
Meeting Date: August 23, 2023

Staff Contact: Mark Kelly, Water Resources Division Manager

TITLE: R-23-20 – Authorizing the Executive Director to Enter into a Joint Funding Agreement with the United States Geological Survey (USGS) for Aquifer and Streamflow Monitoring

ACTION: Recommend Approval

SUMMARY:

The Albuquerque Bernalillo County Water Utility Authority (Water Authority) has collaborated with the U.S. Geological Survey (USGS) on their Hydrologic Monitoring and Water Resource Assessments as part of the New Mexico Monitoring Program of the Middle Rio Grande Basin (MRGB) through joint funding agreements between the two agencies. The proposed agreement continues the Water Authority's collaboration with the USGS since the 1990s. The Water Authority uses the MRGB data as part of its implementation of Water 2120 and the development of long-term strategies for water resource management.

The renewed agreement includes projects as follows: (1) continued monitoring of groundwater storage change in the aquifer; (2) continued collection groundwater levels; (4) the continued monitoring of aquifer compaction and recovery; (5) the installation of a new surface water turbidity monitoring network upstream of the Water Authority's Drinking Water Treatment Plant (DWTP); and, (6) continued operation and maintenance of three USGS stream gages upstream and downstream of the DWTP.

The Water Authority is renewing its five-year joint funding agreement with the USGS, covering Fiscal Years 2024 through 2028. The USGS and the Water Authority would each provide \$1,025,154 over the five-year period of the agreement. This joint funding agreement is effective upon the date of the signing of the last party hereto and shall continue until the end of Fiscal Year 2028 (Sept 2024 through July 2028). Approval of this item will serve as approval of the Executive Director to approve future amendments of this agreement, if any.

FISCAL IMPACT:

\$1,025,154 from FY24 to FY28. Funds have been allocated from the Water Resources Division Budget. Future fiscal year funding will be subject to appropriation.



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
New Mexico Water Science Center
DUNS 025287520
6700 Edith Blvd. NE Bldg. B
Albuquerque, NM 87113

August 11, 2023

Mr. Mark S. Sanchez
Executive Director
Albuquerque-Bernalillo County Water Utility Authority
P.O. Box 568
Albuquerque, NM 87103

Dear Mr. Sanchez:

Enclosed is a copy of Joint Funding Agreement (agreement) 23RGJFA32 for the period of July 1, 2023 through June 30, 2028 to continue the Hydrologic Monitoring and Water Resource Assessments of the Middle Rio Grande Basin, New Mexico Program (Program), between the U. S. Geological Survey (USGS) and the Albuquerque-Bernalillo County Water Utility Authority (Water Authority). This agreement is for a total of \$2,050,308.00, of which \$1,025,154 is to be provided by the Water Authority, and \$1,025,154 is to be provided by USGS.

If you concur, please sign and return the agreement to this office for further processing. Work performed with funds from this agreement will be conducted on a fixed-price basis. The Water Authority will be billed quarterly via DI-1040.

On behalf of USGS, I sincerely appreciate your continued participation in this Program. If you have any questions concerning any work under this Program, please contact either Michael Johnson (505-595-4516) or Meghan Bell (505-382-0119). Please address administrative inquiries to Jacob Gabel (505-250-9869) or Esther Torrez (505-418-6073).

Sincerely,

Michael S. Johnson
Acting Director

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement
FOR
Water Resource Investigations

Fixed Cost Agreement YES[X] NO[]

THIS AGREEMENT is entered into as of the July 1, 2023, by the U.S. GEOLOGICAL SURVEY, New Mexico Water Science Center, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the ALBUQUERQUE BERNALILLO COUNTY WATER UTILITY AUTHORITY party of the second part.

1. The parties hereto agree that subject to the availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation a project for the attached proposal entitled, "Hydrologic Monitoring and Water Resource Assessments of the Middle Rio Grande Basin, New Mexico," herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50, and 43 USC 50b.

2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) include In-Kind-Services in the amount of \$0.00

- (a) \$1,025,154 by the party of the first part during the period July 1, 2023 to June 30, 2028
- (b) \$1,025,154 by the party of the second part during the period July 1, 2023 to June 30, 2028
- (c) Contributions are provided by the party of the first part through other USGS regional or national programs, in the amount of: \$0

Description of the USGS regional/national program:

- (d) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.
- (e) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.

3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.

4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.

5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.

6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.

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 cost, 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. The Parties acknowledge that scientific information and data developed as a result of the Scope of Work (SOW) are subject to applicable USGS review, approval, and release requirements, which are available on the USGS Fundamental Science Practices website (<https://www2.usgs.gov/fsp/>).

**Form 9-1366
(May 2018)**

**U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement
FOR
Water Resource Investigations**

**Customer #: 600000324
Agreement #: 23RGJFA32
Project #: RG10AKB, RG00GVC
TIN #: 85-6000102**

9. Billing for this agreement will be rendered quarterly. Invoices not paid within 60 days from the billing date will bear Interest, Penalties, and Administrative cost at the annual rate pursuant the Debt Collection Act of 1982, (codified at 31 U.S.C. § 3717) established by the U.S. Treasury.

USGS Technical Point of Contact

Name: Meghan Bell
Address: 6700 Edith Blvd NE
Albuquerque, NM 87113
Telephone: (505) 382-0119
Fax:
Email: mbell@usgs.gov

Cooperator Technical Point of Contact

Name: Cetan Christensen
Address: PO Box 568
Albuquerque, NM 87103
Telephone: (505) 289-3086
Fax:
Email: cchristensen@abcwua.org

USGS Billing Point of Contact

Name: Esther Torrez
Address: 6700 Edith Blvd NE
Albuquerque, NM 87113
Telephone: (505) 418-6073
Fax:
Email: mvaldez@usgs.gov

Cooperator Billing Point of Contact

Name: Susan Lander
Address: 1 Civic Plaza
Albuquerque, NM 87102
Telephone: (505) 289-3036
Fax:
Email: slander@abcwua.org

**U.S. Geological Survey
United States
Department of Interior**

**ALBUQUERQUE BERNALILLO COUNTY
WATER UTILITY AUTHORITY**

Signature

Signatures

By _____ Date: 8/11/2023
Name: Michael S. Johnson
Title: Acting Director, New Mexico Water Science Center

By _____ Date: _____
Name: Mark Sanchez
Title: Executive Director



A PROPOSAL SUBMITTED TO:
Albuquerque Bernalillo County Water Utility Authority

Hydrologic Monitoring and Water Resource Assessments of the Middle Rio Grande Basin, New Mexico



Bear Canyon Arroyo at Arroyo del Oso, February 15, 2023 (photo: Meghan Bell)

U.S. Geological Survey
New Mexico Water Science Center
USGS Contact: Michael Johnson/Meghan Bell
REVISED: August 11, 2023

Summary

The Albuquerque Bernalillo County Water Utility Authority (ABCWUA) provides water and wastewater services to the greater Albuquerque metropolitan area, serving over 650,000 water-users with a combination of surface water (through the San Juan-Chama Drinking Water Project) and groundwater. For many years, the ABCWUA has participated in the Hydrologic Monitoring and Water Resource Assessments of the Middle Rio Grande Basin (MRGB), New Mexico Program (MRGB Program) with support from the U.S. Geological Survey (USGS) to better understand the water resources in the MRGB. This document contains summaries of the six components of proposed work (proposal).

Problem. Because of limited water resources and competing resource demands in the MRGB, the ABCWUA needs long-term datasets and hydrologic investigations to better understand the hydrogeologic system. Components of this improved understanding include, but are not limited to, groundwater/surface-water interaction and the quality of those waters in the MRGB to help formulate water-management strategies and maintain an adequate supply of potable water for future needs.

Objectives. The objective of the MRGB Program is for the USGS, in cooperation with the ABCWUA, to produce long-term, reliable and impartial information on the hydrology of the MRGB that will assist ABCWUA in formulating its water management strategies. Each of the six components of the proposal has a specific objective. These objectives are described in more detail in the body of the proposal.

Approach. The MRGB Program, during the five-year joint funding agreement covering Water Authority Fiscal Years 2024 through 2028 (July 2023 through June 2028), will initially consist of six projects. These projects include data collection efforts such as streamflow monitoring, real-time turbidity monitoring, groundwater-level monitoring, and aquifer compaction and recovery monitoring in the Rio Grande Valley. Interpretive studies included in this proposal such as microgravity monitoring of groundwater storage change, and development of a tool that will assist water managers in response to upstream flows that may contain high levels of suspended sediment, will increase the understanding of the hydrology and hydrogeology of the MRGB. Total cost of the proposed five-year program is \$2,050,308.00 (ABCWUA and USGS contributions are each \$1,025,154.00).

Relevance and Benefits. The USGS provides reliable and impartial information on the hydrology and hydrogeology of the MRGB through data collection efforts and interpretive studies. This unbiased science helps the ABCWUA formulate its water management strategies.

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Introduction

The Middle Rio Grande Basin (MRGB) in central New Mexico is defined as the extent of consolidated and unconsolidated deposits of Cenozoic age that encompasses about 3,060 square miles within the structural Rio Grande Rift from Cochiti, New Mexico in the north to San Acacia, New Mexico in the south (fig. 1; Thorn and others, 1993; McAda and Barroll, 2002). The Albuquerque Bernalillo County Water Utility Authority (ABCWUA) provides water and wastewater services to the greater Albuquerque metropolitan area within the MRGB, serving over 650,000 water users with a combination of surface water (San Juan-Chama Drinking Water Project) and groundwater (ABCWUA, 2023a). Because of limited water resources and competing demands in the MRGB, there is a critical need for long-term datasets and hydrologic investigations to understand the hydrogeologic system.

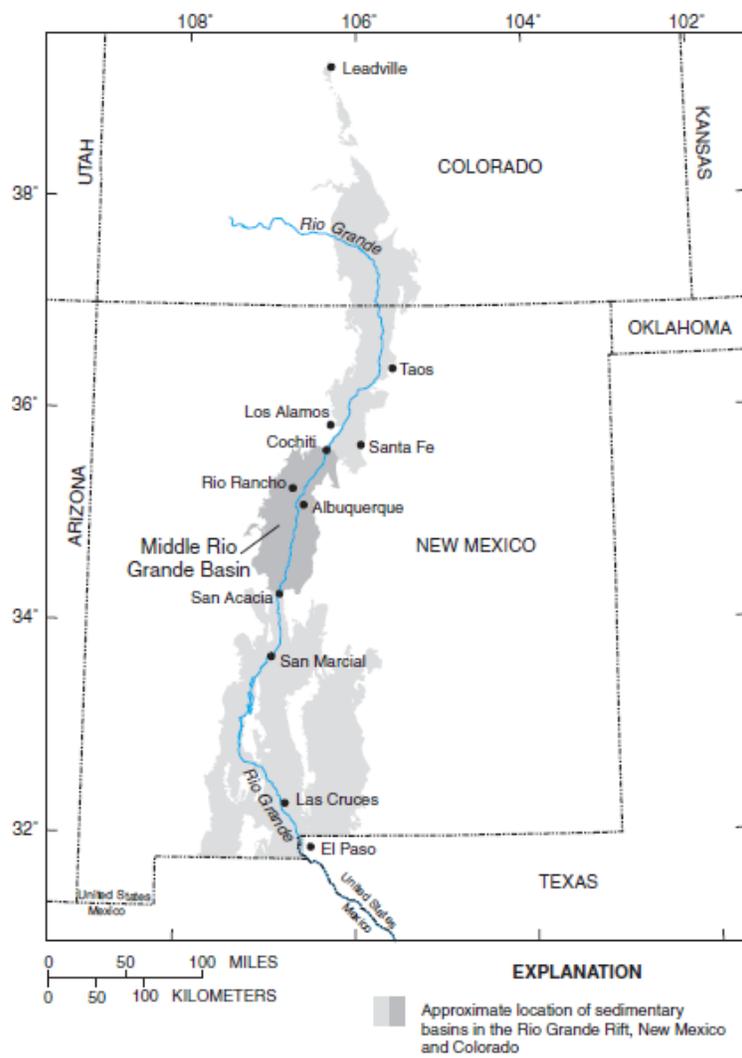


Figure 1. Location of Middle Rio Grande Basin, from McAda and Barroll (2002).

The ABCWUA has cooperated with the U.S. Geological Survey (USGS) in the Hydrologic Monitoring and Water Resource Assessments of the Middle Rio Grande Basin, New Mexico, Program (MRGB Program) for many years. Through continuance of the MRGB Program,

improved basin-wide understanding of groundwater and surface-water resources, including groundwater/surface-water interaction and water quality, will assist the ABCWUA in maintaining an adequate supply of potable water for future needs.

Hydrologic projects conducted each year by the USGS, in cooperation with the ABCWUA, are developed in collaboration with the ABCWUA to ensure agreement between scientific goals and the goals of the ABCWUA's Water Resources Management Strategy (ABCWUA, 2023b). The MRGB Program during the five-year joint funding agreement (JFA) covering Water Authority Fiscal Years (WAFY) 2024 through 2028 (July 2023 through June 2028), will initially consist of six different projects, with total program funding of \$2,050,308 (ABCWUA and USGS contributions are each \$1,025,154).

Problem

The ABCWUA either lacks, or needs additional, reliable, impartial, and long-term data collection and/or interpretive studies related to:

- The quantity of surface water in the Rio Grande upstream and downstream of the San Juan-Chama Drinking Water Project diversion structure and downstream of the wastewater treatment plant discharge to monitor the quantity of surface-water supplies that help to satisfy the water needs of its users;
- groundwater levels in the Santa Fe Group and Rio Grande alluvial aquifers within the MRGB and adjacent areas to determine magnitudes and rates of groundwater-level change, to map horizontal and vertical flow directions, and to document changes in the groundwater-flow system;
- synoptic measurement of groundwater-levels in the Santa Fe Group and Rio Grande alluvial aquifers within the MRGB to provide a snapshot of the potentiometric surface in the aquifer, which will aid in the analysis of groundwater-level change and generation of groundwater-level contours;
- aquifer compaction and recovery in the Rio Grande Valley to monitor the response of the aquifer system to changing groundwater storage;
- groundwater storage changes over time in the ABCWUA service area to monitor the response of the groundwater system to groundwater withdrawals by ABCWUA that help to satisfy the water needs of its users. Additionally, ABCWUA needs help estimating aquifer storage properties to support ABCWUA's aquifer storage and recovery projects; and
- real-time suspended sediment conditions in the Rio Grande and major tributaries upstream of the San Juan-Chama Drinking Water Project diversion structure, and a management tool to assist ABCWUA in response to upstream flows that may contain high suspended sediment levels, or flows originating in fire-affected areas.

Objectives and Scope

The overall objective of the MRGB Program is to provide the ABCWUA with reliable and impartial information on the hydrology and hydrogeology of the MRGB that will assist ABCWUA in formulating its water management strategies. The MRGB Program during this five-year JFA will initially consist of six different projects. The objectives of each project are related to the stated problems and are summarized separately below.

1. Streamflow monitoring

The objective of this project is to monitor and document real-time discharge in the Rio Grande upstream and downstream of the San Juan-Chama Drinking Water Project diversion structure and downstream of the wastewater treatment plant discharge. During the five-year JFA, streamflow monitoring will be accomplished through the continued operation and maintenance of three real-time streamflow gages.

2. Groundwater-level monitoring

The objective of this project is to continue monitoring and documenting groundwater levels in the Santa Fe Group and Rio Grande alluvial aquifers within the MRGB. During the five-year JFA, discrete and continuous groundwater-level measurements will be obtained from a network of 102 observation wells and up to 25 ABCWUA supply wells, as available, located throughout the MRGB.

3. Synoptic groundwater-level monitoring event

The objective of this project is to aid in the analysis of groundwater-level change and the generation of groundwater-level maps. Groundwater levels will be measured in WAFY2025 and WAFY2027 during a low-pumping period (December – March) synoptically at the approximately 100 wells and piezometers used to generate production-zone potentiometric surface contours of the Santa Fe aquifer system.

4. Aquifer compaction and recovery monitoring in the Rio Grande Valley

The objective of this project is to monitor aquifer compaction and recovery in the Rio Grande Valley. During the five-year JFA, discrete and continuous compaction and recovery measurements will continue to be collected from the Albuquerque borehole extensometer.

5. Microgravity monitoring of groundwater storage change

The objective of this project is to monitor groundwater storage changes over time in the ABCWUA service area using repeated and precise measurements of gravity. The study is focused on southeast Albuquerque where the largest groundwater-level declines occurred, but has been expanded to form a regional network within the ABCWUA service area.

6. Rio Grande early turbidity network and flow peak-duration analysis

The objectives of this study are to provide ABCWUA with 1) real-time turbidity data in the study area and 2) an informative tool that will assist water managers in response to upstream flows that may contain high levels of suspended sediment or flows originating in fire-affected areas.

Approach

1. Streamflow monitoring

The USGS will continue to operate and maintain three real-time streamflow gages on the Rio Grande in the Albuquerque area (fig. 2):

- a. RIO GRANDE AT ALAMEDA BRIDGE AT ALAMEDA, NM (08329918)
[Real-time (15-minute recording interval) discharge (July 2003 – present) and water temperature (February 2005 – present)]
- b. RIO GRANDE NR ALAMEDA, NM (08329928)
[Real-time (15-minute recording interval) discharge (March 1989 – present) and water temperature (March 1999 – September 2000)]
- c. RIO GRANDE AT ISLETA LAKES NR ISLETA, NM (08330875)
[Real-time (15-minute recording interval) discharge (October 2002 – present)]

The streamgages have water-stage sensors that transmit data to the USGS National Water Information System (NWIS) database by way of satellite telemetry. Data at the streamgages are recorded at 15-minute intervals and are available on the USGS NWIS web site at <https://waterdata.usgs.gov/nm/nwis/rt>.

Project 1 Budget

Site	WAFY24	WAFY25	WAFY26	WAFY27	WAFY28
Rio Grande at Alameda	\$19,228	\$19,459	\$19,693	\$19,929	\$20,168
Rio Grande nr Alameda	\$19,228	\$19,459	\$19,693	\$19,929	\$20,168
Rio Grande at Isleta Lakes	\$19,228	\$19,459	\$19,693	\$19,929	\$20,168
Total	\$57,684	\$58,377	\$59,079	\$59,787	\$60,504

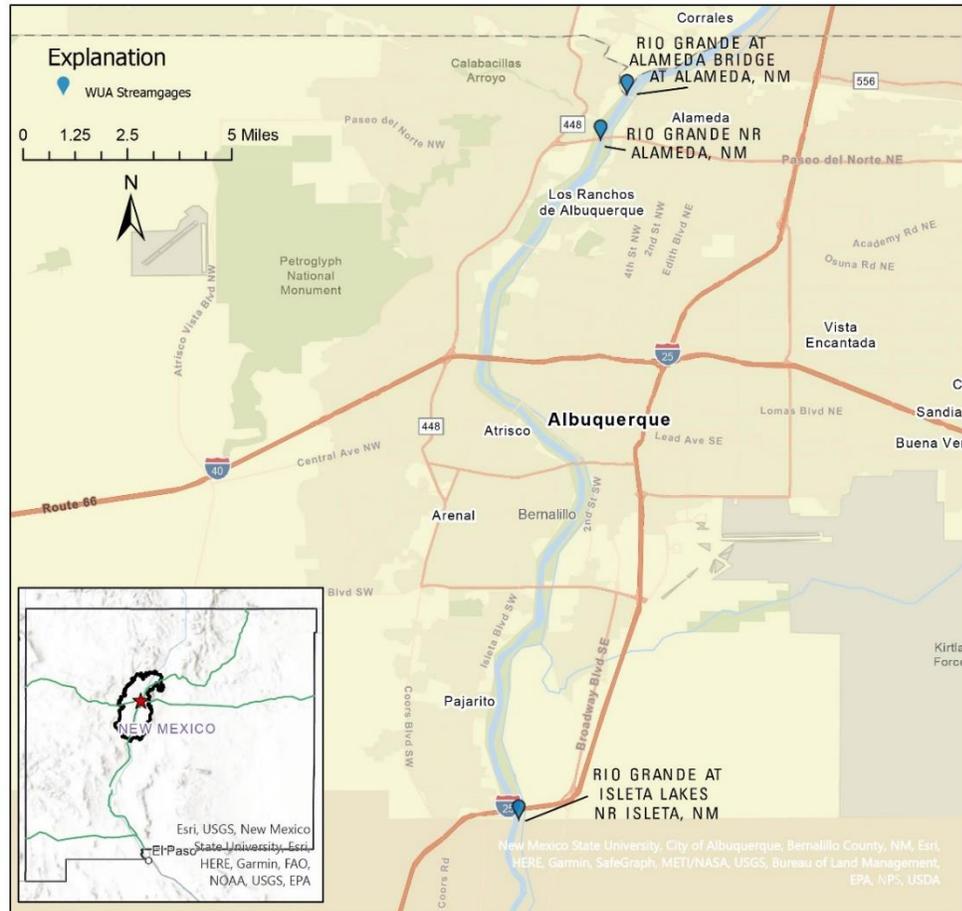


Figure 2. Streamflow gage locations.

2. Groundwater-level monitoring

The objective of this project is to continue monitoring and documenting groundwater levels in the Santa Fe Group and Rio Grande alluvial aquifers within the MRGB. During the 5-year JFA, discrete and continuous groundwater-level measurements will be obtained from a network of 102 observation wells and up to 25 ABCWUA supply wells, as available, located throughout the MRGB (fig. 3). Discrete water-level measurements will be collected from the 102 observation-well network in March and September every year. In addition, USGS personnel will measure water levels in up to 25 ABCWUA production wells each year during the low-pumping period (December – March).

The number of wells in this network may change over time as changes in well accessibility and availability occur. The current (August 2023) network consists of 49 wells and piezometers equipped with continuous recording data loggers, and 57 wells and piezometers which are measured with steel or electric tape semiannually, quarterly, or irregularly. Both continuous and discrete groundwater levels are measured at four of these locations to maintain the period of record for discrete measurements, which is much longer than that of the continuous data (Bell and Montero, 2022).

Water-level data will be published in the USGS NWIS database: [USGS Current Water Data for New Mexico](#). Water-level data for the production wells will be stored in the database, but the wells will not be identified as public supply wells for security reasons. A flat file of all approved data will be provided directly to the ABCWUA.

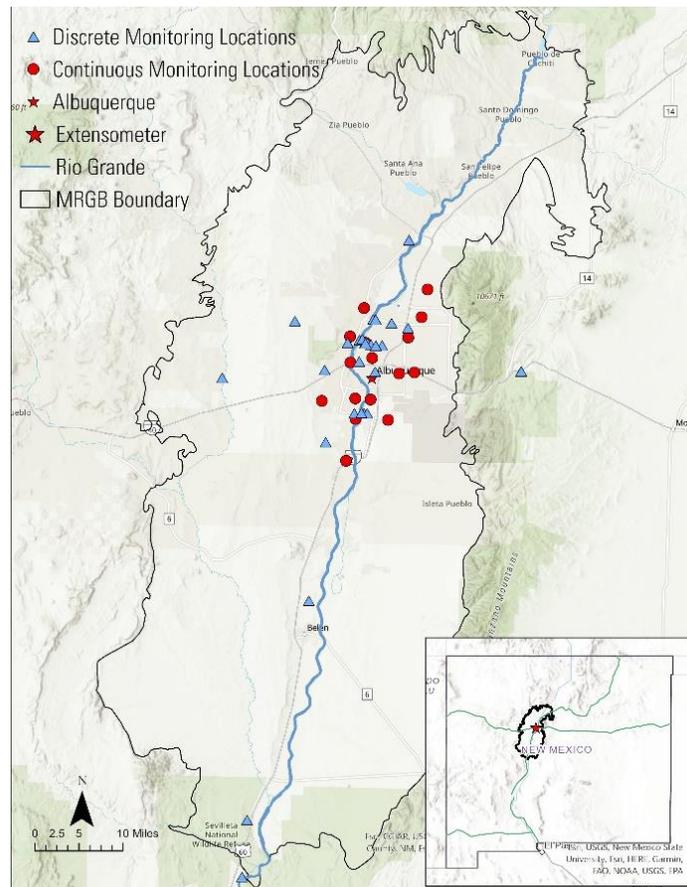


Figure 3. Current groundwater-level monitoring network.

Project 2 Budget

	WAFY24	WAFY25	WAFY26	WAFY27	WAFY28
Labor	\$88,555	\$91,212	\$93,948	\$96,767	\$99,670
Supplies (equipment/field)	\$38,575	\$39,732	\$40,924	\$42,152	\$43,417
Total	\$127,130	\$130,944	\$134,872	\$138,918	\$143,086

3. Synoptic groundwater-level monitoring event

Two coordinated surveys of groundwater-levels in the MRGB will provide a snapshot of the potentiometric surface in the production zone of the aquifer to aid in the analysis of groundwater-level change and generation of groundwater-level maps. Groundwater levels will be measured in WAFY2025 and WAFY2027 during a low-pumping period

(December – March) at all available wells and piezometers that have been used to generate production-zone potentiometric surface contours of the Santa Fe Group aquifer system.

In WAFY2025 and WAFY2027, the USGS will synoptically measure groundwater levels at the approximately 100 wells and piezometers used to generate production zone potentiometric surface contours of the Santa Fe Group aquifer system (fig. 4). The synoptic surveys will take place over the course of 2-3 weeks during a low-pumping period (December – March). This task includes data collection, entry of data into the USGS NWIS database, data review, and approval under appropriate USGS protocols and schedule. A flat file of all approved data will be provided directly to the ABCWUA.

Previous synoptic surveys have included wells and piezometers in the MRGB network, as well as production wells and wells operated by other entities. Measurement of groundwater levels at non-USGS-operated locations is dependent on owner cooperation.

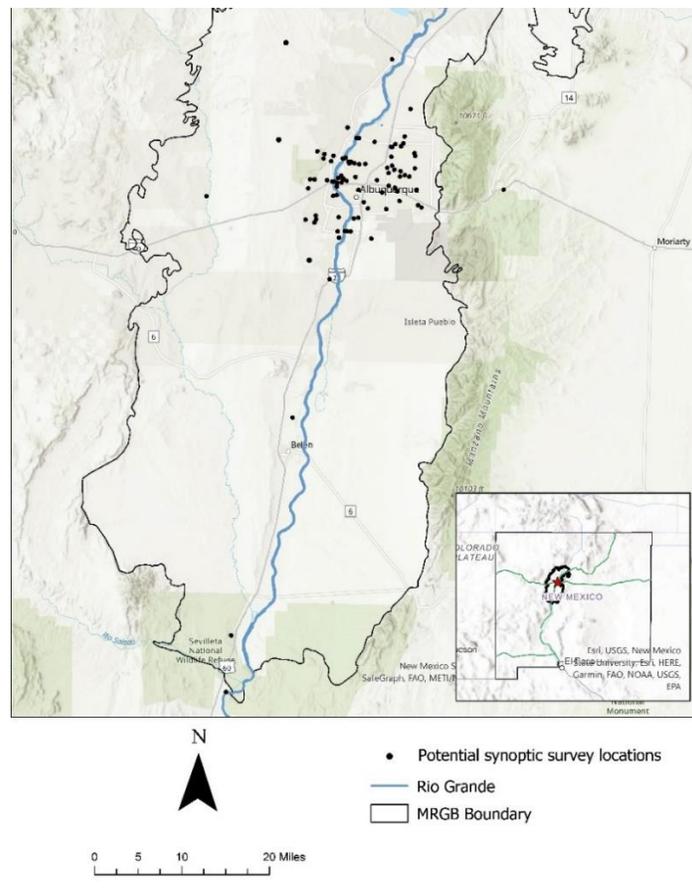


Figure 4. Location of potential sites for inclusion in synoptic groundwater-level survey.

Project 3 Budget

	WAFY24	WAFY25	WAFY26	WAFY27	WAFY28
Labor	-	\$32,144	-	\$34,102	-
Supplies (equipment/field)	-	\$6,584	-	\$6,985	-
Total	-	\$38,728	-	\$41,087	-

4. Aquifer compaction and recovery monitoring in the Rio Grande Valley

The objective of this project is to monitor aquifer compaction and recovery in the Rio Grande Valley. During the 5-year JFA, discrete and continuous compaction and recovery measurements will continue to be collected from the Albuquerque borehole extensometer and published through the National Water Information Systems website (<https://waterdata.usgs.gov/nwis>).

During the 5-year JFA, the USGS will continue to operate and maintain the Albuquerque borehole extensometer (USGS identification number 350836106395405). The extensometer is located within the Middle Rio Grande Basin, east of the Rio Grande (fig. 3). Aquifer compaction and recovery data will be collected continuously (digital 30-minute recording interval and analog), with manual interval dial-gage readings recorded during quarterly site maintenance visits. Continuous analog data will be recorded on scaled graph paper using a Stevens Type F Chart Recorder as a backup to the digital data, and continuous digital data will be measured in millivolts using a linear potentiometer. Dial-gage readings of vertical displacement will be used to convert the continuous potentiometer millivolt readings into relative vertical displacement. The budget below includes replacement/repair costs for 1-2 pieces of equipment associated with the extensometer as needed and as determined by USGS during the 5-year JFA period.

Field sheets and graph paper records will be scanned and stored in the NM WSC electronic archive. Continuous digital millivolt readings will be processed into relative vertical displacement data, which will be entered into the USGS NWIS database, reviewed, approved, and made available to the public on NWIS. A flat file of selected approved data will be provided directly to the ABCWUA. Additional processing to convert relative vertical displacement into absolute vertical displacement will not be performed but could be incorporated if and when an interpretive project is desired.

Project 4 Budget

	WAFY24	WAFY25	WAFY26	WAFY27	WAFY28
Labor	\$4,000	\$4,120	\$4,244	\$4,371	\$4,502
Supplies (equipment/field)	\$3,425	\$3,528	\$3,634	\$3,743	\$3,855
Total	\$7,425	\$7,648	\$7,877	\$8,113	\$8,357

5. Microgravity monitoring of groundwater storage change

The objective of this project is to monitor groundwater storage changes over time in the ABCWUA service area using repeated and precise measurements of gravity. An annual microgravity survey will take place across the network during low water-use periods, typically between January and March.

The microgravity network in the MRGB currently consists of 66 stations distributed throughout the ABCWUA service area (fig. 5). There are 15 absolute-gravity stations and 61 relative-gravity stations in the network; 12 locations have stations for both relative and absolute measurements. During the 5-year JFA, the USGS will continue to monitor

microgravity at the current network once per year, with potential to add additional stations in future years as agreed upon by USGS and ABCWUA.

Surveys will be conducted using an absolute gravity meter and a relative gravity meter, with final station gravity values obtained through least-squares network adjustment of the combined data. We anticipate conducting one gravity survey per year to be done during the winter.

Beginning in WAFY2024, the USGS will publish a Data Release every year that summarizes the results of the annual gravity survey in terms of network-adjusted gravity values, similar to Kennedy and Bell (2017). Absolute gravity values will also be published in the Southwest Gravity Program Absolute-Gravity Database at <https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=1a0335f4fcd344bb839190fa66c113cf>. The data files included in the data release and published to the absolute-gravity database will be provided to ABCWUA.

Project 5 Budget

	WAFY24	WAFY25	WAFY26	WAFY27	WAFY28
Total	\$103,914	\$107,030	\$110,242	\$113,550	\$116,956

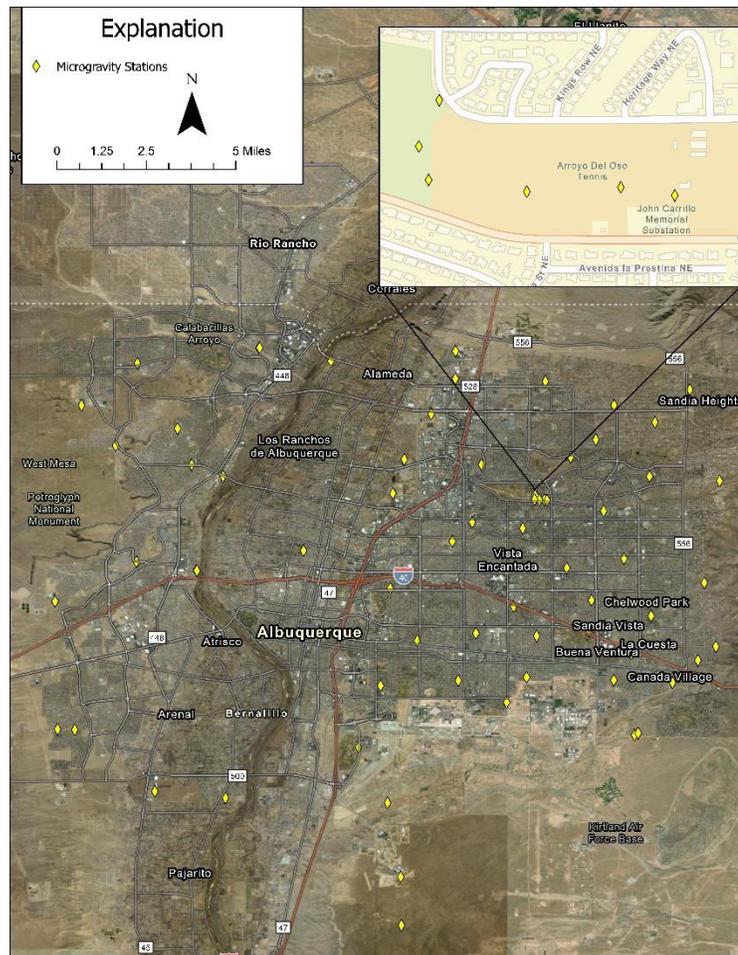


Figure 5. Location map of microgravity stations.

6. Rio Grande early turbidity network and flow peak-duration analysis

The objectives of this study are to provide ABCWUA with 1) real-time turbidity data at six sites in the study area and 2) an informative tool that will assist water managers in response to upstream flows that may contain high levels of suspended sediment or flows originating in fire-affected areas. This study will focus on selected locations upstream of the ABCWUA point of diversion and will investigate the occurrence of elevated levels of suspended sediment (measured as turbidity) above defined thresholds and the duration of these events. The project will be carried out in three phases. Phase 1 includes site reconnaissance and installation of six turbidity sensors in key locations on the Rio Chama and Rio Grande (figure 6; table 1). USGS streamgage 08317400 Rio Grande below Cochiti Dam, NM is already equipped with a turbidity sensor and will be included in this study.

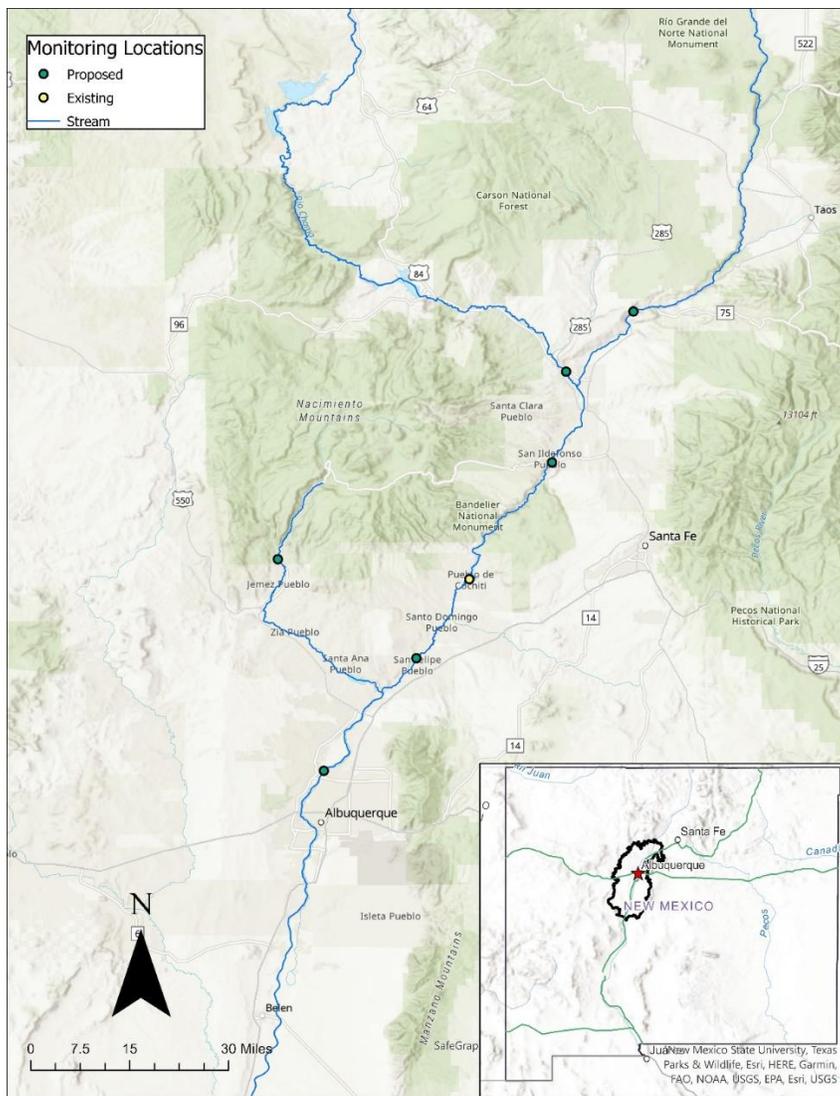


Figure 6. Proposed monitoring locations in table 1 shown as green dots. Yellow dot represents existing turbidity monitoring location (USGS site number 08317400 Rio Grande below Cochiti Dam, NM). Polygon in black outline on location map represents the Middle Rio Grande Basin.

Table 1. Project 6 proposed and existing turbidity monitoring locations

Site Number	Site Name
8290000	RIO CHAMA NEAR CHAMITA, NM
8313000	RIO GRANDE AT OTOWI BRIDGE, NM
8324000	JEMEZ RIVER NEAR JEMEZ, NM
8329918	RIO GRANDE AT ALAMEDA BRIDGE AT ALAMEDA, NM
8279500	RIO GRANDE AT EMBUDO, NM
8319000	RIO GRANDE AT SAN FELIPE, NM
8317400	RIO GRANDE BELOW COCHITI DAM, NM (existing location)

Phase 2 includes preliminary investigation of historical suspended sediment and turbidity peak magnitudes and duration. The findings from this investigation will be used to develop a preliminary version of a surface-water diversion management tool (e.g., a statistical model, machine learning model, script, etc.) that is intended to support surface-water diversion operations within the ABCWUA service area. The capabilities of the tool will be determined in consultation with ABCWUA after evaluation of data and management needs, and consideration of budget limitations. In Phase 3, new data from the targeted turbidity locations will be evaluated to calibrate the surface-water diversion management tool. The study will be concluded with a final report (either USGS series report or journal article) documenting model inputs and study findings. Tasks and associated deliverables are listed in table 2, and the proposed budget and timeline are shown in table 3.

Table 2. Project 6 tasks and deliverables

Task	Deliverable
Phase 1: Purchase and install turbidity sensors at existing USGS gages	Realtime turbidity on web/database
Phase 1: Annual O&M of turbidity sensor at existing USGS gages	Realtime turbidity on web/database
Phase 2 historical data review and analysis	Preliminary surface-water diversion management tool development
Phase 3 analysis of new data and final product	Published results and revised surface-water diversion management tool

Table 3. Project 6 budget and timeline

Task	WAFY2024	WAFY2025	WAFY2026
Purchase and install turbidity sensors at 6 existing USGS gages	\$90,000	NA	NA
Annual O&M of turbidity sensor at 6 existing USGS gages	\$30,000	\$72,000	\$72,000
Preliminary investigation of historical data and development of tool	NA	\$45,000	NA
Analysis of new data, revised tool, and published results	NA	NA	\$100,000
Total (All sites proposed)	\$120,000	\$117,000	\$172,000

Relevance and Benefits

The USGS provides reliable and impartial information on the hydrology and hydrogeology of the MRGB through data-collection efforts and interpretive studies funded by the MRGB Monitoring Program. This unbiased science helps the ABCWUA formulate management strategies to maintain an adequate supply of potable water for future needs. The New Mexico and Arizona Water Science Centers developed a USGS Southwest Gravity Program, of which the Albuquerque microgravity network is a key project component.

This study contributes to the goals of the USGS strategic science direction “Quantifying, Forecasting, and Securing Freshwater for America’s Future” (USGS, 2007) and the USGS Water Census Strategic Science Direction in providing information about the status of the Nation’s water availability and use (Evenson and others, 2012). The study addresses surface water and groundwater availability and interaction, which are priority issues for both the USGS Water Mission Area and the USGS NM WSC.

Quality Assurance Plan

USGS Fundamental Science Practices (FSP) will be followed in order to provide unbiased, objective, and impartial scientific information. Quality assurance (QA) measures as described in the FSP (<https://www2.usgs.gov/fsp/>) and the NM WSC Groundwater, Water-Quality, and Surface-Water Quality Assurance Plans will be followed in order to ensure completeness of the information communicated during the study. The QA objectives for collection and communication of information will:

- Withstand scientific scrutiny

- Ensure that data are obtained by methods appropriate for the information and its intended use, and
- Ensure that data are representative and of known completeness and comparability.

All data will be collected in adherence to USGS standards and methods, including the National Field Manual for the Collection of Water-Quality Data (USGS, variously dated). All data collected under this program will be made publicly available as is USGS policy; however, the USGS New Mexico Water Science Center will notify the ABCWUA prior to the use of applicable data provided by the ABCWUA, or data collected under this program with joint funding from the New Mexico Water Science Center and the ABCWUA, in other research or presentations by the New Mexico Water Science Center.

All data from streamflow gage operation and groundwater-level monitoring will be stored in NWIS. In addition, the relative vertical displacement data from the Albuquerque borehole extensometer (USGS identification number 350836106395405) will be stored in NWIS. Dial-gage readings of vertical displacement from the Albuquerque borehole extensometer will be stored in the NM WSC data archive. Analog data collected on scaled graph paper by the Stevens Type F Chart Recorder at the Albuquerque borehole extensometer will be scanned and stored in the NM WSC electronic archive. Data from real-time turbidity sensors will be available on NWIS web. Each turbidity sensor will be operated in adherence with USGS standards and methods as documented in Wagner and others (2006), and will include regular calibration and fouling checks, record analysis and approval, and data storage in NWIS.

The projects and project budgets will be reviewed by USGS management on a regular basis to ensure project timelines are met. USGS products are impartial, credible, and relevant, provide timely information, and are equally accessible and available to all interested parties.

Deliverables

Table 4. Deliverables.

Project/Report Title	Author(s)	Location/Status	Planned Completion Date
DATA COLLECTION PRODUCTS			
Streamflow monitoring	NA	Available through NWIS Link: http://waterdata.usgs.gov/nm/nwis/rt/ . An annual summary of the data will be published online, available by accessing each individual gaging station. Project status reports will be provided quarterly.	Annual summary of previous water year data will be available by June 30.
Groundwater-level monitoring	NA	Discrete and continuous data available through NWIS: https://waterdata.usgs.gov/nm/nwis/gw . Discrete data will be provided to the ABCWUA in the form of an annual data transmittal. Project status reports will be provided quarterly.	Discrete data from the previous water year will be provided by June 30.
Aquifer compaction and recovery monitoring in the Rio Grande Valley	NA	Continuous digital millivolt readings are processed into relative vertical displacement data, and stored in NWIS. Unprocessed discrete dial-gage data stored in NM WSC data archive. Unprocessed continuous analog data stored as graph paper copies at NM WSC. Project status reports will be provided quarterly.	Data from the previous water year will be provided by June 30.
Microgravity monitoring of groundwater storage change, Albuquerque, NM	Kennedy and Bell	Data will be published as an annual Science Base Data Release, and on the Southwest Gravity Program Absolute-Gravity Database. Project status reports will be provided quarterly.	June 30, 2028
Rio Grande real-time turbidity network	NA	Data from real-time turbidity sensors will be available on NWIS web. Project status reports will be provided quarterly.	Ongoing
REPORTS PLANNED DURING THE FIVE-YEAR JFA			
Rio Grande real-time turbidity network and flow peak-duration analysis	Brown and others	Proposed USGS series report or journal article documenting model inputs and study findings.	June 30, 2026

Timeline and Budget

Table 5. Timeline for Albuquerque Bernalillo County Water Utility Authority fiscal year (WAFY) 2024-2028 (July 1, 2023 through June 30, 2028).

Project	WAFY2024				WAFY2025				WAFY2026				WAFY2027				WAFY2028			
	Q1	Q2	Q3	Q4																
1. Streamflow monitoring																				
2. Groundwater-level monitoring																				
3. Synoptic groundwater-level monitoring event																				
4. Aquifer compaction and recovery monitoring in the Rio Grande Valley																				
5. Microgravity monitoring of groundwater storage change																				
a. Microgravity surveys, and processing and analysis of data																				
b. Compile Data Release																				
c. Complete review process on Data Release																				
d. Release data through ScienceBase																				
6. Rio Grande early turbidity network																				
a. Purchase and install turbidity sensors at existing USGS gages																				

Project	WAFY2024				WAFY2025				WAFY2026				WAFY2027				WAFY2028			
	Q1	Q2	Q3	Q4																
b. Annual O&M of turbidity sensor at existing USGS gages																				
c. Preliminary investigation of historical data and development of tool																				
d. Analysis of new data, revised tool, and published results																				

Table 6. Budget summary for Albuquerque Bernalillo County Water Utility Authority fiscal year (WAFY) 2024-2028 (July 1, 2023 through June 30, 2028).

Project	WAFY2024		WAFY2025		WAFY2026		WAFY2027		WAFY2028	
	ABCWUA	USGS								
1. Streamflow monitoring	\$28,842.00	\$28,842.00	\$29,188.50	\$29,188.50	\$29,539.50	\$29,539.50	\$29,893.50	\$29,893.50	\$30,252.00	\$30,252.00
2. Groundwater-level monitoring	\$63,565.00	\$63,565.00	\$65,472.00	\$65,472.00	\$67,436.00	\$67,436.00	\$69,459.00	\$69,459.00	\$71,543.00	\$71,543.00
3. Synoptic groundwater-level monitoring event	\$0.00	\$0.00	\$19,364.00	\$19,364.00	\$0.00	\$0.00	\$20,543.50	\$20,543.50	\$0.00	\$0.00
4. Aquifer compaction and recovery monitoring in the Rio Grande Valley	\$3,712.50	\$3,712.50	\$3,824.00	\$3,824.00	\$3,938.50	\$3,938.50	\$4,056.50	\$4,056.50	\$4,178.50	\$4,178.50
5. Microgravity monitoring of groundwater storage change	\$51,957.00	\$51,957.00	\$53,515.00	\$53,515.00	\$55,121.00	\$55,121.00	\$56,775.00	\$56,775.00	\$58,478.00	\$58,478.00
6. Rio Grande early turbidity network and flow peak-duration analysis	\$60,000.00	\$60,000.00	\$58,500.00	\$58,500.00	\$86,000.00	\$86,000.00	\$0.00	\$0.00	\$0.00	\$0.00
Total by agency	\$208,076.50	\$208,076.50	\$229,863.50	\$229,863.50	\$242,035.00	\$242,035.00	\$180,727.50	\$180,727.50	\$164,451.50	\$164,451.50
Combined Total	\$416,153		\$459,727		\$484,070		\$361,455		\$328,903	

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