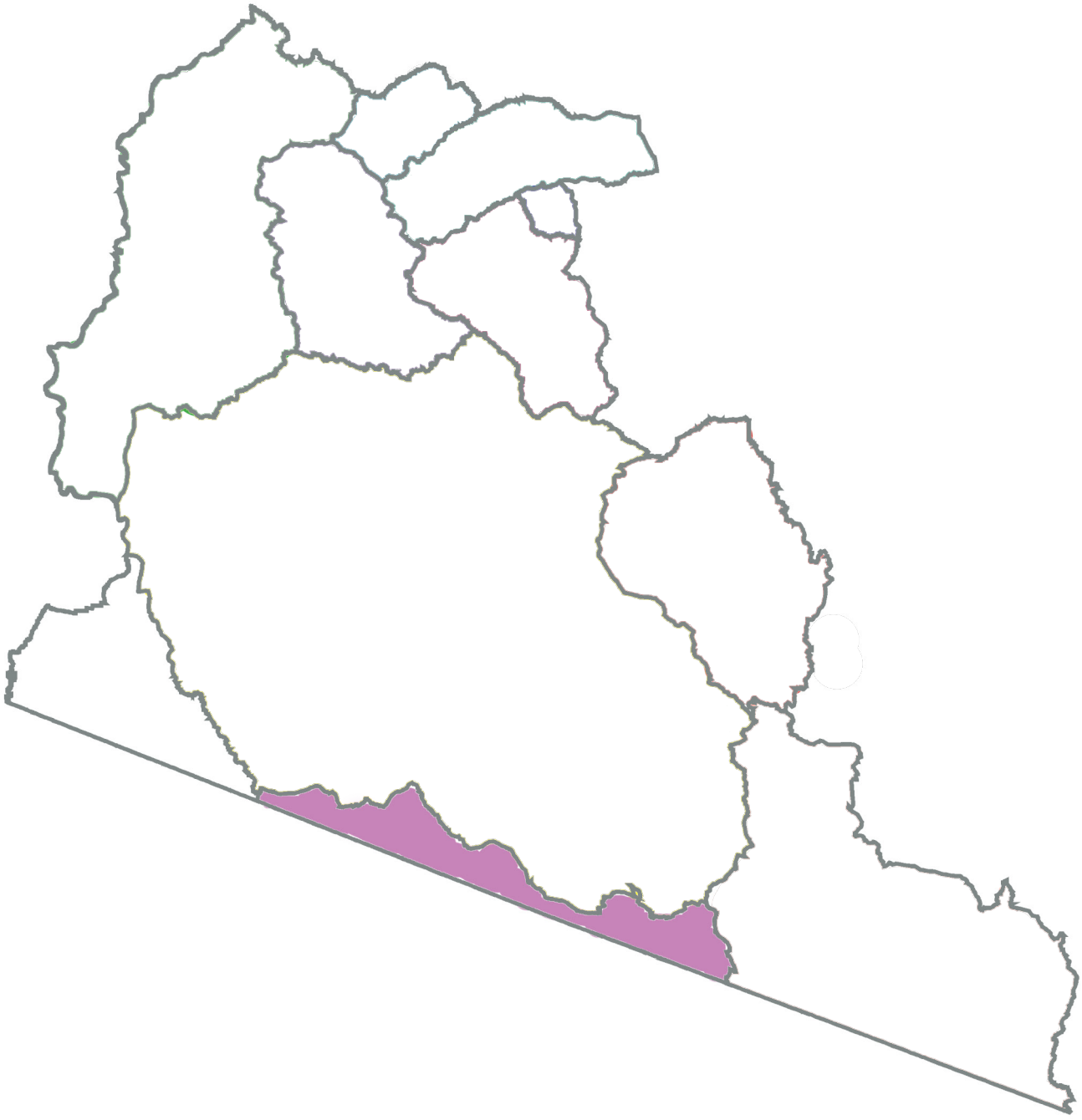
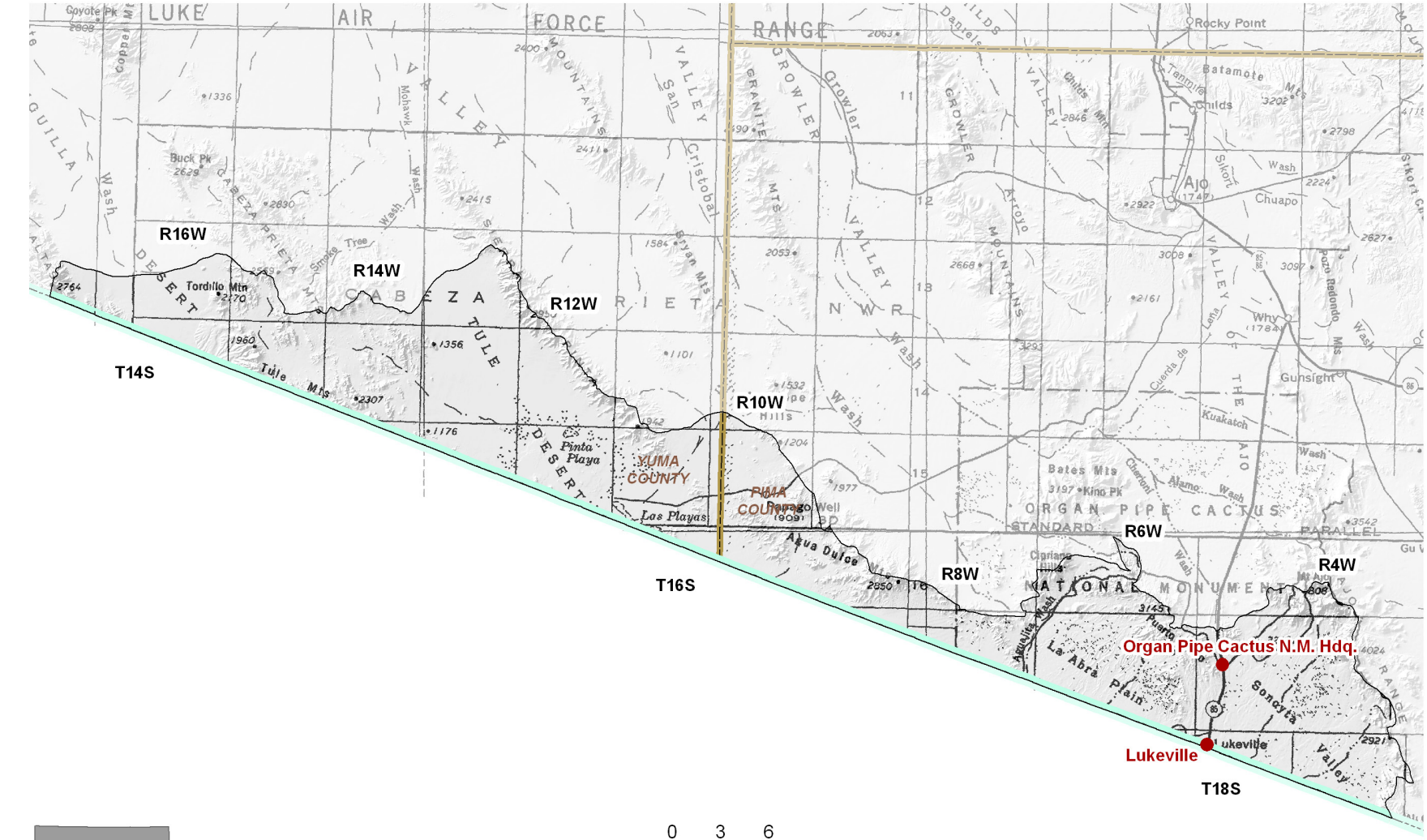
Section 7.10
Western Mexican Drainage Basin

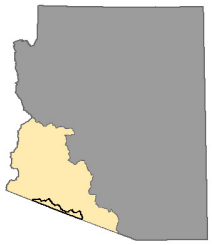


7.10.1 Geography of the Western Mexican Drainage Basin

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 7.0-9)

- Principal geographic features shown on Figure 7.10-1 are:
    - Aguajita Wash west of Lukeville
    - Tule Desert in the western portion of the basin
    - Ajo Range on the eastern basin boundary and the highest point in the basin at 4,024 feet.
    - The lowest point in the basin at 680 feet at Las Playas at the international boundary





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Base Map: USGS 1:500,000, 1981

Figure 7.10-1
Western Mexican Drainage Basin
Geographic Features

International Boundary
COUNTY
City, Town or Place

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, Appendix A. More detailed information on protected areas is found in Section 7.0.4. Land ownership categories are discussed below in the order of largest to smallest percentage in the basin.

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

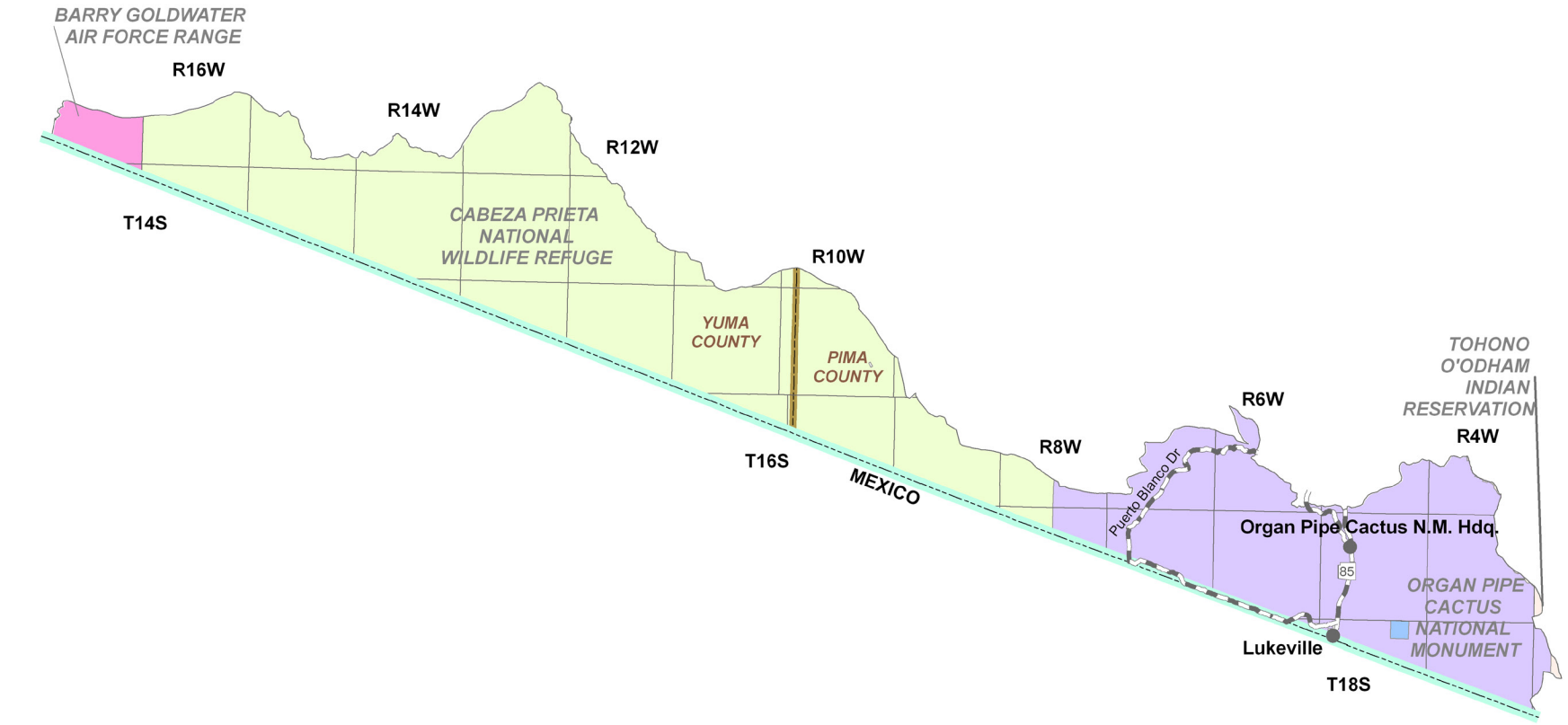
- 0.2% of the land is under tribal ownership as the Tohono O'odham Indian Reservation.
- Tribal lands are located along the eastern basin boundary
- Primary land use is grazing.

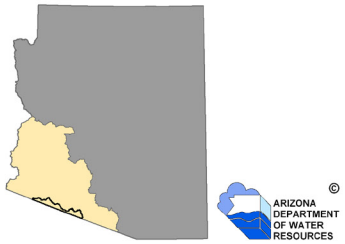
State Trust Land

- 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.





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Source: ALRIS, 2004

0 3 6 Miles

N
S

Land Ownership (Percentage in Basin)

National Wildlife Refuge	(61.1%)
National Park Service	(36.3%)
U.S. Military	(2.2%)
Indian Reservation	(0.2%)
State Trust	(0.1%)
Private	(0.1%)

International Boundary
COUNTY
Major Road
City, Town or Place

Figure 7.10-2
Western Mexican Drainage Basin
Land Ownership

7.10.3 Climate of the Western Mexican Drainage Basin

Climate data from NOAA/NWS Co-op Network stations are complied 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. More detailed information on climate in the planning area is found in Section 7.0.3. A description of climate data sources and methods is found in Volume 1, Appendix A.

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 monthly maximum temperature of 89.2°F and an average minimum temperature 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, 2005

B. Evaporation Pan:

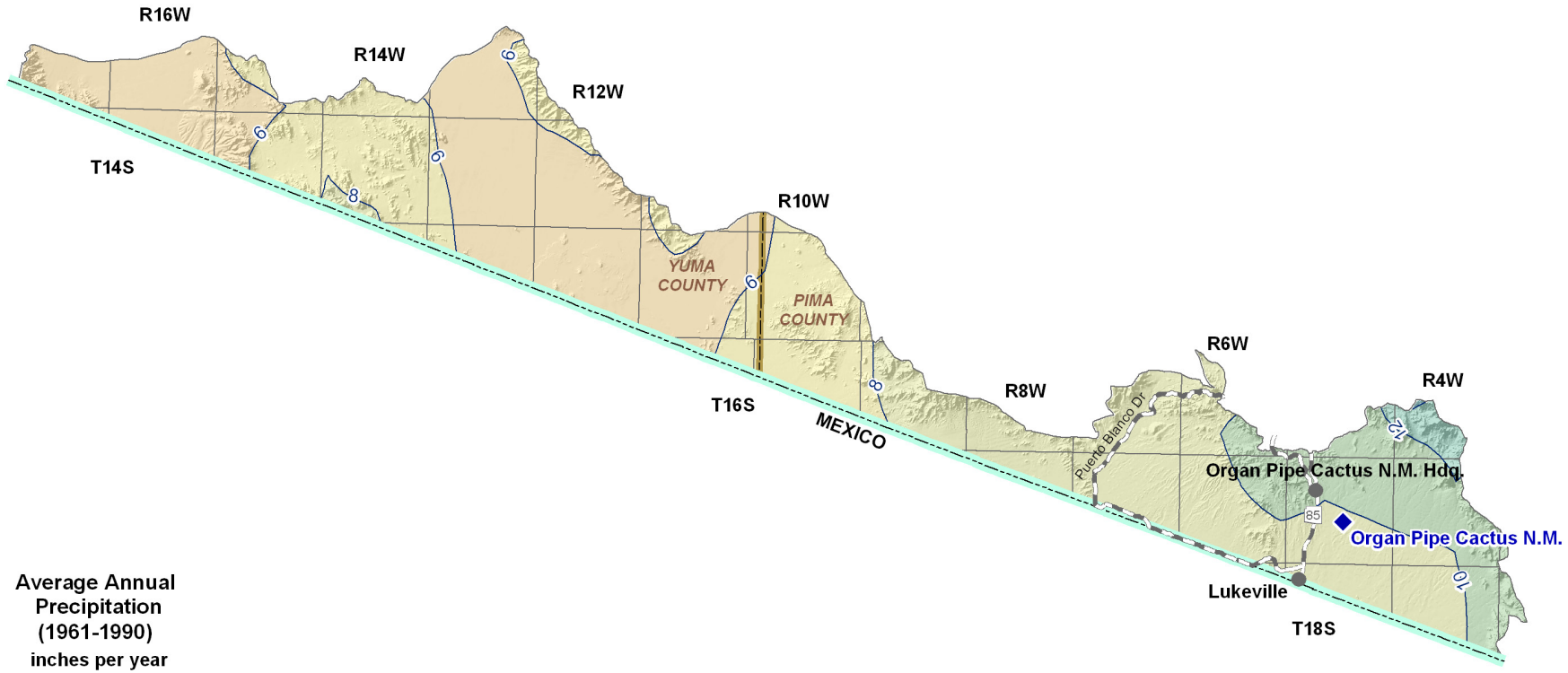
Station Name	Elevation (in feet)	Period of Record Used for Averages	Avg. Annual Evap (in inches)
None			

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								



Average Annual Precipitation (1961-1990)
inches per year

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

Meteorological Stations

- NOAA/NWS
- Precipitation Contour 12
- International Boundary
- COUNTY
- Major Road
- City, Town or Place

0 3 6 Miles

N
S

Precipitation Data
Source: Oregon State University, 1998

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

7.10.4 Surface Water Conditions in the Western Mexican Drainage Basin

Flood ALERT equipment in the basin is shown in Table 7.10-2 and Figure 7.10-4. There are no streamflow data, reservoirs, stockponds or USGS runoff contour data available for this basin. Descriptions of stream, reservoir and stockpond data sources and methods are found in Volume 1, Appendix A.

Flood ALERT Equipment

- Refer to Table 7.10-2
- As of October 2005 there was one station in this basin.

Table 7.10-2 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

Source: ADWR 2005a

Notes:
ADWR = Arizona Department of Water Resources

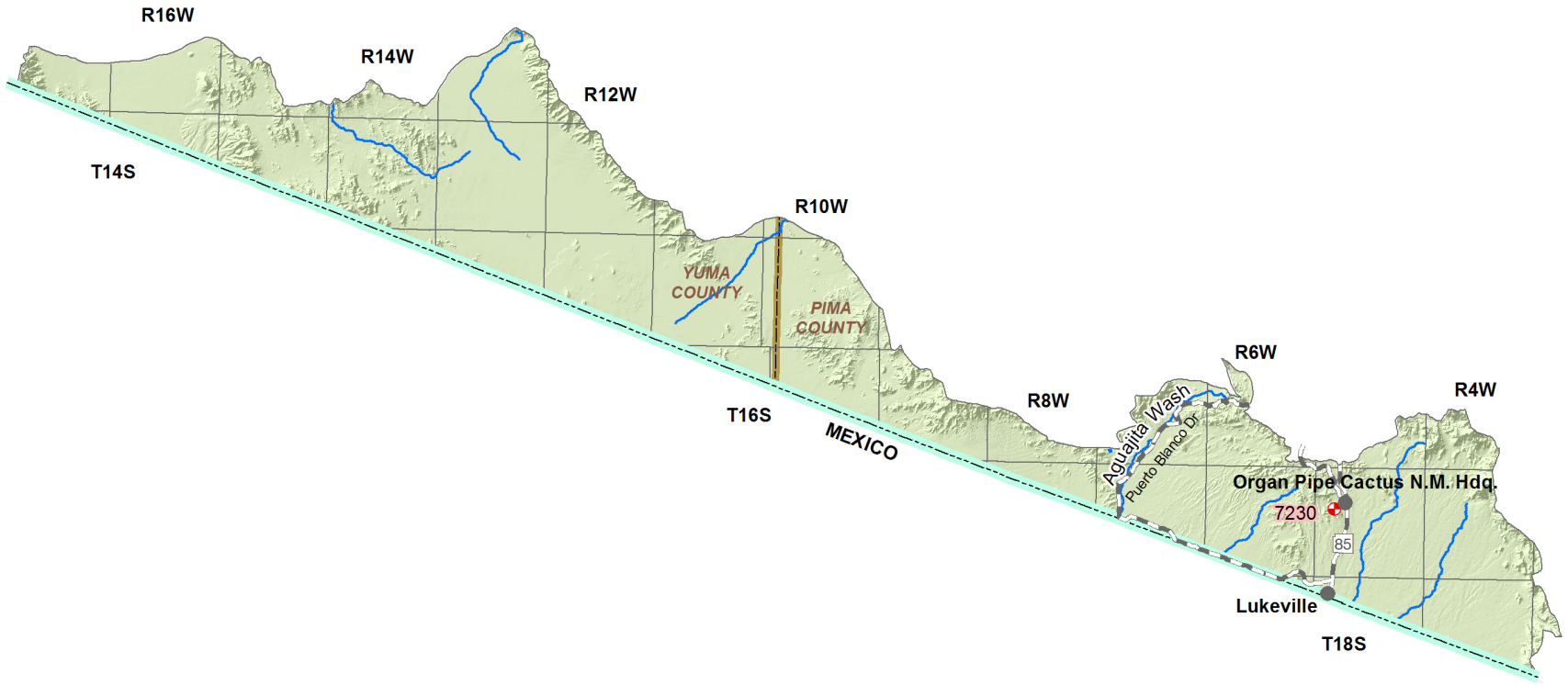


Figure 7.10-4
Western Mexican Drainage Basin
Surface Water Conditions

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 7.10-3. 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. Descriptions of data sources and methods for intermittent and perennial reaches and springs are found in Volume 1, Appendix A.

- There is one major spring with a measured discharge rate of 28 gallons per minute (gpm). 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.
- 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 7.10-3 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

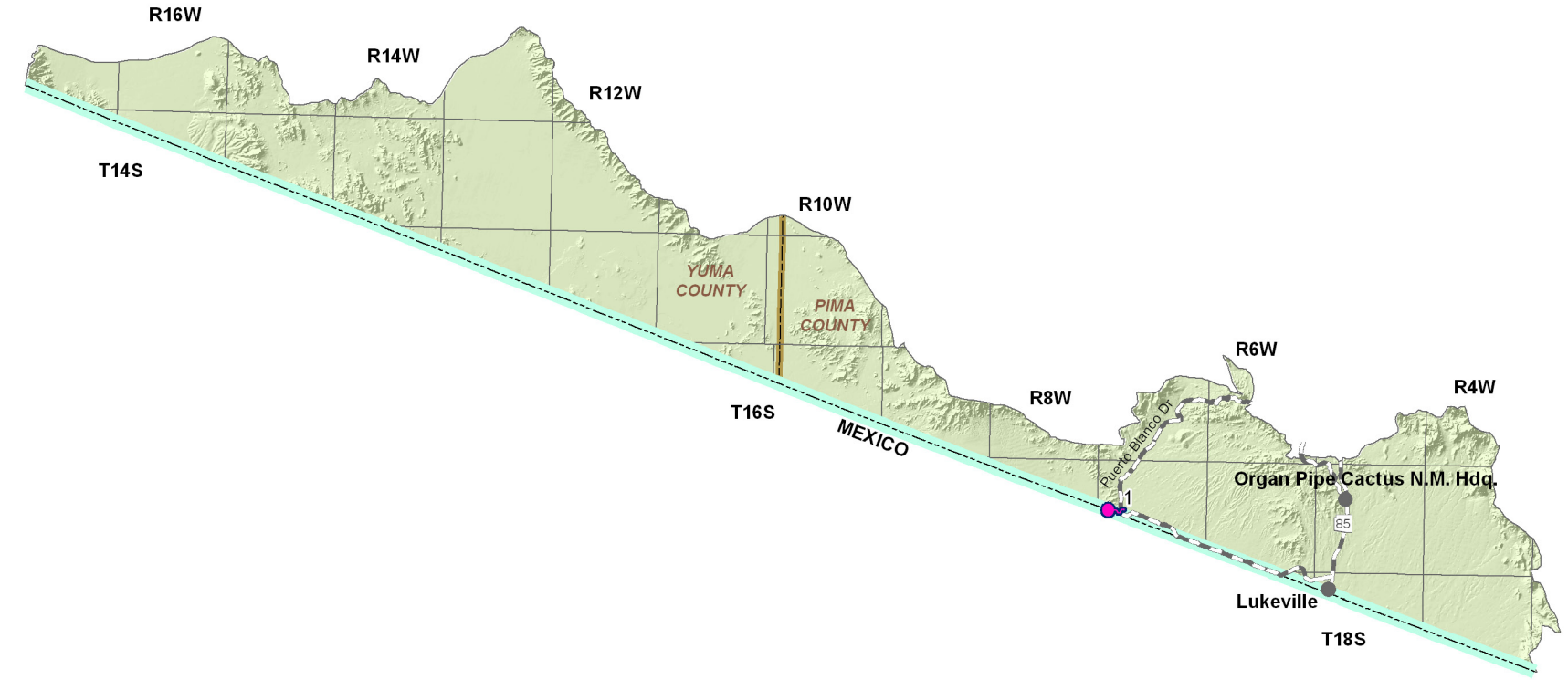
B. Minor Springs (1 to 10 gpm):

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

Source: Compilation of databases from ADWR & others

C. Total number of springs, regardless of discharge, identified by USGS (see ALRIS, 2005 and USGS, 2006): 4 to 6

Notes:
[1] Most recent measurement identified by ADWR



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0 3 6
Miles

N

Figure 7.10-5
Western Mexican Drainage Basin
Perennial\Intermittent Streams
and Major (>10 gpm) Springs

Springs 1
International Boundary
COUNTY
Major Road
City, Town or Place

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 7.10-4. 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, Appendix A. A description of well data sources and methods, including water-level changes and well yields, is found in Volume 1, Appendix A.

Major Aquifers

- Refer to Table 7.10-4 and Figure 7.10-6.
- The major aquifer is basin fill.
- Groundwater flow is from north to south.

Well Yields

- Refer to Table 7.10-4 and Figure 7.10-8.
- As shown on Figure 7.10-8, all recorded well yields are less than 100 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 7.10-4.
- The natural recharge estimate for this basin is 1,000 acre-feet per year (AFA).

Water in Storage

- Refer to Table 7.10-4.
- Storage estimates range from 3.0 million acre-feet (maf) to 4.1 maf to a depth of 1,200 feet.

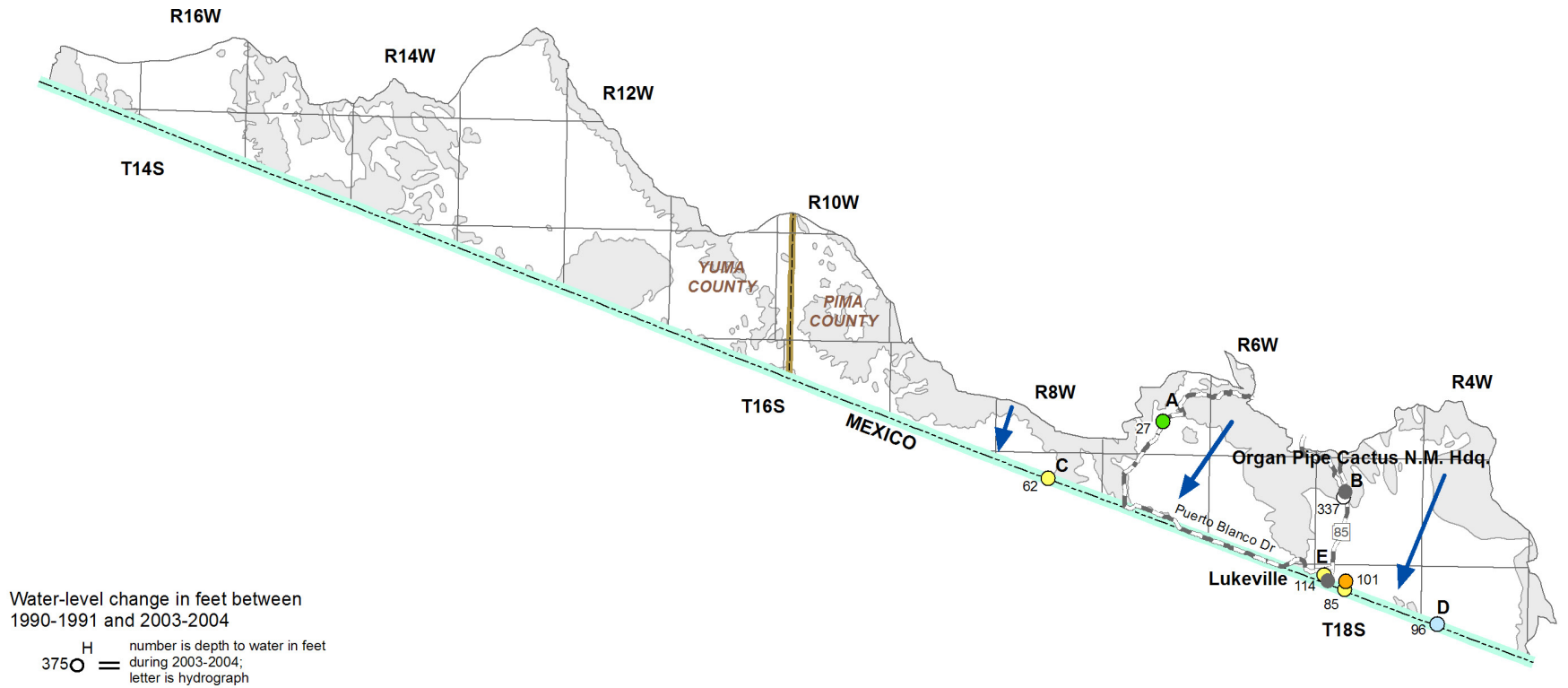
Water Level

- 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 (B) 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 7.10-4 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 (GWSI) and/or USGS
	Range 30-50 Median 50 (3 wells reported)	Reported on registration forms for large (>10-inch) diameter wells (Wells55)
	Range 0-500	Anning and Duet (1994)
Estimated Natural Recharge, in acre-feet/year:	1,000	Freethey and Anderson (1986)
Estimated Water Currently in Storage, in acre-feet:	4,100,000 (to 1,200 ft)	ADWR (1994b)
	3,000,000[1] (to 1,200 ft)	Freethey and Anderson (1986)
Current Number of Index Wells:	1	
Date of Last Water-level Sweep:	2004 (6 wells measured)	

[1]Predevelopment Estimate



Water-level change in feet between 1990-1991 and 2003-2004

375H = number is depth to water in feet during 2003-2004; letter is hydrograph

- Between -30 and -15
- Between -15 and -1
- Between -1 and +1
- Between +1 and +15
- Change Data Not Available
- Generalized Flow Direction
- Consolidated Crystalline & Sedimentary Rocks
- Unconsolidated Sediments
- International Boundary
- COUNTY
- Major Road
- City, Town or Place

0 3 6 Miles

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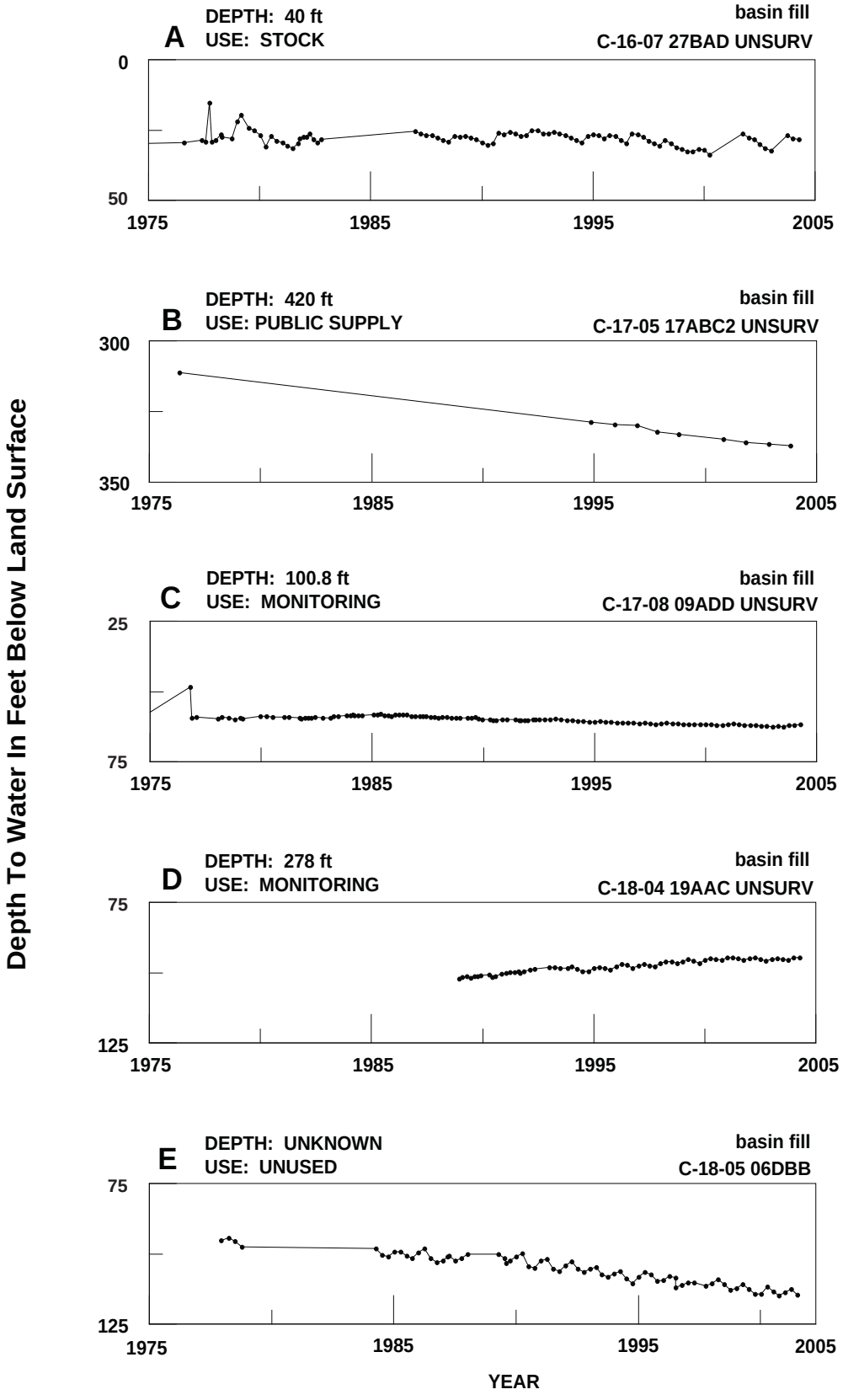
Figure 7.10-6
Western Mexican Drainage Basin
Groundwater Conditions

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



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0 3 6 Miles

N
S

Figure 7.10-8
Western Mexican Drainage Basin
Well Yields

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

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 7.10-5A. There are no impaired lakes or streams in this basin. Figure 7.10-9 shows the location of water quality occurrences keyed to Table 7.10-5. 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 7.10-5A.
- 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 7.10-5 Water Quality Exceedences in the Western Mexican Drainage 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	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

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	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

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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 7.10-6. 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, Appendix A. More detailed information on cultural water demands is found in Section 7.0.7.

Cultural Water Demands

- Refer to Table 7.10-6
- Population in this basin is very small, with 33 residents in 2000.
- There are no recorded surface water uses. All groundwater use is for municipal demand and has remained relatively constant since 1971.
- As of 2005 there were 20 registered wells with a pumping capacity of less than or equal to 35 gpm and five wells with a pumping capacity of more than 35 gpm.

Table 7.10-6 Cultural Water Demand in the Western Mexican Drainage 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		18[2]	5[2]	<500			NR			ADWR (1994a)
1972										
1973										
1974										
1975										
1976				<500			NR			
1977										
1978										
1979										
1980	10									
1981	11	0	0	<500			NR			
1982	12									
1983	13									
1984	14									
1985	15									
1986	16	0	0	<500			NR			
1987	17									
1988	18									
1989	19									
1990	20									
1991	21	0	0	<300	NR	NR	NR			USGS (2007)
1992	23									
1993	24									
1994	25									
1995	27									
1996	28	2	0	<300	NR	NR	NR			
1997	29									
1998	30									
1999	32									
2000	33									
2001	34	0	0	<300	NR	NR	NR			
2002	35									
2003	36									
2004	37									
2005	38									
2010	42									
2020	51									
2030	59									
	WELL TOTALS:	**20**	**5**							

[1] Does not include evaporation losses from stockponds and reservoirs.
[2] Includes all wells through 1980.
NR - Not reported

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 December 2008. 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.

Western Mexican Drainage Basin
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