



Hydrologic and Water Use Data For Cochise Strategic Planning Area

03/05/2016

Presented by

Frank Corkhill

Arizona Department of Water Resources
Hydrology Division



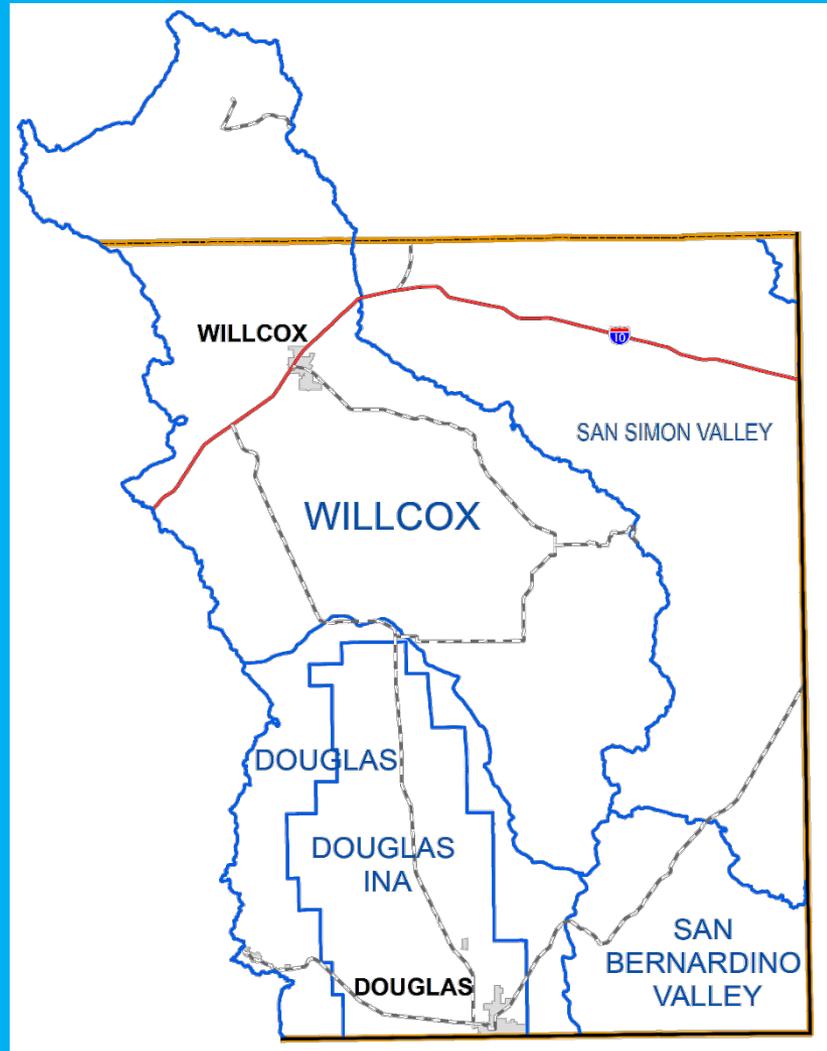
Willcox Community Center
Willcox, Arizona



*Arizona's Next Century:
A Strategic Vision for Water Supply Sustainability*



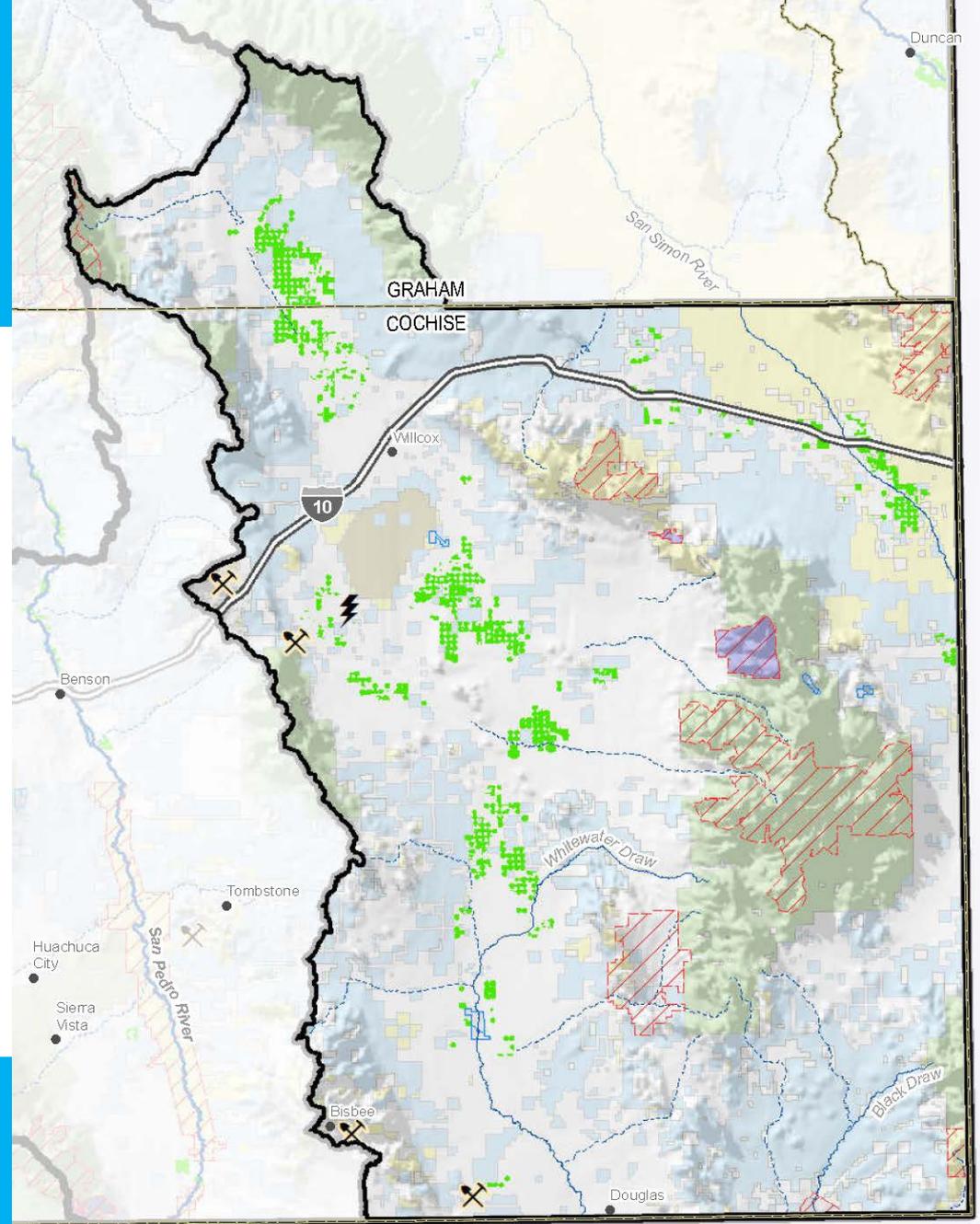
January 2014



-  Agriculture (SWReGAP, 2004)
-  Federal Conservation Land (USFS, BLM, NPS)
-  State Managed Conservation Land (AZGFD, AZSP)
-  BLM Land
-  National Forest
-  National Park
-  Military Reserve
-  Private and Other Land
-  State Trust Land
-  Tribal Land



Cochise Land Ownership



Physical and Hydrologic Characteristics of Groundwater Basins in the Cochise Planning Area

| Basin Characteristic | Unit | Willcox Basin | Douglas Basin | San Simon Valley Sub-basin | San Bernadino Basin |
|--|-------------------|---------------|---------------|----------------------------|---------------------|
| Basin Area (1) | Square Miles | 1,911 | 950 | 1,930 | 387 |
| Estimated Pre-Development GW Storage (2) | Million Acre-Feet | 42 | 32 | 25 | 2 |
| Estimated Natural Recharge (2) & (3) | Acre-Feet/Year | 45,000 | 22,000 | 30,000 to 35,000 | 9,000 |
| Estimated 2014 Irrigation Pumping (4) | Acre-Feet | 172,000 | 45,500 | 43,750 | 0 |

Notes and Sources of Data:

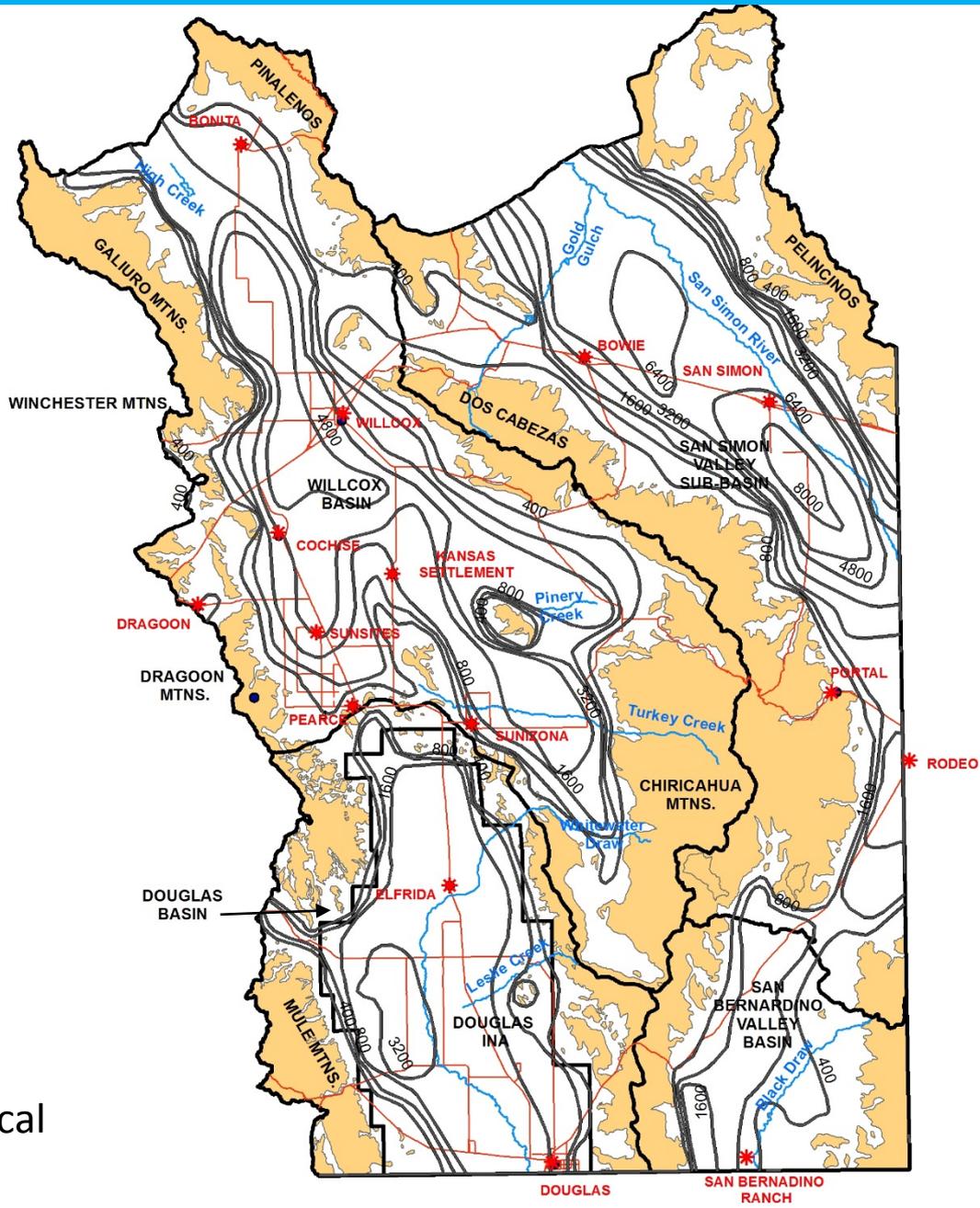
(1) Total Area of San Simon Valley Sub-basin of Safford basin. Area Includes Portion of Sub-basin in New Mexico

(2) GW Storage: All Basins; Natural Recharge: Willcox, Douglas and San Bernardino Basins (only). USGS Hydrologic Investigations Atlas - 664 (1986)

(3) Natural Recharge: San Simon Valley Sub-basin (only). ADWR Hydrology Division (2015)

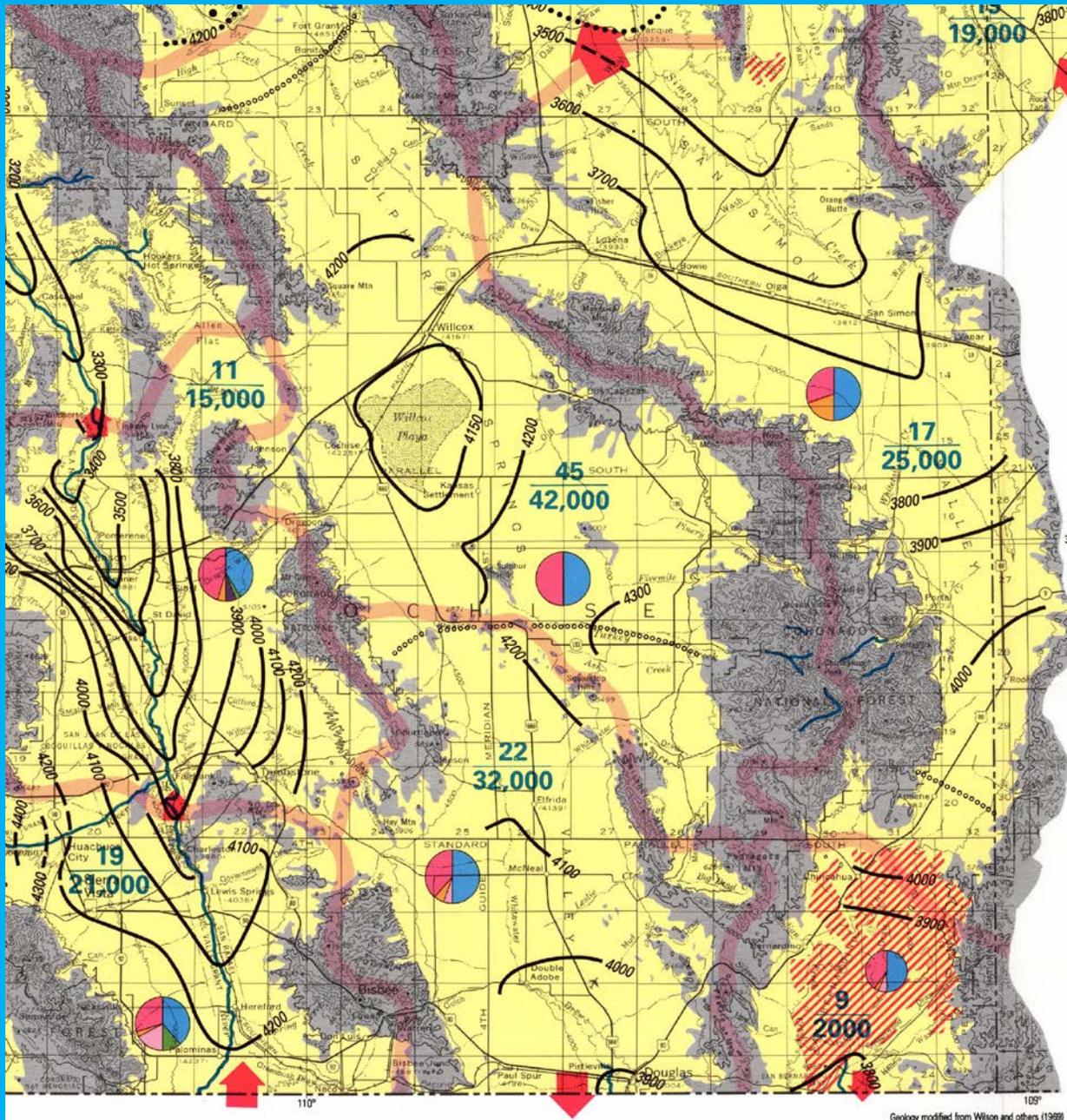
(4) Estimated 2014 Irrigation Pumping . USGS Arizona Basin Water Supply Spreadsheet (2015)

Depth-to-Bedrock In Cochise Strategic Planning Area

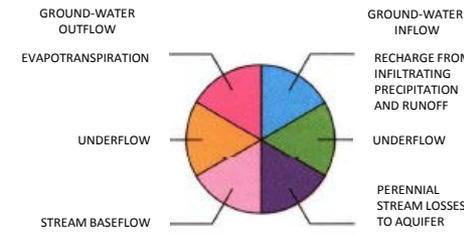


Source:
AZ Geological
Survey

Predevelopment Groundwater Flow Patterns In the Cochise Strategic Planning Area



GROUND-WATER BUDGET



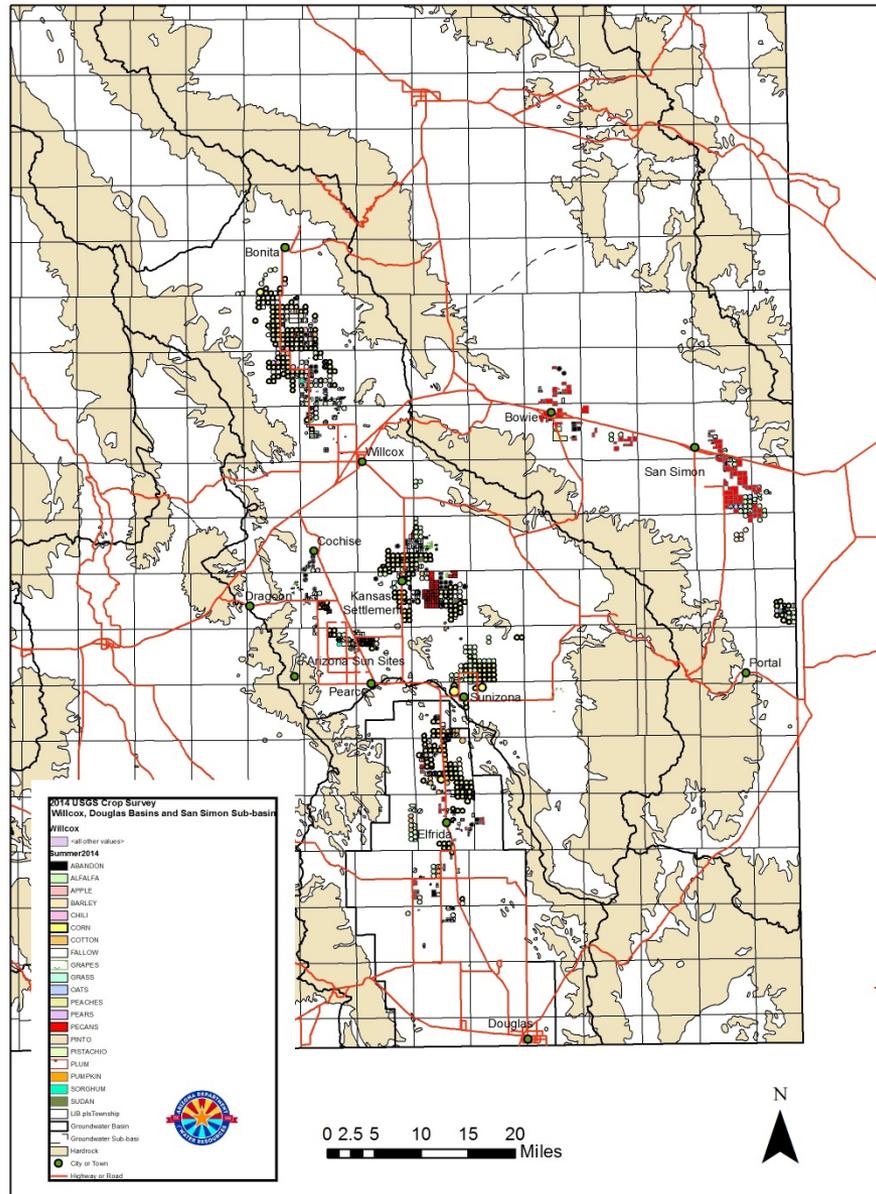
$$\frac{4}{11,000}$$

Ratio of Basin Inflow (AF/Yr) To Total Groundwater Storage (To 1,200 FT BLS)

Source: USGS Hydrologic Investigations Atlas HA-664 (1986)

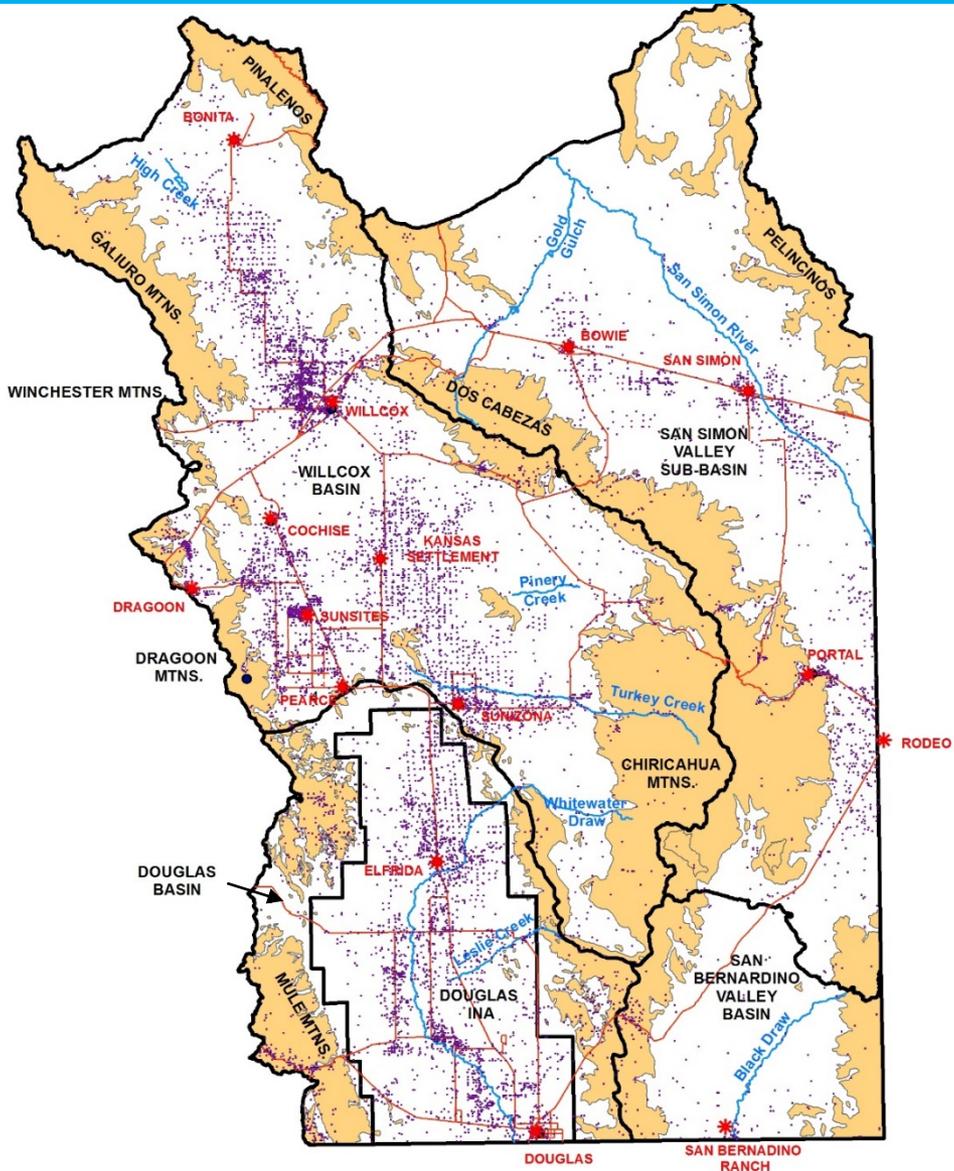
Geology modified from Wilson and others (1968)

USGS 2014 Crop Survey of Willcox and Douglas Basins and San Simon Sub-basin

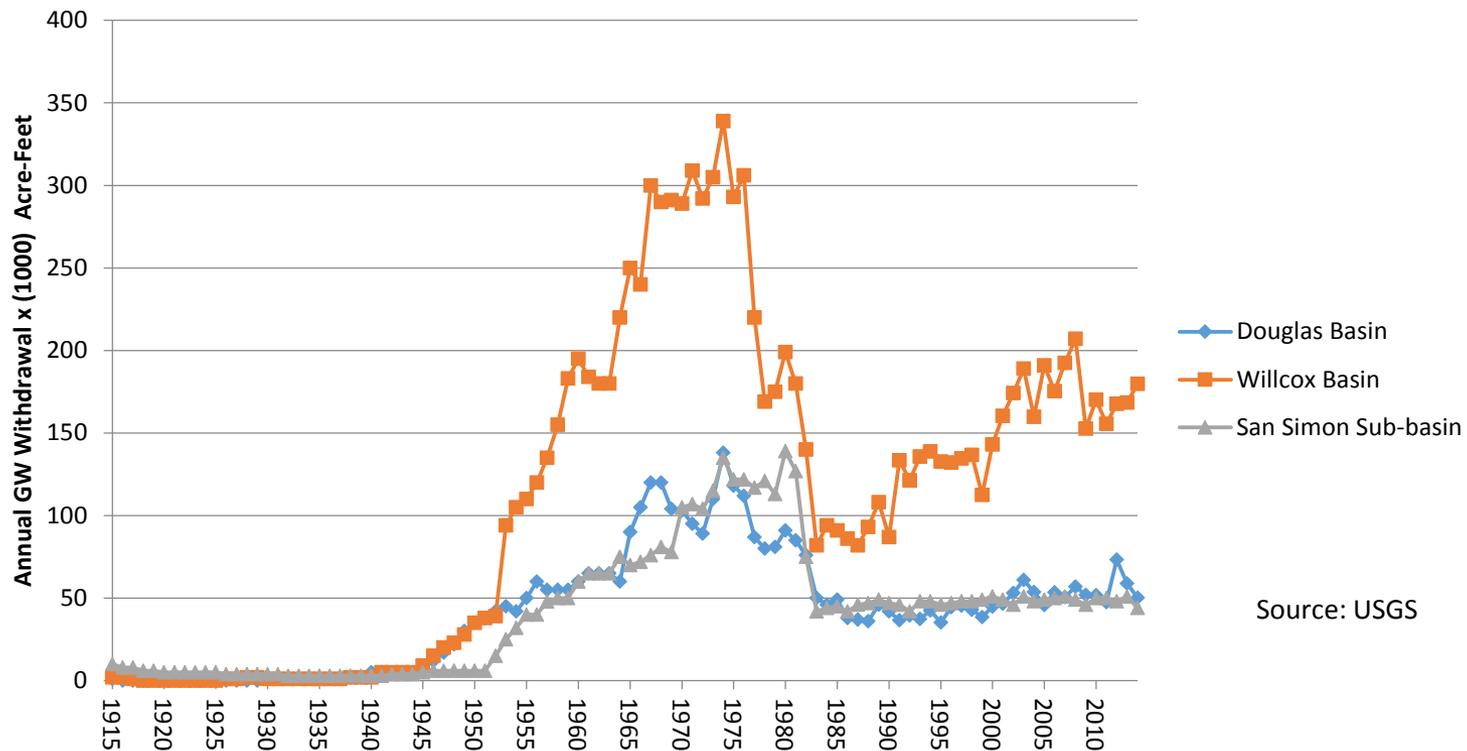


Registered Wells In Cochise Strategic Planning Area

| Primary Water Uses For Registered Wells In the Cochise Planning Area | | | | | | |
|--|----------------|------------------|-------------------------------------|---|------------------|--------------|
| Water Use | Douglas INA | Douglas Basin | San Simon Valley Sub-basin | San Bernadi no Valley Basin | Willcox Basin | Total |
| IRRIGATION | 924 | 50 | 819 | 14 | 2117 | 3924 |
| UTILITY WATER CO. | | 2 | | | 13 | 15 |
| COMMERCIAL | 10 | | 13 | | 18 | 41 |
| DOMESTIC | 1551 | 382 | 887 | 71 | 3868 | 6759 |
| MUNICIPAL USES | 21 | 2 | 8 | | 18 | 49 |
| INDUSTRIAL | 37 | 4 | 10 | 2 | 52 | 105 |
| RECREATION | | | 2 | 1 | 8 | 11 |
| MINING | | 4 | 3 | 1 | 11 | 19 |
| STOCK | 525 | 180 | 570 | 145 | 1143 | 2563 |
| OTHER - MINERAL EXPLORE | 1 | 13 | 2 | | 16 | 32 |
| MONITORING | 113 | 58 | 19 | 3 | 274 | 467 |
| NO WATER USE | 173 | 152 | 51 | 10 | 406 | 792 |
| OTHER - PRODUCTION | 12 | | 2 | | 7 | 21 |
| RECOVERY | | | | | 1 | 1 |
| DEWATERING | | | | | 4 | 4 |
| REMEDIATION | | | 15 | | 9 | 24 |
| Total | 3367 | 847 | 2401 | 247 | 7965 | 14827 |

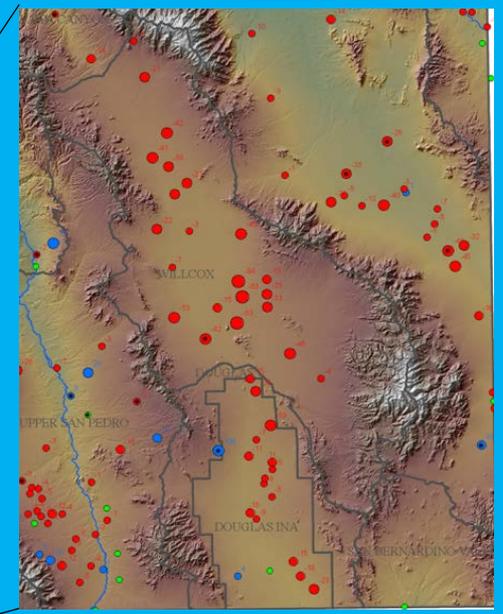
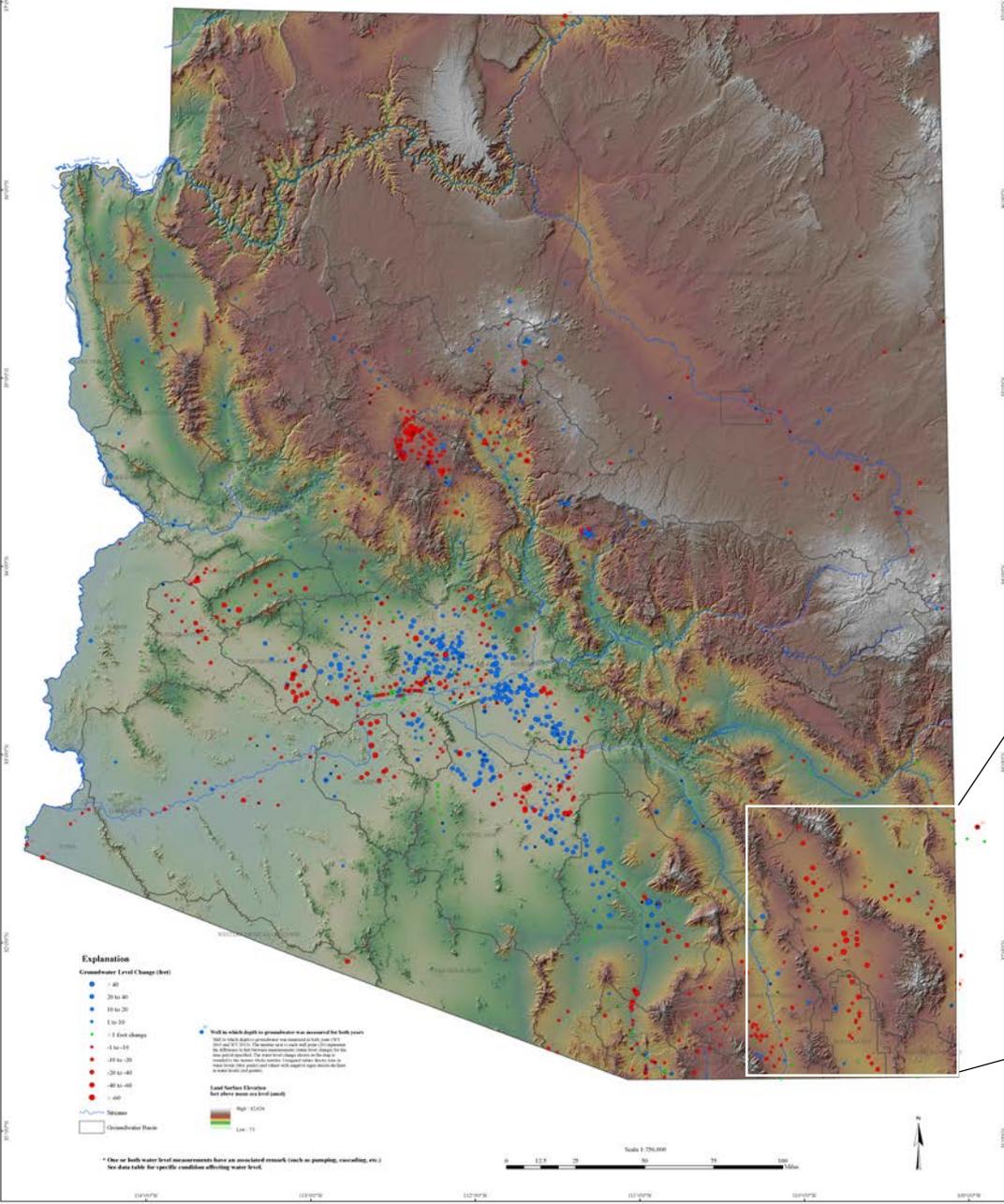


Total Estimated Groundwater Withdrawals In The Douglas and Willcox Basins and the San Simon Sub-Basin 1915 to 2014



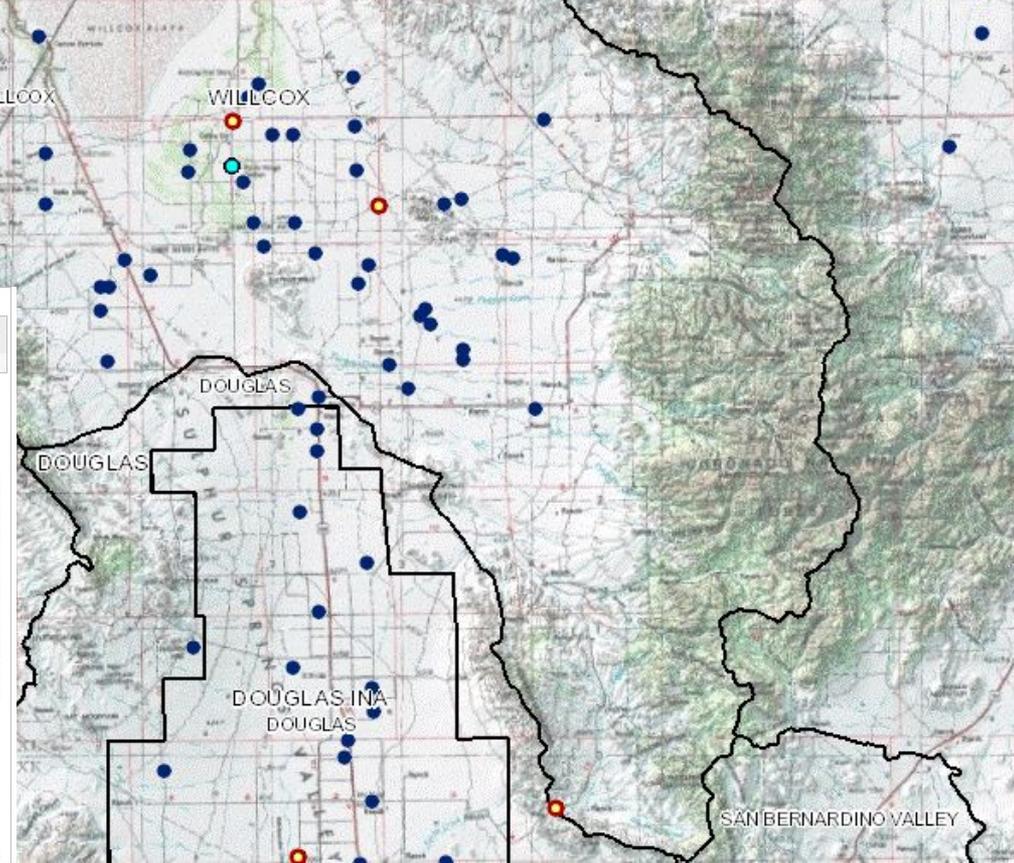
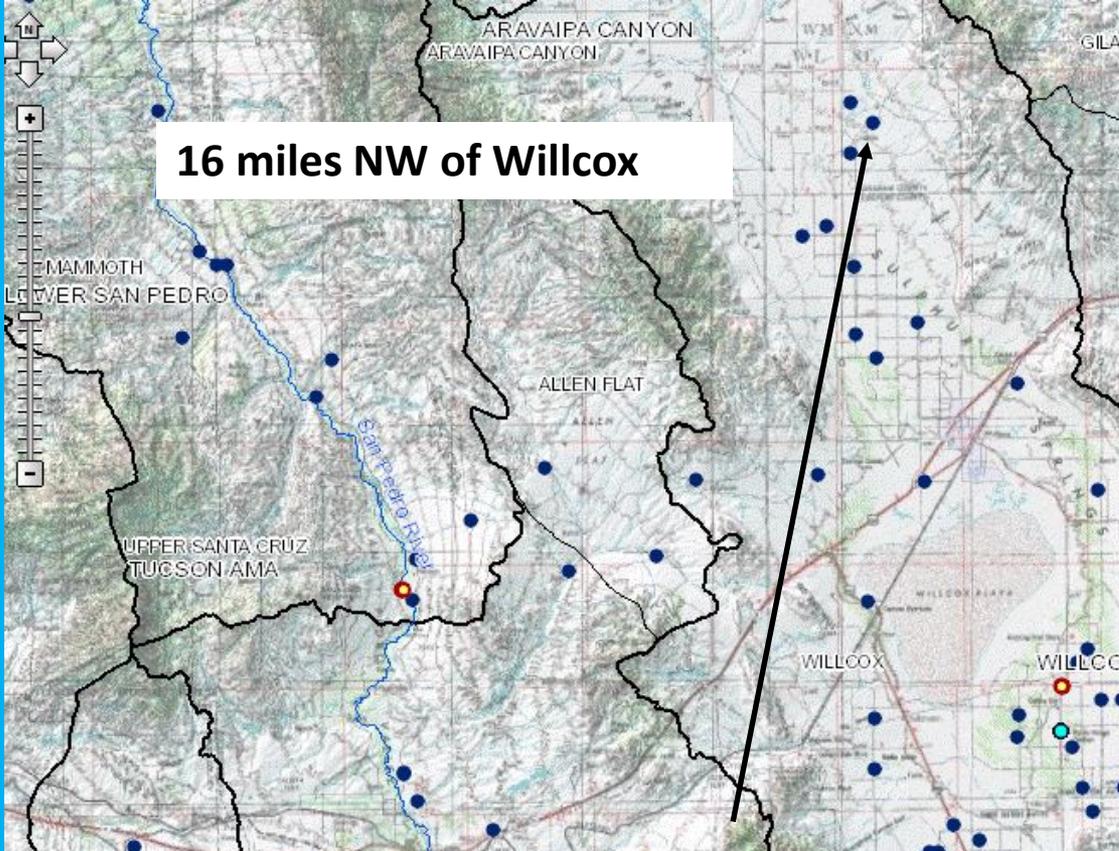
Source: USGS

Water Level Changes In Arizona 2003 - 2013



Water Level Change Statistics For GWSI Wells In Cochise Planning Area

| Basin | Time Period | Well Count | Wells w/ Rising WLs | Wells w/ Declining WLs | Wells w/ No Change in WLs | Range WL Change [ft] | Median WL Change [ft] | Mean WL Change [ft] | Standard Deviation WL Change [ft] | Median Rate WL Change [ft/yr] | Mean Rate WL Change [ft/yr] |
|-----------|--------------|------------|---------------------|------------------------|---------------------------|----------------------|-----------------------|---------------------|-----------------------------------|-------------------------------|-----------------------------|
| Willcox | 2006 to 2015 | 392 | 42 | 339 | 12 | -105 to 89 | -23.7 | -20.5 | 21.3 | -2.6 | -2.3 |
| Douglas | 2005 to 2015 | 235 | 35 | 192 | 8 | -52.6 to 75.3 | -9.7 | -13.4 | 18.9 | -1 | -1.3 |
| San Simon | 2007 to 2015 | 281 | 34 | 200 | 27 | -95.9 to 90.8 | -6.1 | -9.2 | 17.7 | -0.8 | -1.2 |

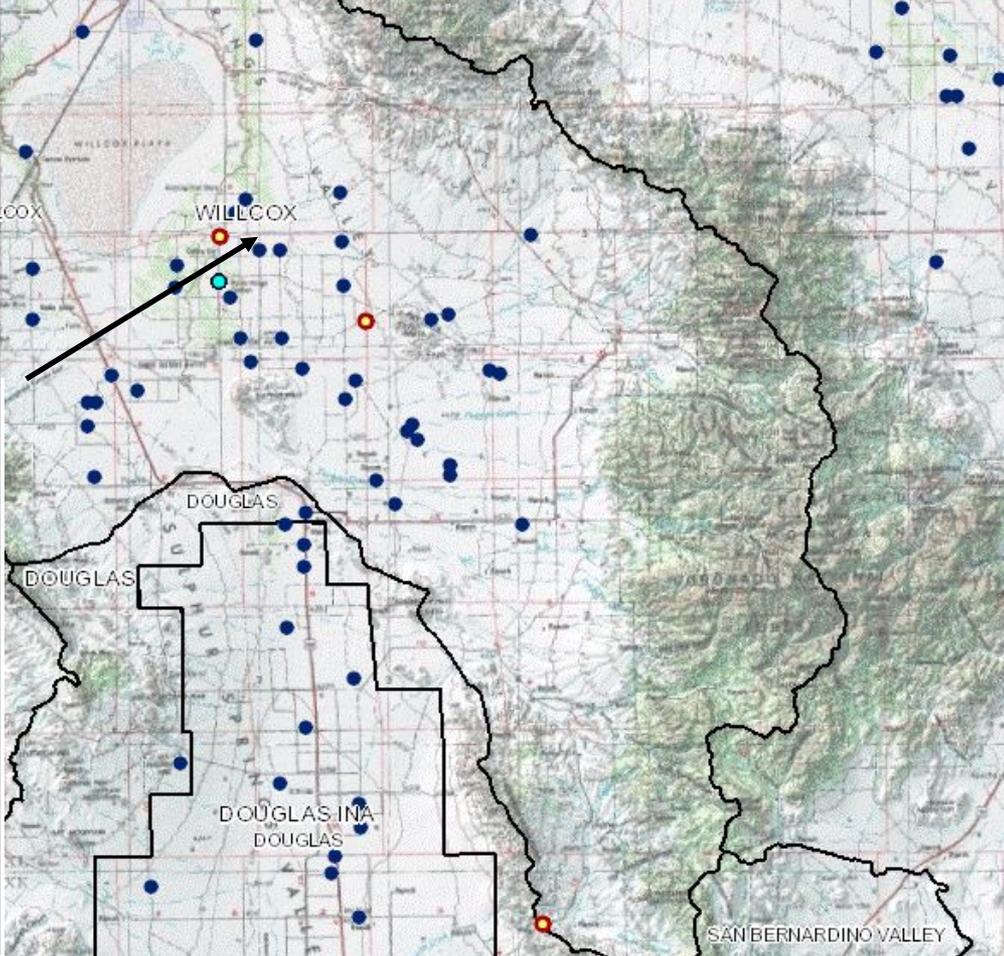
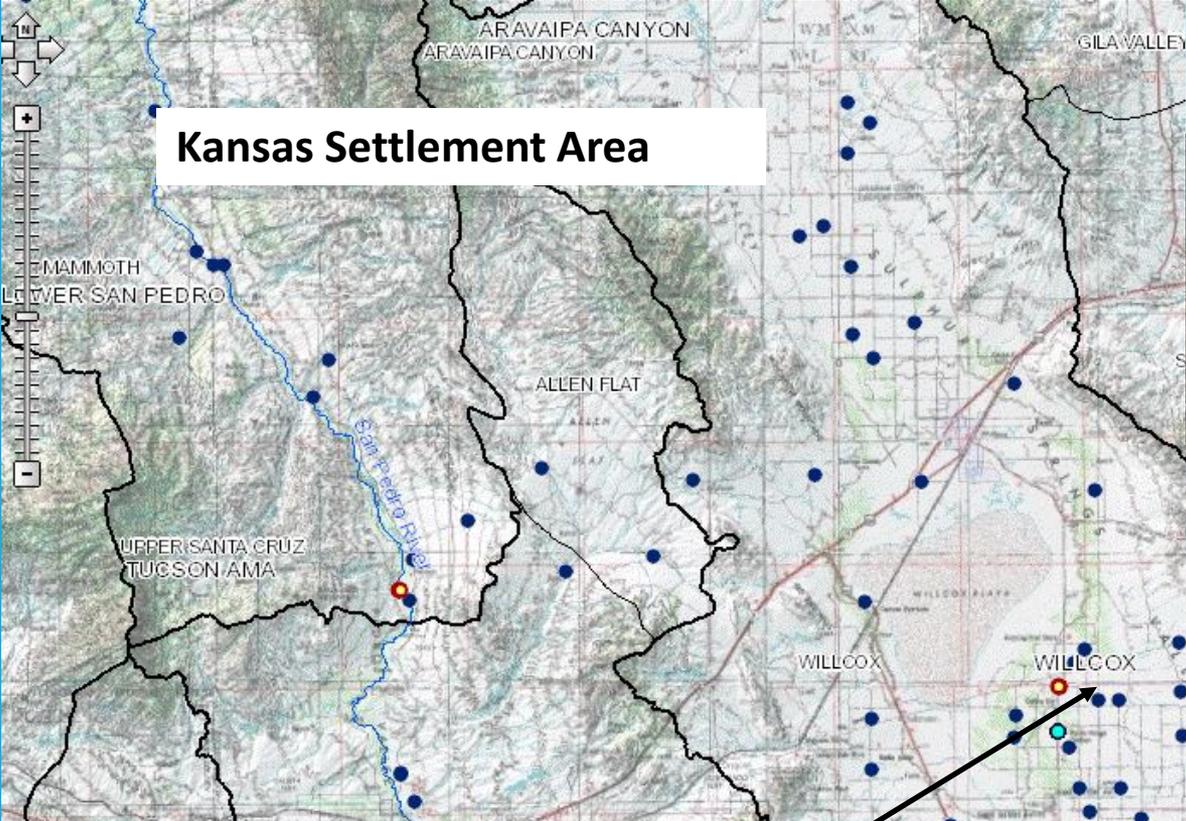


Arizona GroundWater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Ev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|------------|-----------------|----------------|------------|----------------|----------|-------------|
| D-11-24 17DAA | 322840109543901 | 622902 | 32° 28' 41.0" | 109° 54' 38.3" | 4472 | IRRIGATION | 700 | | | 11/7/2012 | 428.8 | 4043.2 |



Kansas Settlement Area

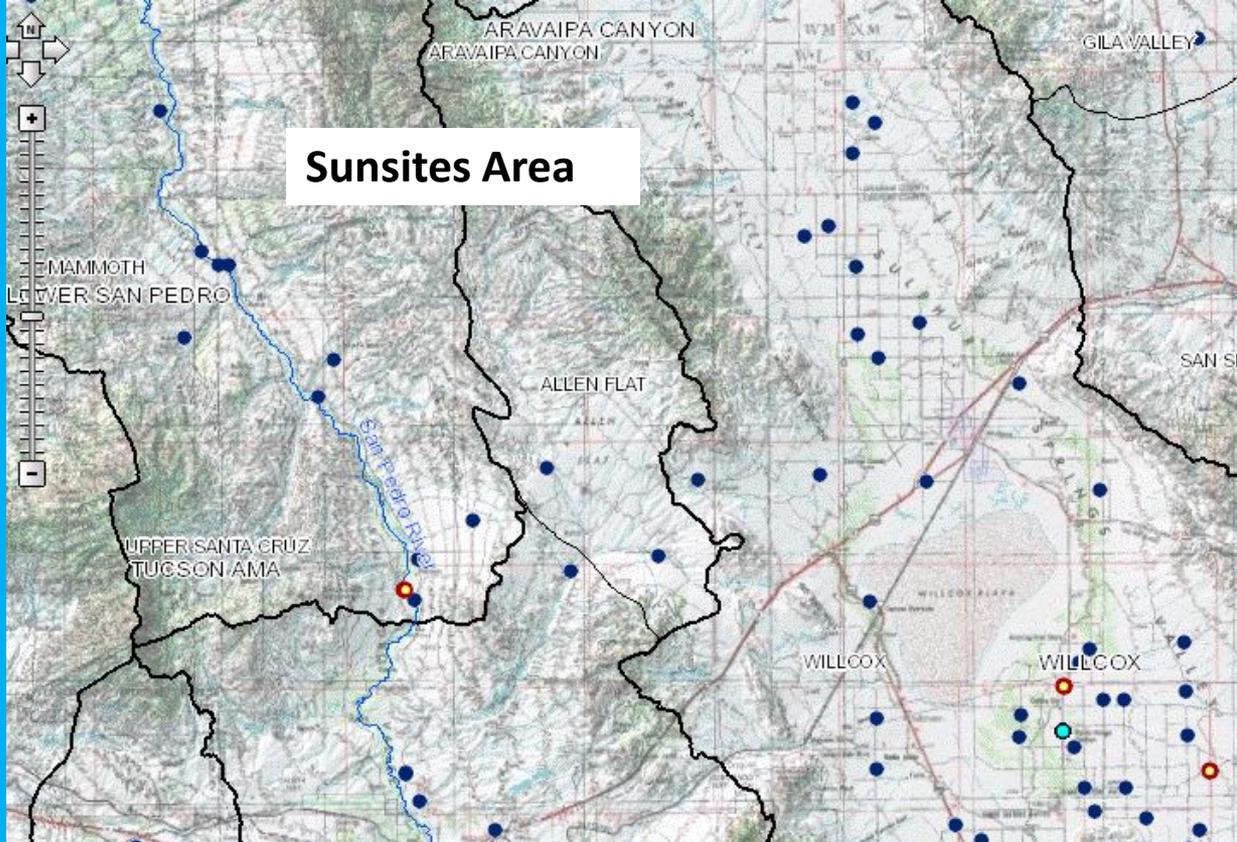


Arizona GroundWater Monitoring Site Hydrograph

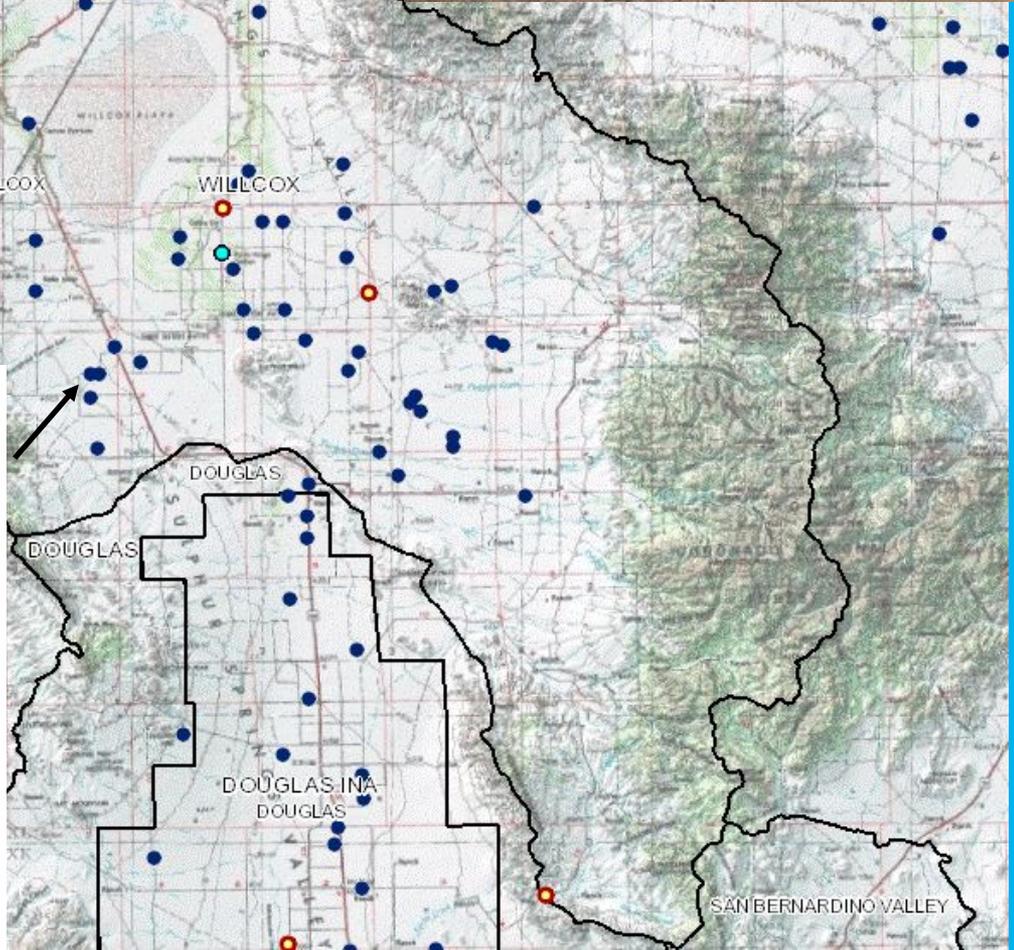
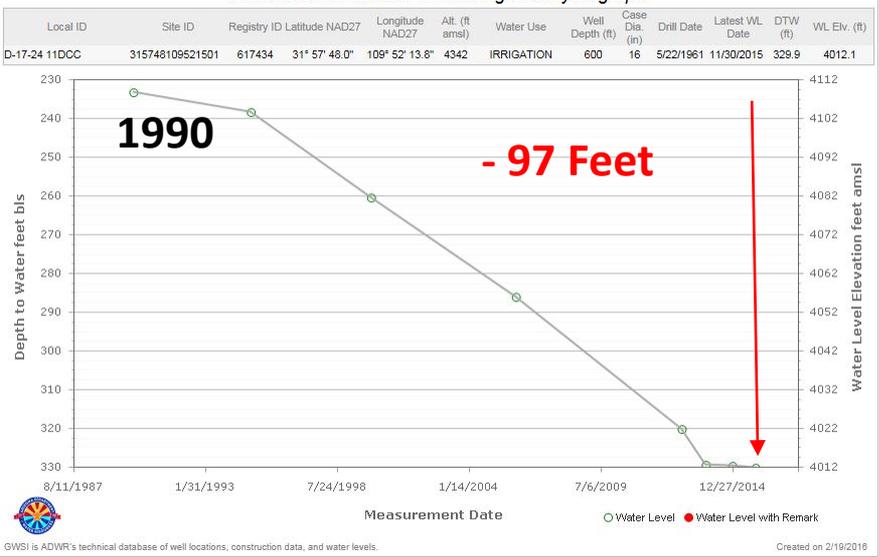
| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|-----------|-----------------|----------------|------------|----------------|----------|---------------|
| D-16-26 06DDA | 320403109434701 | 612109 | 32° 4' 6.7" | 109° 43' 44.9" | 4257.8 | STOCK | 662 | 16 | 3/22/1958 | 12/10/2014 | 375.1 | 3882.7 |



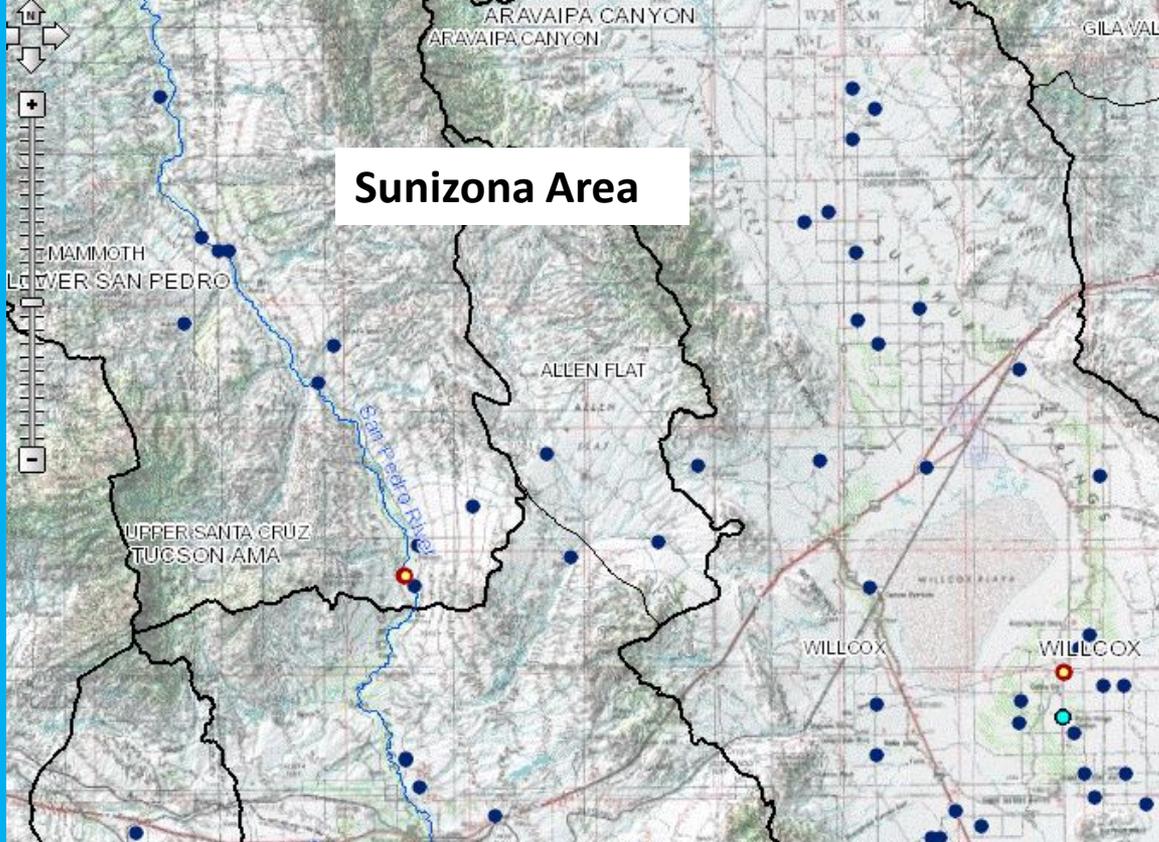
Sunsites Area



Arizona GroundWater Monitoring Site Hydrograph

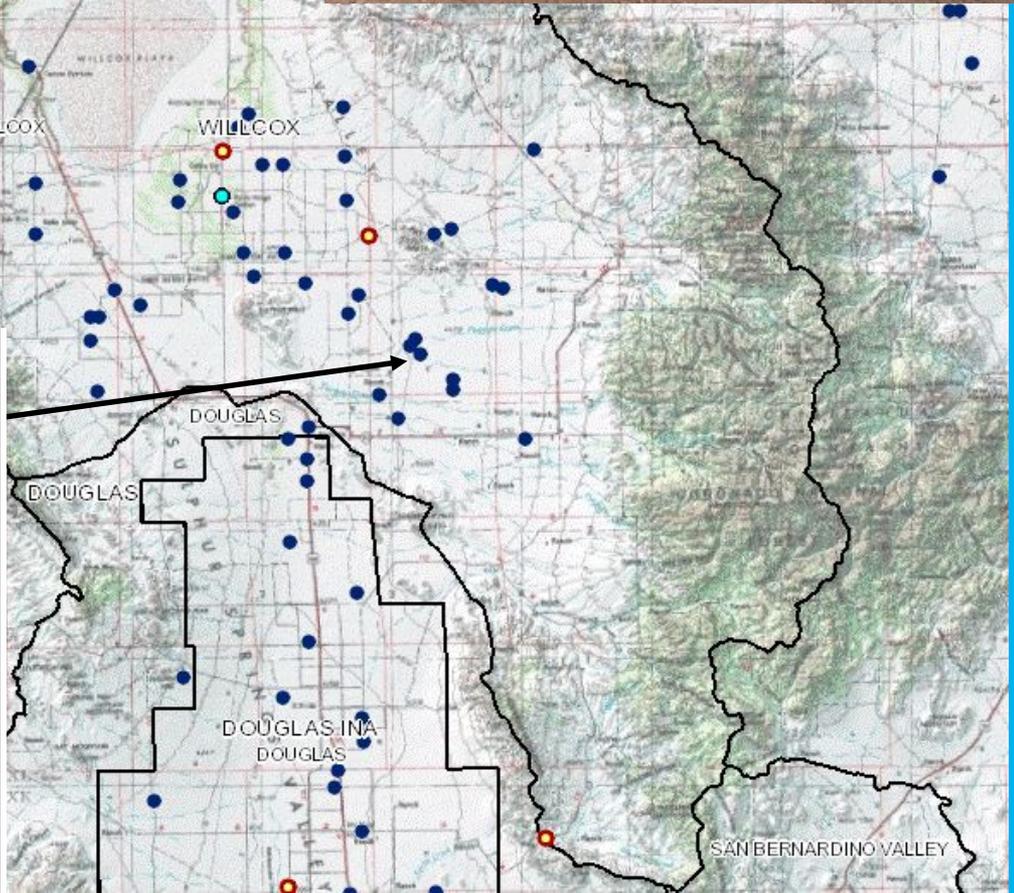
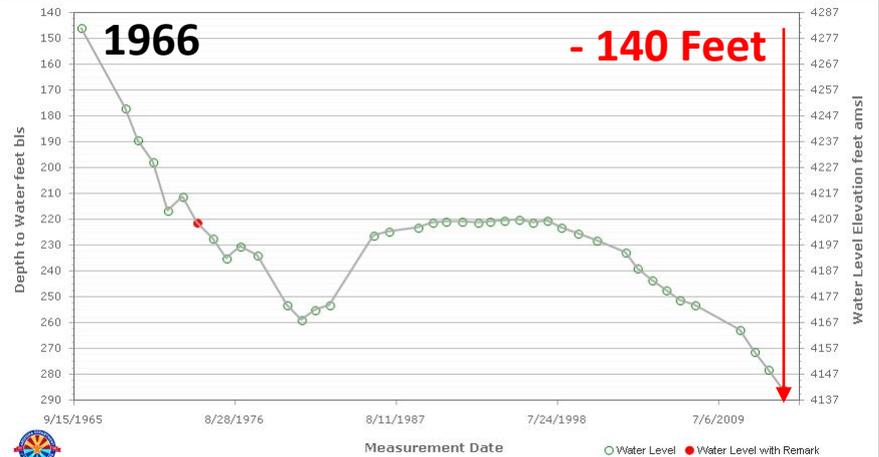


Sunizona Area



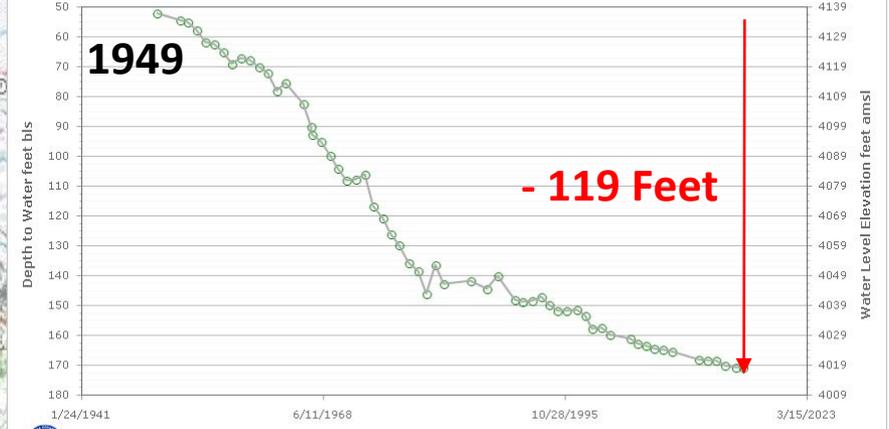
Arizona GroundWater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|------------|-----------------|---------------|------------|----------------|----------|---------------|
| D-17-27 28BAA | 315602109360701 | 627815 | 31° 56' 2.7" | 109° 36' 4.8" | 4427 | IRRIGATION | 701 | 14 | 10/22/1965 | 11/5/2013 | 285.8 | 4141.2 |



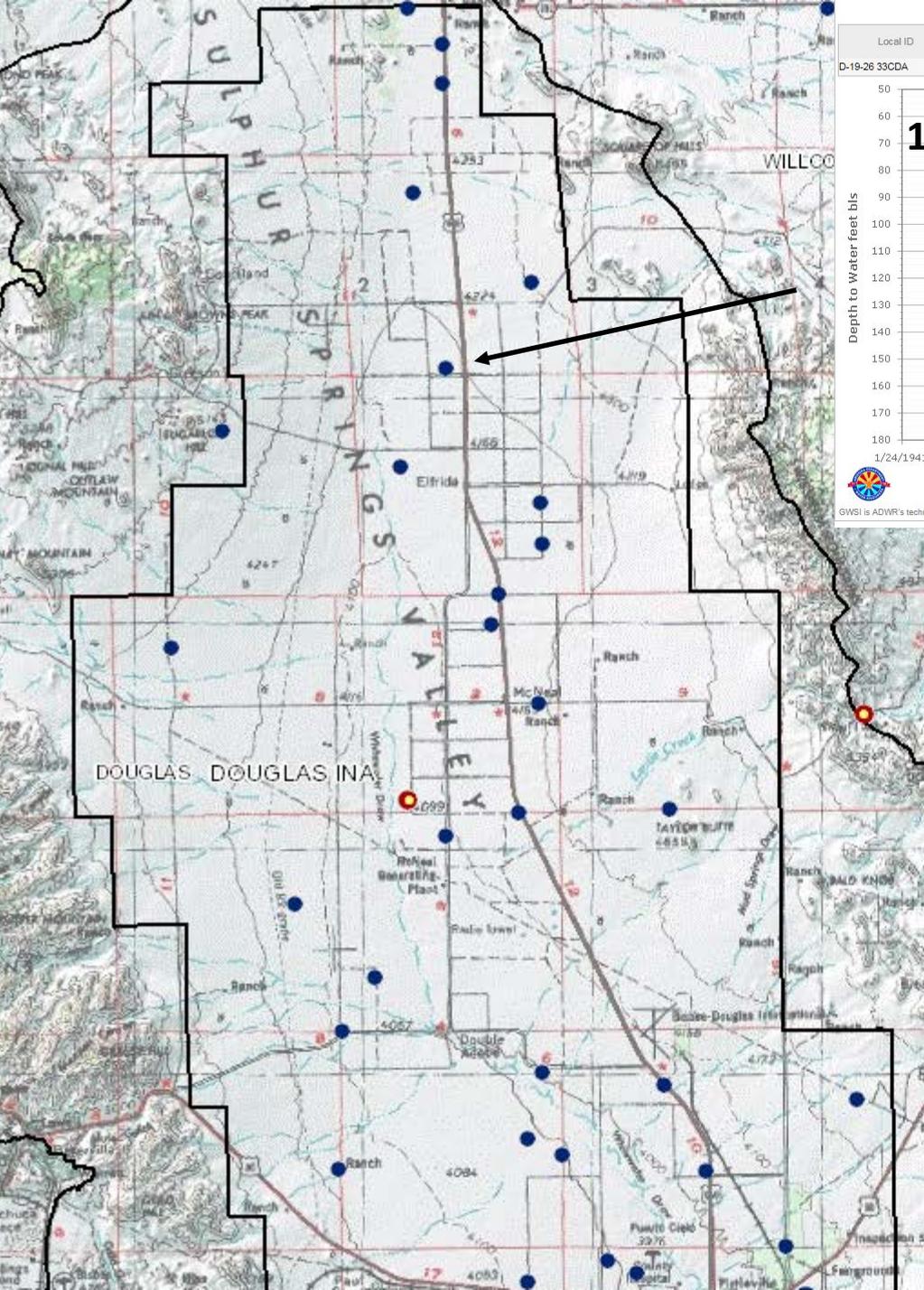
Arizona GroundWater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|-----------|-----------------|---------------|------------|----------------|----------|---------------|
| D-19-26 33CDA | 314358109414801 | | 31° 43' 55.0" | 109° 41' 43.0" | 4188.9 | DOMESTIC | 252 | 12 | 9/1/1947 | 12/1/2015 | 170.6 | 4018.3 |

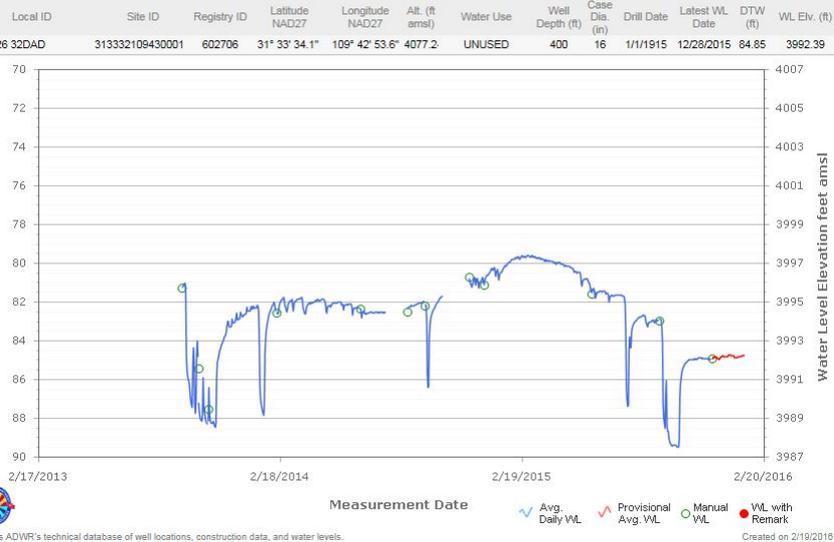


Legend: ○ Water Level ● Water Level with Remark

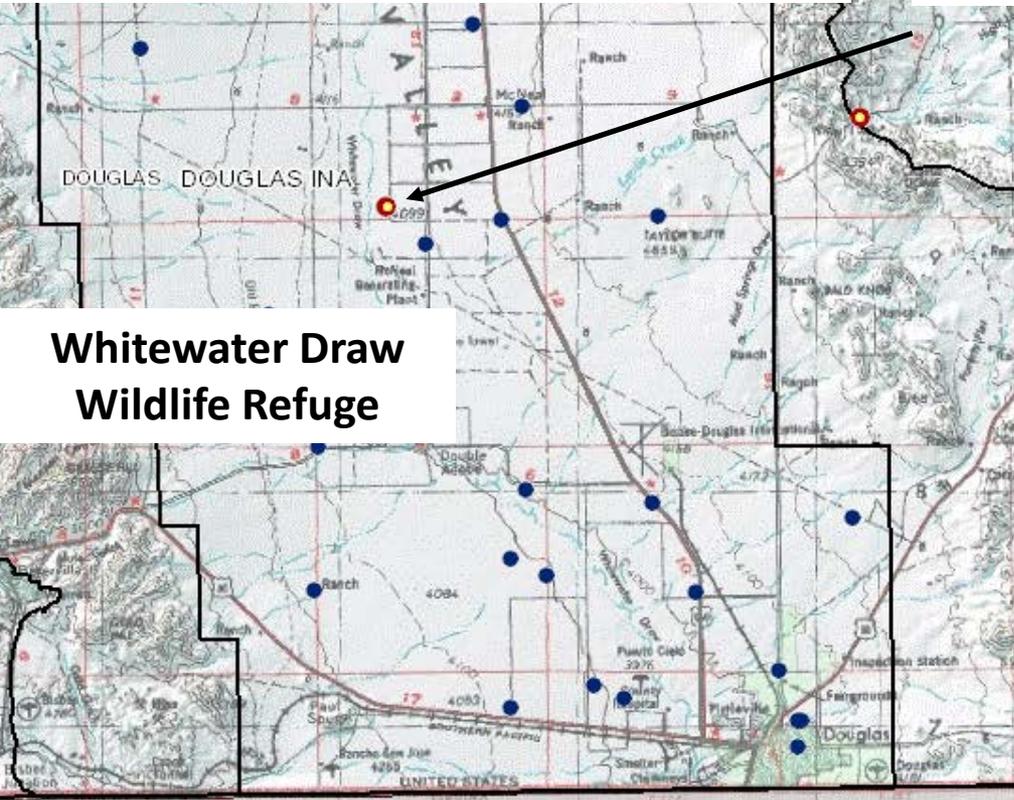
ADWR is ADWR's technical database of well locations, construction data, and water levels. Created on 2/19/2016



Arizona Automated GroundWater Monitoring Site Hydrograph

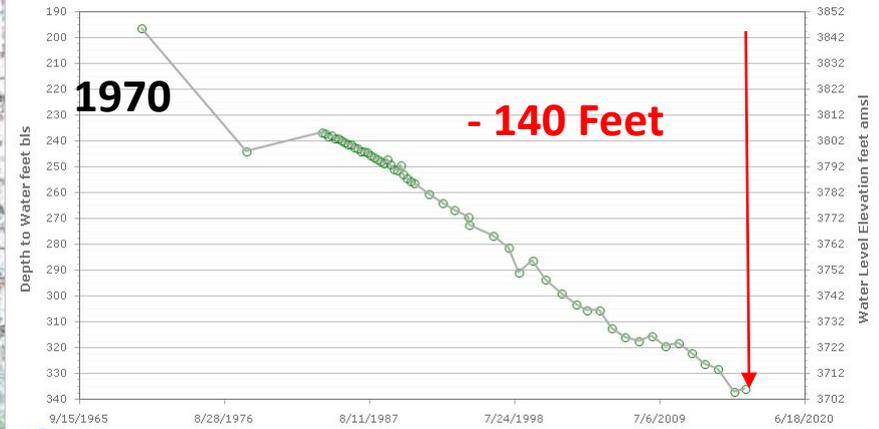


Arizona GroundWater Monitoring Site Hydrograph



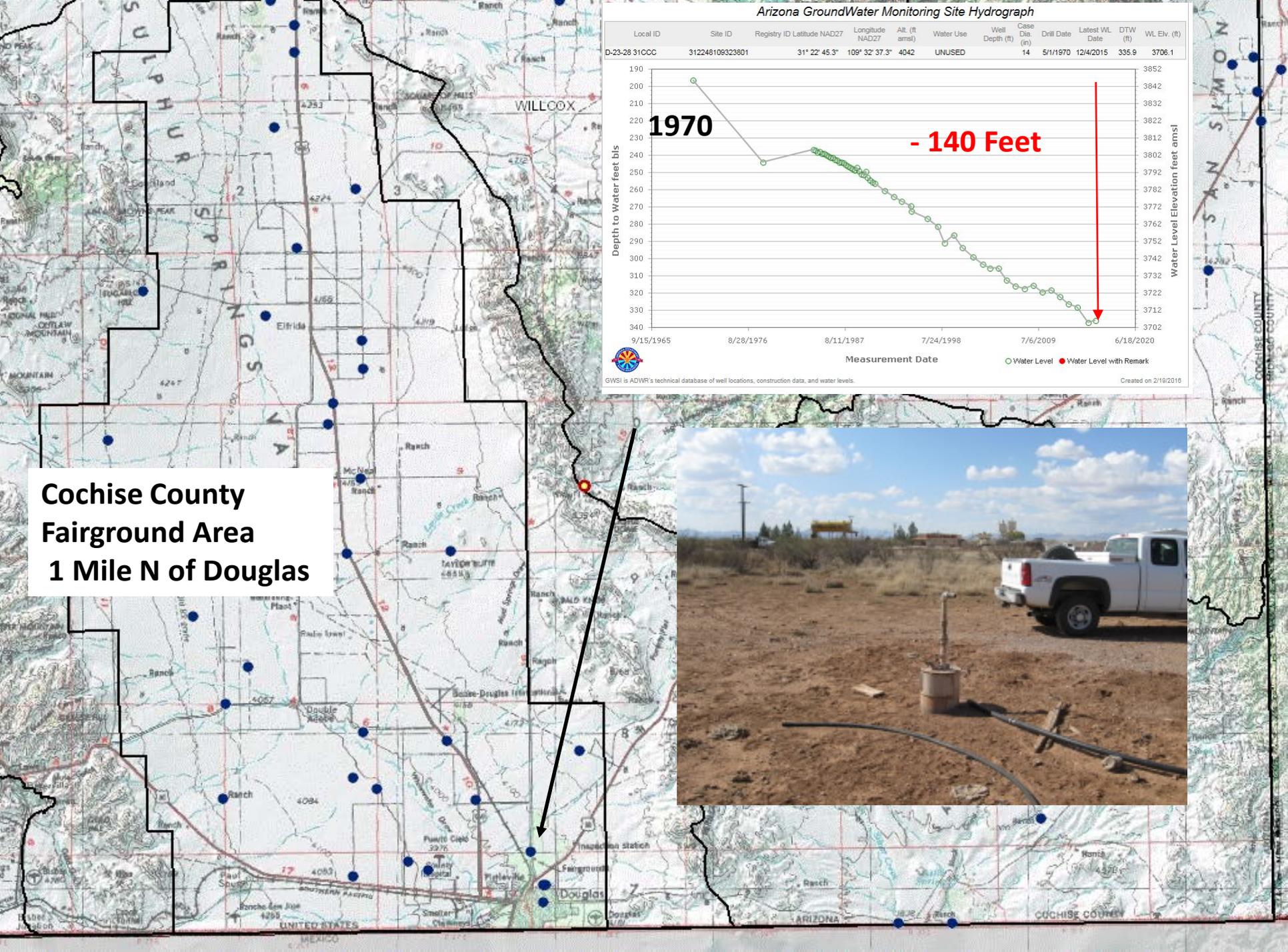
Arizona Groundwater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|-----------|-----------------|---------------|------------|----------------|----------|---------------|
| D-23-28 31CCC | 312248109323801 | | 31° 22' 45.3" | 109° 32' 37.3" | 4042 | UNUSED | | 14 | 5/1/1970 | 12/4/2015 | 335.9 | 3706.1 |



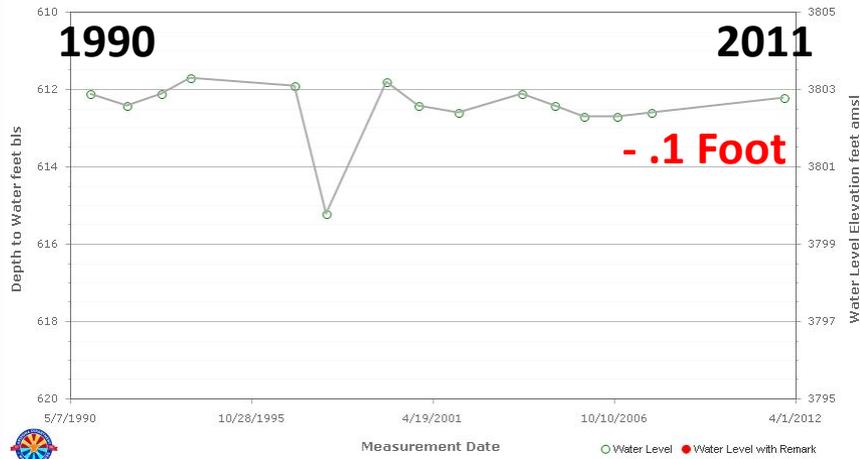
GWIS is ADWR's technical database of well locations, construction data, and water levels. Created on 2/19/2018

**Cochise County
Fairground Area
1 Mile N of Douglas**



Arizona GroundWater Monitoring Site Hydrograph

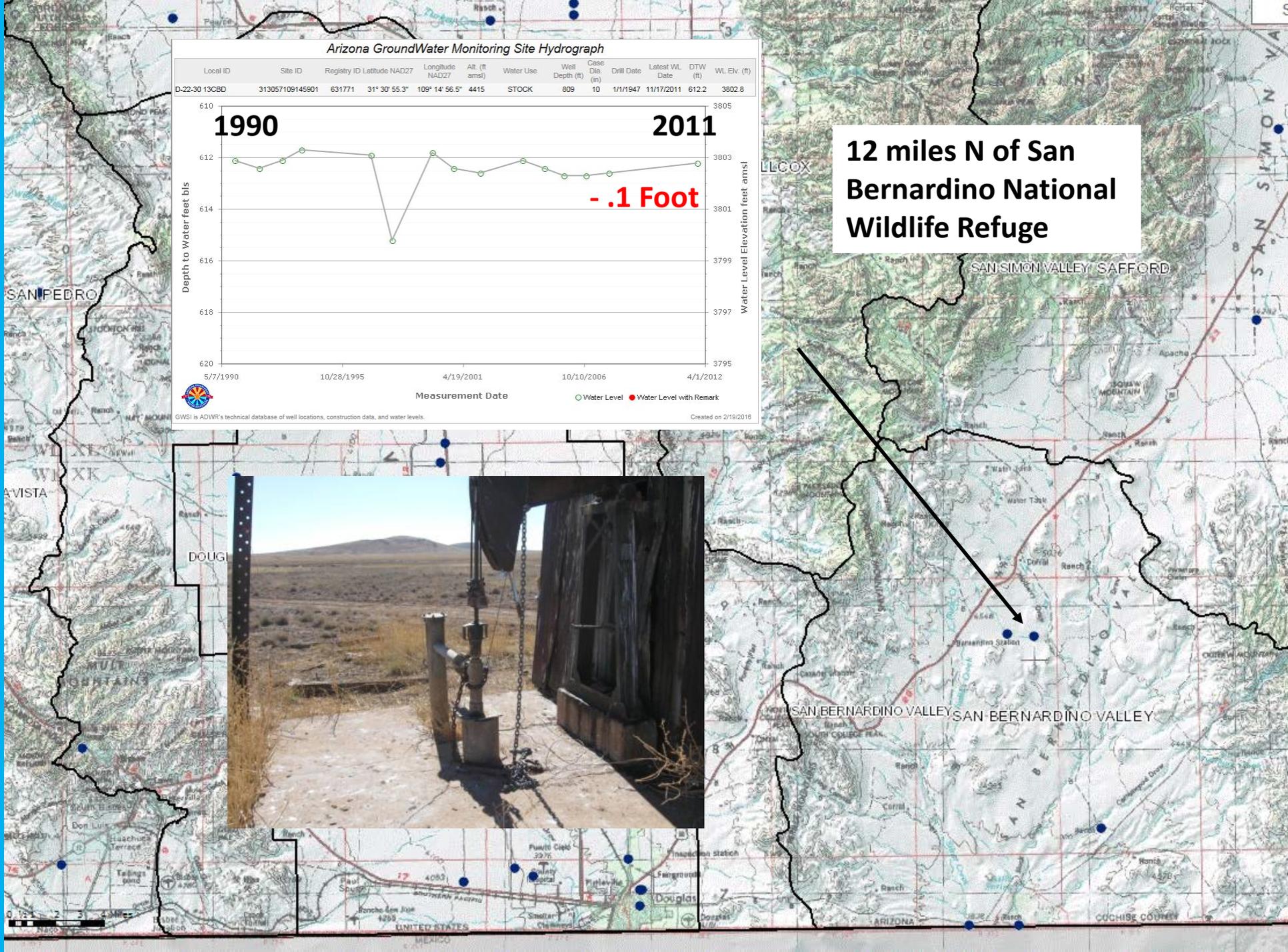
| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|-----------|-----------------|----------------|------------|----------------|----------|---------------|
| D-22-30 13CBD | 313057109145901 | 631771 | 31° 30' 55.3" | 109° 14' 56.5" | 4415 | STOCK | 809 | 10 | 11/1/1947 | 11/17/2011 | 612.2 | 3802.8 |

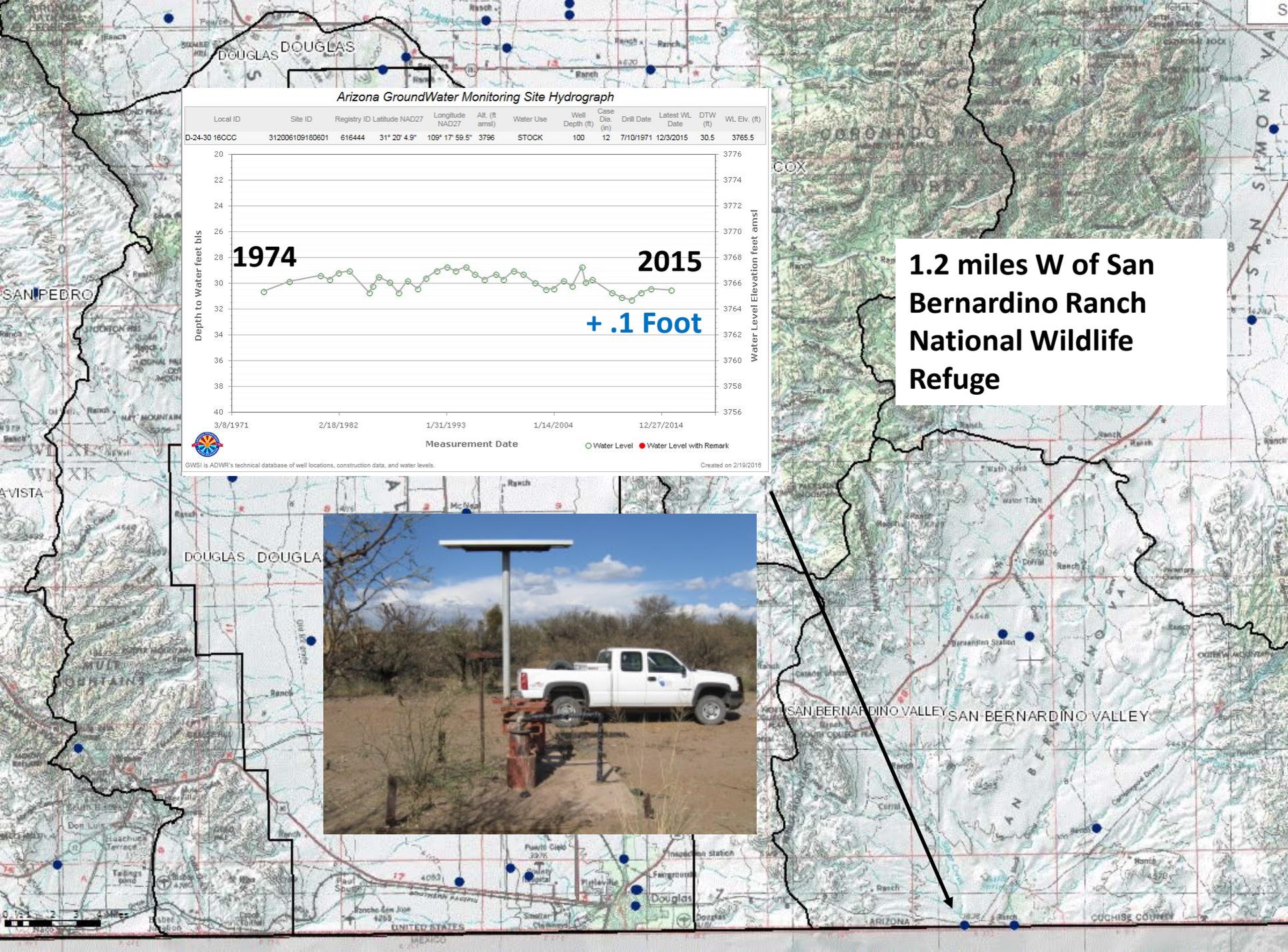


GWISI is ADWR's technical database of well locations, construction data, and water levels.

Created on 2/19/2016

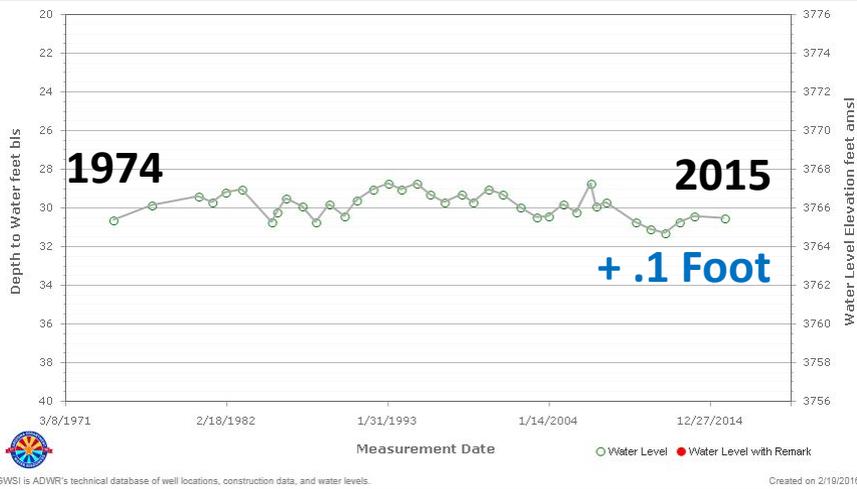
12 miles N of San Bernardino National Wildlife Refuge





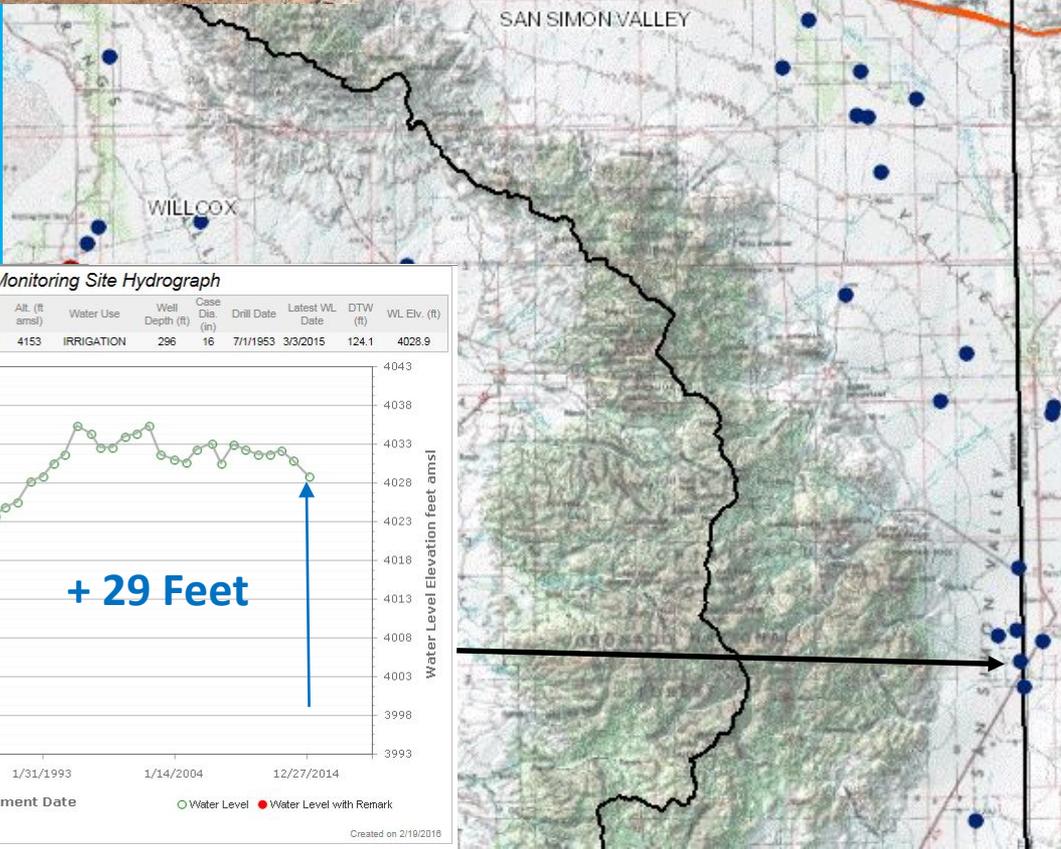
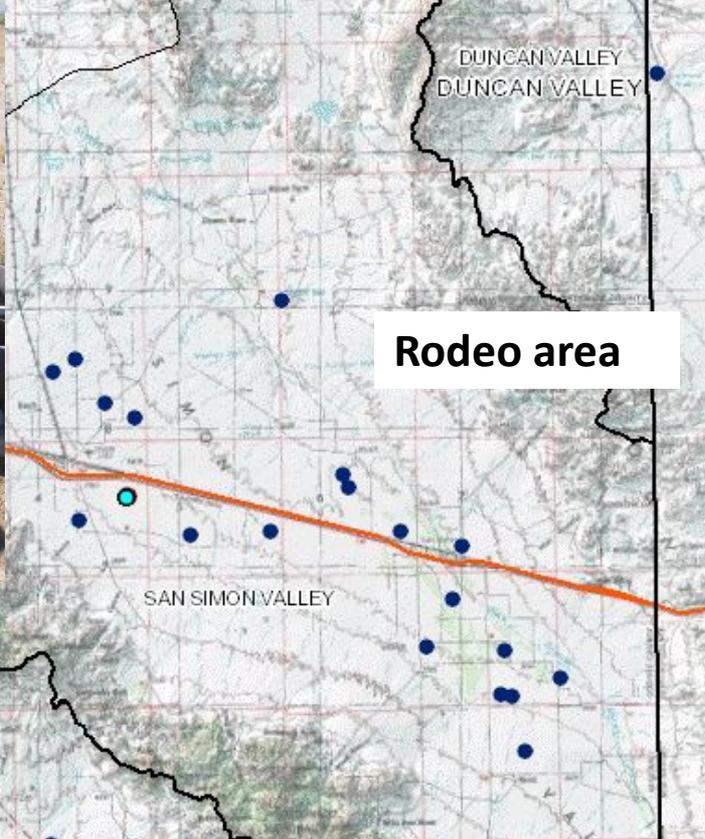
Arizona GroundWater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|-----------|-----------------|----------------|------------|----------------|----------|---------------|
| D-24-30 16CCC | 312006109180601 | 616444 | 31° 20' 4.9" | 109° 17' 59.5" | 3796 | STOCK | 100 | 12 | 7/10/1971 | 12/3/2015 | 30.5 | 3765.5 |



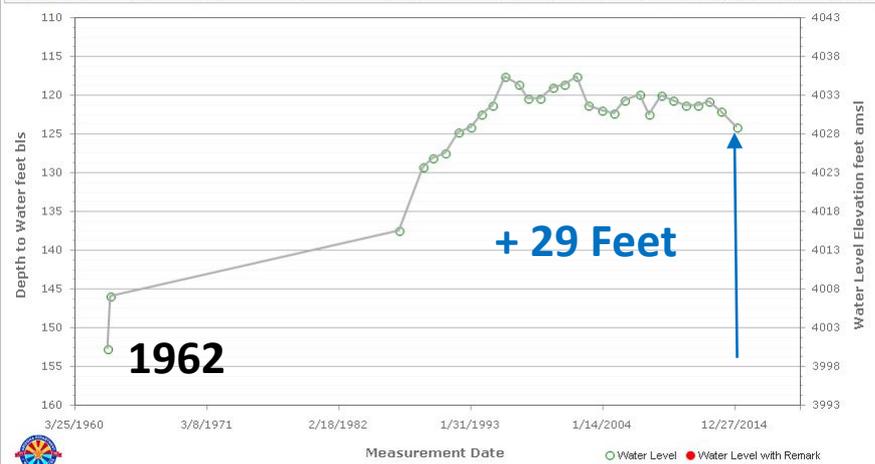
1.2 miles W of San Bernardino Ranch National Wildlife Refuge

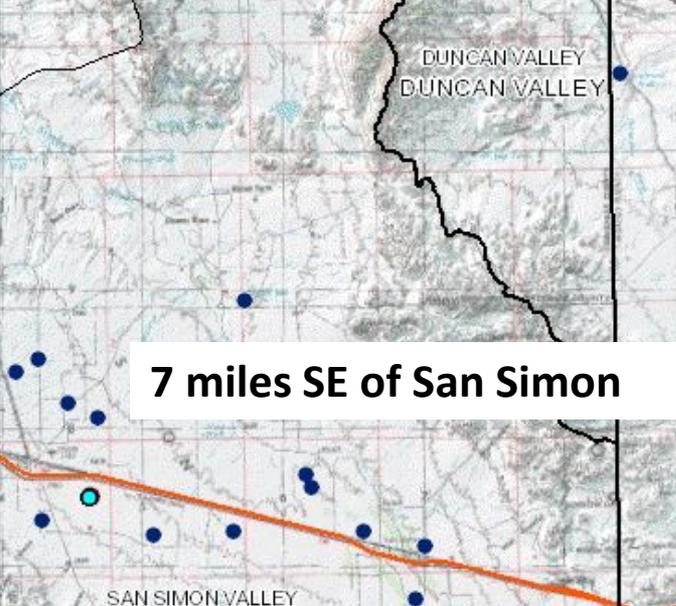




Arizona GroundWater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|------------|-----------------|----------------|------------|----------------|----------|---------------|
| D-18-32 35CBA | 314854109025601 | | 31° 48' 51.8" | 109° 3' 0" | 4153 | IRRIGATION | 296 | 16 | 7/1/1963 | 3/3/2015 | 124.1 | 4028.9 |



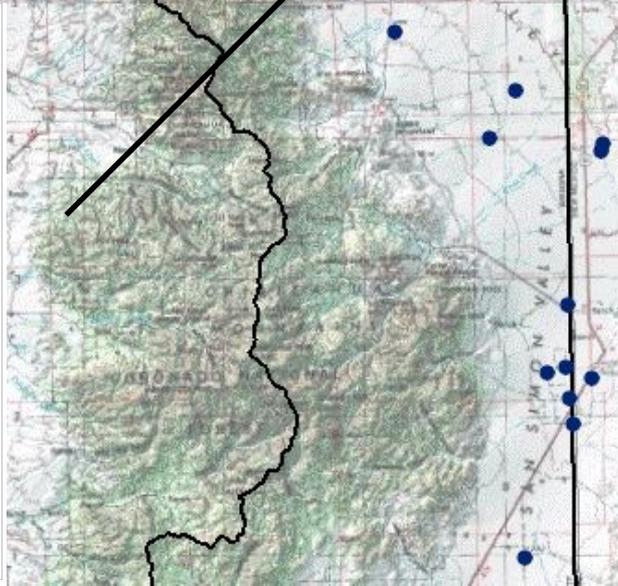


7 miles SE of San Simon

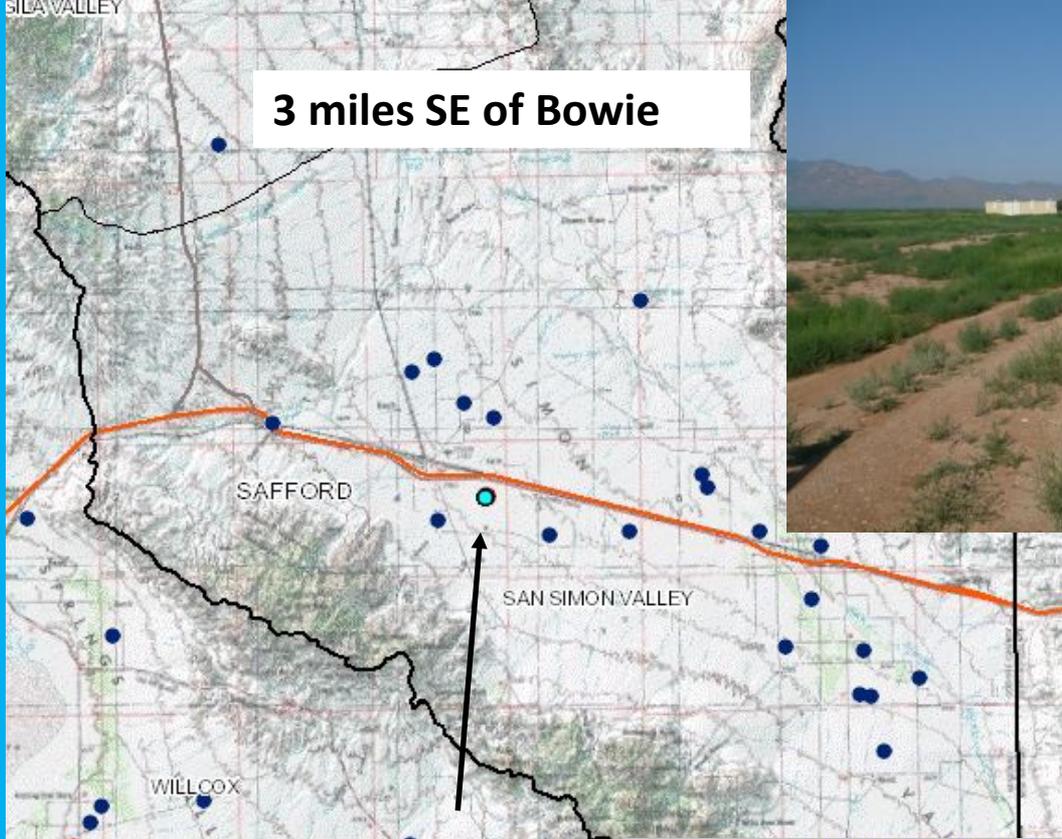


Arizona GroundWater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|------------|-----------------|----------------|------------|----------------|----------|---------------|
| D-14-31 35BCC | 321016108094501 | | 32° 10' 12.6" | 109° 9' 27.5" | 3772 | IRRIGATION | 800 | 16 | 12/24/1959 | 3/3/2015 | 263.9 | 3488.1 |



3 miles SE of Bowie



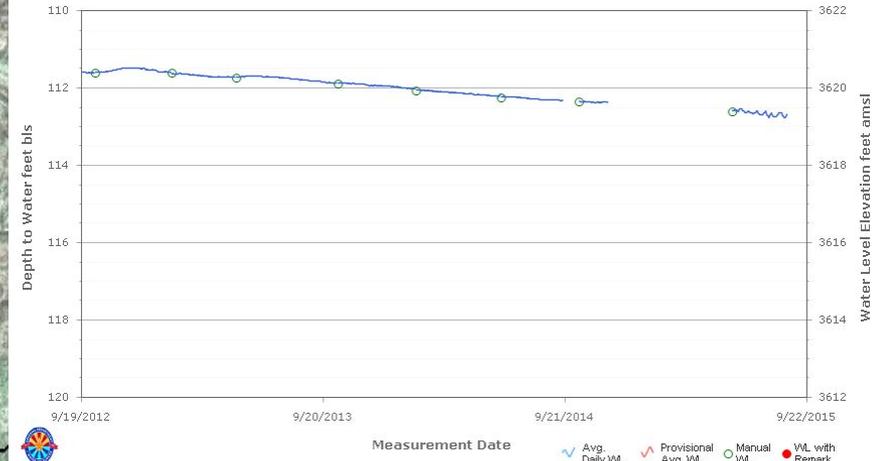
Arizona GroundWater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|-----------|-----------------|----------------|------------|----------------|----------|---------------|
| D-13-28 13BCD | 321812109264401 | 610888 | 32° 18' 12.1" | 109° 26' 46.8" | 3732.1' | UNUSED | 177 | 12 | 4/6/1979 | 12/28/2015 | 112.71 | 3619.45 |

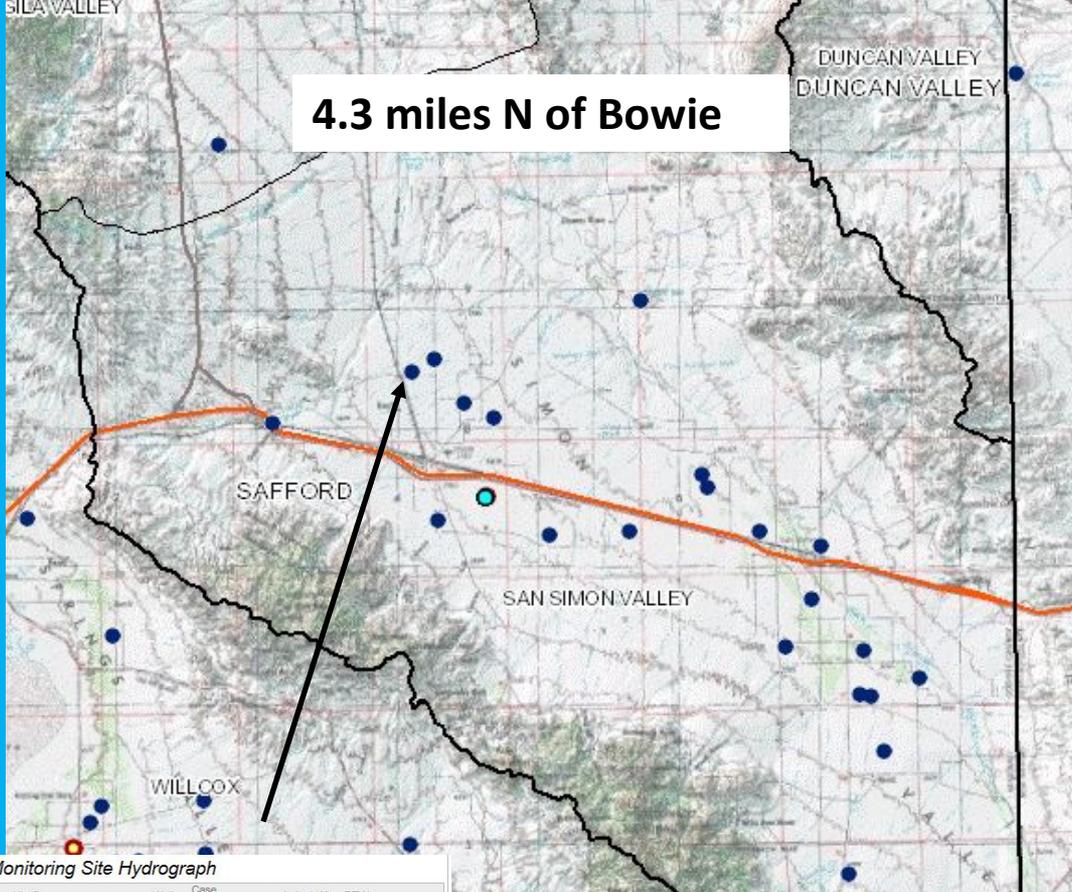


Arizona Automated GroundWater Monitoring Site Hydrograph

| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|-----------|-----------------|----------------|------------|----------------|----------|---------------|
| D-13-28 13BCD | 321812109264401 | 610888 | 32° 18' 12.1" | 109° 26' 46.8" | 3732.1' | UNUSED | 177 | 12 | 4/6/1979 | 12/28/2015 | 112.71 | 3619.45 |

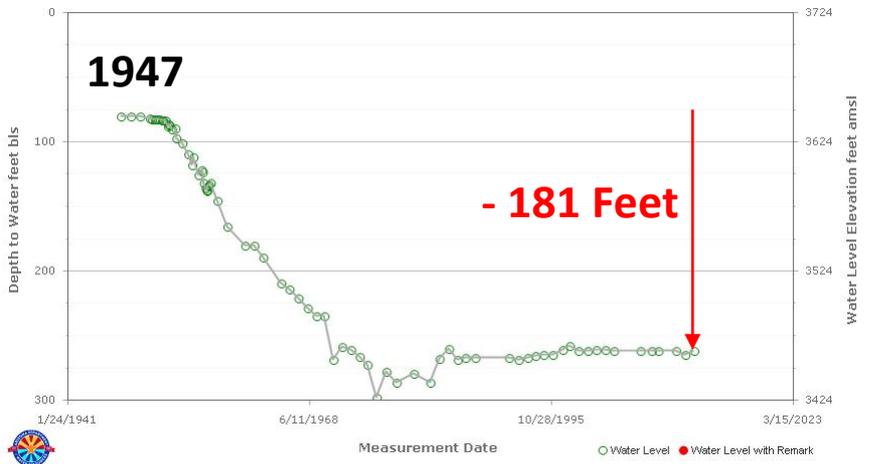


4.3 miles N of Bowie



Arizona GroundWater Monitoring Site Hydrograph

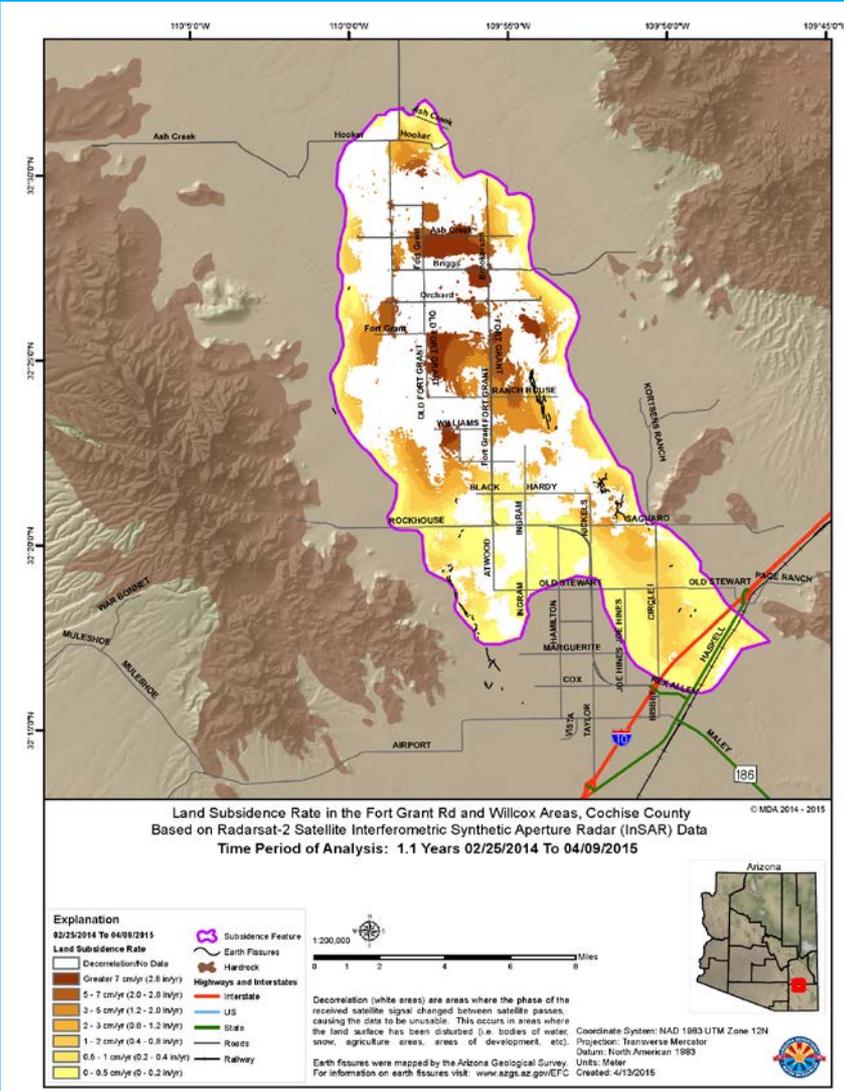
| Local ID | Site ID | Registry ID | Latitude NAD27 | Longitude NAD27 | Alt. (ft amsl) | Water Use | Well Depth (ft) | Case Dia. (in) | Drill Date | Latest WL Date | DTW (ft) | WL Elev. (ft) |
|---------------|-----------------|-------------|----------------|-----------------|----------------|-----------|-----------------|----------------|------------|----------------|----------|---------------|
| 0-12-28 17DDD | 322301109300901 | 609816 | 32° 23' 7.0" | 109° 30' 4.9" | 3724 | UNUSED | 567 | 6 | | 11/29/2011 | 261.6 | 3462.4 |



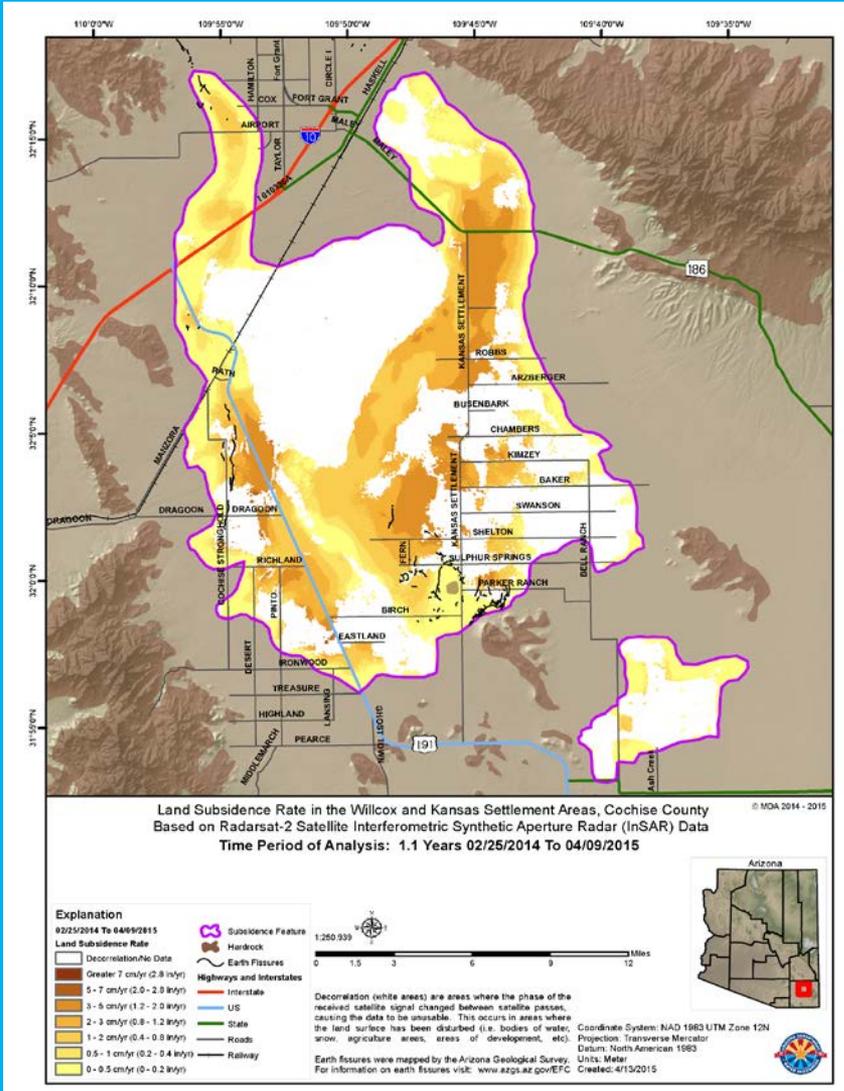
11/06/2012 10:44



Land Subsidence in the Willcox Basin 2/14 to 4/15

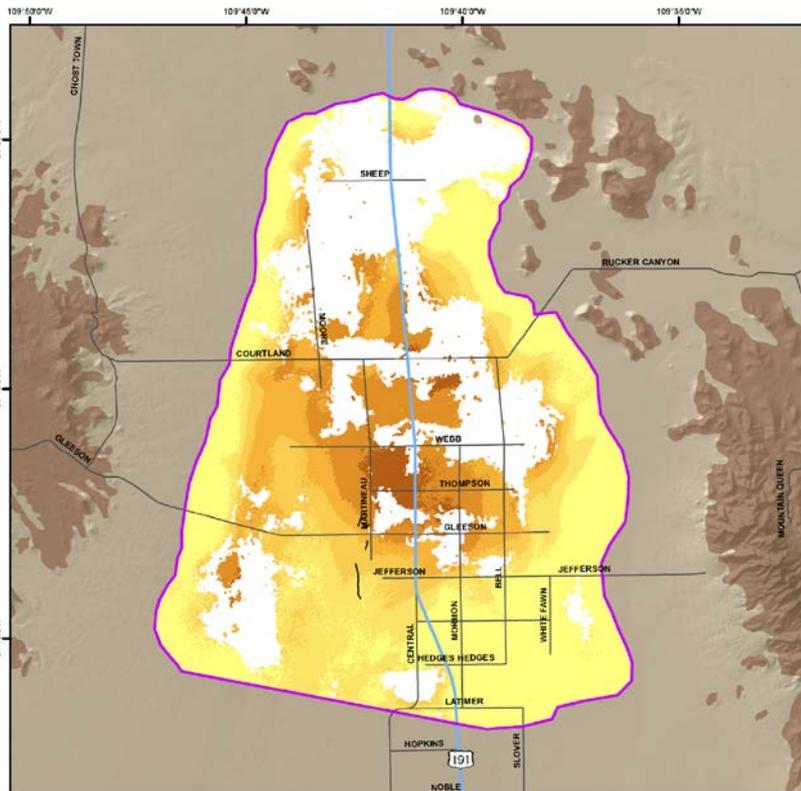


**Ft. Grant Rd. Area
 Northern Willcox Basin**



**Kansas Settlement Area
 Southern Willcox Basin**

Land Subsidence in the Douglas Basin and San Simon Valley Sub-basin 2/14 to 4/15



Land Subsidence Rate in the Elfrida Area, Cochise County
Based on Radarsat-2 Satellite Interferometric Synthetic Aperture Radar (InSAR) Data
Time Period of Analysis: 1.1 Years 02/25/2014 To 04/09/2015

© MDA 2014 - 2015

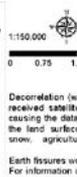
Explanation

02/25/2014 To 04/09/2015

Land Subsidence Rate

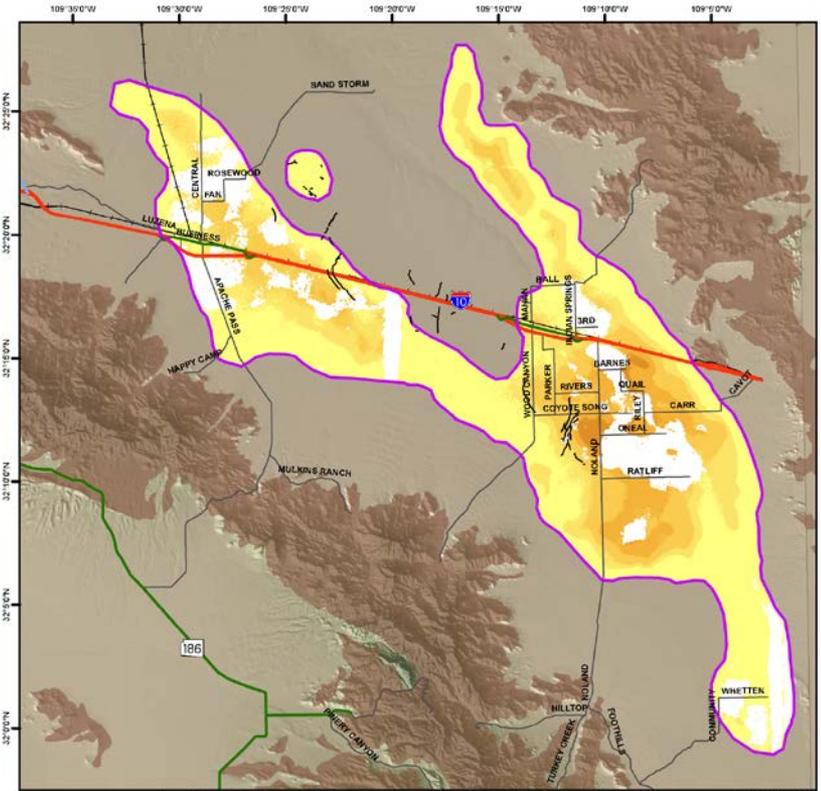
| |
|---------------------------------|
| Decomelation/No Data |
| Greater 7 cm/yr (2.8 in/yr) |
| 5 - 7 cm/yr (2.0 - 2.8 in/yr) |
| 3 - 5 cm/yr (1.2 - 2.0 in/yr) |
| 2 - 3 cm/yr (0.8 - 1.2 in/yr) |
| 1 - 2 cm/yr (0.4 - 0.8 in/yr) |
| 0.5 - 1 cm/yr (0.2 - 0.4 in/yr) |
| 0 - 0.5 cm/yr (0 - 0.2 in/yr) |

- Subsidence Feature**
- Handrock
 - Earth Fissures
 - Highways and Interstates
 - US
 - State
 - Roads
 - Railway



Decomelation (white areas) are areas where the phase of the received satellite signal changed between satellite passes causing the data to be unusable. This occurs in areas where the land surface has been disturbed (i.e. bodies of water, snow, agriculture areas, areas of development, etc).
Earth fissures were mapped by the Arizona Geological Survey. For information on earth fissures visit: www.azgs.gov/EFC Created: 4/14/2015

Coordinate System: NAD 1983 UTM Zone 12N
Units: Meter
Datum: North American 1983



Land Subsidence Rate in the Bowie and San Simon Areas, Cochise County
Based on Radarsat-2 Satellite Interferometric Synthetic Aperture Radar (InSAR) Data
Time Period of Analysis: 1.1 Years 02/25/2014 To 04/09/2015

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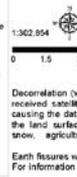
Explanation

02/25/2014 To 04/09/2015

Land Subsidence Rate

| |
|---------------------------------|
| Decomelation/No Data |
| Greater 7 cm/yr (2.8 in/yr) |
| 5 - 7 cm/yr (2.0 - 2.8 in/yr) |
| 3 - 5 cm/yr (1.2 - 2.0 in/yr) |
| 2 - 3 cm/yr (0.8 - 1.2 in/yr) |
| 1 - 2 cm/yr (0.4 - 0.8 in/yr) |
| 0.5 - 1 cm/yr (0.2 - 0.4 in/yr) |
| 0 - 0.5 cm/yr (0 - 0.2 in/yr) |

- Subsidence Feature**
- Handrock
 - Earth Fissures
 - Highways and Interstates
 - US
 - State
 - Roads
 - Railway



Decomelation (white areas) are areas where the phase of the received satellite signal changed between satellite passes, causing the data to be unusable. This occurs in areas where the land surface has been disturbed (i.e. bodies of water, snow, agriculture areas, areas of development, etc).
Earth fissures were mapped by the Arizona Geological Survey. For information on earth fissures visit: www.azgs.gov/EFC Created: 4/14/2015

Coordinate System: NAD 1983 UTM Zone 12N
Units: Meter
Datum: North American 1983

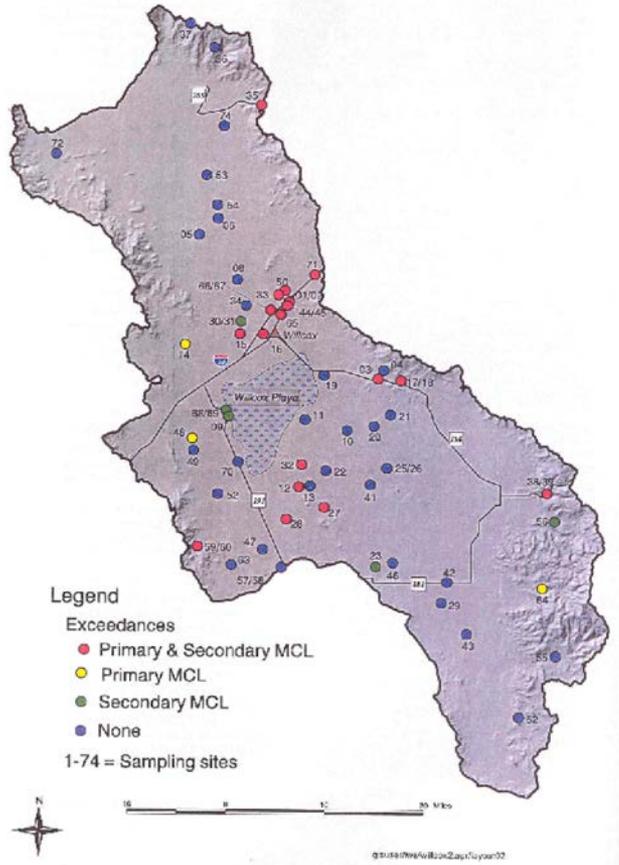


**Elfrida Area
Northern Douglas Basin**

**Bowie - San Simon Area
San Simon Valley Sub-basin**

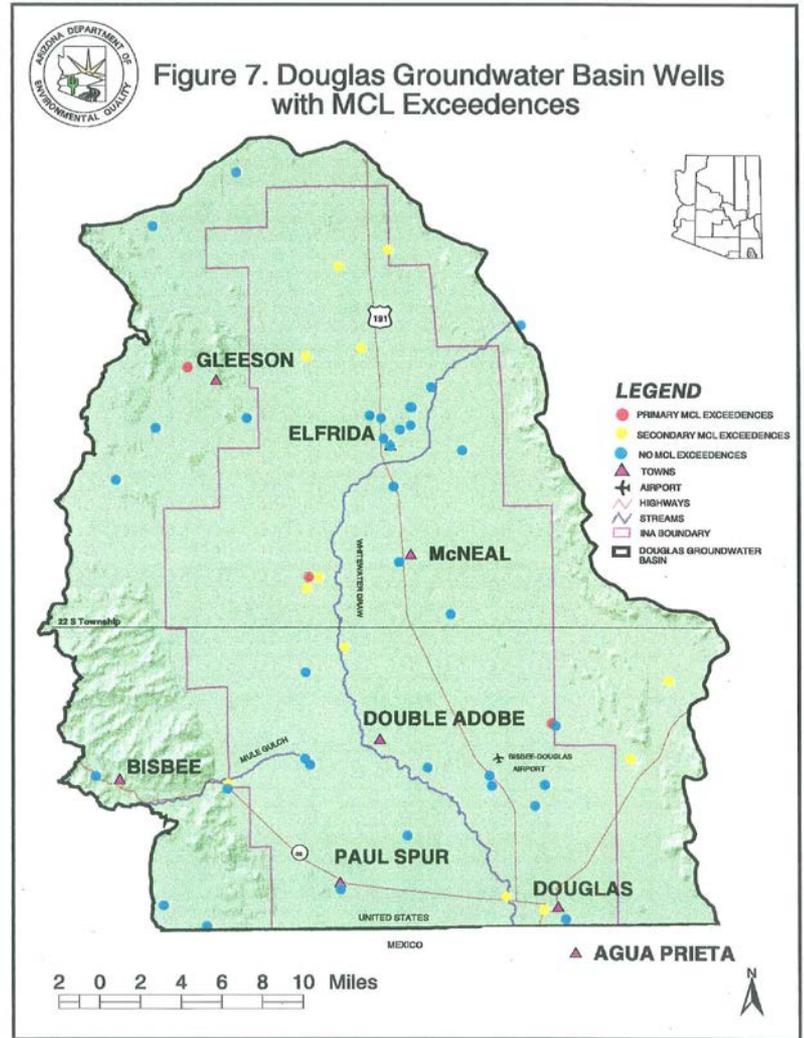
ADEQ Water Quality Exceedances For Willcox and Douglas Basins

Figure 7 - Water Quality Exceedances and Sampling Sites



Groundwater Sampling Results 10

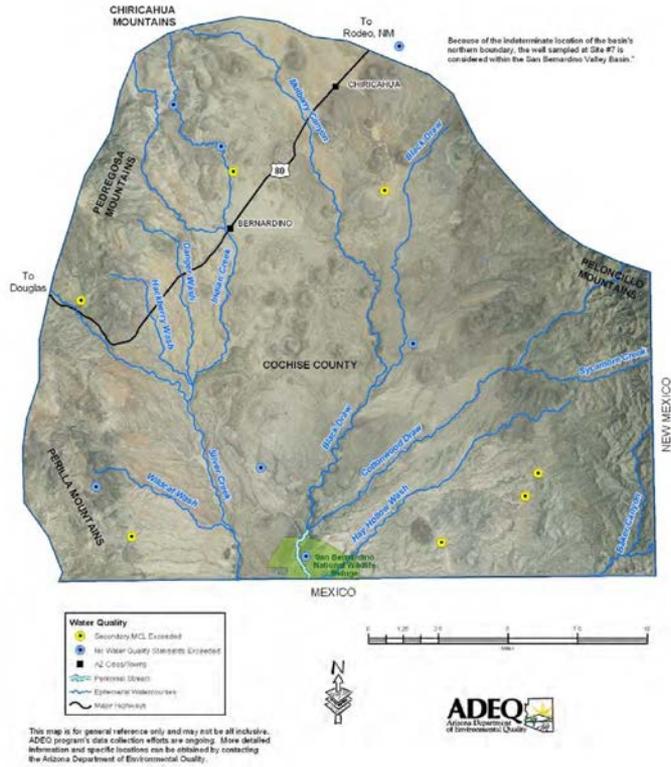
Willcox Basin



Douglas Basin

ADEQ Water Quality Exceedances For San Bernardino Basin and the San Simon Valley Sub-basin

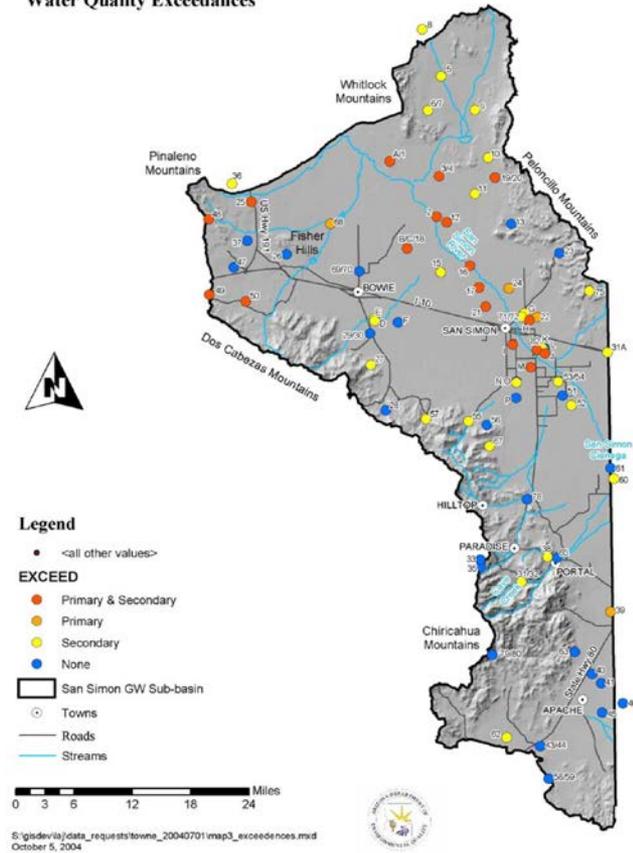
Map 3 - Water Quality Standards



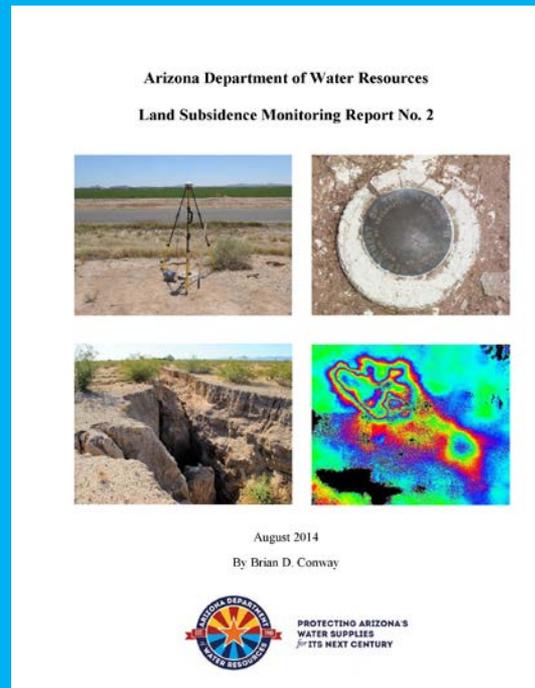
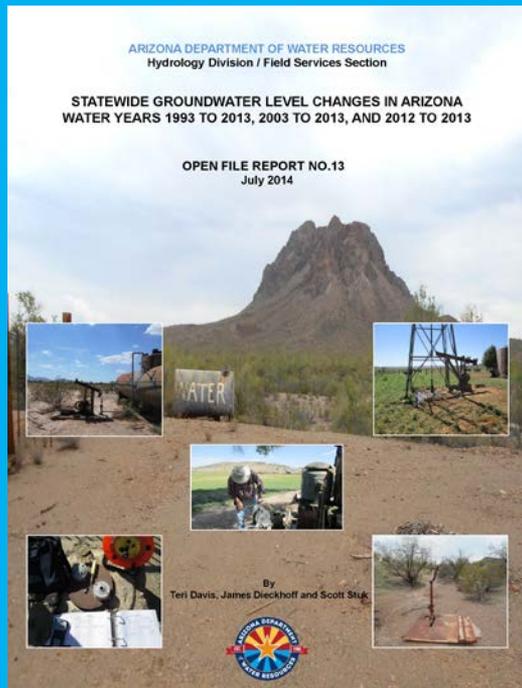
19

San Bernardino Basin

Map 3 - San Simon GW Sub-basin Water Quality Exceedances



San Simon Valley Sub-basin

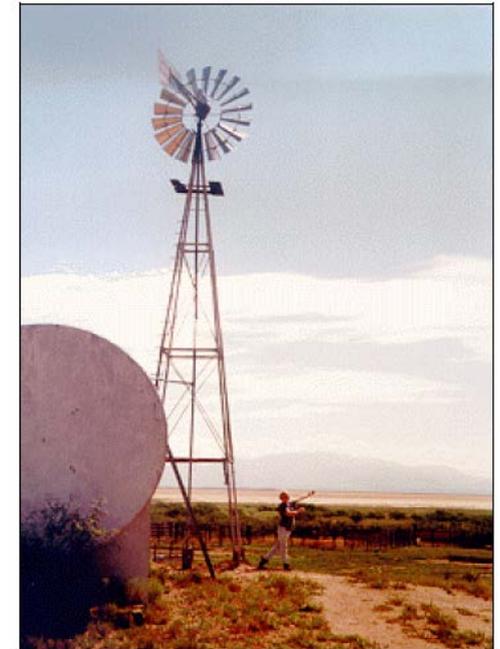
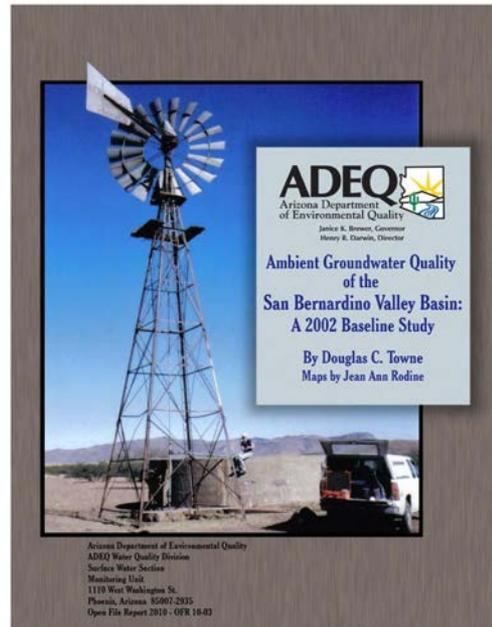
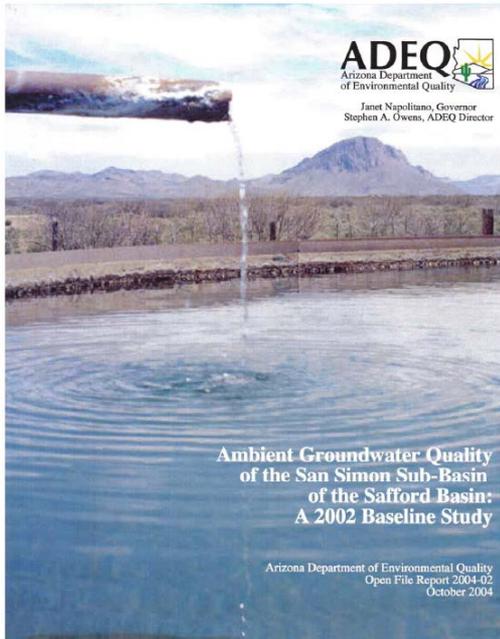


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For More Information
and Hydrologic Data
for the Cochise
Planning Area
Aquifers, Please Visit:

<http://www.azwater.gov/AzDWR/Hydrology/Library/Library.htm>



**AMBIENT GROUNDWATER QUALITY
OF THE DOUGLAS BASIN:
A 1995-96 BASELINE STUDY**



Prepared by
Hydrologic Support and Assessment Section
Water Quality Division
Arizona Department of Environmental Quality



June 1999
OFR 99-11

For More Information on
the Water Quality of
Cochise Planning Area
Aquifers, Please Visit:

<http://www.azdeq.gov/environ/water/assessment/ambient.html>

For Further Information Please Visit The ADWR Website at: www.azwater.gov

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