



- 7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.
- 8. The maps, records, or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records, or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at costs, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records, or reports published by either party shall contain a statement of the cooperative relations between the parties.
- 9. USGS will issue billings utilizing Department of the Interior Bill for Collection (form DI-1040). Billing documents are to be rendered quarterly. Payments of bills are due within 60 days after the billing date. If not paid by the due date, interest will be charged at the current Treasury rate for each 30 day period, or portion thereof, that the payment is delayed beyond the due date. (31 USC 3717; Comptroller General File B-212222, August 23, 1983).

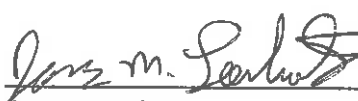
**U.S. Geological Survey**  
**United States**  
**Department of the Interior**  
**USGS Point of Contact**

**Cochise County Board of Supervisors**

**Name:** James M. Leenhouts  
**Address:** 520 N. Park Ave., Suite 221  
 Tucson, AZ 85719  
**Telephone:** 520-670-6671 x278  
**Email:** leenhout@usgs.gov

**Name:** Arlethe Rios, Clerk  
**Address:** 1415 W. Melody Lane, Building G  
 Bisbee, AZ 85603  
**Telephone:** 520-432-9200  
**Email:** board@cochise.az.gov

**Signatures and Date**

<b>Signature:</b>		<b>Date:</b>	<b>Signature:</b>	<b>Date:</b>
<b>Name:</b>	James M. Leenhouts			
<b>Title:</b>	Director			

## Scope of Work

Agreement 17CMAZ00900, between USGS and Cochise County

For Federal fiscal year 2017 the funds from this agreement will cover ongoing hydrologic monitoring in the Sierra Vista Subwatershed of the Upper San Pedro Basin. This work has specific bearing on monitoring the hydrologic system with respect to attaining a sustainable yield of groundwater withdrawals in accordance with the goals of the Upper San Pedro Partnership ([http://www.usppartnership.com/press\\_mission.htm](http://www.usppartnership.com/press_mission.htm)). In addition, the information obtained through this basic monitoring is critical to verifying the predictive performance of groundwater modeling of the Sierra Vista Subwatershed.

The cost of running the gaging stations and most of the other activities has increased this year by 3 - 4% (\$3,200 total, or about 3.5%). The USGS will contribute \$34,500 to the agreement, or about 36% of the total cost. The specifics of the work are listed below.

Operation of the Lewis Springs study site. The Lewis Springs site, located just north of where Arizona Route 90 crosses the San Pedro River, has been operating about 22 years. This site has provided some of the most complete information available on the San Pedro River regarding interactions between the regional aquifer system and the perennial San Pedro River reaches. The long period of continuous record at this site makes it particularly valuable for detecting changes in effects of regional-aquifer pumping on the river. Instrumentation at the site includes 6 piezometers at three locations along a line extending perpendicularly away from the river. Two locations have nested piezometers that measure vertical hydraulic gradients from the regional to the stream-alluvium aquifer. The site also records stream stage so the hydraulic gradient to the river may be calculated. To visit the web page for this site navigate to: <http://az.water.usgs.gov/projects/9671-9GO/>

Operation of tributary stream-gaging stations. Mountain-front, low-flow stream-gaging stations provide information about the amount of mountain-front recharge that is taking place in the Subwatershed. Flows result from both snow melt in the winter and spring, and from storm runoff during the summer months. Low-flow stream gaging also provides a means of assessing long-term climate change effects on the Subwatershed, if any. Major tributary stream-gaging stations help quantify the tributary contribution to San Pedro River surface flow.

- a) The Banning Creek stream-gaging station is located about a mile up Banning Creek toward Bisbee from the intersection of U.S. Routes 80 and 90, and is the only gaging station on the east side of the Subwatershed upstream of Walnut Gulch. Banning Creek is one of the larger watersheds in the Mule Mountains. The Banning Creek discharge record is over 15 years old, beginning in February of 2001. To visit the web page for this station navigate to:  
[http://waterdata.usgs.gov/az/nwis/uv/?site\\_no=09470700&PARAMeter\\_cd=00065.00060](http://waterdata.usgs.gov/az/nwis/uv/?site_no=09470700&PARAMeter_cd=00065.00060)
- b) The Ramsey Canyon stream-gaging station is located in the Huachuca Mountains at the top of Ramsey Canyon Road, adjacent to The Nature Conservancy's Ramsey Canyon preserve headquarters building. Ramsey Canyon is one of a series of significant watersheds that drain the higher elevations of the Huachuca Mountains and is the southernmost gaging station on the west side of the Subwatershed. The Ramsey Canyon discharge record is over 16 years old, beginning in May of 2000. To visit the web page for this station navigate to: [http://waterdata.usgs.gov/az/nwis/uv/?site\\_no=09470750&PARAMeter\\_cd=00065.00060](http://waterdata.usgs.gov/az/nwis/uv/?site_no=09470750&PARAMeter_cd=00065.00060)
- c) The Upper Babocomari stream-gaging station is located on the Babocomari Ranch about 4 miles west of Arizona Route 90. The Babocomari River is perennial in stretches and is the primary tributary stream in the Upper San Pedro basin. The Babocomari is essentially perennial at the Upper Babocomari gaging station. In combination with the Lower Babocomari gaging station (funded by other USGS partners), these gaging station data help to quantify the contribution from the Babocomari River to the surface flow of the San Pedro River as well as to increase understanding of the groundwater – surface water interactions along the intervening reach of the Babocomari River. The Upper Babocomari discharge record is over 16 years old,

beginning in July of 2000. To visit the web page for this station navigate to:

[http://waterdata.usgs.gov/az/nwis/uv/?site\\_no=09471380&PARAMeter\\_cd=00065,00060](http://waterdata.usgs.gov/az/nwis/uv/?site_no=09471380&PARAMeter_cd=00065,00060)

Collection of stream samples and analysis of stable isotopes of water. The stable isotopes of water provide a sensitive indicator of water sources in a stream. Some of the funds in this agreement will be used to support an ongoing program to collect and analyze these isotopes at several locations. The collection locations along the San Pedro River are: Palominas, Hereford, Lewis Springs, Charleston, and Tombstone. Samples are also collected from the Babocomari River at the Lower Babocomari gaging station near Tombstone, AZ (station number 09471400). Samples are collected monthly, and the procedure includes measurements of electrical conductivity and stream discharge. Collectively, the data provide valuable information regarding the interactions between the regional-aquifer system and the flow in the San Pedro River. In addition, the isotopes are used to look for changes in the relative sources of water to the stream as would occur if regional ground-water pumping captures water that would otherwise have supported base flow.

Spring discharge measurements. Groundwater discharges from the subsurface not only through the river streambed, but also through various springs adjacent to the river along its length. Discharge is to be measured quarterly at five spring three along the west side of the river (Horsethief, Murray, and Moson Springs) and two on the east side of the river (Lewis Spring, McDowell-Craig Farm flowing well).

Data management. In addition to the activities outlined above, the USGS is engaged in other hydrologic monitoring activities including aquifer storage monitoring [includes both water level monitoring in wells throughout the Sierra Vista Subwatershed (continuous automated transducer measurements and manual quarterly measurements), vertical gradients monitored in paired deep and shallow piezometers near to the river and used to establish gaining and losing reaches of the river, horizontal gradients monitored via cross-river piezometer transects, and additional tributary and main stem stream-gaging. All of these data need to be compiled, quality assured and controlled, and entered into the USGS national data base in a timely fashion.

**Budget for federal FY 2017**

Agreement 17CMAZ00900, between USGS and Cochise County

<b>Task</b>	<b>Cost item</b>	<b>Cost (in dollars)</b>
Operation of Lewis Springs monitoring site	Data collection/site operation	16,000
Operation of Banning Creek stream gaging station	Data collection/site operation	16,000
Operation of Upper Babocomari stream gaging station	Data collection/site operation	16,000
Operation of Ramsey Canyon stream gaging station	Data collection/site operation	16,000
Collection of stream samples and analyses of stable isotopes of water	Labor	6,200
	Lab analyses	8,900
	Equipment	700
	Shipping	700
Spring discharge measurements	Data collection, 5 springs	5,600
Data management	Subwatershed data management/entry	10,300
<b>Total of project cost items</b>		<b>96,400</b>

<b>Funding source – USGS</b>	<b>34,500</b>
<b>Funding source – Cochise County</b>	<b>61,900</b>
<b>Total project funding</b>	<b>96,400</b>