Prepared in consultation with the Secretaries of Agriculture and Defense and in cooperation with the Upper San Pedro Partnership in response to Public Law 108-136, Section 321

Water Management of the Regional Aquifer in the Sierra Vista Subwatershed, Arizona—2012 Report to Congress

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
Sally Jewell, Secretary

U.S. Geological Survey
Suzette Kimball, Acting Director

U.S. Geological Survey, Reston, Virginia 2014

For more information on the USGS—the Federal source for science about the Earth,
its natural and living resources, natural hazards, and the environment:
World Wide Web: http://www.usgs.gov
Telephone: 1-888-ASK-USGS

Suggested citation:
U.S. Department of the Interior, 2014, Water management of the regional aquifer in the Sierra Vista Subwatershed, Arizona—2012 report to Congress: Washington, D.C., U.S. Department of Interior, 24 p.

Contents

Figures

Tables

Executive summary

Section 321 of the Defense Authorization Act of 2004, Public Law 108-136, requires each annual 321 report to address five requirements, of which four are quantitative. For the calendar-year 2011 reporting period:

1. The quantity of the annual overdraft of the regional aquifer increased 500 acre-ft during the reporting period, 2011, compared to the previous reporting period, 2010. The 2011 annual deficit is 5,100 acre-ft;
2. The increase in (1), therefore, did not meet the deficit reduction goal specified for the reporting period;
3. The water-use management and conservation measures undertaken by each water-use controlling member of the Partnership during the reporting period are shown in table 4;
4. The extent of the contribution of such measures to the reduction of the overdraft in 2011 was 8,500 acre-ft**.**

   In addition, the Partnership has fallen short of the goal set by Congress to achieve sustainable yield (defined by the Partnership as erasing the water budget deficit) by September 30, 2011.

Groundwater depletion in the Sierra Vista Subwatershed continues albeit at a rate slower than in 2002. Although the annual overdraft of the aquifer has been greatly reduced from the 13,700 acre-ft originally anticipated for 2011 (fig. 1) to 5,100 acre-ft today, groundwater continues to be removed from storage and at nearly the same rate as over the previous 5 years. Since the beginning of 321 monitoring in 2002, about 70,300 acre-ft of groundwater has been removed from storage in addition to the hundreds of thousands of acre-ft that has been removed from storage since groundwater pumping commenced in the first half of the 20th century (D.R. Pool, unpub. data, 2011). Until the aquifer begins to accrete storage (the annual water budget balance becomes greater than zero) sustainable yield cannot be achieved, and until additional management measures are undertaken, it is unlikely that there will be further progress made toward this goal. Nonetheless, the Partnership continues to explore new ways to reduce the annual deficit, to support monitoring of the principal indicators of sustainable groundwater yield, and to support research to improve estimates of key water budget components.

Table ES1. Water recharged to and withdrawn/discharged from the regional aquifer underlying the Sierra Vista Subwatershed in 2011

[Water-budget volumes are in acre-ft; inflows are assigned positive numbers, outflows are assigned negative numbers; all values are estimates based upon the best available data and computational methods; values rounded to nearest 100 acre-ft]

Component	Estimated volume
Natural aspects of system	1,900
Pumping	-15,500
Active management measures	4,100
Passive recharge resulting from human activities	4,400
Total aquifer storage change	**-5,100**

Preface

The Defense Authorization Act of 2004, Public Law 108-136, Section 321, stipulates the way in which Section 7 of the Endangered Species Act applies to the Fort Huachuca, Arizona, military reservation. Section 321 of this Act further directs the Secretary of the Interior to prepare reports to Congress on steps to be taken to reduce the overdraft and restore the sustainable yield of groundwater in the Sierra Vista Subwatershed:

> The Secretary of [the] Interior shall prepare, in consultation with the Secretary of Agriculture and the Secretary of Defense and in cooperation with the other members of the Partnership, a report on water use management and conservation measures that have been implemented and are needed to restore and maintain the sustainable yield of the regional aquifer by and after September 30, 2011. The Secretary of the Interior shall submit the report to Congress not later than December 31, 2004. . . . Not later than October 31, 2005, and each October 31 thereafter through 2011, the Secretary of the Interior shall submit, on behalf of the Partnership, to Congress a report on the progress of the Partnership during the preceding fiscal year toward achieving and maintaining the sustainable yield of the regional aquifer by and after September 30, 2011.

Pursuant to this requirement, an initial Section 321 report, submitted to Congress in 2005, established goals to achieve sustainability and indicated the various water management measures planned by Partnership members to meet the targeted reductions in aquifer use (U.S. Department of the Interior, 2005).

The report that follows is the final annual progress report, the seventh in the series of such reports requested by Congress. The report utilizes the best information currently available including data from Partnership research studies of the Sierra Vista Subwatershed, data collected by the monitoring program which has been tailored to Section 321 information needs, and the most recent population data from the Arizona Office of Employment and Population Statistics, The State Demographer's Office. The authorship of this report is attributed collectively to the Upper San Pedro Partnership, a consortium of Federal and State agencies, local jurisdictions, and non-governmental organizations. Information for this report was supplied by several agencies including the Arizona Department of Water Resources, the U.S. Geological Survey, the Agricultural Research Service, the Bureau of Land Management, the Bureau of Reclamation, and other Upper San Pedro Partnership members.

Additional discussion of indicators of sustainability found in earlier Section 321 reports was not possible this year due to insufficient federal funds to support publication of a more in-depth report. The current, abbreviated report would not have been possible without the financial support of The Nature Conservancy and the USGS Arizona Water Science Center, and without the continued interest, discussions, and technical support of the member organizations of the Upper San Pedro Partnership.

Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
Length		
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
Area		
Acre	4,047	square meter (m^2)
Volume		
gallon (gal)	0.003785	cubic meter (m^3)
acre-foot (acre-ft)	325851	gallon (gal)
acre-foot (acre-ft)	1,233	cubic meter (m^3)
Flow rate		
acre-foot per year (acre-ft/yr)	1,233	cubic meter per year (m^3/yr)
cubic foot per second (cfs)	448.812	gallon per minute (gpm)
gallon per minute (gpm)	1.6141	acre foot per year (acre-ft/yr)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
gallon per day (gal/d)	0.003785	cubic meter per day (m^3/d)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows: °F=(1.8×°C)+32
Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows: °C=(°F-32)/1.8
Vertical coordinate information is referenced to the insert datum name (and abbreviation) here for instance, "North American Vertical Datum of 1988 (NAVD 88)."
Horizontal coordinate information is referenced to the insert datum name (and abbreviation) here for instance, "North American Datum of 1983 (NAD 83)."
Altitude, as used in this report, refers to distance above the vertical datum.

Water Management of the Regional Aquifer in the Sierra Vista Subwatershed, Arizona—2012 Report to Congress

This report is submitted to Congress by the Secretary of the Interior, in consultation with the Secretary of Agriculture and Secretary of Defense and in cooperation with the other members of the Upper San Pedro Partnership.

Section 321 of the Defense Authorization Act of 2004, Public Law 108-136, requires each annual 321 report to include the following:

1. The quantity of the overdraft of the regional aquifer reduced during the reporting period;
2. Whether the reduction in (1) met the goal specified for the reporting period;
3. The water-use management and conservation measures undertaken by each water-use controlling member of the Partnership during the reporting period;
4. The extent of the contribution of such measures to the reduction of the overdraft;
5. The legislative accomplishments made during the reporting period in removing legal impediments that hinder the mitigation of water use by Partnership members.

The first four quantitative requirements are addressed in order, below (Quantitative requirements). The fifth reporting requirement (Legislative accomplishments) is addressed following a summary discussion of items one through four.

Though the original 321 legislation specified annual reporting on a fiscal-year basis, due to Congress on October 31, most of the data needed for the 321 Reports are reported on a calendar-year basis and are typically not available until well after the end of the calendar year. As with previous Section 321 reports, therefore, this year's report covers the previous calendar year (2011). The 321 legislation also required the Upper San Pedro Partnership to "achieve and maintain the sustainable yield of the regional aquifer [of the Sierra Vista Subwatershed] by and after September 30, 2011." This report includes data through December 31, 2011. The additional three months of data beyond September 30, 2011 has no meaningful effect on the final evaluation of the Partnership's attempt to achieve sustainable yield of groundwater from the regional aquifer by the end of fiscal year 2011.

Quantitative requirements

1. The quantity of the overdraft of the regional aquifer reduced during 2011

The value of the annual Subwatershed overdraft or deficit calculated using the water-budget method increased (became a larger negative value) from -4,600 acre-ft in 2010 to -5,100 acre-ft in 2011. In 2011, therefore, the annual overdraft increased by -500 acre-ft (fig. 1 and table 1). This value includes accounting for all revisions that have been made to base water budget values since the beginning of 321 reporting (table 2a). All annual aquifer storage deficits can only be compared after a similar accounting; these data are provided in table 2b. The increase in the 2011 annual overdraft, in part, is the result of a drier precipitation year following a wetter year. Appendix A includes precipitation data compiled by the Agricultural Research Service for the Subwatershed beginning in 1989, which includes the entire period of 321 Reporting.

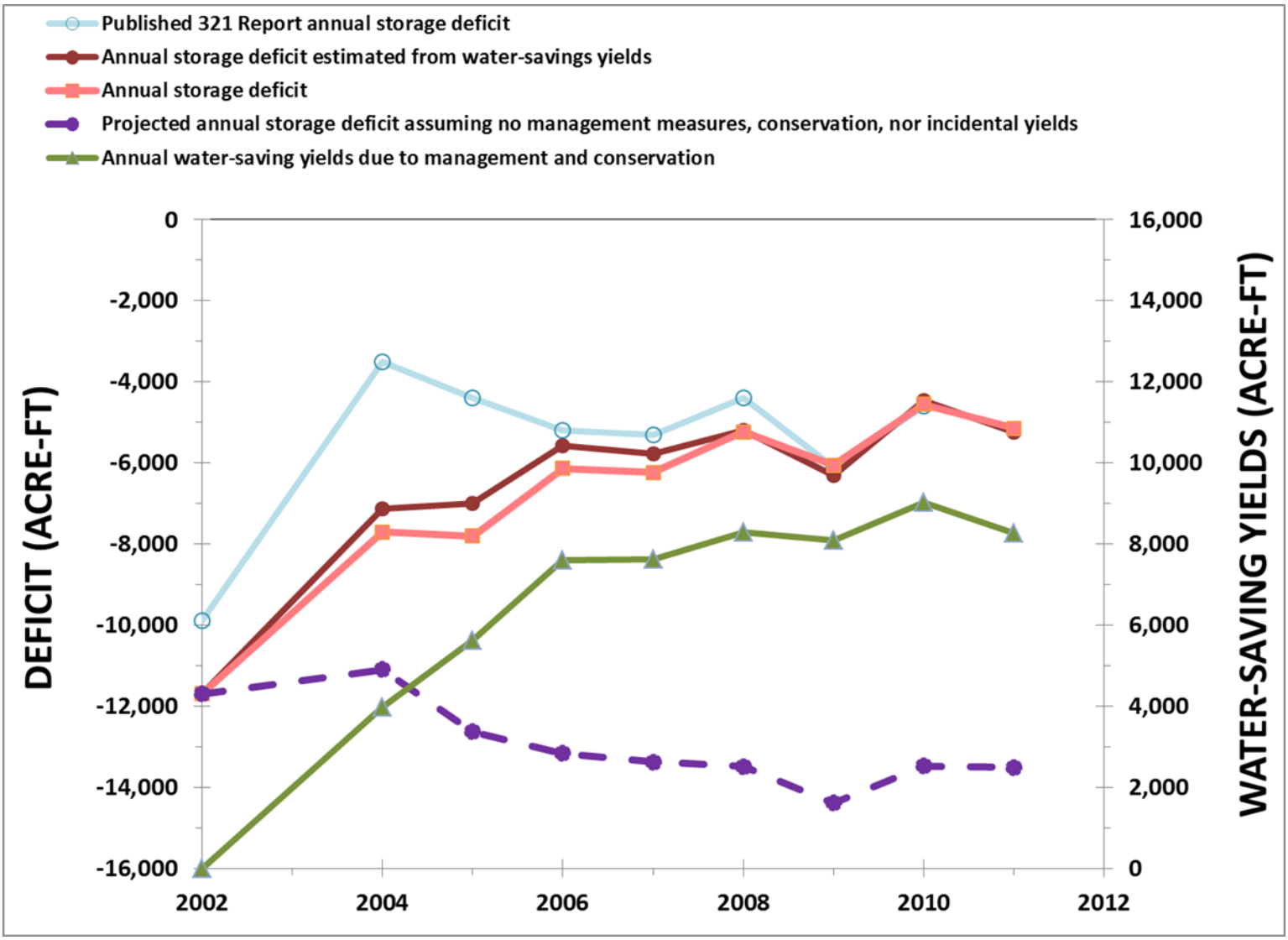

Figure 1. Effect of management-measure yields on annual aquifer-storage change (calculated as the difference between projected annual aquifer-storage depletions if no management measures are taken and the water-saving yields attributed to management measures and conservation). In other words, in terms of water-saving yields, the dashed purple line plus the green line (triangles) equals the maroon line (solid circles). The water-budget storage deficit calculated for each year (column 6 in table 2b) is shown for comparison (salmon line with squares), as are the deficits originally published in earlier 321 reports (light blue line with open circles; column 2 in table 2b). Corrected annual deficit values include all updates to the base groundwater budget and to the calculation of annual water-saving yields that have occurred since the beginning of 321 reporting. For purposes of comparison, updated water savings yields are adjusted in a manner consistent with previous years and thus do not match values found in Table 4.

Table 1. Water recharged to and withdrawn/discharged from the regional aquifer underlying the Sierra Vista Subwatershed in 2011

[Water-budget volumes are in acre-ft; inflows are assigned positive numbers, outflows are assigned negative numbers; all values are estimates based upon the best available data and computational methods; all totals rounded to nearest 100 acre-ft.]

Component	Estimated volume	Description
Natural aspects of system		
Natural recharge[1]	15,000	Inflow largely from percolating waters on and around mountains and through ephemeral-stream channels
Groundwater inflow[1]	3,000	Subsurface inflow from Mexico
Groundwater outflow[1]	-440	Subsurface outflow at USGS San Pedro River near Tombstone streamflow-gaging station (09471550)
Stream base flow[2]	-4,890	Groundwater discharge to the river that flows out of the Subwatershed
Evaporation and plant transpiration[3]	-10,800	Groundwater consumed in the riparian system exclusive of evapotranspiration supplied by near-riparian recharge from precipitation or flood runoff
Sub-total	**1,900**	Natural aspects of system
Pumping		
Pumping, water companies and public supply– gross	-9,933	Groundwater extractions by water companies and municipalities (excluding golf courses)
Pumping, rural/exempt well – gross	-4,238	Groundwater extractions by private wells
Pumping, industrial (turf, sand and gravel, stock tanks, golf courses) – gross	-1,226	Groundwater extractions for industrial uses (including golf courses)
Pumping, irrigation – net[4]	-61	Groundwater extractions for agricultural use
Sub-total	**-15,500**	Pumping
Active management measures		
Reduction of riparian evapotranspiration	645	Management of invasive mesquite
Municipal effluent recharge[5,6]	3,273	
Detention basin recharge[7]	143	
Sub-total	**4,100**	Active management measures
Passive recharge resulting from human activities		
Incidental recharge[8]	2,066	
Urban-enhanced recharge[9]	2,300	
Sub-total	**4,400**	Passive recharge due to human activities
Total aquifer storage change[10]	**-5,100**	Additions or reductions in stored aquifer water

[1] Flow volume estimated by the Arizona Department of Water Resources (2005).

[2] Base flow discharge at USGS San Pedro River near Tombstone streamflow-gaging station (09471550) estimated from entire period of record through 2009 (Kennedy and Gungle, 2010).

[3] Evapotranspiration value is the average of the high and low estimates of Scott and others (2006).

[4] Pumping for irrigation is consumptive use only. Area considered is the groundwater basin portion of the Sierra Vista Subwatershed only. The area within the boundaries of the Sierra Vista Subwatershed includes more agricultural lands—primarily located in the head waters of the Babocomari River—than the area within the groundwater basin portion of the Subwatershed.

[5] Municipal effluent recharge is water returned to the aquifer through recharge facilities as reported by the City of Sierra Vista (Mike Hemesath, Director, Department of Public Works, City of Sierra Vista, written commun., April 17, 2012), Fort Huachuca (Kim Mulhern, , Fort Huachuca, written commun., March 9, 2012), City of Tombstone (Jack Wright, Distribution Systems Operator, City of Tombstone , oral commun., May, 2012), and City of Bisbee (Mike Bollinger, Wastewater Superintendent, City of Bisbee, written commun., June 21, 2012).

[6] Includes 524 acre-ft of incidental recharge (leakage) through the constructed wetlands above the recharge ponds at the Sierra Vista Waste Water Reclamation facility (Dooley, S.W., City of Sierra Vista Water Reclamation Facility annual underground water storage report for calendar year 2011, March 26, 2011, administrative report prepared for Arizona Department of Water Resources).

[7] Recharge of stormwater within basins installed to mitigate flood peaks in urban ephemeral-stream channels.

[8] Incidental recharge is an estimate of water returned to the aquifer from septic tanks and turf watering.

[9] Urbanization in semiarid climates can increase recharge by concentrating rainfall runoff in ephemeral-stream channels (Kennedy, 2007; Lohse and others, 2010). Estimate provided by the Agricultural Research Service. Recharge caused by urbanization only partially mitigates the increased pumping that accompanies increased urbanization.

[10] Subtotals and total are equal to sum of individual terms rounded to nearest 100 acre-ft; sum of subtotals can differ from sum of all individual terms rounded to nearest 100 acre-ft due to rounding error.

Table 2a. Revisions to base groundwater budget, Sierra Vista Subwatershed of the Upper San Pedro basin, 2002–11. Negative values indicate an increase in the aquifer storage deficit (overdraft). Calendar year 2003 water-budget data were not analyzed in the 321 Report series.

[Volumes are in acre-ft]

Water budget year	Base groundwater-budget element revised in given year	Volume before revision (original)	Volume after revision (improved)	Resulting change in water-budget balance	Cumulative change in water-budget balance[1]
2002	None			0	0
2003	None	NA	NA	NA	NA
2004	Urban enhanced recharge	0	3,100	3,100	3,100
	[treated effluent incidental recharge][1]	[0]	[700]	[700]	3,800
2005	Urban enhanced recharge	3,100	2,300	-800	3,000
2006	Exempt well pumping	-5,030	-4,390	640	3,640
	Evapotranspiration	-7,700	-10,800	-3,100	540
2007	None			0	540
2008	[treated effluent incidental recharge][1]	[700]	[800]	[100]	640
2009	Base flow discharge	-3,250	-4,890	-1,640	-1000
	[treated effluent incidental recharge][1]	[800]	[0]	[-800]	-1,800
2010	None			0	-1,800
2011	None			0	-1,800

Table 2b. Annual aquifer storage deficit (overdraft) for the Sierra Vista Subwatershed. For each year of 321 reporting, the overdraft is presented as published in the annual 321 Reports (column 2), as calculated using only water-budget elements originally used in the 2002 water budget (column 3), and after taking all revisions to base water-budget elements (as of the writing of this report) into account (column 6). The differences in the value of the overdraft as originally published compared to the value calculated using 2002 base budget elements only (column 4), and as compared to the value calculated accounting for all revisions to the base water-budget elements, as found in the 2011 water budget (column 5), are also presented. Note that the water-budget year is not the same as the year of the 321 Report, and that calendar year 2003 water-budget data were not analyzed in the 321 Report series.

[Deficits are in acre-ft]

Water-budget year	Deficits published in 321 Reports	Deficits if no base revisions to 2002 water budget[1]	Published deficits relative to 2002 water-budget components	Published deficits relative to 2010 water-budget components	Corrected deficits using current base budget revisions[1]
2002	-9,900	-9,900	0	1,800	-11,700
2003	NA	NA	NA	NA	NA
2004	-3,500	-5,900	2,400	4,200	-7,700
2005	-4,400	-6,000	1,600	3,400	-7,800
2006	-5,200	-4,340	-860	940	-6,140
2007	-5,300	-4,440	-860	940	-6,240
2008	-4,400	-3,440	-760	1040	-5,240
2009	-6,100	-4,300	-1,800	0	-6,100
2010	-4,600	-2,800	-1,800	0	-4,600
2011	-5,100	-3,300	-1,800	0	-5,100

[1]From 2004 to 2008 there was on average 700 acre-ft of leakage per year (800 acre-ft in 2008) from the Sierra Vista Waste Water Reclamation Facility (Mike Hemesath, Director, City of Sierra Vista Department of Public Works, written commun., April 9, 2010; Hemesath, unpub. data, 2010). This is considered recharge and from 2004 to 2008 it was not included in the published annual 321 Report water budgets. This volume is a management measure that went into effect after 2002, and thus is not considered to be one of the base water-budget revisions; this is indicated by brackets in table 2a. In order to have the most accurate water budget possible, however, this volume is included in the water-budget accounting for years 2004, 2005, 2006, 2007, and 2008. Beginning in 2009, the estimated leakage (recharge) is included in the water budget found in the 321 Report (table 1). This was 524 acre-ft in 2011 (Mike Hemesath, Director, City of Sierra Vista Department of Public Works, written commun., April 26, 2012; Hemesath, unpub. data, 2012). The deficit if no base revisions are made to the 2002 water budget (table 2b, column 3) must include this additional 700 acre-ft for years 2004–07 and 800 acre-ft for 2008 to be correct as it is a previously missing management measure from those years, not a permanent base revision to a water-budget element. The corrected deficit using base water-budget element revisions (table 2b, column 6) must also include this additional volume to be correct. The deficits published in the annual 321 reports (table 2b, column 2), however, are just that, what was actually published, and so do not include this correction.

2. Whether the reduction in the deficit met the goal specified for the reporting period

The water-budget goal for 2011 presented in table 4 of the 2004 321 Report (U.S. Department of the Interior, 2005) was for the Partnership to have erased the annual water-budget deficit and to have accreted 1,900 acre-ft of storage by the end of 2010. Because of the revisions to the water budget noted in (1) and presented in tables 2a and 2b, however, the annual goals have likewise been revised since 2004. The revised annual water-budget goal anticipates a water budget balance of +100 acre-ft in 2011. The annual deficit in 2011 was -5,100 acre-ft (table 1), short of the goal by 5,200 acre-ft.

The projected change in the annual deficit from 2010 to 2011 was for an improvement (reduction of the deficit or increase in the surplus) of 600 acre-ft (table 3). As indicated in (1), above, the quantity of the annual overdraft of the regional aquifer increased during 2011 by about 500 acre-ft, from an annual deficit of -4,600 acre-ft in 2010 to an annual deficit of -5,100 acre-ft in 2011. Therefore, there was no "reduction in the deficit" from 2010 to 2011, the change in the water budget balance falling short of the annual deficit-reduction goal specified for the reporting period by 1,100 acre-ft.

In addition, Public Law 108-136, Section 321 (d) (1) states:

> …the Secretary of the Interior shall submit, on behalf of the Partnership, to Congress a report on the progress of the Partnership during the preceding fiscal year toward achieving and maintaining the sustainable yield of the regional aquifer by and after September 30, 2011.

As evidenced by the 2011 annual deficit of -5,100 acre-ft, the Partnership has failed to achieve and maintain the goal of sustainable yield by the Congressional target date. The Upper San Pedro Partnership does continue to invest time, energy, and money in its efforts to reduce the annual water budget deficit and to improve estimates of key water budget components.

Table 3. Original and revised 2011 water-budget deficit/surplus goals and actual water-budget deficit or surplus. Values include all revisions to base groundwater budget as of 2011. Positive numbers indicate an increase or surplus, negative numbers a decrease or deficit. The annual water budget balance fell short of the revised goal for 2011 by 5,200 acre-ft, and the annual change in the water budget balance from 2010 to 2011 fell short of the annual improvement goal by 1,100 acre-ft.

[in acre-ft; all values rounded to nearest 100 acre-ft]

Annual water-budget balance			Annual improvement in water-budget balance	
Original goal for 2011 (from 2004 321 Report)	Revised 2011 goal (due to base water-budget revisions)	Actual 2011 value	Annual improvement goal, 2010–11 (2004 321 Report)	Actual improvement, 2010–11
1,900	100	-5,100	600	-500

3. Water use management and conservation measures undertaken by each water-use controlling member of the Partnership

The water-use management and conservation measures undertaken by each water-use controlling Partnership member in 2011 are detailed in the last column of table 4. Table 4 represents a comprehensive overhaul of the methodology used to calculate the annual Partnership member yields that result from conservation measures. There are two principal changes. First, Fort Huachuca, Sierra Vista, and the Bureau of Land Management (BLM) recorded conservation yields in the baseline year of 2002 (U.S. Department of the Interior, 2006; see table 2). Going forward in time from 2002, yields in the respective

categories (mesquite and tamarisk reduction for BLM, effluent recharge and detention basins for the other two) should have been reduced by this amount since this conservation measure was already in place at the time 321 reporting got under way. Only Fort Huachuca proceeded to report in this manner, reducing subsequent yields in most years by the amount already conserved in 2002. Table 4 adjusts the effluent recharge conservation value for Sierra Vista downward by 930 acre-ft, and the stormwater detention basin yield by 140 acre-ft for each year of reporting (equal to what occurred in 2002). Similarly, the BLM value for mesquite reduction is reduced by 475 acre-ft for each year of reporting. These revisions do not affect the water budget calculations (table 1), however. The 2002 water budget was calculated as if these 2002 conservation measures had not yet occurred. Instead, they were first included in the 2004 water budget (2005 321 Report; U.S. Department of the Interior, 2006). In order to rectify water budget deficit calculations with management-measures and conservation-yields deficit calculations, the yields in place in 2002 (but not included in that water budget) must be added to the sum of annual yields. This adjustment is taken into account in fig. 1.

Second, jurisdictional "conservation measures" have been calculated a variety of ways over the years of 321 reporting, from attempts to sum up all the effects of water saving programs (e.g., low-flow appliance sales, acres of turf removal) to very approximate estimations. Now for all years these calculations follow the method used sporadically in the past for Sierra Vista, Fort Huachuca, and more recently, Huachuca City. This method proceeds as follows: the current year's population (p_{2011}) is multiplied by the per capita pumping rate for 2002 ($Q_{pc,2002}$). This gives the approximate amount of pumping that would have occurred in a given year had no water conservation measures (including education and changes in the culture of water conservation) taken place ($P_{nc,2011}$). The amount of actual pumping ($P_{a,2011}$) that occurred in the given year is then subtracted from that amount to produce the conservation yield ($Y_{C,\ 2011}$) resulting from water conservation measures:

$$Y_{C,2011} = P_{nc,2011} - P_{a,2011} \qquad \text{where } P_{nc,2011} = p_{,2011} * Q_{pc,2002}$$

This methodology has been utilized in table 4 for all years of conservation yield calculations for Fort Huachuca, Sierra Vista, Bisbee, Huachuca City, and Tombstone. Cochise County conservation could not be calculated this way. Most of Cochise County consists of unmetered private wells which make the annual change in the average pumping rate difficult to determine. Because some segments of each incorporated town and city are also on unmetered private wells, some error remains in the conservation values shown. Nevertheless, these are more accurate water conservation estimates than have been used in the past. The advantage of this approach is that it accounts for hard-to-measure changes in individual water-use behavior and accounts for the water-reduction benefits of all low water-use appliances installed in the jurisdiction. Pre-2010 population estimates for Arizona cities and towns have been re-estimated since the U.S. Census was completed in 2010, and these updated population values have been used where applicable for re-calculating conservation yields.

As now calculated, the water-saving yields from the measures undertaken in 2011 (5,600 acre-ft) are about 400 acre-ft less than the 2010 yields. As mentioned above, in order to rectify water budget deficit calculations with management measures and conservation yields deficit calculations, the yields in place in 2002 must be added to these annual yields.

Table 4. Estimated yields for 2011 from Partnership member measures to reduce aquifer overdraft.

[Yields are in acre-ft; numbers compiled March—July, 2012, based on data provided by respective jurisdictions or in conjunction with USGS; conservation yields in each year are relative to a zero yield in the baseline year of 2002; recharge yields are total values and are relative to a baseline of zero acre-ft; totals rounded to nearest 100 acre-ft]

Description	Measure type	2002 (reported)	2002 (corrected)	2003	2004	2005	2006	2007	2008	2009	2010	2011
Fort Huachuca												
Conservation measures[1,2]	Conservation	0	[0]	[52]	[181]	[376]	[699]	[678]	[890]	[913]	[857]	[986]
Effluent recharge[3]	Recharge	190	0	230	226	197	133	102	211	115	194	24
Stormwater detention basins[4]	Recharge	60	0	-26	-33	-11	124	104	46	-44	172	-47
Cochise County												
Conservation measures[5]	Conservation	0	0	0	10	60	110	110	110	120	120	120
Stormwater detention basins	Recharge	0	0	0	0	0	0	30	30	30	30	30
Sierra Vista												
Conservation measures[1,2]	Conservation	0	0	-215	418	561	1,040	865	1,343	915	1,863	1,942
Improved golf course efficiency	Conservation	0	0	0	0	[15]	[45]	[15]	[15]	[15]	[15]	[15]
Effluent recharge[6]	Recharge	930	0	1,520	1,640	1,715	2,000	1,746	1,751	1,657	1,736	1,733
Stormwater detention basins[7]	Recharge	140	0	40	150	-60	-10	-35	-16	-116	45	-40
Bisbee												
Conservation measures	Conservation	0	0	25	49	33	-26	-51	-54	-64	-77	-94
Reduced groundwater pumping through effluent reuse	Conservation	0	0	0	0	0	0	0	0	0	83	159
Effluent recharge[8]	Recharge	0	0	0	0	0	250	250	475	440	351	276
Huachuca City												
Conservation measures[2]	Conservation	0	0	1	26	22	29	80	54	46	27	69
Tombstone												
Conservation measures[2]	Conservation	0	0	0	32	-151	-315	-243	13	40	-40	-66
Effluent recharge[9]	Recharge	0	0	0	0	0	130	130	90	90	74	55
Bureau of Land Management												
Mesquite and tamarisk reduction[10]	Conservation	475	0	0	0	0	0	0	140	140	170	170
Urban enhanced ephemeral-stream channel stormwater recharge												
Increase in stormwater recharge in ephemeral-stream channels caused by urbanization[11]	Recharge	3,100	0	0	0	-800	-800	-800	-800	-800	-800	-800
Incidental yields (retirement of agricultural pumping)												
Retirement of agricultural pumping[12]	Conservation	0	0	0	0	1,025	2,070	2,070	2,070	2,070	2,070	2,070
Total yields												
Total yield[13]		0	**0**	**1,600**	**2,500**	**2,600**	**4,700**	**4,400**	**5,500**	**4,600**	**6,000**	**5,600**

[1]Brackets denote values not included in the total yield. Fort Huachuca is wholly contained within the boundaries of the City of Sierra Vista, and Fort Huachuca's "Conservation measures" are thus already included as part of Sierra Vista's "Conservation measures." Fort Huachuca's yields were double counted in 321 reports before 2009. Sierra Vista's "Improved golf course efficiency" is included as part of Sierra Vista's "Conservation measures" (value is based on all groundwater pumping in Sierra Vista).

[2] Yield relative to 2002 baseline of zero. Conservation efforts started earlier than 2002 that continue to provide yields do not contribute to a reported yield because they are already incorporated in the baseline actual water-use figures. Yield calculated as the difference between pumping reported by the agency for 2011 and the pumping that would have occurred using the 2002 gallons-per-capita-per-day rate for the associated population estimated for 2011 using data downloaded on April 26, 2012, from Arizona

Office of Employment and Population Statistics The State Demographer's Office, 2011 (http://azstats.gov/population-data-query-tool/).

[3] Fort Huachuca actually recharged 239 acre-ft of effluent in 2002 (Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, written commun., March 9, 2012). Only the increase in recharge since 2002 is credited here.

[4] Recharge from stormwater detention basins on Fort Huachuca (Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, written commun., March 9, 2012). Report estimates based on monitoring data and therefore yield is subject to 2011 rainfall.

[5] Conservation yield attributable to Cochise County could not be calculated owing to the large number of small unmetered wells. The reported yield of 120 acre-ft is attributable to toilet-replacement rebates and assumed savings from code changes. Cochise County undertook various code changes that should have yielded water savings, but that cannot be quantified owing to lack of available metered water-use data. The code changes relate to use in new construction of hot water on demand systems, gray water plumbing, humidity sensors on outdoor irrigation, turf, evaporative coolers, and artificial water features, and require high-efficiency commercial laundry facilities.

[6] Dooley, S.W., City of Sierra Vista Water Reclamation Facility annual underground water storage report for calendar year 2011, March 26, 2011, administrative report prepared for Arizona Department of Water Resources. Recharge values are based on metered inflows to infiltration basins minus estimated evaporative loss plus leakage through constructed wetlands.

[7] Recharge of stormwater in 2011 in the City of Sierra Vista's stormwater detention basins. Values based on a Sierra Vista calculation derived from a Partnership sponsored study of runoff and recharge (Stantec Consulting and GeoSystems Analysis Inc., 2006). This technique was developed to provide a consistent method to calculate yields from Fort Huachuca, Sierra Vista, and Cochise County basins. Negative values indicate that recharge is less than in baseline year of 2002.

[8] Mike Bollinger, Wastewater Superintendent, City of Bisbee, written commun., June 21, 2012. Recharge from effluent released into Greenbush Draw; 95% of total effluent discharged is assumed to recharge the groundwater system.

[9] Jack Wright, Distribution Systems Operator, City of Tombstone , oral commun., May, 2012. Recharge from effluent produced by residents of Tombstone that is released into Walnut Gulch; 95% of total effluent discharged is assumed to recharge the groundwater system.

[10] Water-use savings through management of invasive mesquite and tamarisk using various treatments. Mesquite and tamarisk reduction reduces water use by replacing mesquite with more shallowly rooted plants. Yield estimated using an Agricultural Research Service model of riparian transpiration in the San Pedro Riparian National Conservation Area. Water conservation is greatest initially following treatment and decreases over time, although this conservation reduction has not been estimated at this time.

[11] Urbanization in semiarid climates can increase recharge by concentrating rainfall runoff in ephemeral-stream channels (Kennedy, 2007; Lohse and others, 2010). Estimates provided by the Agricultural Research Service; credit not claimed by any particular Partnership member. These preliminary estimates will be refined through ongoing research and monitoring programs. Increased water use due to urbanization likely exceeds increased recharge. All urban-enhanced recharge estimates represent quantities expected in an average year—no current monitoring can provide year-specific values.

[12] Yield did not result from any specific Partnership member actions.

[13] Total yields rounded to nearest 100 acre-ft. Yields based on the best current data and assumptions. Yield values differ in places from prior Section 321 reports owing both to changes in implemented and planned projects and to reanalysis of yields using improved methods.

Note that the water budget shown in table 1 is calculated using combined estimated total pumping with management-measure yields, but excluding explicit conservation measures: the estimated reduction in gross pumping volume due to conservation measures is implicit in any reductions in groundwater pumping included in table 1.

4. Extent of contribution of management and conservation measures to the reduction of the overdraft

Had neither management nor conservation measures been employed, the deficit projected for 2011 would have been about 13,700 acre-ft (this takes into account all revisions to the water budget as well as an adjustment for the difference between the projected and actual population). The storage deficit estimated from management and conservation yields for 2011 is about 5,200 acre-ft (fig. 1). The contribution of management and conservation measures to the reduction of the overdraft originally projected for 2011 (includes the yields in place in 2002 as mentioned above), therefore, equaled about 8,500 acre-ft (table 4). The deficit calculated for 2011 using the primary, water-budget based, method and including all revisions to the base groundwater budget is about
-5,100 acre-ft (table 1).

Summary and conclusions of the quantitative requirements of the 2011 321 reporting

Section 321 of the Defense Authorization Act of 2004, Public Law 108-136, requires each annual 321 report to address five requests, four of which are quantitative and have been discussed above. Item 5, Legislative accomplishments and impediments, is discussed further below. Responses to the four quantitative requirements of the Act follow:

1. The quantity of the annual overdraft of the regional aquifer increased 500 acre-ft during the reporting period, 2011, compared to the previous reporting period, 2010;
2. The increase in (1), therefore, did not meet the deficit reduction goal specified for the reporting period;
3. The water-use management and conservation measures undertaken by each water-use controlling member of the Partnership during the reporting period are shown in table 4 by jurisdiction;
4. The extent of the contribution of such measures to the reduction of the overdraft projected in 2004 for 2011 was 8,500 acre-ft**.**

In addition, the Partnership has fallen short of the goal set by Congress of achieving sustainable yield (defined by the Partnership as erasing the water budget deficit) by September 30, 2011.

Groundwater depletion in the Sierra Vista Subwatershed continues. Though the rate of depletion is slower than in 2002, groundwater continues to be removed from storage. Since 2002 (the beginning of 321 monitoring), about 70,300 acre-ft has been removed from storage in addition to the hundreds of thousands of acre-ft that previously were removed from storage since groundwater pumping commenced in the first half of the 20th century (D.R. Pool, U.S. Geological Survey, unpub. data, 2011). Until the aquifer begins to accrete storage (the annual water budget balance becomes greater than zero) there will be no reduction in the cumulative deficit and until additional management measures are undertaken, it is unlikely that there will be further real progress made toward this goal.

Nonetheless, and to the credit of Partnership members, while Congressionally-mandated annual reporting ends with this 321 report, the Partnership continues to explore new ways to reduce the annual

deficit, to support monitoring of the principal indicators of sustainable groundwater yield, and to support research to improve estimates of key water budget components. In short, the Upper San Pedro Partnership remains active and continues to work to achieve sustainable yield in the Sierra Vista Subwatershed of the Upper San Pedro Basin.

Legislative Accomplishments

Consistent with the requirements of Section 321, the initial report included a list of potential legal barriers to the implementation of certain management measures. Section 321(d)(2)(C) further requires that annual reports include a discussion of what progress has been made in addressing these legal impediments. To meet this reporting requirement, the following list restates the legal impediments discussed in the initial Section 321 report and includes the current status of proposals to address these barriers. Recognizing that changes in applicable legal standards have broad-based policy effects that are beyond the scope of this report, this discussion of legal impediments carries no explicit or implicit recommendation or endorsement for any legislative action by any Partnership member or Federal, State, local, or other entity.

Water-Management Measures and Legal Impediments had originally been identified in three major categories: ***Conservation Measures, Recharge/Reuse Measures,*** and ***Augmentation/ Importation Measures.*** Within each major category, specific issues have been determined to be important to meeting the stated goal of sustainability. Individual member entities have worked on those issues under their jurisdiction during the past seven years. Additionally, the Partnership has tracked legislation as it has been introduced in the Arizona Legislature along with any final action or inaction taken. Last year, the Partnership added an additional major category: ***Statutory/Adjudication Issues.*** This new category lists items of concern that, if resolved, could result in a dramatic change in the Partnership's ability to reach sustainability while at the same time recognizing their political challenges.

General Report on Major Actions:

Augmentation/Recharge:

In 2007, the Bureau of Reclamation (Reclamation), working with the USPP, completed an appraisal level study of augmentation alternatives for the Sierra Vista Subwatershed. The study concluded that augmentation is a necessary facet of an overall water resource management plan for the Subwatershed and that a more in-depth, "feasibility" level analysis was warranted. Reclamation regulations define a "feasibility study" as a detailed investigation that includes design and construction plans, an environmental impact analysis in accordance with the National Environmental Policy Act (NEPA), and a benefit-cost analysis. The study report includes a recommendation to Congress on whether construction of a preferred alternative is feasible, meaning that it is politically, legally, and financially viable.

In 2009 Congress passed Public Law 111-11, which authorized Reclamation to conduct a feasibility study of water augmentation alternatives in the Sierra Vista Subwatershed. Study participants include Reclamation, Fort Huachuca, Bureau of Land Management, State of Arizona, City of Sierra Vista, and The Nature Conservancy. The legislation mandated 55% of the study costs to be borne by the non-federal partners. The Feasibility Study received a total of $643,000 ($289,000 Federal, $354,000 non-Federal) in 2010, but no funds were available in 2011. Congress has appropriated $457,000 for fiscal year 2012. Future budget constraints may continue to affect the progress and schedule of the Feasibility Study.

Non-Federal Funding Opportunities:

Cochise County received almost $1.7 million in funding from a major private foundation in 2011 for the Palominas Recharge Pilot Project near the San Pedro River in the Palominas area. The foundation appears likely to remain supportive of funding efforts with appropriate, collaborative, co-funded projects involving USPP members.

Upper San Pedro Water District Election:

This proposal will not be on the ballot in 2012, and the remaining money appropriated for its work has been taken back by the state.

Legislative Actions:

Pursuant to HB 2661, the Water Resources Development Commission (WRDC) submitted a report to the Legislature and Governor in October, 2011, on the availability of water supplies for Arizona for the next 25, 50, and 100 years. The WRDC consists of 17 commission members representing various Arizona industries and water users and nine ex officio members representing state and federal agencies and the Governor's office.

Five committees—Population, Water Supply and Demand, Environmental, Finance, and Legislative Recommendations—produced reports based on examination of existing data and information, resulting in the compilation of data necessary to conduct more comprehensive statewide water resource planning. Data were compiled at both the groundwater basin and county level. The commission found that some portions of the state have sufficient water supplies while others will require development of additional supplies for the future. The final report contains recommendations related to the need for additional data analysis and further studies, and noted that a variety of solutions need to be developed to address the diverse water supply challenges in the state.

The WRDC was given until its sunset date of September 30, 2012, to continue to evaluate and develop potential legislative proposals, including formation of a water augmentation authority.

The report (in two volumes) is available at
http://www.azwater.gov/AzDWR/WaterManagement/WRDC_HB2661/Meetings_Schedule.htm

The Arizona legislature passed SB1236 in 2012, requiring ADWR to develop a water harvesting pilot project in Cochise County and a second one in Yavapai County, subject to available funding, by December 2012.

The state also established a legislative study committee on harvested water (HB2363) that is tasked with, 1) proposing a definition of macro-harvested water; 2) study, analyze, and evaluate issues arising from the collection and recovery of macro-harvested water; 3) review relevant administrative rules and guidelines adopted by ADWR for water recharge in active management areas; 4) submit a status report by December 15, 2012; 5) submit a final report of findings and recommendations by 9/30/2013.

Budget cuts and their impact on the mission of the Arizona Department of Water Resources:

While ADWR budget and staffing levels remained essentially the same for fiscal year 2012 as in the previous fiscal year, the Department's budget is now roughly half of the funding available in the years

prior to 2010. A consequence of the reduced budget and staff is reduced ability for ADWR to provide financial and staff support to the Bureau of Reclamation feasibility study of water augmentation alternatives in the Sierra Vista Subwatershed. For FY 2013, ADWR is funded almost entirely by general fund appropriations. The renewed funding from the state's general fund was necessary due to the elimination of the municipality fee in the budget reconciliation bill.

Report on Actions Taken on Specific Impediments:

Conservation Measures:

Code Changes:

- Limited authority exists for local (city, county) action with respect to modifying human behavior subsequent to final building inspection or for actions not related to development (i.e., water-wasting ordinances).

    - Although there have been no additional authorities requested or granted to local governments, many of the municipalities and Cochise County continue to work with developers in the voluntary mitigation of water use in new residential and commercial subdivisions.

- Current state law does not provide any effective mechanisms for local/regional water management authority, or local ability to create funding mechanisms outside of Active Management Areas (AMAs).

- Under current state law regarding ADWR determination of "water inadequacy" (ADWR's "water adequacy certificate"), only availability for human uses, not ecological uses, are considered.

- No Arizona agency has the authority to restrict new wells or require the metering of existing or new wells outside of designated active management areas and irrigation non-expansion areas, regardless of the groundwater availability in the area.

    - No legislative change addressing the three issues, above, was requested or passed during the 2011 session.

Zoning:

- Current law limits counties from applying subdivision standards (with respect to water-resource management) to lot splits of five or fewer (ARS 11-806/11-809).

    - No legislative change addressing this issue was requested or passed during the 2012 session.

Easements:

- Current state law regarding the establishment of "irrigation non-expansion areas (INAs)" applies to entire basins or sub basins and cannot be applied to a subwatershed such as the Sierra Vista Subwatershed (ARS 45-432).

- No legislative change addressing this issue was requested or passed during the 2012 session.

- Current tax policy provides incentives for water-consuming uses but not for water-conservation uses on undeveloped lands (ARS 42-15004).

  - No legislative change addressing this issue was requested or passed during the 2011 session.

Technology Incentives:

- Currently, there are no matching funds from state sources for conservation projects outside of the riparian zone to help address water-management issues.

  Although no state funds became available during FY12 due to budget deficits, a private foundation has funded a new local non-profit (The Cochise Water Project) to implement projects for individuals and businesses.

Recharge/Reuse Measures:

Effluent Recharge/Reuse:

- Currently, there are no matching funds from state sources for conservation projects outside of the riparian zone to help address water-management issues. Additionally, sufficient funding is not available for communities to meet EPA/ADEQ's high water-quality standards for effluent to be recharged through shallow basins.

Stormwater Recharge:

- Currently Arizona limits the disposition and (or) use options for State trust lands. Such options could help permit construction of optimally located recharge facilities.

  - Although no state funds became available during FY12 due to budget deficits, the USPP Technical Committee has been working to identify suitable recharge locations. The Arizona State Land Department will cooperate with the effort under its statutory guidelines.

- Fort Huachuca and TNC have partnered through the Army Compatible Use Buffer (ACUB) program to purchase land near the San Pedro River identified as suitable for recharge when these properties become available.

- The first property, 285-acre Mansker tract, was purchased in November, 2011 and this is the site of Cochise County's Palominas (storm water) Recharge Project.

- In April, 2012, TNC purchased the 1,811-acre Riverstone tract with ACUB funds.

Augmentation/Importation Measures:

- Currently Arizona limits the disposition and (or) use options for State trust lands. Such options could help permit construction of optimally located recharge facilities.

    - Although no state funds became available during FY12 due to budget deficits, the USPP Technical Committee has been working to identify suitable recharge locations. The Arizona State Land Department will cooperate with the effort under its statutory guidelines.

- Current state law generally prohibits interbasin transfer of groundwater, and intrabasin transfer of groundwater between subbasins may be subject to the payment of 'damages.'

    - Each year the legislature passes a one-year session law that allows for interbasin transfers under emergency drought conditions.

S**tatutory/Adjudication Issues:**

- The Arizona Corporation Commission (ACC), Arizona's public utilities commission, is limited in its ability to consider area-wide conservation pricing for the private and individually owned water providers who serve a major portion of the area's population.

- Under Arizona law, appropriable surface water, including the subflow of a river or stream, and groundwater are regulated separately when, hydrologically, there is no line that separates the two water sources.

- The outcome of the Gila River Adjudication, which has been ongoing for over 30 years, may render some projects unfeasible. Arizona's definitions regarding surface water, groundwater, and the potential connections between them are subject to the judicial proceedings in the Gila River Adjudication.

- At the present time, Native American CAP entitlements cannot be leased for exportation and used outside of the Central Arizona Water Conservation District service area except by exchange. Any change to this would require modification of existing Indian water contracts as well as state law and the CAP Master Repayment Contract. However, it does not require a change in the settlement legislation. In addition, Tucson CAP subcontractors have a first right of refusal to any Tucson area Indian water being leased for more than 25 years.

- ADWR's definition of adequacy requires continuous and legal and physical availability of water for 100 years based on modeling of projected use. Under this law, an objection to issuance of water adequacy for Pueblo del Sol Water Company was made by Bureau of Land Management and by Audubon Arizona, both USPP members. There were other objections filed as well. The basis for the BLM objection is that when determining the availability of groundwater, ADWR must consider BLM's federal water rights needed to protect water for habitat in the SPRNCA.

See the 2010 and 2011 321 Reports for details of legal impediments and legislative accomplishments from those years. See Appendix D from the 2010 321 Report for details of legal impediments and legislative accomplishments from the 2009 and earlier 321 Reports.

References Cited

Arizona Office of Employment and Population Statistics The State Demographer's Office, 2011, AZSTATS,GOV, Census data and population estimates, accessed May 7, 2012, *http://azstats.gov/population-data-query-tool*

Arizona Department of Water Resources, 2005, Upper San Pedro Basin Active Management Area review report, 219 p.

Kennedy, J., 2007, Changes in storm runoff with urbanization: the role of pervious areas in a semi-arid environment, Master's thesis, University of Arizona Department of Hydrology and Water Resources.

Kennedy, J., and Gungle, B., 2010, Quantity and sources of base flow in the San Pedro River near Tombstone, Arizona: U.S. Geological Survey Scientific Investigations Report 2010-5200, 43 p.

Lohse, K.A., Gallo, E. L., and Kennedy, J. R., 2010, Possible tradeoffs from urbanization on groundwater recharge and water quality: Southwest Hydrology, v 9, no. 1, p 18-19, 32-33.

Scott, R.L, Williams, D.G., Goodrich, D.C., Cable, W.L., Levick, L.R., McGuire, R., Gazal, R.M., Yepez, E.A., Ellsworth, P., and Huxman, T.E, 2006, Determining the riparian ground-water use within the San Pedro Riparian National Conservation Area and the Sierra Vista Subwatershed, Arizona, chap D *of* Leenhouts, J. M., Stromberg, J.C., and Scott, R.L., eds., Hydrologic requirements of and consumptive ground-water use by riparian vegetation along the San Pedro River, Arizona: U.S. Geological Survey Scientific Investigations Report 2005–5163, 154 p.

Stantec Consulting and GeoSystems Analysis, 2006, Cochise County Flood Control/Urban Runoff Recharge Plan: Stantec Consulting Inc. and GeoSystems Analysis, Inc., variously paged.

U.S. Department of the Interior, 2005, Water management of the regional aquifer in the Sierra Vista Subwatershed, Arizona—2004 report to Congress: U.S. Department of Interior report to Congress, 36 p.

U.S. Department of the Interior, 2006, Water Management of the Regional Aquifer in the Sierra Vista Subwatershed, Arizona—2005 Report to Congress: U.S. Geological Survey, 26 p.

Appendix A – Precipitation in the Sierra Vista Subwatershed

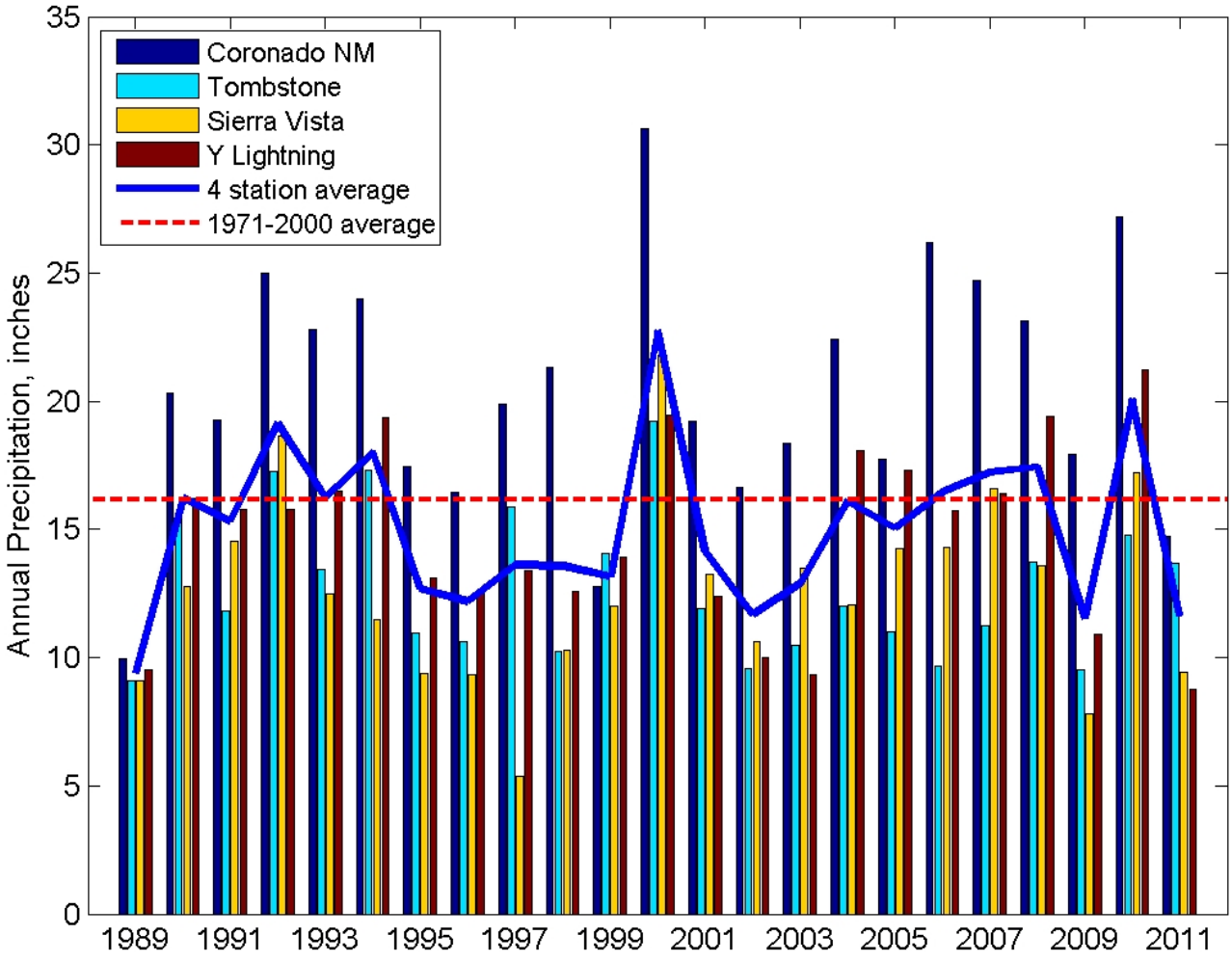

Figure A1. Four-station precipitation average and individual precipitation station values for the Sierra Vista Subwatershed of the Upper San Pedro Basin, 1989–2011.

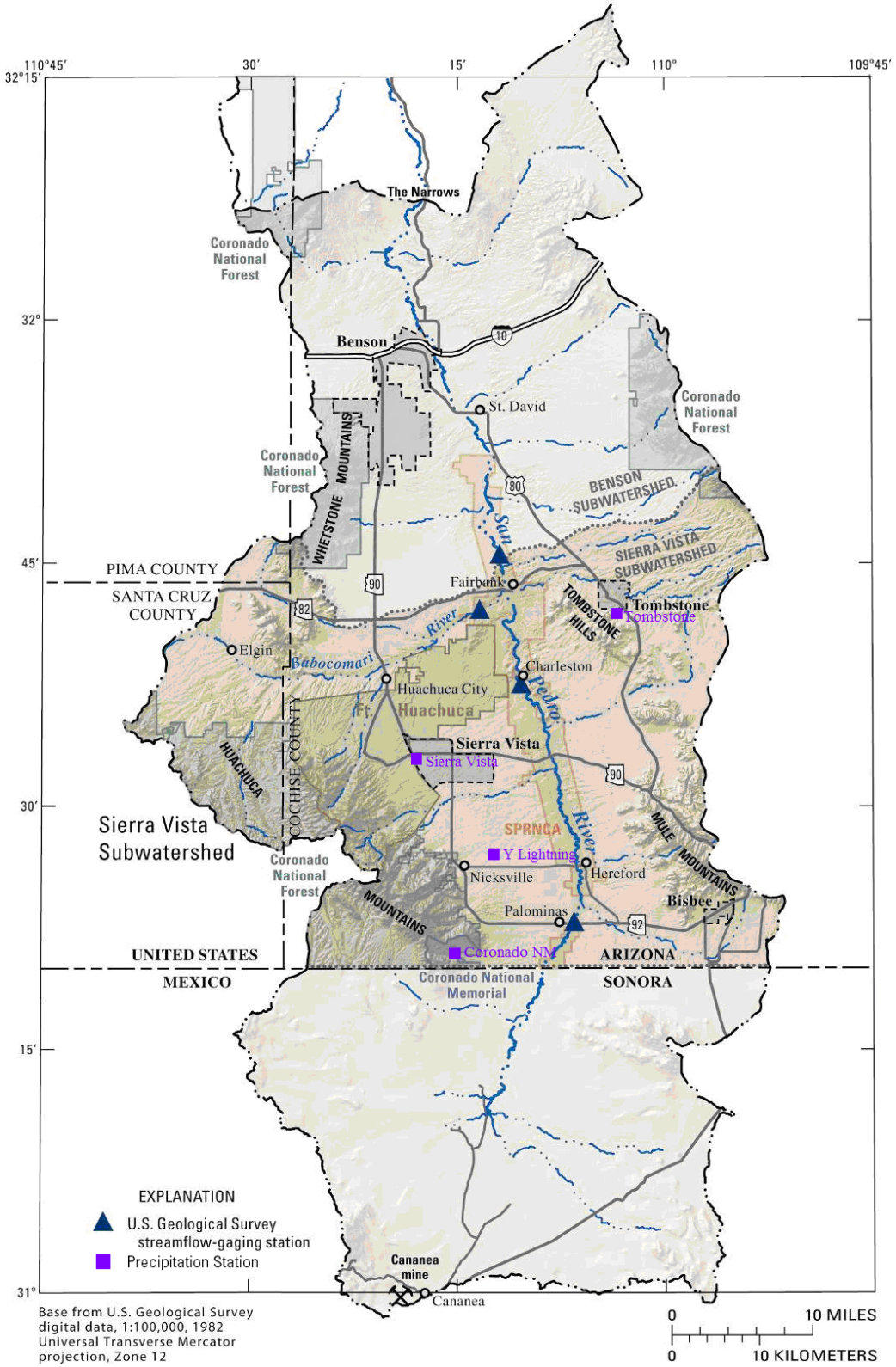

Figure A2. Location map for four precipitation stations referenced in fig. A1

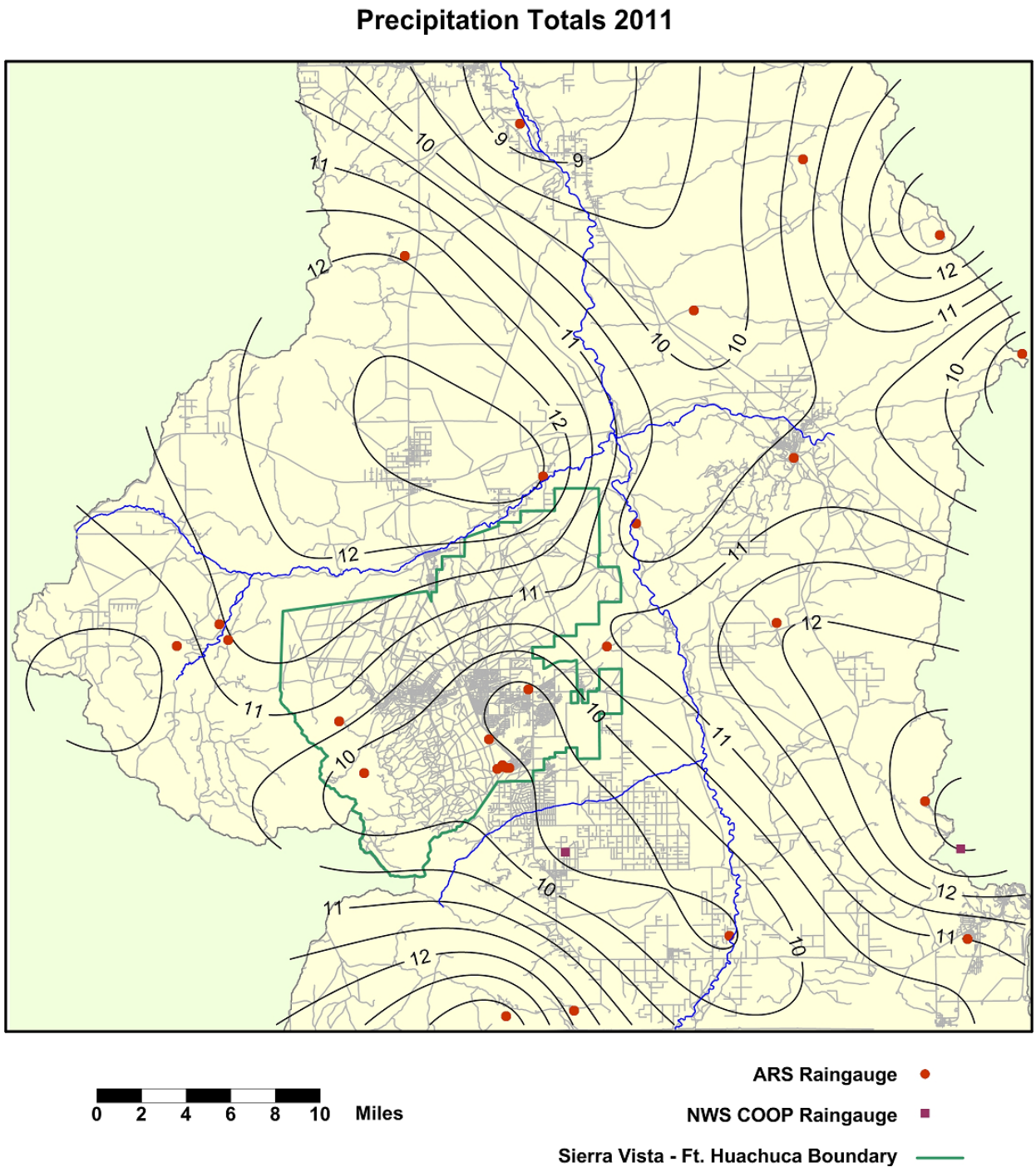

Figure A3. Subwatershed precipitation contour map, based on Agricultural Research Service (ARS) and National Weather Service cooperative rain gage network data. The interpolated basin floor precipitation calculated for the Subwatershed in 2011 based on these data was 10.90 inches (see 2009, 2010, and 2011 321 Reports for previous years' averages). Based on the 4-station average shown in figure A1, estimated precipitation for the Subwatershed in 2010 was higher, 11.65 inches. This is because of the greater relative weighting of the near-mountain Coronado National Memorial precipitation station in the 4-station average.

Appendix B – Public Law 108-136 (Section 321)

SEC. 321. COOPERATIVE WATER USE MANAGEMENT RELATED TO FORT HUACHUCA, ARIZONA, AND SIERRA VISTA SUBWATERSHED.

(a) LIMITATION ON FEDERAL RESPONSIBILITY FOR CIVILIAN WATER CONSUMPTION IMPACTS.—
(1) LIMITATION.—For purposes of section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1536), concerning any present and future Federal agency action at Fort Huachuca, Arizona, water consumption by State, local, and private entities off of the installation that is not a direct or indirect effect of the agency action or an effect of other activities that are interrelated or interdependent with that agency action, shall not be considered in determining whether such agency action is likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

(2) VOLUNTARY REGIONAL CONSERVATION EFFORTS.—Nothing in this subsection shall prohibit Federal agencies operating at Fort Huachuca from voluntarily undertaking efforts to mitigate water consumption.

(3) DEFINITION OF WATER CONSUMPTION.—In this subsection, the term ‘‘water consumption’’ means all water use off of the installation from any source.

(4) EFFECTIVE DATE.—This subsection applies only to Federal agency actions regarding which the Federal agency involved determines that consultation, or reinitiation of consultation, under section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1536) is required with regard to an agency action at Fort Huachuca on or after the date of the enactment of this Act.

(b) RECOGNITION OF UPPER SAN PEDRO PARTNERSHIP.—Congress hereby recognizes the Upper San Pedro Partnership, Arizona, a partnership of Fort Huachuca, Arizona, other Federal, State, and local governmental and nongovernmental entities, and its efforts to establish a collaborative water use management program in the Sierra Vista Subwatershed, Arizona, to achieve the sustainable yield of the regional aquifer, so as to protect the Upper San Pedro River, Arizona, and the San Pedro Riparian National Conservation Area, Arizona.

(c) REPORT ON WATER USE MANAGEMENT AND CONSERVATION OF REGIONAL AQUIFER.—

(1) IN GENERAL.—The Secretary of [the] Interior shall prepare, in consultation with the Secretary of Agriculture and the Secretary of Defense and in cooperation with the other members of the Partnership, a report on the water use management and conservation measures that have been implemented and are needed to restore and maintain the sustainable yield of the regional aquifer by and after September 30, 2011. The Secretary of the Interior shall submit the report to Congress not later than December 31, 2004.

(2) PURPOSE.—The purpose of the report is to set forth measurable annual goals for the reduction of the overdrafts of the groundwater of the regional aquifer, to identify specific water use management and conservation measures to facilitate the achievement of such goals, and to identify impediments in current Federal, State, and local laws that hinder efforts on the part of the Partnership to mitigate water usage in order to restore and maintain the sustainable yield of the regional aquifer by and after September 30, 2011.

(3) REPORT ELEMENTS.—The report shall use data from existing and ongoing studies and include the following elements:

(A) The net quantity of water withdrawn from and recharged to the regional aquifer in the one-year period preceding the date of the submission of the report.

(B) The quantity of the overdraft of the regional aquifer to be reduced by the end of each of fiscal years 2005 through 2011 to achieve sustainable yield.

(C) With respect to the reduction of overdraft for each fiscal year as specified under subparagraph (B), an allocation of responsibility for the achievement of such reduction among the water-use controlling members of the Partnership who have the authority to implement measures to achieve such reduction.

(D) The water use management and conservation measures to be undertaken by each water-use controlling member of the Partnership to contribute to the reduction of the overdraft for each fiscal year as specified under subparagraph (B), and to meet the responsibility of each such member for each such reduction as allocated under subparagraph (C), including—

(i) a description of each measure;
(ii) the cost of each measure;
(iii) a schedule for the implementation of each measure;
(iv) a projection by fiscal year of the amount of the contribution of each measure to the reduction of the overdraft; and
(v) a list of existing laws that impede full implementation of any measure.

(E) The monitoring and verification activities to be undertaken by the Partnership to measure the reduction of the overdraft for each fiscal year and the contribution of each member of the Partnership to the reduction of the overdraft.

(d) ANNUAL REPORT ON PROGRESS TOWARD SUSTAINABLE YIELD.—

(1) IN GENERAL.—Not later than October 31, 2005, and each October 31 thereafter through 2011, the Secretary of the Interior shall submit, on behalf of the Partnership, to Congress a report on the progress of the Partnership during the preceding fiscal year toward achieving and maintaining the sustainable yield of the regional aquifer by and after September 30, 2011.
(2) REPORT ELEMENTS.—Each report shall include the following:
(A) The quantity of the overdraft of the regional aquifer reduced during the reporting period, and whether such reduction met the goal specified for such fiscal year under subsection (c)(3)(B).
(B) The water use management and conservation measures undertaken by each water-use controlling member of the Partnership in the fiscal year covered by such report, including the extent of the contribution of such measures to the reduction of the overdraft for such fiscal year.
(C) The legislative accomplishments made during the fiscal year covered by such report in removing legal impediments that hinder the mitigation of water use by members of the Partnership.

(e) VERIFICATION INFORMATION.—Information used to verify overdraft reductions of the regional aquifer shall include at a minimum the following:

(1) The annual report of the Arizona Corporation Commission on annual groundwater pumpage of the private water companies in the Sierra Vista Subwatershed.
(2) The San Pedro base flow monitoring record of the Charleston flow gauge of the United States Geological Survey.
(3) Current surveys of the groundwater levels in area wells as reported by the Arizona Department of Water Resources and by Federal agencies.

(f) SENSE OF CONGRESS.—It is the sense of Congress that any future appropriations to the Partnership should take into account whether the Partnership has met its annual goals for overdraft reduction.

(g) DEFINITIONS.—In this section:
(1) The term ‘‘Partnership’’ means the Upper San Pedro Partnership, Arizona.
(2) The term ‘‘regional aquifer’’ means the Sierra Vista Subwatershed regional aquifer, Arizona.
(3) The term ‘‘water-use controlling member’’ has the meaning given that term by the Partnership.

Appendix C – Agency Representation in the Upper San Pedro Partnership

Local Agencies

Bisbee
Cochise County
Huachuca City
Sierra Vista
Tombstone

Arizona State Agencies

Department of Water Resources
Department of Environmental Quality
Hereford Natural Resources Conservation District
State Land Department

Federal Agencies

Bureau of Land Management
Bureau of Reclamation
Fort Huachuca
National Park Service
USDA Agricultural Research Service
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey

Non-Governmental Agencies

ABCDW LLC
Arizona Natural Resource Conservation Districts State Association
Audubon Arizona
The Nature Conservancy