderness area, managed by the BLM, is located in T11S, R20E. (see Figure 3.0-13)
- Primary land uses are grazing and recreation.

Indian Reservations

- 1.6% of land is under ownership of the San Carlos Apache Tribe.
- The small portion of the San Carlos Apache Indian Reservation is located east of Dudleyville.
- Primary land use is grazing.

National Park Service (NPS)

- 0.8% of land is federally owned and managed by the National Park Service.
- A small portion of Saguaro National Park is in the southwestern corner of the basin.
- Primary land use is recreation.

Other (Game and Fish, County and Bureau of Reclamation Lands)

- 0.2% of land is owned by the Bureau of Reclamation
- This land is not visible on the map but is located in T4S, R14E.
- Primary land use is for water delivery.

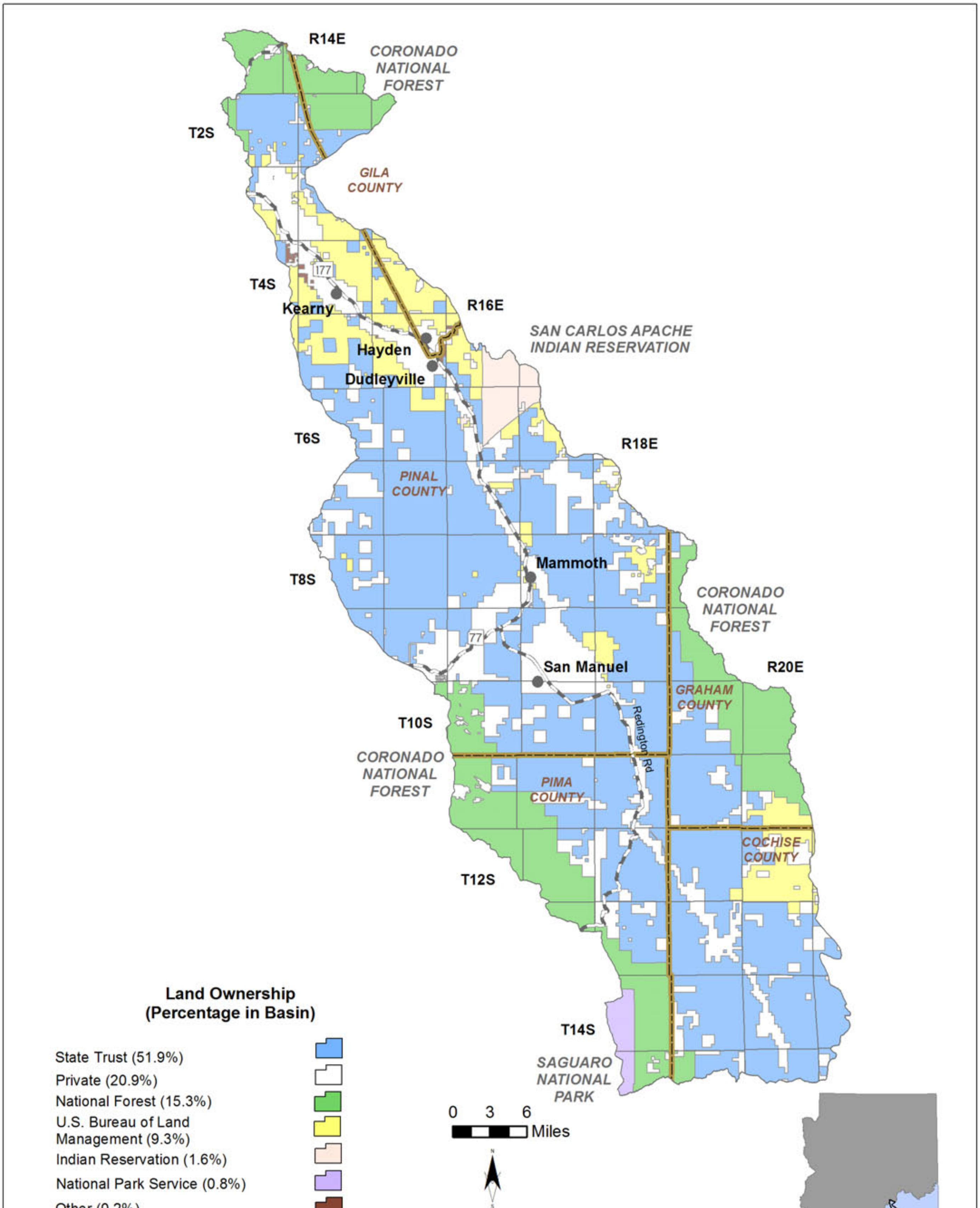


Figure 3.8-2
Lower San Pedro Basin
Land Ownership

3.8.3 Climate of the Lower San Pedro Basin

Climate data from NOAA/ NWS Coop Network stations are complied in Table 3.8-1 and their locations are shown on Figure 3.8-3. Figure 3.8-3 also shows precipitation contour data from the Spatial Climate Analysis Service (SCAS) at Oregon State University. The Lower San Pedro Basin does not contain Evaporation Pan, AZMET and SNOTEL/Snowcourse stations. More detailed information on climate is found in Section 3.0.4. A description of the climate data sources and methods is found in Volume 1, Appendix A.

NOAA/NWS Coop Network

- Refer to Table 3.8-1A
- There are six NOAA/NWS Coop network climate stations in the basin. The average monthly maximum temperature occurs in July and ranges from 64.9°F at Palisade Ranger Station to 86.4°F at Winkleman 6 S. The average monthly minimum temperature occurs in January and December and ranges from 34.5°F at Palisade Ranger Station to 47.6°F at Cascabel.
- Highest average seasonal rainfall occurs in the summer (July-September). For the period of record used, highest annual rainfall is 32.24 inches at Palisade Ranger Station and the lowest is 14.33 inches, at Cascabel.

SCAS Precipitation Data

- See Figure 3.8-3
- Additional precipitation data shows rainfall as high as 36 inches at the Santa Catalina Mountains southwest of San Manuel and as low as 14 inches at the San Pedro River Valley in the vicinity of Dudleyville.

Table 3.8-1 Climate Data for the Lower San Pedro Basin

A. NOAA/NWS Co-op Network:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Temperature Range (in F)		Average Total Precipitation (in inches)				
			Max/Month	Min/Month	Winter	Spring	Summer	Fall	Annual
Cascabel	3,140	1971-2000	82.5/Jul	47.6/Dec	3.41	1.08	6.56	3.28	14.33
Oracle 2 SE	4,510	1971-2000	79.5/Jul	45.5/Dec	7.59	1.93	9.31	6.09	24.92
Palisade Ranger Station	7,960	1965-1981[1]	64.9/Jul	34.5/Jan	9.26	2.80	12.31	7.88	32.24
San Manuel	3,460	1954-2004[1]	83.3/Jul	47.3/Jan	3.76	1.56	6.51	3.25	14.75
Willow Springs Ranch	3,690	1949-1978[1]	81.2/Jul	45.2/Jan	2.86	1.67	5.79	5.46	15.77
Winkelman 6 S	2,080	1942-1980[1]	86.4/Jul	46.9/Dec	4.48	1.54	5.43	4.76	16.22

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 Evaportranspiration, in inches (*Number of years to calculate averages*)
None			

D. SNOTEL/Snowcourse:

Station Name	Elevation (in feet)	Period of Record	Average Snowpack, at Beginning of the Month, as Inches Snow Water Content *(Number of measurements to calculate average)*					
			Jan.	Feb.	March	April	May	June
None								

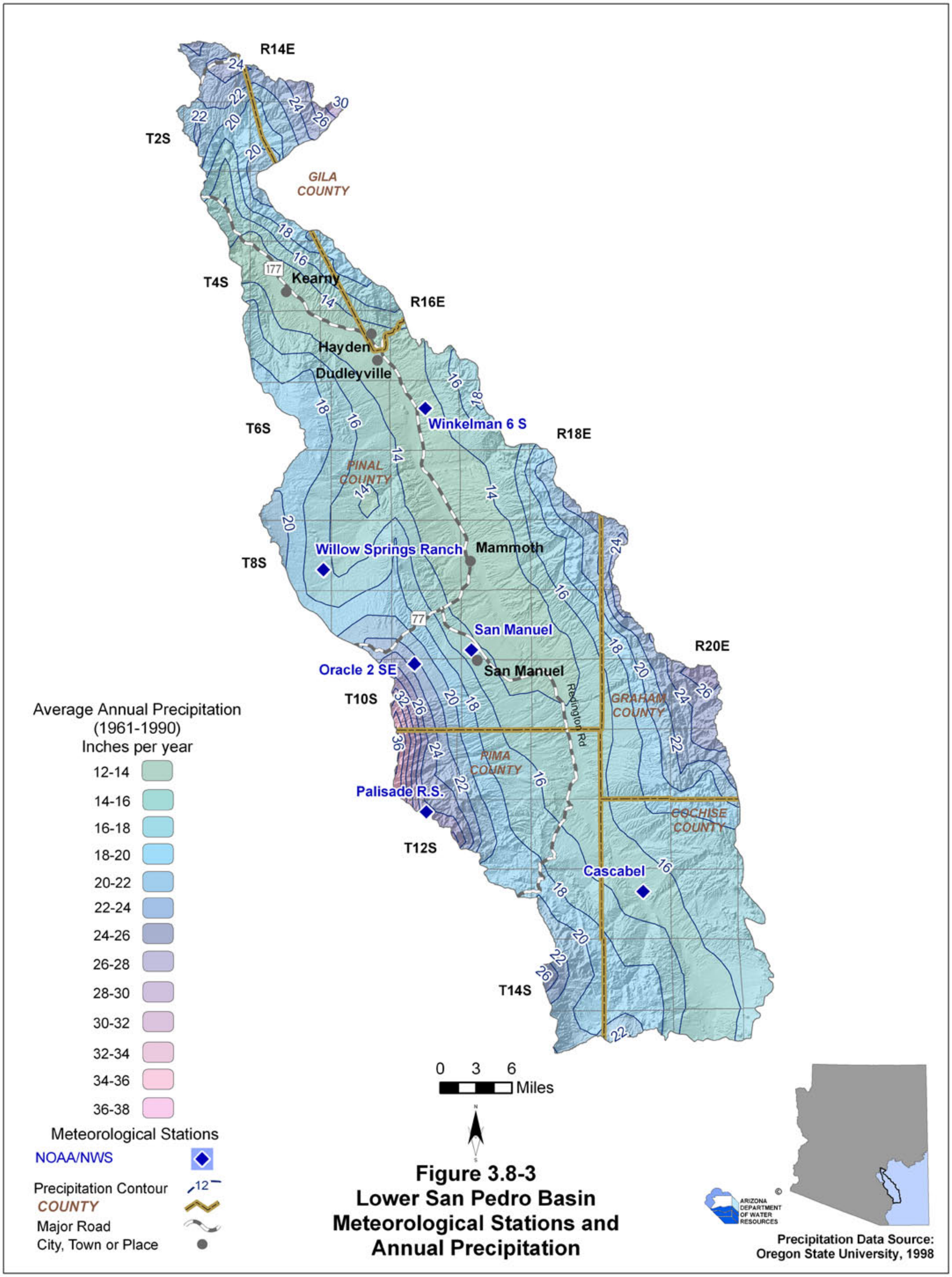


Figure 3.8-3
Lower San Pedro Basin
Meteorological Stations and
Annual Precipitation

3.8.4 Surface Water Conditions in the Lower San Pedro Basin

Streamflow data, including average seasonal flow, average annual flow and other information is shown in Table 3.8-2. Flood ALERT equipment in the basin is shown on Table 3.8-3. Reservoir and stockpond data, including maximum storage or maximum surface area, are shown in Table 3.8-4. The location of streamflow gages identified by USGS number, flood ALERT equipment and USGS runoff contours are shown on Figure 3.8-5. Descriptions of stream, reservoir and stockpond data sources and methods are found in Volume 1, Appendix A.

Streamflow Data

- Refer to Table 3.8-2.
- Data from 11 stations on four watercourses are shown on the table and on Figure 3.8-5. Eight stations have been discontinued and the remaining three are real-time stations.
- The average seasonal flow for most stations is highest in the Summer (July-September) and lowest in the Spring (April-June).
- Maximum annual flow in this basin was 2,375,696 acre-feet in 1993 on the Gila River and minimum annual flow was 17 acre-feet in 1969 on the Peck Canyon tributary.
- See Figure 3.7-4 for stream hydrograph of Aravaipa Creek near Mammoth.

Flood ALERT Equipment

- Refer to Table 3.8-3.
- There are four stations in the basin as of October 2005.

Reservoirs and Stockponds

- Refer to Table 3.8-4.
- There are seven small reservoirs in this basin.
- There are an estimated 648 stockponds in this basin.

Runoff Contour

- Refer to Figure 3.8-4.
- Average annual runoff varies from 0.5 inches per year, or 26.65 acre-feet per square mile, in the vicinity of the San Pedro River to one inch per year, or 53.3 acre-feet per square mile on the eastern and western boundaries of the basin.

Figure 3.8-4 Annual Flows (in acre-feet) at Aravaipa Creek near Mammoth (Station # 9473000) Water Years 1932 - 2007

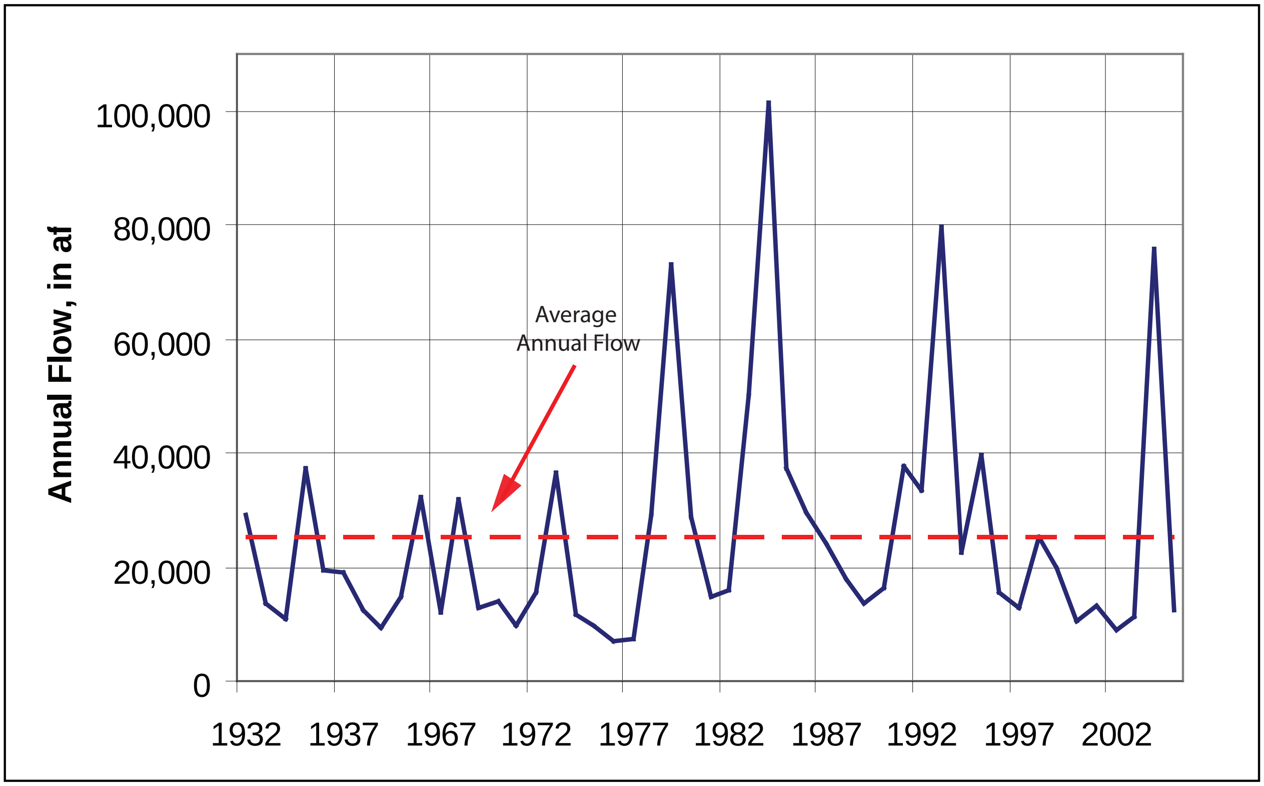


Table 3.8-2 Streamflow Data for the Lower San Pedro Basin

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	
9470000	Gila River at Winkelman	13,268	1,922	9/1917-7/2004 (discontinued)	30	31	32	7	43,522 (1953)	237,525	282,922	2,203,619 (1993)	47
9472000	San Pedro River near Redington	2,927	2,940	6/1943-9/1995 (discontinued)	19	2	64	16	297 (1997)	21,399	31,033	131,073 (1955)	50
9472050	San Pedro River at Redington Bridge near Redington	3,096	2,820	7/1998-current (real time)	2	0	57	41	2,325 (2002)	13,451	19,491	48,736 (2000)	4
9472100	Peck Canyon Tributary near Redington	8	2,850	10/1967-9/1972 (discontinued)	0	3	90	8	17 (1969)	71	78	152 (1971)	4
9472500	San Pedro River near Mammoth	3,583	2,307	5/1931-6/1941 (discontinued)	12	1	78	9	17,520 (1933)	43,149	43,406	73,846 (1940)	9
9473000	Avavaipa Creek near Mammoth	537	2,345	5/1931-current (real time)	42	11	19	28	6,756 (1976)	18,901	24,768	120,211 (1983)	46
9473020	Avavaipa Creek near Fieldman	557	NA	5/1919-9/1921 (discontinued)	No statistics run, less than 3 years of data								2
9473100	San Pedro River below Aravaipa Creek near Mammoth	4,343	2,125	10/1979-9/1983 (discontinued)	60	6	28	6	17,086 (1981)	18,679	20,706	26,352 (1980)	3
9473400	San Pedro River near Winkelman	4,430	NA	4/1962-12/1965 (discontinued)	13	2	50	35	43,294 (1963)	66,099	62,045	76,742 (1965)	3
9473500	San Pedro River at Winkelman	4,453	1,925	1/1966-12/1978 (discontinued)	22	2	41	35	8,615 (1975)	35,764	37,803	109,321 (1978)	13
9474000	Gila River at Kelvin	18,011	1,745	1/1911-current (real time)	31	23	23	14	56,398 (1961)	324,351	370675	2,375,969 (1993)	93

Source: USGS (NWIS) 2005 & 2008

Notes:
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 retreived in 2005
NA= Not available

Table 3.8-3 Flood ALERT Equipment in the Lower San Pedro Basin

Station ID	Station Name	Station Type	Install Date	Responsibility
700	Alder Canyon Wash	Precipitation/Stage	NA	ADWR
1030	Oracle Ridge	Precipitation	3/1/1983	Pima County FCD
1140	Dan Saddle	Precipitation	NA	Pima County FCD
6760	Signal Peak Repeater	Repeater/Precipitation	5/18/1993	ADWR

Source: ADWR 2005b

Notes:
NA = Not available
ADWR = Arizona Department of Water Resources
FCD = Flood Control District

Table 3.8-4 Reservoirs and Stockponds in the Lower San Pedro 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	JURISDICTION
None identified by ADWR at this time					

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

MAP KEY	RESERVOIR/LAKE NAME (Name of dam, if different)	OWNER/OPERATOR	MAXIMUM SURFACE AREA (acres)	USE	JURISDICTION
None identified by ADWR at this time					

Source: Compilation of databases from ADWR & others

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

Total number: 4
Total maximum storage: 360 acre-feet

D. Other Small Reservoirs (between 5 and 50 acres surface area)[1]

Total number: 3
Total surface area: 33 acres

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

Total number: 648 (from water right filings)

Notes:
[1]Capacity data not available to ADWR

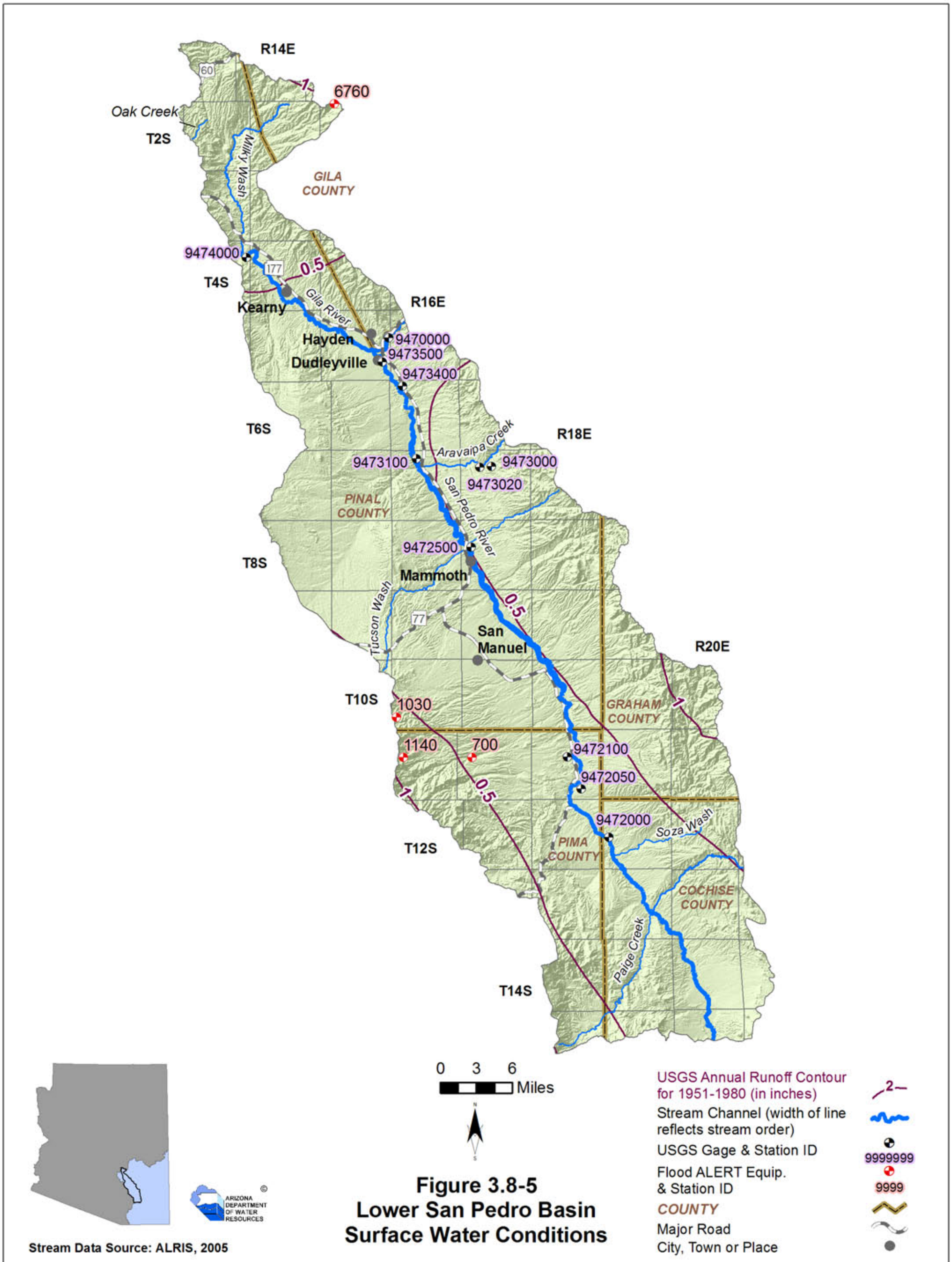


Figure 3.8-5
Lower San Pedro Basin
Surface Water Conditions

Stream Data Source: ALRIS, 2005

3.8.5 Perennial/Intermittent Streams and Major Springs in the Lower San Pedro 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 3.8-5. The locations of major springs as well as perennial and intermittent streams are shown on Figure 3.8-6. Descriptions of data sources and methods for intermittent and perennial reaches and springs are found in Volume 1, Appendix A.

- There are a number of perennial streams located throughout the basin.
- Numerous intermittent streams are also located throughout the basin.
- The San Pedro River is predominantly an intermittent stream in the basin with small sections where it is perennial south of Dudleyville and in the vicinity of the Pima County/Cochise County line.
- There are 13 major springs with a measured discharge of 10 gallons per minute (gpm) or greater at any time. The largest discharge is 1,000 gpm at Cooks Lake spring.
- Springs with measured discharge of 1 to 10 gpm are not mapped but coordinates are given in Table 3.8-5. There are 30 minor springs identified in this basin.
- Listed discharge rates may not be indicative of current conditions. Most of the measurements were taken prior to 1990 and many of the major spring measurements were taken in the 1950's. Only four minor spring measurements post-date 1990.
- The total number of springs identified by the USGS varies from 203 to 209, depending on the database reference.

Table 3.8-5 Springs in the Lower San Pedro Basin

A. Major Springs (10 gpm or greater):

Map Key	Name	Location		Discharge (in gpm)[1]	Date Discharge Measured
		Latitude	Longitude		
1	Cooks Lake	325144	1104301	1,000	2/9/1951
2	Bingham[2]	322724	1102910	494	4/18/1968
3	V S[2]	324847	1104206	150	2/15/1951
4	Putnam	324931	1104510	112	6/16/1978
5	Unnamed	321548	1101623	40	03/1946
6	Unnamed[2]	322026	1101438	35	11/1950
7	Unnamed[2]	321535	1101739	25	03/1936
8	Unnamed[2]	321527	1101508	20	2/24/1951
9	Unnamed[2]	322019	1102507	15	10/1950
10	Unnamed[2]	322000	1101956	15	11/17/1950
11	Piper	325901	1104333	15	2/14/1951
12	Upper Walnut[2]	322537	1102027	11	1/18/1989
13	Swamp Spring Canyon[2,3]	322609	1101709	10[4]	06/1984

B. Minor Springs (1 to 10 gpm):

Name	Location		Discharge (in gpm)[1]	Date Discharge Measured
	Latitude	Longitude		
Horse Camp	324154	1102631	8	NA
Unnamed	324319	1103000	7	03/1950
Copper Creek	324522	1102844	6	10/2002
Unnamed	324416	1103104	5	11/27/1972
Unnamed	322722	1103824	5	7/10/1952
Red	325328	1103746	4	04/1951
Carrizo[2]	325326	1103631	4	2/13/1951
Peasley	322913	1104017	4	10/1949
Unnamed[2]	322558	1102251	4	01/1951
Barrel Hoop[2,3]	322624	1101542	4	04/1986
Stratton	322757	1104439	3	10/1949
Unnamed[2]	322807	1104337	3	NA
Alder Box	322748	1104211	3	10/1949
Lost Trail[2,3]	322604	1101732	3	11/2002

Table 3.8-5 Springs in the Lower San Pedro Basin (Cont)

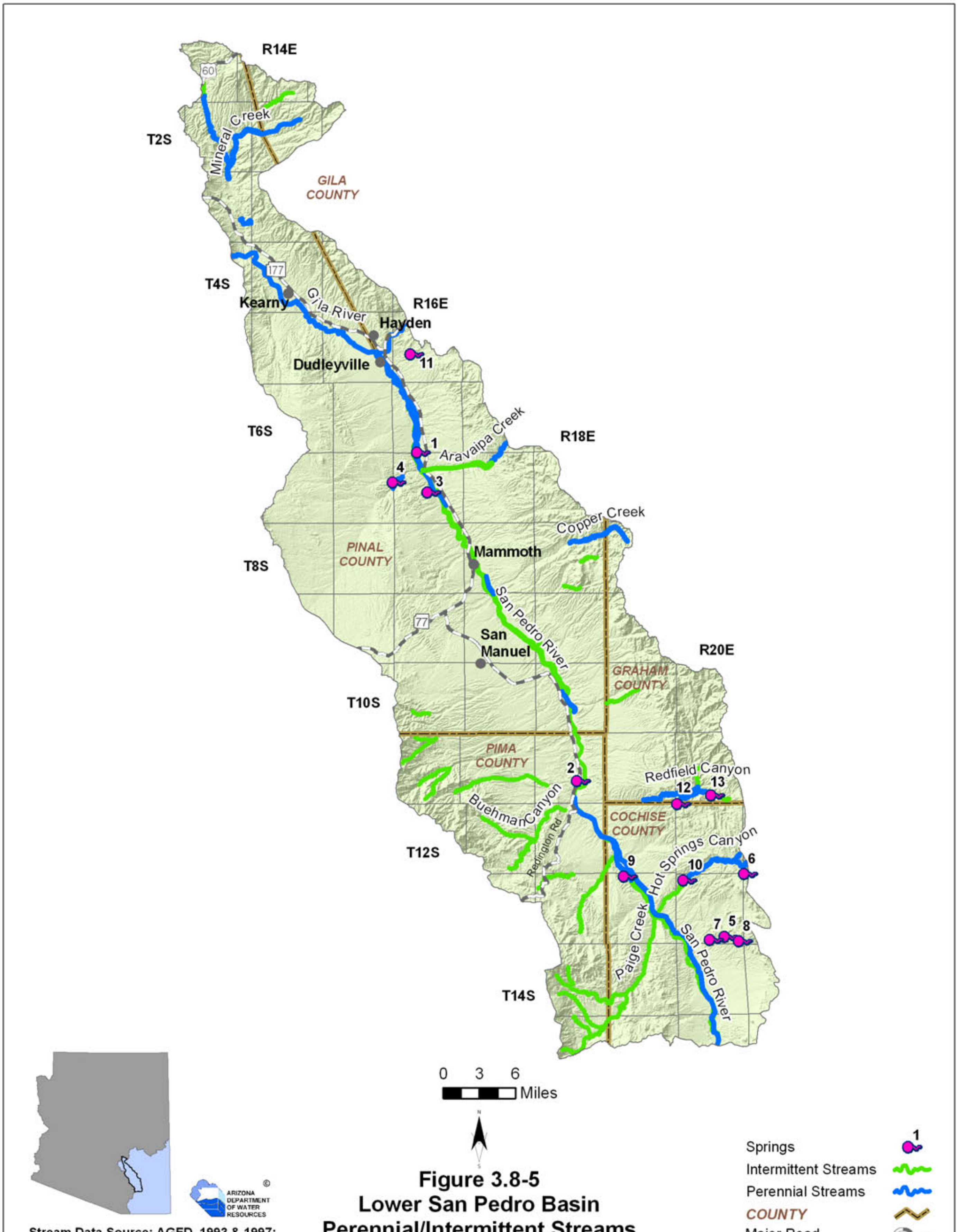
B. Minor Springs:

Name	Location		Discharge (in gpm)[1]	Date Discharge Measured
	Latitude	Longitude		
Unnamed	325745	1103935	2	06/1950
Carrico	325334	1103723	2	02/1951
Oak	325029	1103158	2	04/1951
Red Horse	322951	1104047	2	08/1951
Tio Cruz	322457	1101527	2[5]	08/1986
Miller[2,3]	322737	1101708	2	09/1993
Buddy Opic	322809	1104005	2	10/1949
Old Ranch[2,3]	322750	1101721	2	01/1993
Norton	324344	1102640	2	NA
Rock Wall	322951	1104225	1	11/1949
Juan	322821	1104017	1	10/1949
Addington	324338	1103114	1	04/1951
Unnamed[2]	324724	1103211	1	04/1950
Walnut[2,3]	322552	1102018	1	01/1989
Rim Slope[3]	322549	1101541	1	NA
Roble	321610	1102655	1[5]	01/1951

Source: Compilation of databases from ADWR & others

C. Total number of springs, regardless of discharge, identified by USGS (see ALRIS, 2005a and USGS, 2006a): 203 to 209

Notes:
NA = Not Available
[1]Most recent measurement identified by ADWR
[2]Spring not displayed on current USGS topo map
[3]Location approximated by ADWR
[4]Most recent measurement < 10 gpm
[5]Most recent measurement < 1 gpm



Stream Data Source: AGFD, 1993 & 1997; Brown and Carmony, 1981; Pima County DOT, 2000 & 2005

Figure 3.8-5
Lower San Pedro Basin
Perennial/Intermittent Streams and Major (>10 gpm) Springs

3.8.6 Groundwater Conditions of the Lower San Pedro 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 3.8-6. Figure 3.8-7 shows aquifer flow direction and water-level change between 1990-1991 and 2003-2004. Figure 3.8-8 contains hydrographs for selected wells shown on Figure 3.8-7. Figure 3.8-9 shows well yields in five 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 3.8-6 and Figure 3.8-7.
- The major aquifers in the basin are basin fill and recent stream alluvium/basin fill.
- Artesian conditions exist about five miles north to ten miles south of Mammoth in wells drilled deeper than 500 feet.
- Flow direction is generally from southeast to northwest.

Well Yields

- Refer to Table 3.8-6 and Figure 3.8-9.
- As shown on Figure 3.8-9 well yields in this basin range from less than 100 gallons per minute (gpm) to more than 2,000 gpm.
- One source of well yield information, based on 181 reported wells, indicates that the median well yield in this basin is 1,000 gpm.

Natural Recharge

- Refer to Table 3.8-6.
- Principal sources of recharge in this basin are mountain-front recharge and streambed infiltration.
- Natural recharge estimates range from 24,000 acre-feet per year to 29,000 acre-feet per year.

Water in Storage

- Refer to Table 3.8-6. Water levels are shown for wells measured in 2003-2004.
- Storage estimates for this basin range from 11 million acre-feet to 27 million acre-feet to a depth of 1,200 feet.

Water Level

- Refer to Figure 3.8-7. Water levels are shown for wells measured in 2003-2004.
- The Department annually measures 19 index wells in this basin. Hydrographs for six of these wells are shown in Figure 3.8-8.
- Depth to water varies in this basin with the deepest recorded water level in 2003-2004 at 503 feet south of Mammoth and the shallowest at 17 feet north of Mammoth.

Table 3.8-6 Groundwater Data for the Lower San Pedro Basin

Basin Area, in square miles:	1,624	
Major Aquifer(s):	**Name and/or Geologic Units**	
	Recent Stream Alluvium	
	Basin Fill	
Well Yields, in gal/min:	Range 628 - 1,910 Median 1295 (10 wells measured)	Measured by ADWR and/or USGS
	Range 1 - 4,000 Median 1,000 (181 wells reported)	Reported on registration forms for large (> 10-inch) diameter wells
	Range 70 - 2,700	ADWR (1994b)
	Range 0 - 2,500	Anning and Duet (1994)
Estimated Natural Recharge, in acre-feet/year:	29,000	Anderson and Freethey (1995)
	25,000	ADWR (1994b)
	24,000	Freethey and Anderson (1986)
Estimated Water Currently in Storage, in acre-feet:	12,000,000 - 25,600,000 (to 1,200 ft/not given)	ADWR (1990 and 1994b)
	11,000,000[1] (to 1,200 ft)	Freethey and Anderson (1986)
	>27,000,000	Arizona Water Commission (1975)
Current Number of Index Wells:	19	
Date of Last Water-level Sweep:	1994 (274 wells measured)	

[1]Predevelopment Estimate

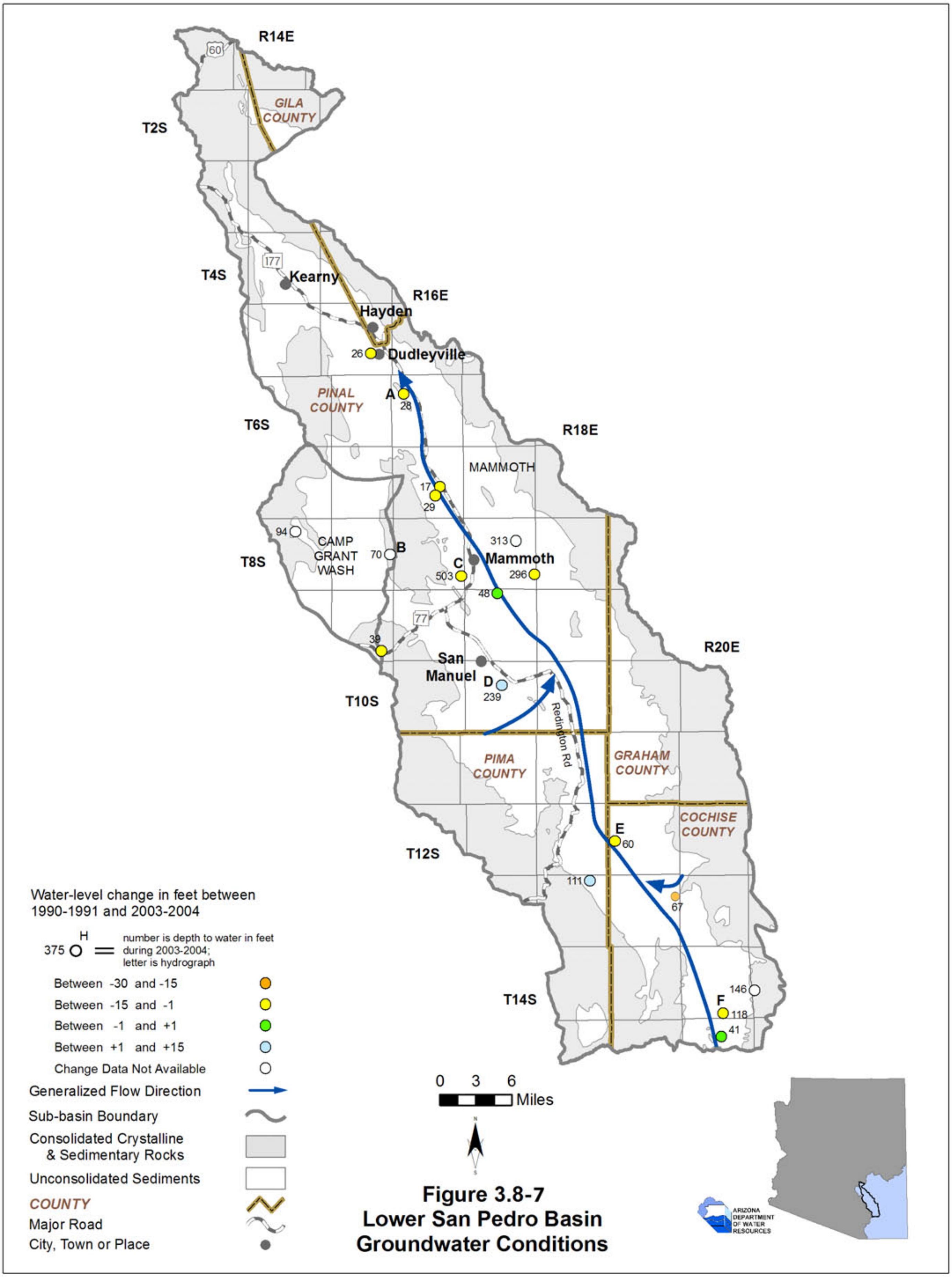


Figure 3.8-7
Lower San Pedro Basin
Groundwater Conditions

Figure 3.8-8
Lower San Pedro Basin
Hydrographs Showing Depth to Water in Selected Wells

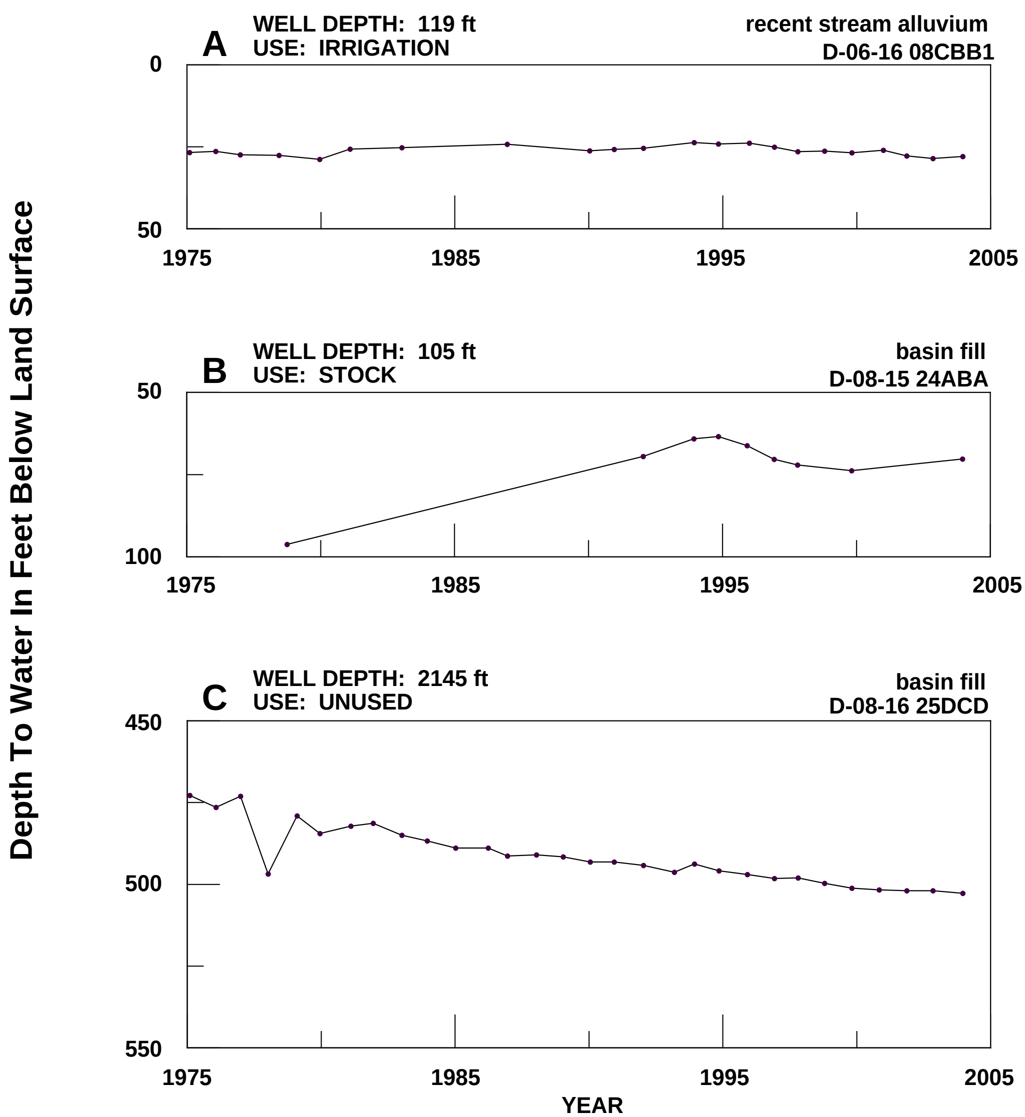
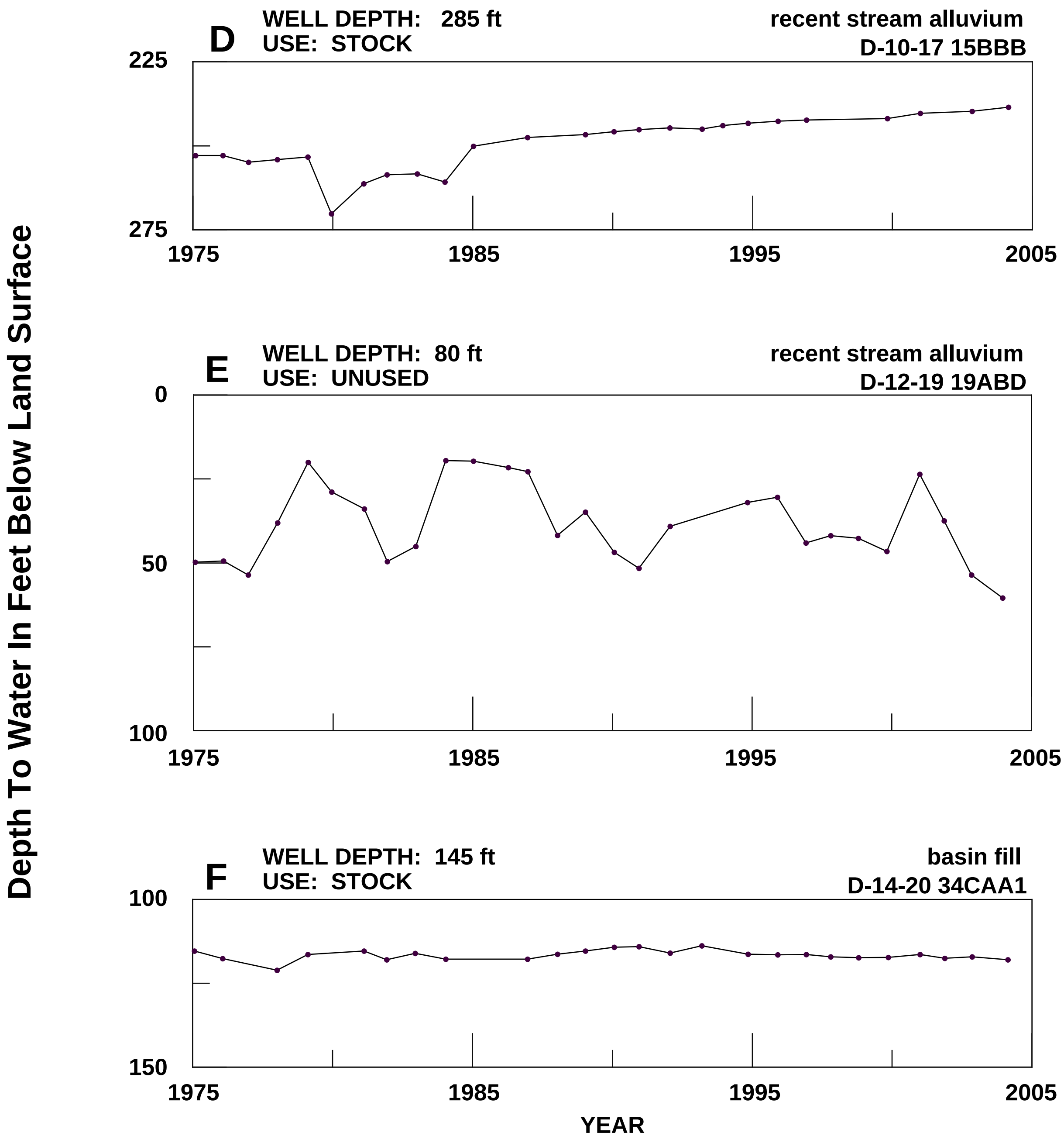


Figure 3.8-8 (Cont)
Lower San Pedro Basin
Hydrographs Showing Depth to Water in Selected Wells



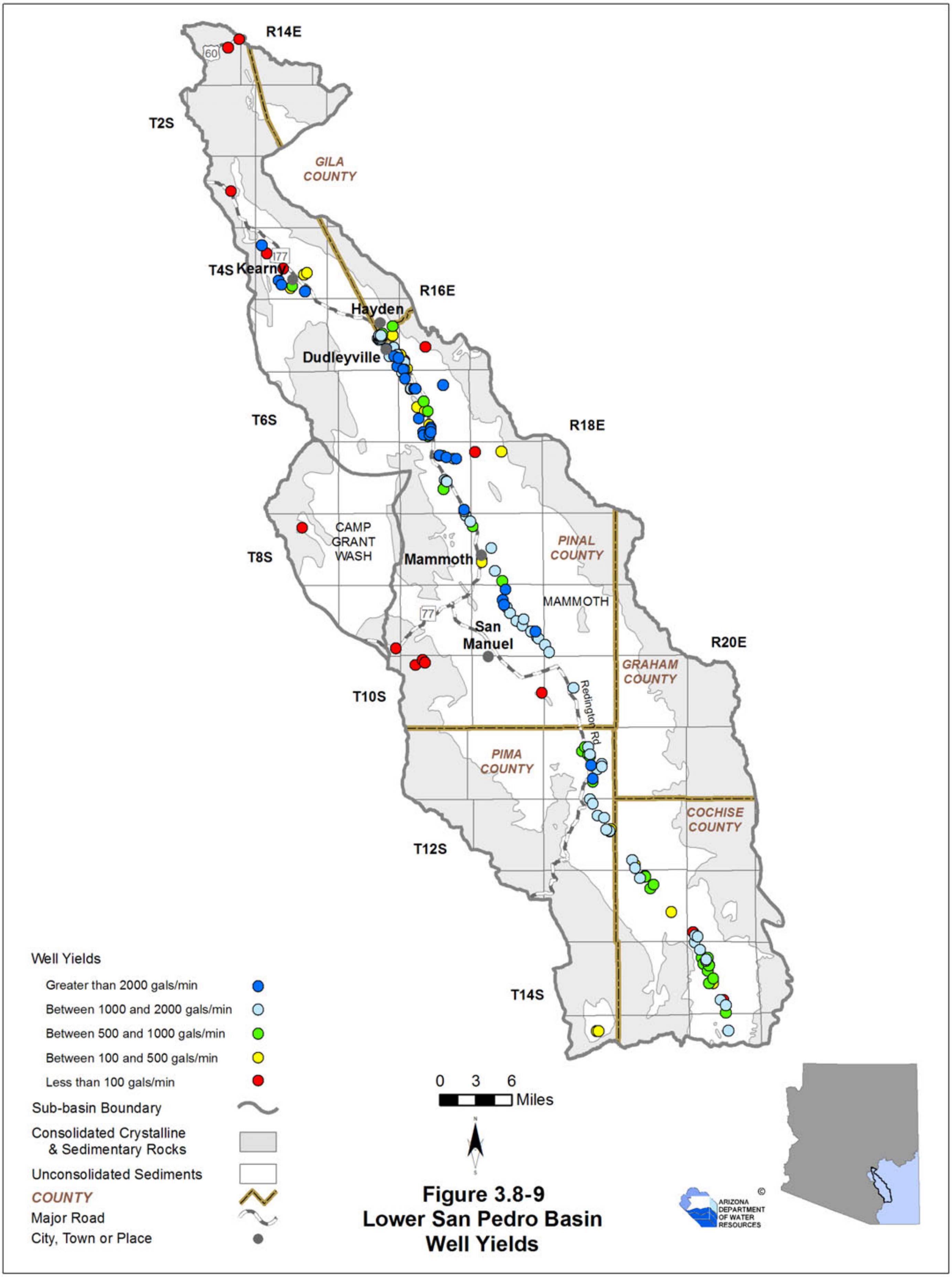


Figure 3.8-9
Lower San Pedro Basin
Well Yields

3.8.7 Water Quality of the Lower San Pedro Basin

Sites with parameter concentrations that have equaled or exceeded drinking water standard(s) (DWS), including location and parameter(s) are shown in Table 3.8-7A. Impaired lakes and streams with site type, name, length of impaired stream reach, area of impaired lake, designated use standard and parameter(s) exceeded is shown in Table 3.8-7B. Figure 3.8-10 shows the location of exceedences and impairment keyed to Table 3.8-7. All community water systems are regulated under the Safe Drinking Water Act and treat water supplies to meet drinking water standards. Not all parameters were measured at all sites; selective sampling for particular constituents is common. A description of water quality data sources and methods is found in Volume 1, Appendix A.

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

- Refer to Table 3.8-7A.
- Fifty-six sites have parameter concentrations that have equaled or exceeded DWS.
- The parameter most frequently equaled or exceeded was flouride.
- Other parameters commonly equaled or exceeded in the sites measured in this basin were cadmium, arsenic, nitrates, total dissolved solids, lead, antimony, beryllium and radionuclides.

Lakes and Streams with impaired waters

- Refer to Table 3.8-7B.
- Water quality standards were exceeded in one reach of Mineral Creek and in one reach of the San Pedro River.
- The parameters exceeded in Mineral Creek included copper and selenium.
- The parameters exceeded in the San Pedro River were E. coli and selenium.
- Mineral Creek is part of the ADEQ water quality improvement effort called the Total Maximum Daily Load (TMDL) program. The TMDL report has not yet been completed for this stream, however, cleanup by the mining company ASARCO is ongoing. Investigation is underway for the impaired portion of the San Pedro River in this basin.

Effluent Dependent Reaches

- Refer to Figure 3.8-10
- There is one small portion of an unnamed tributary to Alder Creek that is effluent dependent. The source of the effluent is from the Summerhaven wastewater treatment facility located in the Tucson AMA.

Table 3.8-7 Water Quality Exceedences in the Lower San Pedro Basin[1]

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	1 South	13 East	12	NO3
2	Well	1 South	13 East	12	NO3
3	Well	1 South	13 East	14	NO3
4	Well	1 South	14 East	21	Cu
5	Well	4 South	14 East	6	NO3
6	Well	4 South	14 East	11	Cd
7	Well	4 South	14 East	11	Cd
8	Well	4 South	14 East	11	As, Cd
9	Well	4 South	14 East	23	Cd
10	Well	4 South	14 East	23	Cd
11	Well	4 South	14 East	27	Cd
12	Well	4 South	14 East	35	NO3
13	Well	5 South	14 East	2	F
14	Well	5 South	15 East	23	As, F
15	Well	5 South	15 East	25	Hg
16	Well	5 South	15 East	25	Hg
17	Well	6 South	16 East	6	F
18	Well	6 South	16 East	8	F
19	Well	6 South	16 East	29	F
20	Well	6 South	16 East	33	F
21	Well	6 South	16 East	34	TDS
22	Well	7 South	16 East	10	Sb
23	Well	7 South	16 East	22	F
24	Well	7 South	16 East	22	As, F
25	Well	7 South	16 East	22	As, F
26	Well	7 South	16 East	36	F
27	Well	7 South	17 East	6	Pb
28	Well	8 South	17 East	18	Be
29	Well	8 South	17 East	18	Be
30	Well	8 South	17 East	19	As, F
31	Well	8 South	17 East	30	As, Be, F
32	Well	8 South	17 East	30	F
33	Well	8 South	17 East	31	As, F
34	Well	8 South	17 East	32	As, F
35	Well	8 South	17 East	32	As, F, Pb
36	Well	8 South	18 East	14	As
37	Well	8 South	18 East	23	As
38	Well	9 South	15 East	35	NO3
39	Well	9 South	16 East	31	F, Rad
40	Well	9 South	17 East	4	As, F
41	Well	9 South	17 East	14	F
42	Well	9 South	17 East	24	As, F, Pb
43	Well	9 South	17 East	24	As, F, Pb
44	Well	9 South	18 East	31	As
45	Well	9 South	18 East	32	As, F
46	Well	9 South	18 East	32	As
47	Well	10 South	18 East	3	F
48	Well	10 South	18 East	8	Sb, F
49	Well	10 South	18 East	8	As, F
50	Well	11 South	18 East	26	As
51	Well	13 South	18 East	6	Rad, TDS
52	Well	13 South	19 East	30	As
53	Well	13 South	20 East	21	As
54	Well	13 South	20 East	31	As
55	Well	14 South	21 East	19	F
56	Well	15 South	18 East	11	TDS

Source: Compilation of databases from ADWR & others

Table 3.8-7 Water Quality Exceedences in the Lower San Pedro Basin (Cont)[1]

B. Lakes, Rivers 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[2]
a	Stream	Mineral Creek (Devil's Canyon - Gila River)	10	NA	A&W	Cu, Se
b	Stream	San Pedro (Aravaipa Creek - Gila River)	15	NA	A&W	E.coli, Se

Source: ADEQ 2005e

Notes:
Because of map scale, feature locations may appear different than the location indicated on the table
NA = Not applicable
[1] Water quality samples collected between 1980 and 2004.
[2] Sb = Antimony
As = Arsenic
Be = Beryllium
Cd = Cadmium
Cu = Copper
F= Fluoride
Pb = Lead
Hg = Mercury
NO3 = Nitrate
Se = Selenium
Rad = One or more of the following radionuclides - Gross Alpha, Gross Beta, Radium, and Uranium
TDS = Total Dissolved Solids
[3] A&W = Aquatic and Wildlife

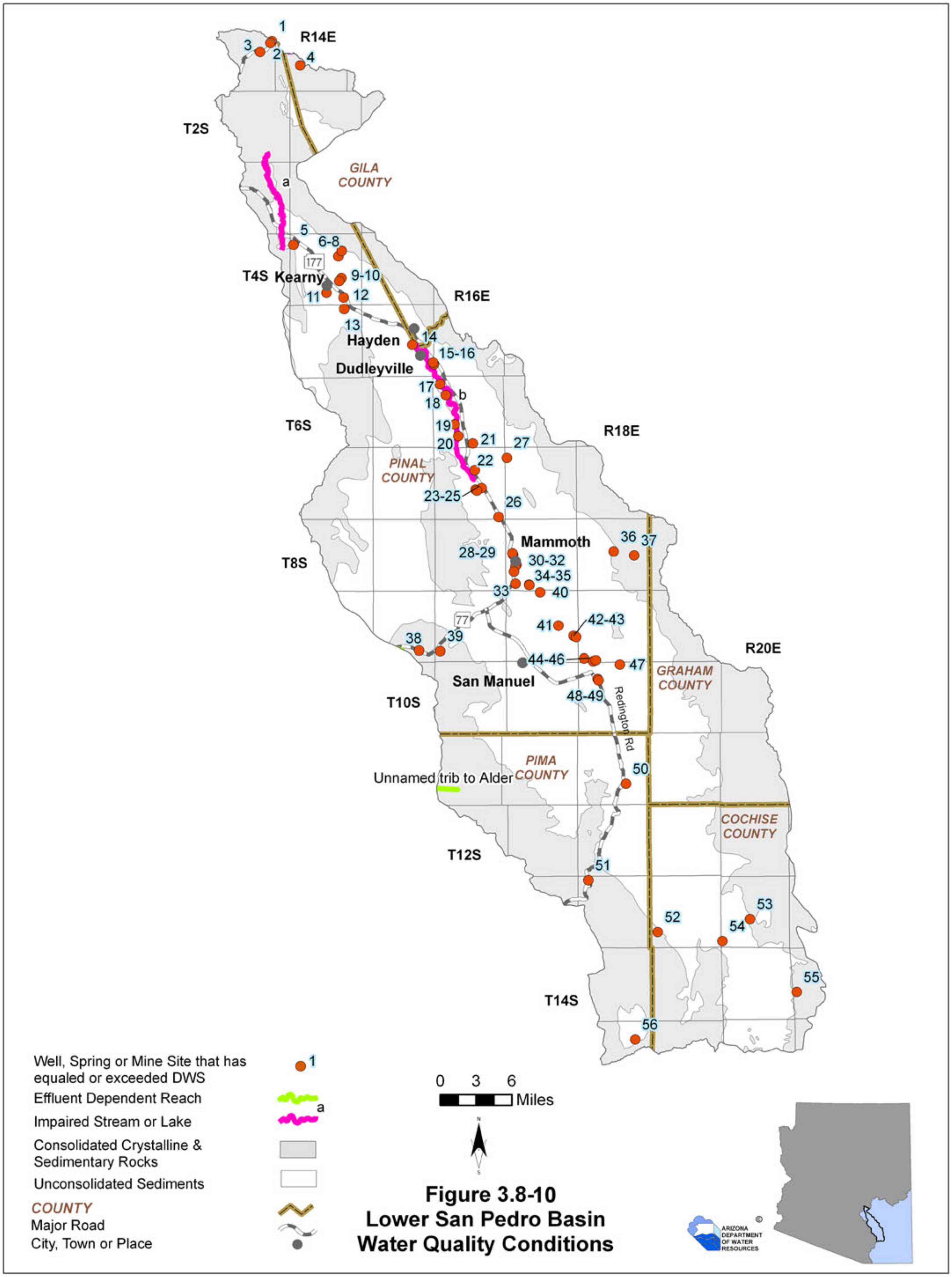


Figure 3.8-10
Lower San Pedro Basin
Water Quality Conditions

3.8.8 Cultural Water Demands in the Lower San Pedro 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 3.8-8. Effluent generation including facility ownership, location, population served and not served, volume treated, disposal method and treatment level is shown on Table 3.8-9. Figure 3.8-11 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 demands is found in Section 3.0.7.

Cultural Water Demands

- Refer to Table 3.8-8 and Figure 3.8-11.
- Population decreased in this basin 1980 to 2000. Projections suggest a minimal growth through 2030.
- Total groundwater demand has decreased from 1971 to 2005 with an average of 25,700 acre-feet pumped per year in the period from 2001-2005.
- Surface water diversions have also decreased from 1971 to 2005 with approximately 1,000 acre-feet diverted per year in the period from 1991 – 2005 for agricultural and municipal uses.
- The majority of agricultural demand is along Highway 177, Highway 77 and along the San Pedro River in Pima and Cochise Counties.
- The largest single demand for groundwater is industrial with an average of 15,900 acre-feet per year pumped in the period from 2001-2005.
- There are numerous mines in the basin. The active Ray Mine north of Kearny, a small inactive mine in the vicinity of Hayden and numerous inactive mines including the Mammoth Mine and San Manuel Mine in the vicinity of Mammoth.
- Municipal demand has remained relatively constant with an average of 2,300 acre-feet per year pumped in the period from 2001-2005. The town of Oracle is located at the western boundary of the basin. Wells associated with this town are in the Tucson Active Management Area at Oracle Junction.
- As of 2005 there were 1,630 registered wells with a pumping capacity of less than or equal to 35 gallons per minute and 398 wells with a pumping capacity of more than 35 gallons per minute.

Effluent Generation

- Refer to Table 3.8-9.
- There are five known wastewater treatment facilities in the basin.
- Over 12,000 people are served by these facilities.
- 708 acre-feet of effluent per year are generated in this basin.
- One facility, the Kearny Wastewater Treatment Facility, discharges wastewater for irrigation.
- Discharge from one facility, the Mammoth Wastewater Treatment Facility, recharges the aquifer through an unlined impoundment. This facility is not permitted by the Department as an Underground Storage Facility.

Table 3.8-8 Cultural Water Demands in the Lower San Pedro Basin[1]

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		1,028[2]	297[2]	56,000			6,000			ADWR (1994a)
1972										
1973										
1974										
1975										
1976				56,000			6,000			
1977										
1978										
1979										
1980	19,300									
1981	18,960	92	21	47,000			6,000			
1982	18,620									
1983	18,279									
1984	17,939									
1985	17,599									
1986	17,259	118	28	40,000			6,000			
1987	16,919									
1988	16,578									
1989	16,238									
1990	15,898									
1991	15,860	147	25	2,500	31,000	12,800	500	NR	<1,000	USGS (2007) ADWR (2008b) Gila River Commissioner Annual Report
1992	15,821									
1993	15,783									
1994	15,745									
1995	15,707									
1996	15,668	100	8	2,500	26,300	11,100	400	NR	<1,000	
1997	15,630									
1998	15,592									
1999	15,553									
2000	15,515									
2001	16,154	145	19	2,300	15,900	7,500	300	NR	<1,000	
2002	16,793									
2003	17,432									
2004	18,071									
2005	18,710									
2010	21,905									
2020	29,180									
2030	34,736									
WELL TOTALS:		**1,630**	**398**							

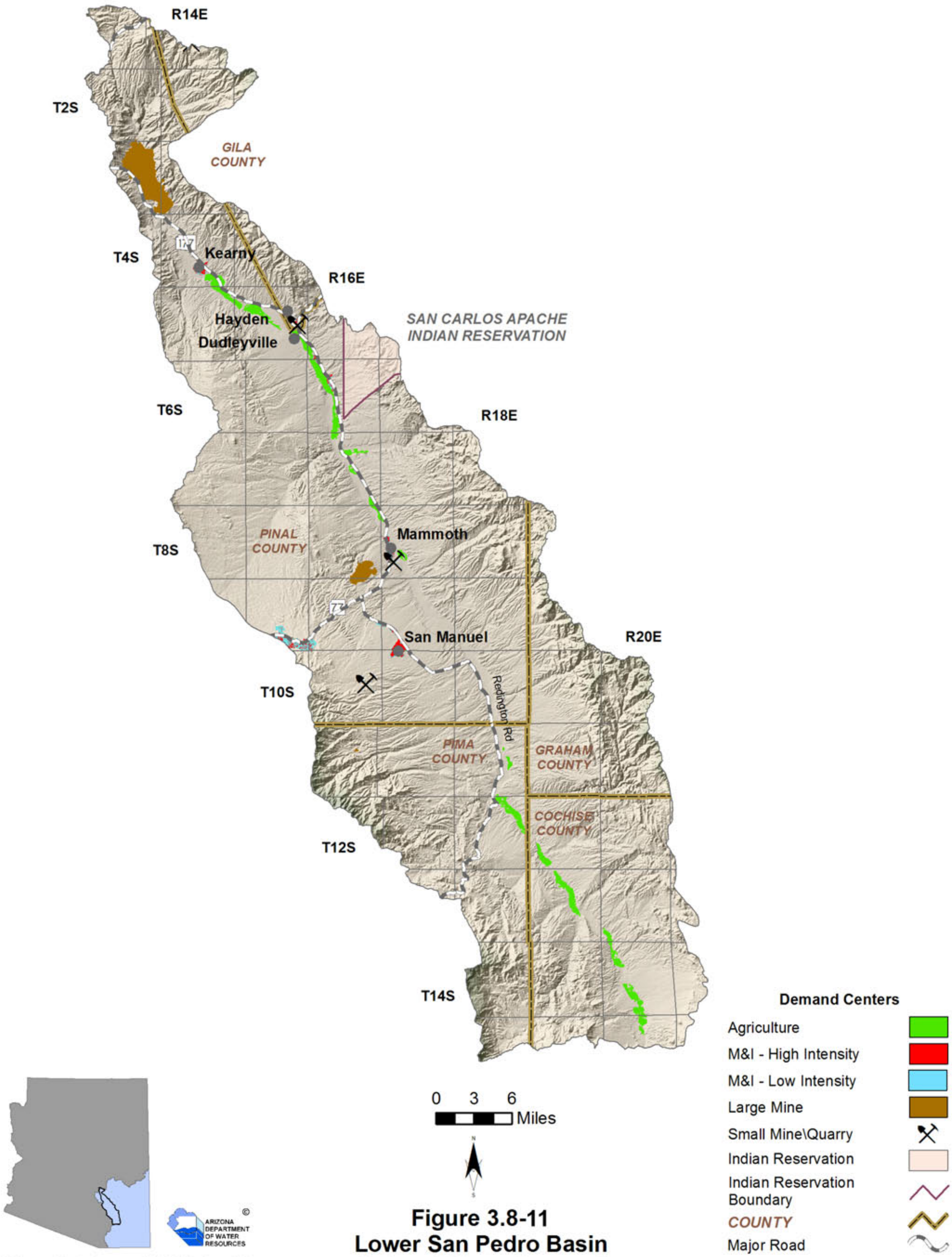
Notes:
NR=Not reported
[1] Does not include evaporation losses from stockponds and reservoirs or effluent
[2] Includes all wells through June 1980.

Table 3.8-9 Effluent Generation in the Lower San Pedro 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	Golf Course/Turf/Landscape	Wildlife Area	Industrial Use	Discharge to Another Facility	Infiltration Basins			
Coronado Utilities WWTP	Santec Corp.	San Manuel	4,100	291								X	Tertiery		2008
Hayden Collection Systems	Town of Hayden	Hayden	910	NA							Winkleman WWTP		NA		2003
Kearny STP	Town of Kearny	Kearny	2,550	190				X	X				Adv. Trt. II & Nutrient Removal	NA	2007
Mammoth WWTF	Town of Mammoth	Mammoth	1,700	99		X						X	Secondary	NA	2004
Oracle WWTF	Oracle SD	Oracle	1,551	90		X							Secondary	NA	2004
Winkleman WWTP	Town of Winkleman	Winkleman	1,210	38	Gila River								Secondary	NA	2004
Total			**12,021**	**708**											

Source: Compilation of databases from ADWR & others

Notes:
Year of Record is for the volume of effluent treated/generated
NA: Data currently not available to ADWR
WWTF: Wastewater Treatment Facility
WWTP: Wastewater Treatment Plant
SD: Sanitation District
STP: Sewage Treatment Plant
Adv. Tr. II: Advance treatment level II



Primary Data Source: USGS National Gap Analysis Program, 2004

Figure 3.8-11
Lower San Pedro Basin
Cultural Water Demand

3.8.9 Water Adequacy Determinations in the Lower San Pedro 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 3.8-109A and B for water reports and analysis of adequate water supply. Figure 3.8-12 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.

- Eleven water adequacy determinations have been made in this basin through December 2008.
- Three determinations of inadequacy have been made. These determinations are scattered throughout the basin.
- All determinations of inadequacy were because the applicant chose not to submit necessary information and/or available hydrologic data was insufficient to make a determination.
- One analysis of adequate water supply for 2,940 lots has been issued in this basin.
- 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
Cochise	0	0	NA
Gila	7	7	100%
Graham	0	0	NA
Pima	0	0	NA
Pinal	>1,204	1,188	~98%

Table 3.8-10 Adequacy Determinations in the Lower San Pedro Basin[1]

A. Water Adequacy Reports

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 the Time of Application
			Township	Range	Section						
1	Aravaipa #1	Pinal	7 South	16 West	9, 10	24	53-500282	Adequate		1/27/1975	Aravaipa Water Company
2	Cherry Valley	Pinal	10 South	16 West	6	26	53-500452	Adequate		10/24/1977	Arizona Water Company - Oracle System
4	Kearney Subdivision #12	Pinal	4 South	14 West	22	13	53-500838	Adequate		6/19/1979	John W. Galbreath Development Corp.
5	Mammoth, Town of	Pinal	8 South	17 West	19	16	53-500933	Inadequate	A1	4/11/1988	Town of Mammoth
6	Mountain Valley	Pinal	1 South	13 West	13	NA	53-501025	Inadequate	A1	3/30/1981	Dry Lot Subdivision
7	Oracle Mountain View Estates	Pinal	9 South	15 West	36	NA	53-501076	Inadequate	A1	1/2/1982	Arizona Water Company - Oracle System
8	Oracle Ranch Estates #2	Pinal	9 South	15 West	26, 27	38	53-501077	Adequate		8/16/1979	Arizona Water Company - Oracle System
9	Rancho Robles	Pinal	9 South	15 West	35	17	53-501269	Adequate		8/9/1979	Arizona Water Company - Oracle System
10	San Manuel, Townsite	Pinal	9 South	17 West	31,32	1,050	53-500201	Adequate		7/7/1988	Arizona Water Company
11	Two O'Clock Hill	Pinal	9 South	15 West	35	20	53-501587	Adequate		10/15/1974	Arizona Water Company - Oracle System
12	Winkelman Terrace	Gila	5 South	15 West	13	7	53-300508	Adequate		8/25/1998	Arizona Water Company & Community Wells

B. Analysis of Adequate Water Supply

Map Key	Subdivision Name	County	Location			No. of Lots	ADWR File No.[2]	Date of Determination	Water Provider at the Time of Application
			Township	Range	Section				
3	Cielo	Pinal	9 South	15 West	12, 13, 24, 25	2,948	43-401716	6/27/2005	Town of Mammoth

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 unavaible;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
NA= Data not currently available to ADWR

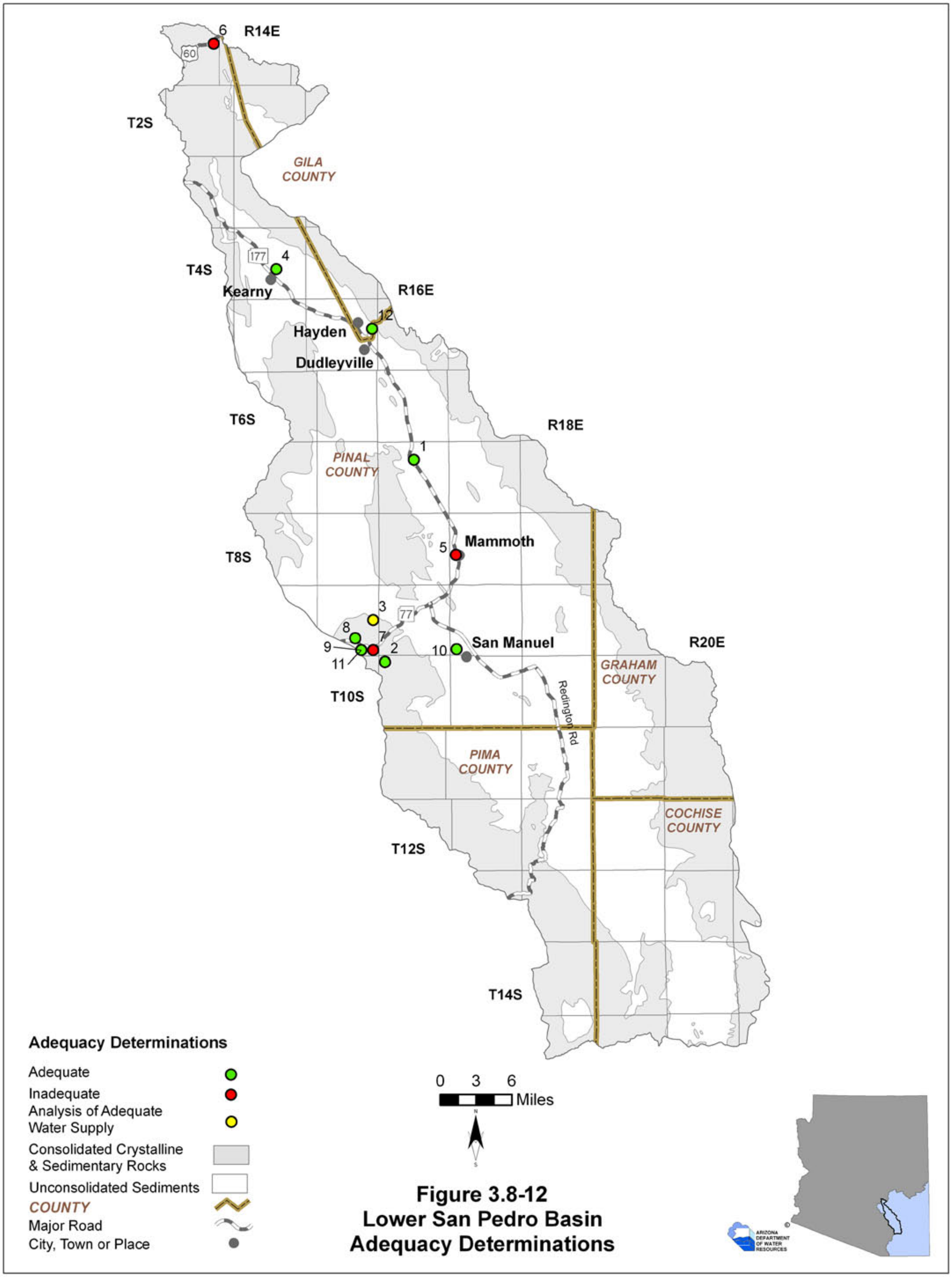


Figure 3.8-12
Lower San Pedro Basin
Adequacy Determinations

LOWER SAN PEDRO BASIN
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