

Section 7.10 Western Mexican Drainage Basin



7.10.1 Geography of the Western Mexican Drainage Basin

The Western Mexican Drainage Basin, located in the south central part of the planning area is 610 square miles in area. Geographic features and principal communities are shown on Figure 7.10-1. The basin is characterized by desert valleys and low elevation mountain ranges. Vegetation types include Lower Colorado River Valley and Arizona Uplands Sonoran desertscrub. (See Figure 7.0-7)

- Principal geographic features shown on Figure 7.10-1 are:
 - Basin places of Lukeville and the Organ Pipe National Monument Headquarters
 - Aguajita Wash west of Lukeville
 - Tule Desert in the western portion of the basin
 - The lowest point in the basin at 680 feet at Las Playas at the international boundary
- Not well shown on Figure 7.10-1 is the Sierra de Santa Rosa on the eastern basin boundary and the highest point in the basin at 3,149 feet.

7.10.2 Land Ownership in the Western Mexican Drainage Basin

Land ownership, including the percentage of ownership by category, for the Western Mexican Drainage Basin is shown in Figure 7.10-2. The principal feature of land ownership in this basin is the large proportion of National Wildlife Refuge lands. A description of land ownership data sources and methods is found in Volume 1, Section 1.3.8. Land ownership categories are discussed below in the order of largest to smallest percentage in the basin.

National Wildlife Refuge

- 61.1% of the land is federally owned and managed by the U.S. Fish and Wildlife Service as the Cabeza Prieta National Wildlife Refuge.
- Land uses include resource protection and recreation.

National Park Service (NPS)

- 36.3% of the land is federally owned and managed by the National Park Service as the Organ Pipe Cactus National Monument.
- Land uses include resource conservation and recreation.

U.S. Military

- 2.2% of the land is federally owned and managed by the U.S. Military as the Barry Goldwater Air Force Range.
- Primary land use is military activity.

Indian Reservation

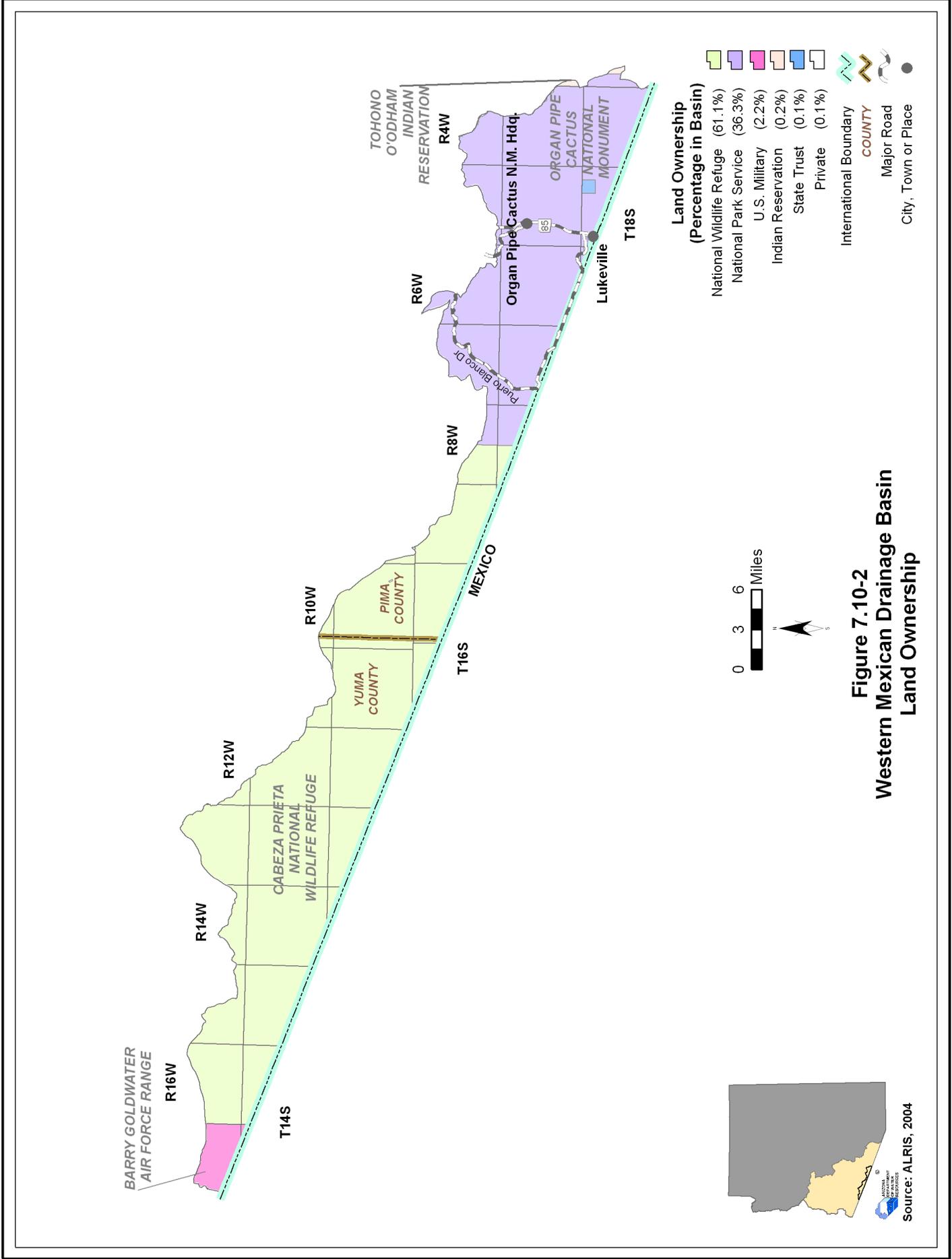
- 0.2% of the land is under tribal ownership as the Tohono O'odham Indian Reservation.
- Tribal lands are located along the eastern basin boundary
- Primary land use is grazing.

State Trust Land

- 0.1% of the land is held in trust for the public schools under the State Trust Land system.
- State trust land is found in the eastern portion of the basin surrounded by the Organ Pipe Cactus National Monument.
- Primary land use is resource conservation.

Private

- 0.1% of the land is private.
- All private land is in the vicinity of Lukeville, however, it cannot be seen at the map scale shown.
- Land uses include domestic and commercial.



7.10.3 Climate of the Western Mexican Drainage Basin

Climate data from NOAA/NWS Co-op Network stations are compiled in Table 7.10-1 and the locations are shown on Figure 7.10-3. Figure 7.10-3 also shows precipitation contour data from the Spatial Climate Analysis Service (SCAS) at Oregon State University. The Western Mexican Drainage Basin does not contain Evaporation Pan, AZMET or SNOTEL/Snowcourse stations. A description of the climate data sources and methods is found in Volume 1, Section 1.3.3.

NOAA/NWS Co-op Network

- Refer to Table 7.10-1A
- There is one NOAA/NWS Co-op Network station in the basin, Organ Pipe Cactus N.M., with an average high of 89.2°F and an average low of 54.7°F.
- Highest average seasonal rainfall, 4.38 inches, occurs in the summer season (July-September) when 44% of the annual average precipitation occurs.

SCAS Precipitation Data

- See Figure 7.10-3
- Additional precipitation data shows average annual rainfall as high as 14 inches along the northeastern basin boundary and as low as four inches in the western portion of the basin.

Table 7.10-1 Climate Data for the Western Mexican Drainage 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
Organ Pipe Cactus N.M.	1,680	1971 - 2000	89.2/Jul	54.7/Jan	2.66	0.32	4.38	2.52	9.88

Source: WRCC, 2003

B. Evaporation Pan:

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

Source: WRCC, 2003.

C. AZMET:

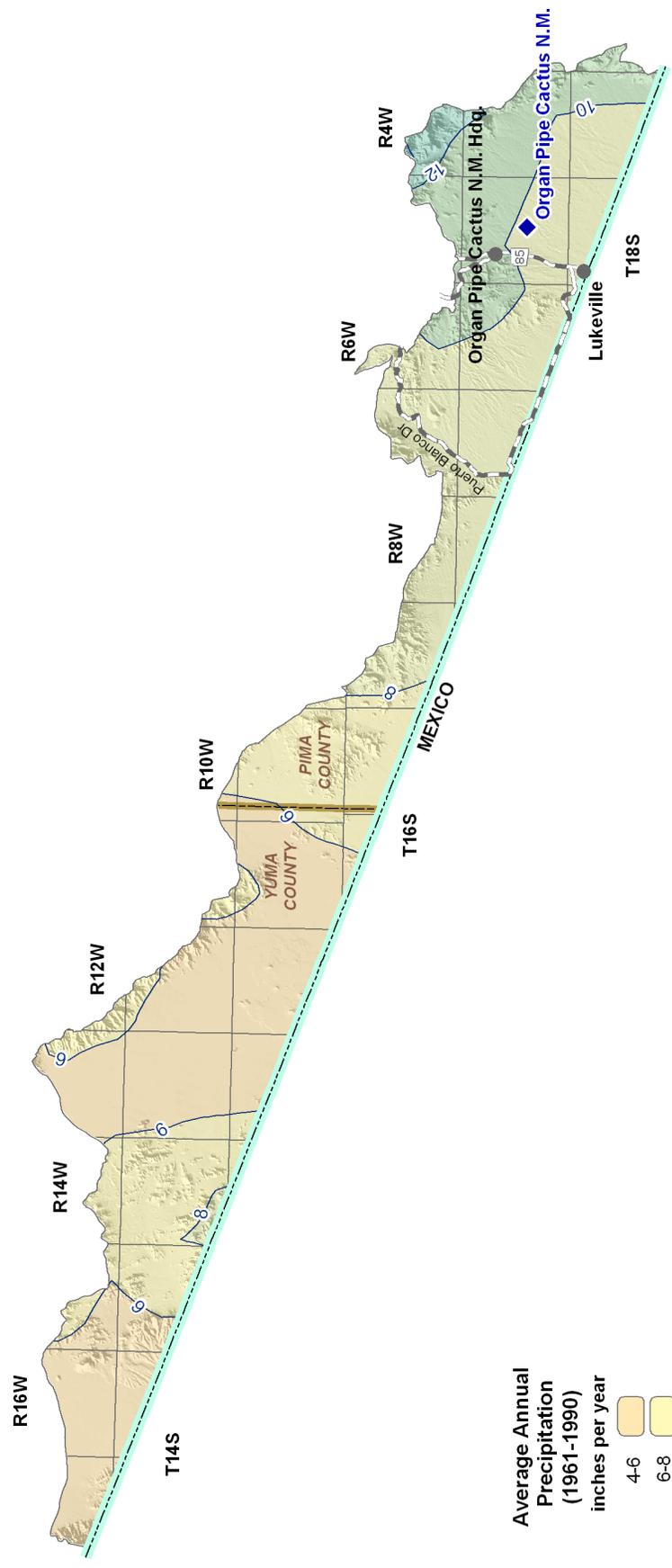
Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Annual Reference Evapotranspiration, in inches (Number of years to calculate averages)
None			

Source: Arizona Meteorological Network, 2005

D. SNOTEL/Snowcourse:

Station Name	Elevation (in feet)	Period of Record Used for Averages	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								

Source: NRCS, 2005



Average Annual Precipitation (1961-1990)
inches per year

- 4-6
- 6-8
- 8-10
- 10-12
- 12-14

Meteorological Stations

- NOAA/NWS
- Precipitation Contour
- International Boundary
- COUNTY
- Major Road
- City, Town or Place

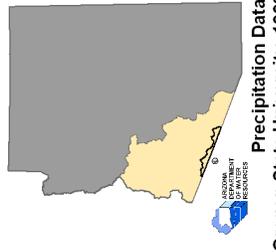
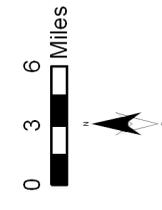


Figure 7.10-3
Western Mexican Drainage Basin
Meteorological Stations and Annual Precipitation

Source: Oregon State University, 1998

7.10.4 Surface Water Conditions in the Western Mexican Drainage Basin

Flood ALERT equipment in the basin is shown in Table 7.10-3 and Figure 7.10-4. There are no streamflow data, reservoirs, stockponds or USGS runoff contour data available for this basin. A description of stream data sources and methods is found in Volume 1, Section 1.3.16. A description of reservoir data sources and methods is found in Volume 1, Section 1.3.11. A description of stockpond data sources and methods is found in Volume 1, Section 1.3.15.

Flood ALERT Equipment

- Refer to Table 7.10-3
- There is one weather station in the basin located at the Organ Pipe Cactus National Monument Headquarters.

Table 7.10-2 Streamflow Data for the Western Mexican Drainage Basin

Station Number	USGS Station Name	Drainage Area (in mi ²)	Mean Basin Elevation (in feet)	Period of Record	Average Seasonal Flow (% of annual flow)				Annual Flow/Year (in acre-feet)			Years of Record
					Winter	Spring	Summer	Fall	Minimum	Median	Mean	
None												

Sources: USGS NWIS, USGS 1998 and USGS 2003.

Table 7.10-3 Flood ALERT Equipment in the Western Mexican Drainage Basin

Station ID	Station Name	Station Type	Install Date	Responsibility
Organ Pipe Weather Station	7230	Weather Station	7/31/2004	ADWR

Notes:
ADWR = Arizona Department of Water Resources

Table 7.10-4 Reservoirs and Stockponds in the Western Mexican Drainage Basin

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

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

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

Total number: 0

Total maximum storage: 0 acre-feet

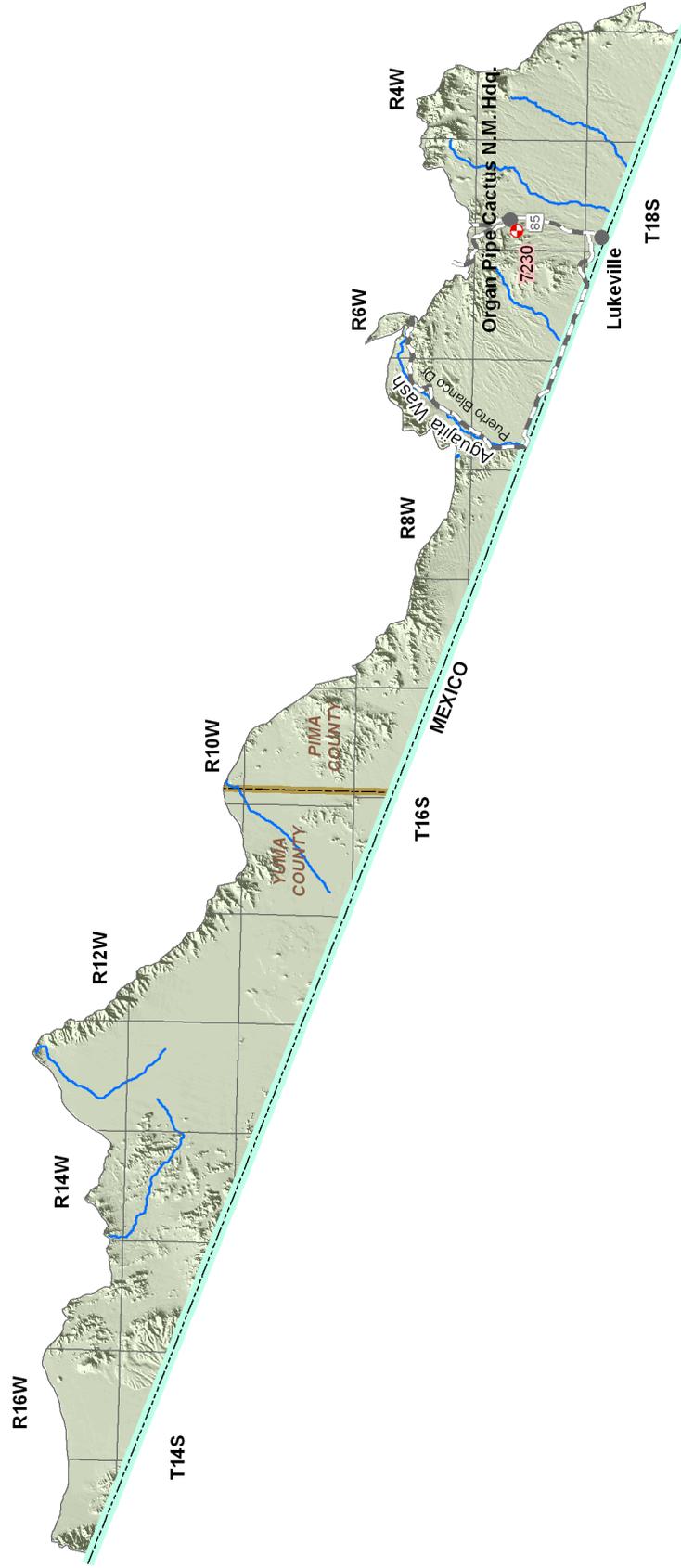
D. Other Small Reservoirs (between 5 and 50 acres surface area)

Total number: 0

Total surface area: 0 acres

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

Total number: 0



-  Stream Channel (width of line reflects stream order)
-  Flood ALERT Equip. & Station ID
-  International Boundary
-  COUNTY
-  Major Road
-  City, Town or Place

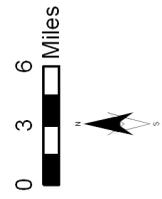


Figure 7.10-4
Western Mexican Drainage Basin
Surface Water Conditions



Stream Data Source: ALRIS, 2005

7.10.5 Perennial/Intermittent Streams and Major Springs in the Western Mexican Drainage 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 7.10-5. The location of a major spring is shown on Figure 7.10-5. There are no perennial or intermittent streams in the Western Mexican Drainage Basin. A description of data sources and methods for intermittent and perennial reaches is found in Volume 1, Section 1.3.16. A description of spring data sources and methods is found in Volume 1, Section 1.3.14.

- There is one major spring with a measured discharge rate of 28 gallons per minute. This discharge rate may not be indicative of current conditions; the spring was last measured during or prior to 1992. This is the only major spring in the planning area.
- Springs with measured discharge of 1 to 10 gpm are not mapped but coordinates are given in Table 7.10-5B. There are two minor springs in this basin.
- The total number of springs, regardless of discharge, identified by the USGS varies from four to six, depending on the database reference.

Table 7.10-5 Springs in the Western Mexican Drainage Basin

A. Major Springs (10 gpm or greater):

Map Key	Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
		Latitude	Longitude		
1	Quitobaquito (multiple)	315640	1130103	28	During or prior to 1992

B. Minor Springs (1 to 10 gpm):

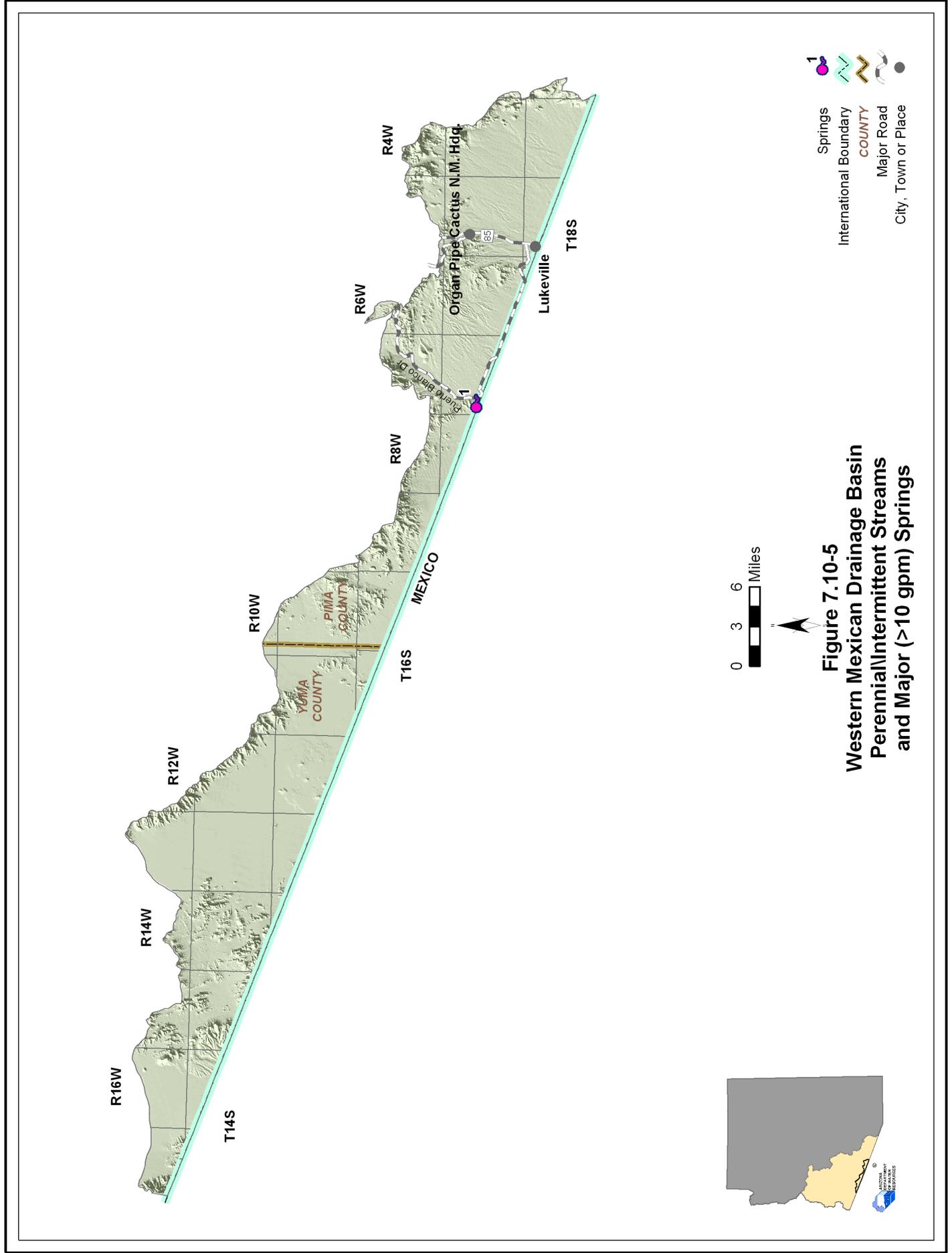
Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
	Latitude	Longitude		
Agujita	315623	1130037	4	12/13/1976
Unnamed	315700	1130116	1	12/14/1976

C. Total number of springs, regardless of discharge, identified by USGS

(see ALRIS, 2005 and NHD, 2006): 4 - 6

Notes:

¹ Most recent measurement identified by ADWR



7.10.6 Groundwater Conditions of the Western Mexican Drainage Basin

Major aquifers, well yields, estimated water in storage, number of index wells and date of last water-level sweep are shown in Table 7.10-6. Figure 7.10-6 shows aquifer flow direction and water-level change between 1990-1991 and 2003-2004. Figure 7.10-7 contains hydrographs for selected wells shown on Figure 7.10-6. Figure 7.10-8 shows well yields in one category. A description of aquifer data sources and methods is found in Volume 1, Section 1.3.2. A description of well data sources and methods, including water-level changes and well yields, is found in Volume 1, Section 1.3.19.

Major Aquifers

- Refer to Table 7.10-6 and Figure 7.10-6.
- The major aquifer is basin fill.
- Groundwater flow is from north to south.

Well Yields

- Refer to Table 7.10-6 and Figure 7.10-8.
- As shown on Figure 7.10-8, all recorded well yields less than 100 gallons per minute (gpm).
- One source of well yield information, based on three reported wells, indicates that the median well yield is 50 gpm.

Natural Recharge

- Refer to Table 7.10-6.
- The only estimate of natural recharge is 1,000 acre-feet per year.

Water in Storage

- Refer to Table 7.10-6.
- There are two estimates of water in storage, 3 million acre-feet and 4.1 million acre-feet, both to a depth of 1,200 feet.

Water Level

- Refer to Figure 7.10-6. Water levels are shown for wells measured in 2003-2004.
- The Department annually measures one index well in this basin, hydrographs for this well and four other wells are shown on Figure 7.10-7.
- The deepest water level shown on the map is 337 feet at the Organ Pipe Cactus National Monument Headquarters and the shallowest is 27 feet near Puerto Blanco Drive.

Table 7.10-6 Groundwater Data for the Western Mexican Drainage Basin

Basin Area, in square miles: 610		
Major Aquifer(s):	Name and/or Geologic Units	
	Basin Fill	
Well Yields, in gal/min:	1.9 (1 well measured)	Measured by ADWR and/or USGS
	Range 30-50 Median 50 (3 wells reported)	Reported on registration forms for large (> 10-inch) diameter wells
	N/A	ADWR (1990 and 1994)
	Range 0-500	USGS (1994)
Estimated Natural Recharge, in acre-feet/year:	1,000	Freethy and Anderson (1986)
Estimated Water Currently in Storage, in acre-feet:	4,100,000 (to 1,200 ft)	ADWR (1994)
	3,000,000 ¹ (to 1,200 ft)	Freethy and Anderson (1986)
	N/A	Arizona Water Commission (1975)
Current Number of Index Wells:	1	
Date of Last Water-level Sweep:	2004 (6 wells measured)	

¹Predevelopment Estimate

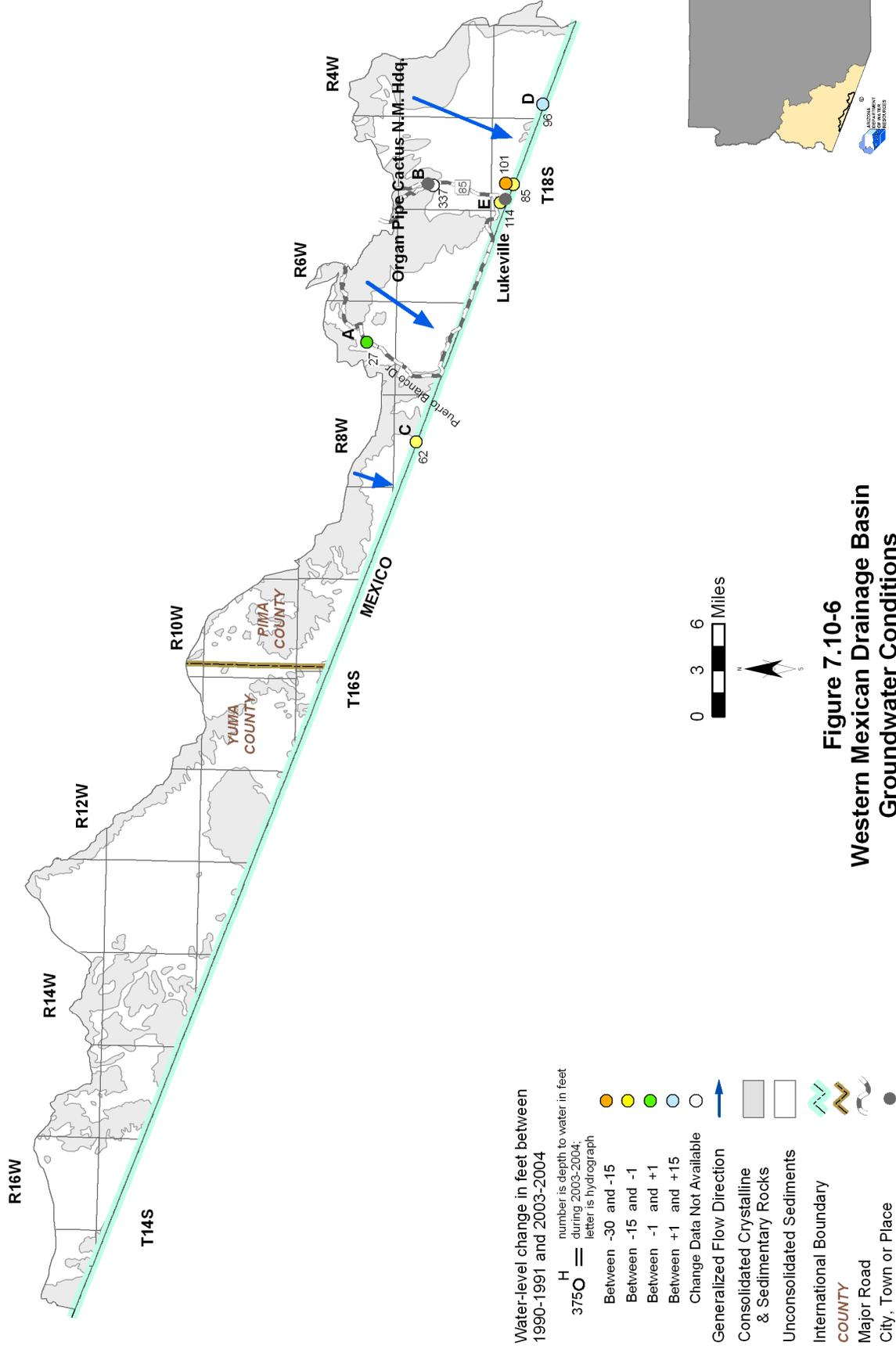
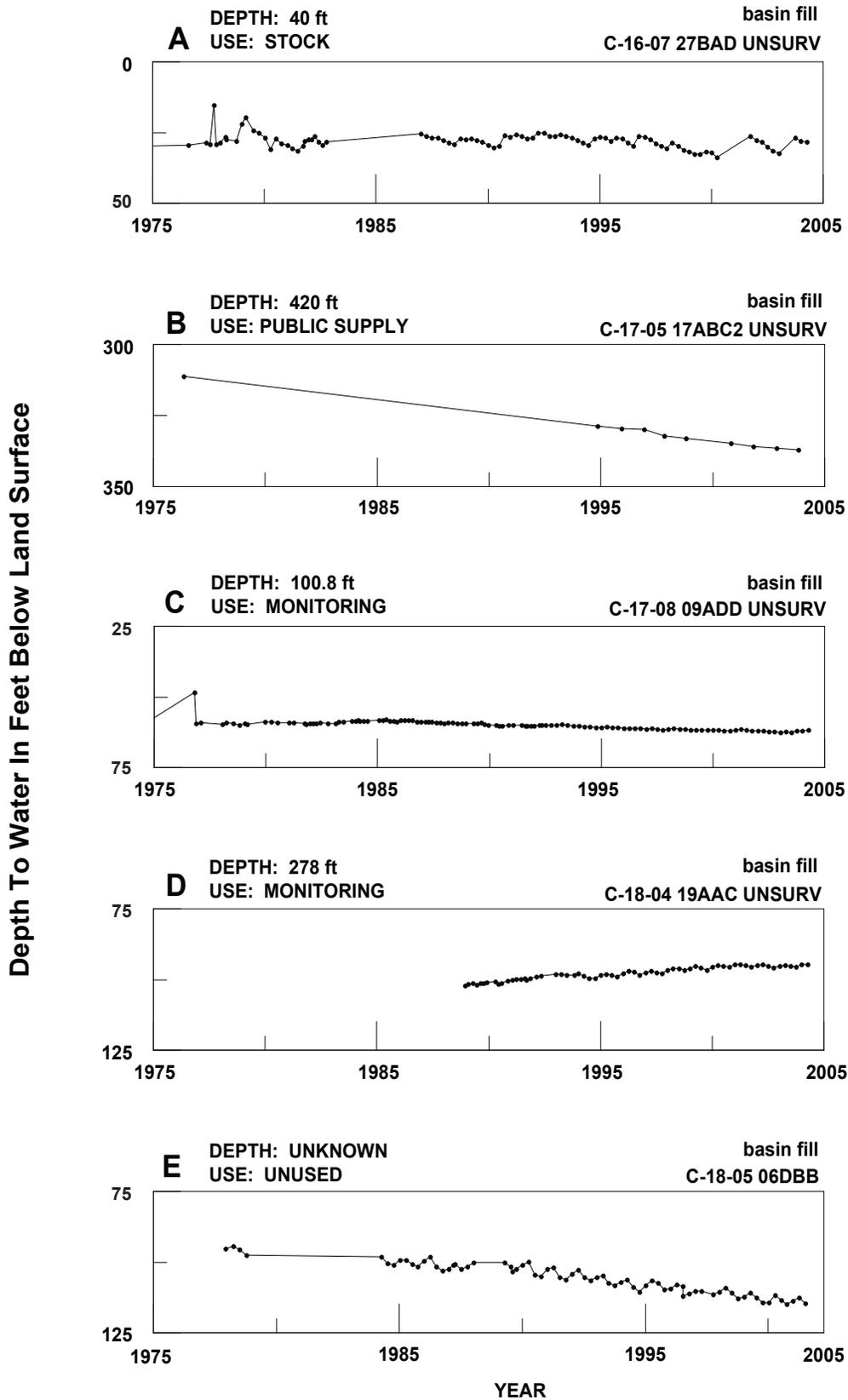
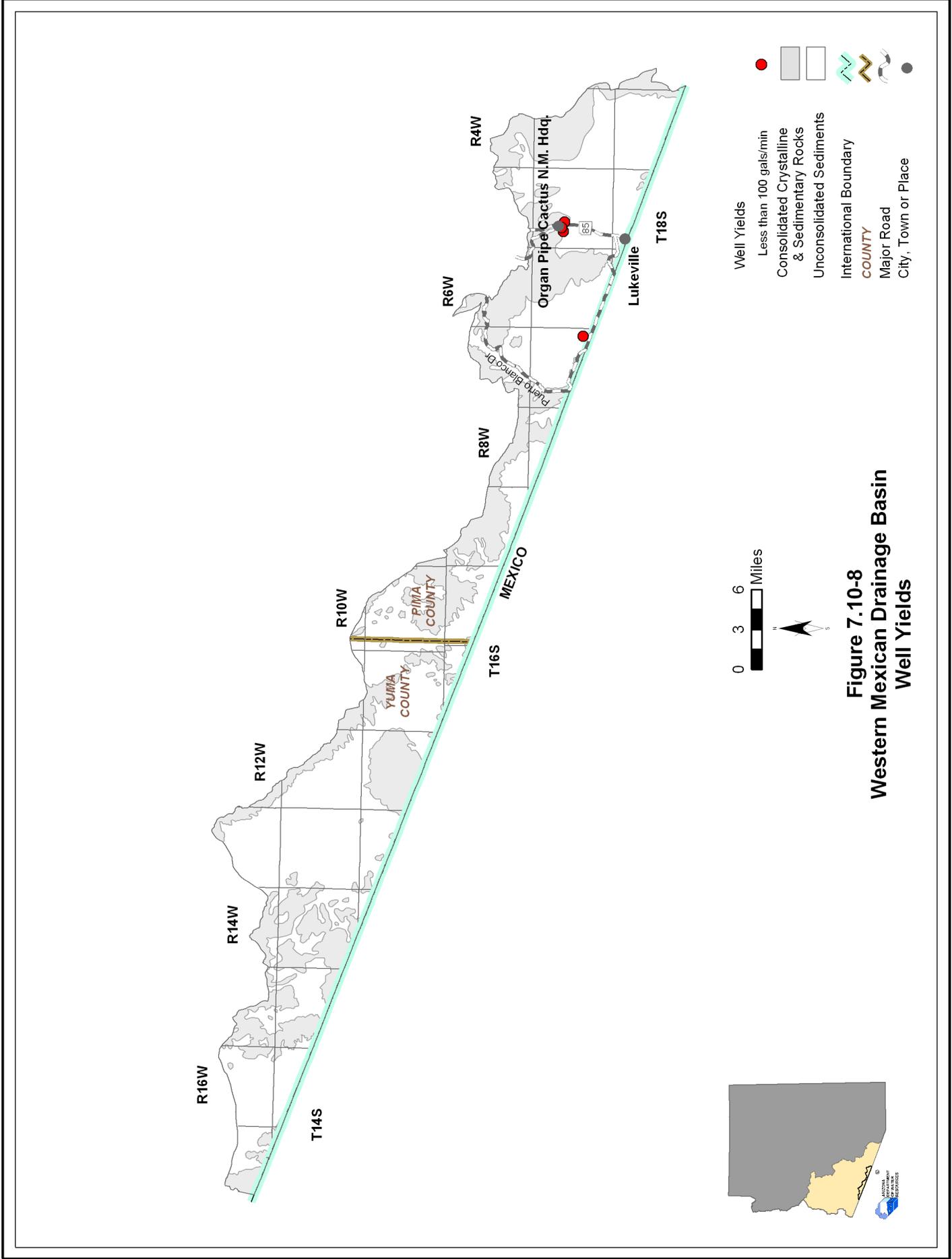


Figure 7.10-7
Western Mexican Drainage Basin
Hydrographs Showing Depth to Water in Selected Wells





- Well Yields
 - Less than 100 gals/min
- Consolidated Crystalline & Sedimentary Rocks
- Unconsolidated Sediments
- International Boundary
- COUNTY
- Major Road
- City, Town or Place

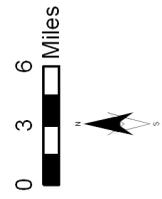


Figure 7.10-8
Western Mexican Drainage Basin
Well Yields



7.10.7 Water Quality of the Western Mexican Drainage 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 7.10-7A. There are no impaired lakes or streams in this basin. Figure 7.10-9 shows the location of water quality occurrences keyed to Table 7.10-7. A description of water quality data sources and methods is found in Volume 1, Section 1.3.18. Not all parameters were measured at all sites; selective sampling for particular constituents is common.

Wells, Springs and Mine Sites

- Refer to Table 7.10-7A.
- Six wells have parameter concentrations that have equaled or exceeded drinking water standards.
- The parameter for fluoride was equaled or exceeded in all wells.
- Other parameters equaled or exceeded include arsenic and lead.

Table 7.10-7 Water Quality Exceedences in the Western Mexican Drainage 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	17 South	7 West	17	F
2	Well	17 South	7 West	17	As, F
3	Well	17 South	7 West	18	As, F, Pb
4	Well	17 South	7 West	24	F
5	Well	17 South	8 West	9	F
6	Well	17 South	8 West	11	As, F

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	Parameter(s) Exceeding Use Standard
None identified by ADWR at this time						

Notes:

¹ Water quality samples collected between 1976 and 1988.

² As = Arsenic
F = Fluoride
Pb = Lead

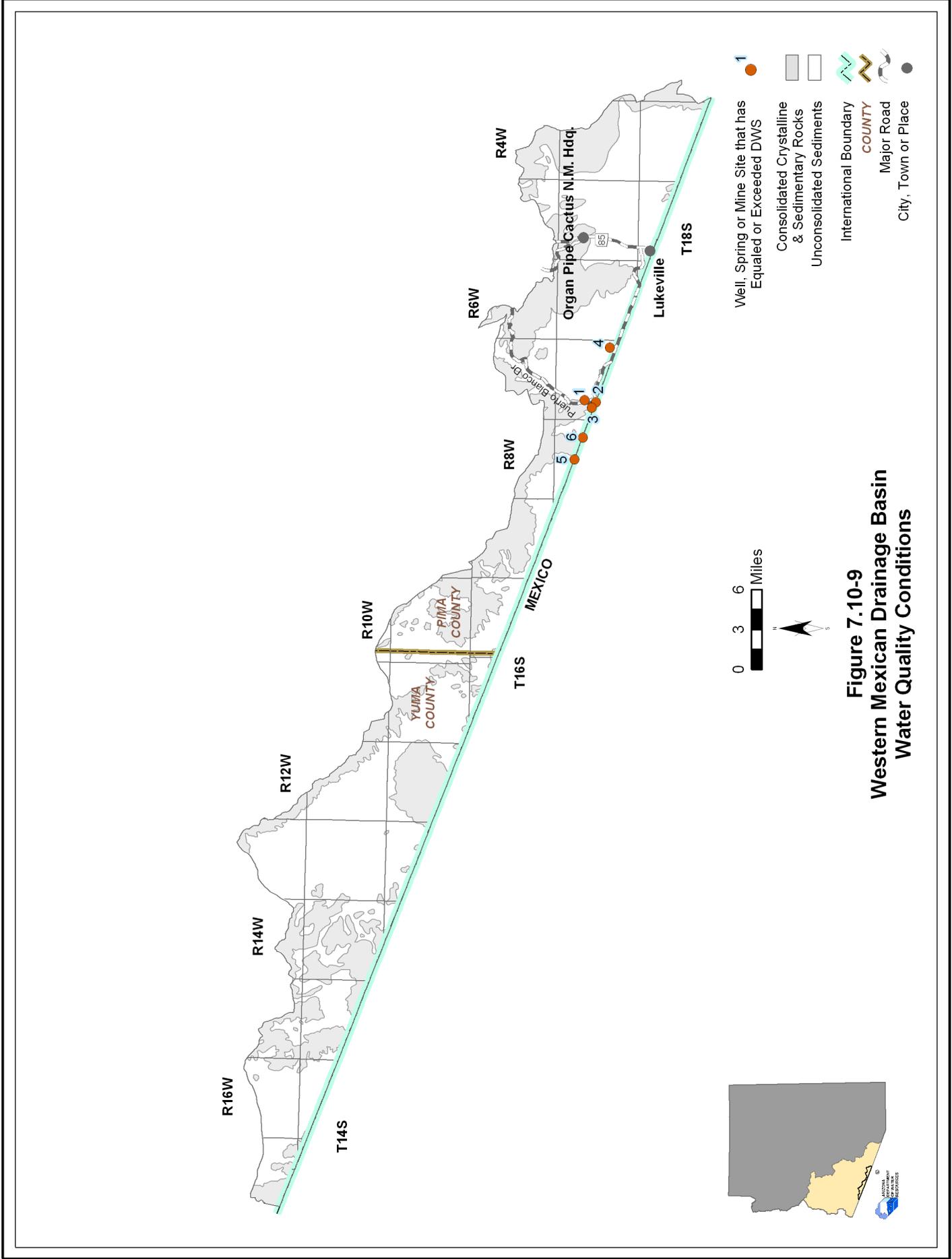


Figure 7.10-9
Western Mexican Drainage Basin
Water Quality Conditions

7.10.8 Cultural Water Demands in the Western Mexican Drainage 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 7.10-8. There is no recorded effluent generation in this basin. The USGS National Gap Analysis Program, the primary source of cultural demand map data, showed no demand centers for this basin. A description of cultural water demand data sources and methods is found in Volume 1, Section 1.3.5. More detailed information on cultural water demands is found in Section 7.0.7.

Cultural Water Demands

- Refer to Table 7.10-8
- Population in this basin is very small, with 34 residents in 2000. Projections suggest a small increase in population through 2050.
- There are no recorded surface water uses. All groundwater use is for municipal demand and has remained relatively constant since 1971.
- As of 2003 there were 16 registered wells with a pumping capacity of less than or equal to 35 gallons per minute and five wells with a pumping capacity of more than 35 gallons per minute.

Table 7.10-8 Cultural Water Demands in the Western Mexican Drainage Basin¹

Year	Recent (Census) and Projected (DES) 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	Irrigation	Municipal	Industrial	Irrigation		
1971		14 ²	5 ²	<500			NR			ADWR (1994)	
1972											
1973											
1974											
1975											
1976											
1977		<500			NR						
1978											
1979		0			0			<500			
1980	10										
1981	11										
1982	12										
1983	13										
1984	14										
1985	15	2			0			<500			
1986	16										
1987	17										
1988	18										
1989	19	0			0			<300			
1990	20										
1991	21										
1992	23										
1993	24										
1994	26										
1995	27	0			0			<300			
1996	28										
1997	30										
1998	31										
1999	33	0			0			<300			
2000	34										
2001	36										
2002	39										
2003	41										
2010	58										
2020	64										
2030	70										
2040	77										
2050	85										

WELL TOTALS: 16 5

¹ Does not include evaporation losses from stockponds and reservoirs.

² Includes all wells through 1980.

NR - Not reported

Table 7.10-9 Effluent Generation in the Western Mexican Drainage Basin

Facility Name	Ownership	City/Location Served	Population Served	Volume Treated/Generated (acre-feet)	Disposal Method						Current Treatment Level	Population Not Served	Year of Record
					Water-course	Evaporation Pond	Irrigation	Golf Course	Wildlife Area	Discharged to Another Facility			
No Waste Water Treatment Facilities Identified by ADWR in this Basin													

7.10.9 Water Adequacy Determinations in the Western Mexican Drainage Basin

No water adequacy applications for the Western Mexican Drainage Basin were filed with the Department as of May 2005. A description of the Water Adequacy Program is found in Volume 1, Appendix A. Adequacy determination data sources and methods are found in Volume 1, Section 1.3.1.

Table 7.10-10 Adequacy Determinations in the Western Mexican Drainage Basin

Map Key	Subdivision Name	County	Location			No. of Lots	ADWR File No.	ADWR Adequacy Determination	Reason(s) for Inadequacy Determination	Date of Determination	Water Provider at the Time of Application
			Township	Range	Section						
None identified by ADWR at this time											

Western Mexican Drainage Basin

References and Supplemental Reading

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