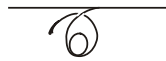
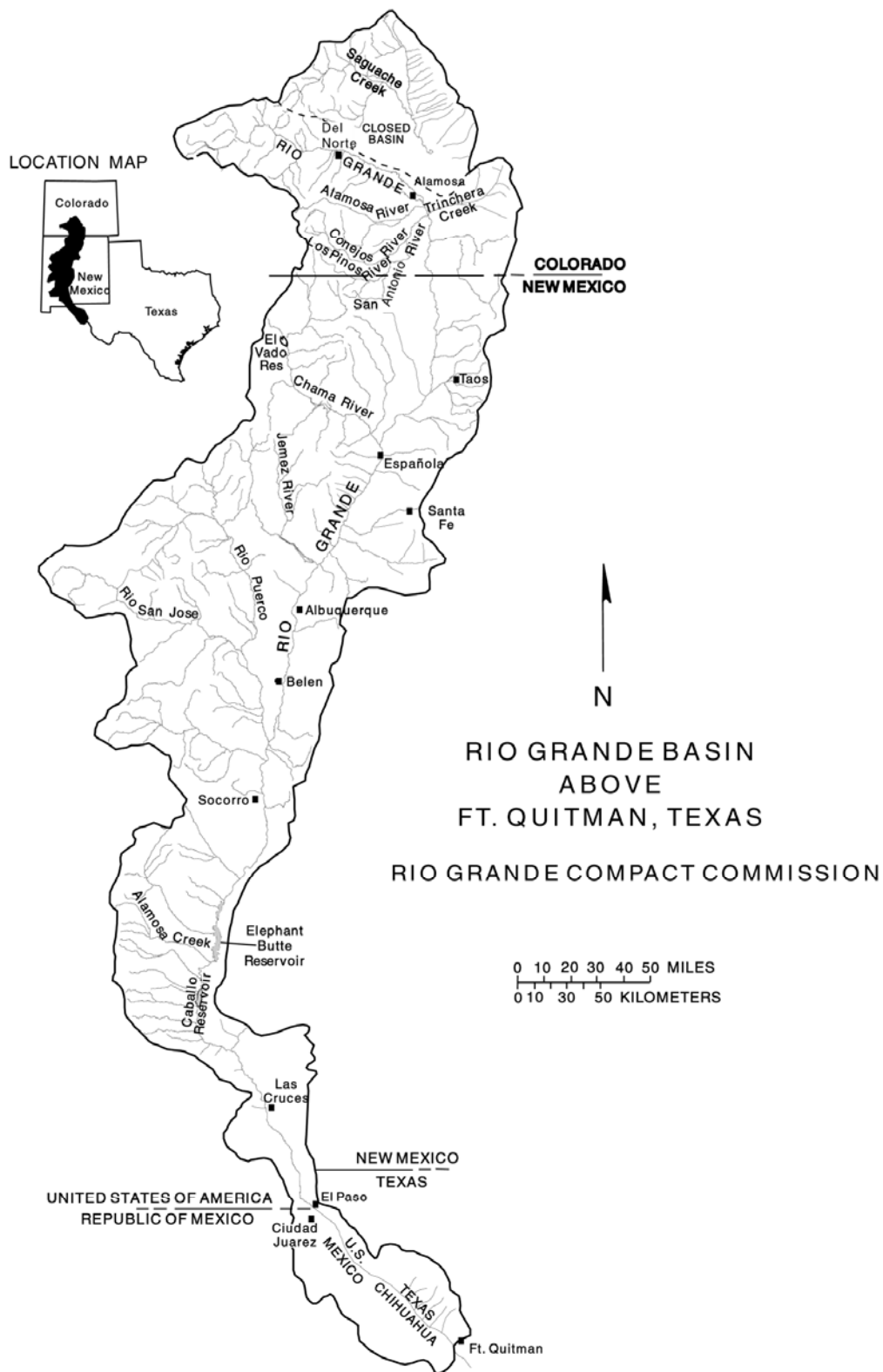


**REPORT  
of the  
RIO GRANDE COMPACT  
COMMISSION  
2015**



**TO THE GOVERNORS OF  
Colorado, New Mexico and Texas**



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**RIO GRANDE COMPACT COMMISSION  
COLORADO TEXAS NEW MEXICO**

March 31, 2016

The Honorable John W. Hickenlooper  
Governor of the State of Colorado  
Denver, Colorado

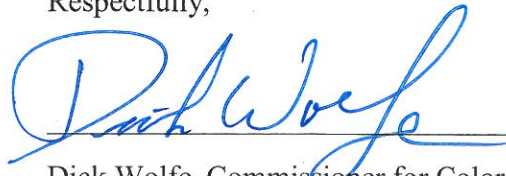
The Honorable Greg Abbott  
Governor of the State of Texas  
Austin, Texas

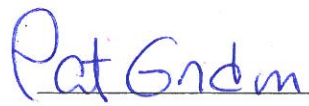
The Honorable Susana Martinez  
Governor of the State of New Mexico  
Santa Fe, New Mexico

Honorable Governors: The 77th Annual Meeting of the Rio Grande Compact Commission was held in Alamosa, Colorado on March 31, 2016. The Commission reviewed the cost of operation and found that the expenses for the administration of the Rio Grande Compact were \$201,072 in the fiscal year ending June 30, 2015. The United States bore \$54,390 of this total; the balance of \$146,682 was borne equally by the three States party to the Compact.

Enclosed herewith is the 2015 Report of the Rio Grande Compact Commission.

Respectfully,

  
Dick Wolfe, Commissioner for Colorado

  
Patrick R. Gordon, Commissioner for Texas

  
Tom Blaine, Commissioner for New Mexico

**REPORT OF THE ENGINEER ADVISERS  
TO THE RIO GRANDE COMPACT COMMISSION  
March 31, 2016**

The Engineer Advisers to the Rio Grande Compact Commission met in Albuquerque New Mexico on February 3 and 4, 2016, in Santa Fe, New Mexico between February 29 and March 2, 2016 and in Albuquerque, New Mexico on March 3 and 4, 2016 to:

- 1) receive reports,
- 2) prepare the 2015 Rio Grande Compact (Compact) water accounting,
- 3) discuss continuing and new issues in preparation for the 2016 annual meeting of the Rio Grande Compact Commission (Commission), and
- 4) prepare the Engineer Advisers' report.

The Engineer Advisers requested and received the participation of the U.S. Geological Survey (USGS), the U.S. Bureau of Reclamation (Reclamation), the U.S. Army Corps of Engineers (Corps), the U.S. Bureau of Indian Affairs (BIA), the International Boundary and Water Commission (IBWC), the Colorado Water Conservation Board (CWCB), the National Weather Service, and the U.S. Fish and Wildlife Service (Service) at the meetings. The agencies each presented information about their specific water-related activities in the basin during the previous calendar year.

## **COMPACT ACCOUNTING**

The Engineer Advisers reviewed the streamflow and reservoir storage records and other pertinent data for the Upper Rio Grande Basin during calendar year 2015 and are again unable to reach a consensus on the 2015 accounting. The lack of consensus arises from a disagreement that began in 2011 amongst the Texas Engineer Adviser and New Mexico and Colorado Engineer Advisers on the release of credit water by Reclamation from Elephant Butte Reservoir in late summer 2011. As a result, the Engineer Advisers have not reached consensus on how to finalize the 2011 through 2015 Compact Delivery Tables for Colorado and New Mexico and the Release and Spill from Project Storage Table. For 2015, as in previous years, each of the Engineer Advisers developed accounting procedures described in the addenda to this report. At the 2015 meeting, the Commission did not approve any of the proposed accounting scenarios. In

2016, the Engineer Advisers used the accounting scenarios they individually prepared to carry forward Compact accounting for the 2015 calendar year. In addition, in its addendum, New Mexico describes the effects of use of the accounting methods 1 and 2 on the timing of Article VII storage restrictions and upstream storage operations.

## **RIO GRANDE BASIN CONDITIONS**

Snowpack and snow-water equivalent amounts were generally below average for most of the winter of 2014-2015. However, the unusual large, late season rain and snow events in May and June 2015 increased both snowpack and snowmelt runoff significantly. As a result, snowmelt runoff levels in 2015 were near average in most of the basin in Colorado and near the median in New Mexico.

Summer monsoon precipitation was about average in the Upper Rio Grande Basin in Colorado and New Mexico in 2015. Platoro Reservoir reached a high of approximately 50 percent of capacity during June of 2015 as part of the Colorado direct flow storage regulation operation. Usable Water in Rio Grande Project Storage was below the Article VII trigger of 400,000 acre-feet until April when Usable Water in storage exceeded 400,000 acre-feet. In June, Usable Water dropped below the 400,000 acre-feet threshold and again put post compact reservoirs under the Article VII storage restrictions. The exact dates of when Usable Water rose above 400,000 acre-feet in April and dropped below it in June differ based upon the accounting method used. Consequently, the amounts of water stored in post compact reservoirs when the Article VII storage restriction was not in effect differ by accounting method used.

Reclamation stored 21,687 acre-feet of Rio Grande water in El Vado Reservoir for its six Middle Rio Grande Pueblo Prior and Paramount (P&P) operation. All of this water was stored while under Article VII restrictions. The reservoir reached a high of approximately 125,000 acre-feet on June 16, 2015. The San Juan-Chama Project (SJCP) delivered 90,566 acre-feet through the Azotea Tunnel into the Rio Grande basin during the year which is approximately 94 percent of the estimated Project firm yield. 2015 was the first year in which there was no initial SJCP allocation made in January, and the second year in a row in which the full allocation of 96,200 acre-feet was not delivered to SJC contractors. At its March 2015 meeting, the Compact Commission approved a deviation at El Vado Reservoir allowing temporary modification of operations during April, May, and June 2015 when the Article VII storage restriction was in

effect.

## **CONTINUING ISSUES**

This section of the report summarizes new information about issues previously addressed by the Engineer Advisers. It reflects information obtained by the Engineer Advisers prior to the 2016 Commission meeting, including information obtained from the reports of the federal agencies at meetings with the Engineer Advisers or otherwise reported at the 2016 Engineer Adviser meetings. The terms “reported” and “indicated” herein reflect information provided by various entities without analysis by the Engineer Advisers.

### **Middle Rio Grande Endangered Species Act Collaborative Program**

Reclamation reported that the Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) activities during 2015 focused on completion of a revised Biological Assessment and updating the 2013 Program Document for a Recovery Implementation Program. Collaborative Program funded activities were allocated to species population monitoring (Rio Grande silvery minnow, Southwestern Willow Flycatcher, and Yellow-billed Cuckoo), captive propagation facilities, minnow augmentation, genetics monitoring, and specific 2003 Biological Opinion required activities. Reclamation spent approximately \$9 million on those activities and on water acquisition, Low Flow Conveyance Channel (LFCC) pumping, and program management. Of this amount, they determined that \$1 million was subject to a 25% non-Federal cost share. Reclamation also reported that the habitat improvement acreage requirement of the 2003 BO had been fully met. The additional habitat restoration underway in the San Acacia and Isleta reaches is intended to show the commitment of the Collaborative Program to the MRG species recovery.

The NMISC reported it spent just over \$1 million in 2015, more than meeting the required non-federal cost share for 2015. The NMISC focused its work on its propagation facility; habitat restoration planning, monitoring, and construction, and development of the new Biological Opinion (BO) and Recovery Implementation Plan (RIP). The Corps reported they also contributed funding for Collaborative Program efforts including database management and development of an adaptive management plan and that, under a separate authority, they are continuing habitat construction within the Albuquerque Reach.

The Minnow Action Team (MAT) continued to meet to assess and recommend potential water management actions that address species needs and hydrologic conditions. The MAT recommended managing the river to meet the 2003 Biological opinion flow targets, create a pulse flow in May 2015 if feasible, monitor refugial areas in the Isleta Reach, and provide some amount of supplemental water for selected refugial habitats. Rainfall events in May 2015, augmented by re-regulation of inflow at El Vado Reservoir, was used to provide a 7-day long spawning peak of around 2,000 cubic feet per second per second (cfs).

### **2003 Middle Rio Grande Programmatic BiOp**

The term of the 2003 BO has been extended during the Section 7 consultation. Reclamation reported that it remains in compliance with the 2003 MRG BO. Dry year flow targets were in effect with a fifth year in a row of below normal runoff entering the MRG. Reclamation reported that monsoon rains provided a wet July although August and September were drier than normal. Through near continual monitoring of flows, the release of 22,255 acre-feet of supplemental water, routine water operations calls, and coordinated management, water managers were able to meet all the flow targets in 2015. The Service conducted rescue on 17.4 miles of drying river compared to 26.4 miles in 2014, 36.5 miles in 2013 and 51.0 in 2012.

### **Federal Agencies' Efforts towards a New Middle Rio Grande Water Operations Biological Opinion and Associated Litigation**

Formal Section 7 Endangered Species Act (ESA) consultation on water management and river maintenance operations from the stateline with Colorado to Elephant Butte Reservoir in New Mexico, including maintenance of the delta channel continues. In July 2015, Reclamation, the State of New Mexico and MRGCD completed a refined joint Biological Assessment (refined joint BA) and submitted it to the Service for consideration. The refined joint BA was updated to include the New Mexico meadow jumping mouse and the Western Yellow-billed cuckoo both of which were listed as threatened in 2014. It also includes commitments from Reclamation, the MRGCD, and the State of New Mexico intended to:

- 1) directly address the adverse affects of the proposed actions;

- 2) help maintain broad Endangered Species Act compliance for New Mexico water users living and using water in the Rio Grande Basin from Elephant Butte Dam north to the stateline with Colorado; and
- 3) provide possible additional voluntary conservation measures to improve the state of the species.

The Service indicated they are seeking commitments towards the refined joint BO in four major areas:

- 1) Using adaptive management to implement and test the concepts of their draft hydrologic objective;
- 2) Implementing storage and release for species purposes;
- 3) Implementing river connectivity at the San Acacia and Angostura diversion dams and improving connectivity at the Isleta diversion dam; and
- 4) Constructing and maintaining reach scale habitat restoration.

Both Reclamation and the Service reported they intend to complete consultation on the refined joint BA in September 2016. New Mexico asked Reclamation if it plans to consider evaluating coordinated Middle Rio Grande and Rio Grande Project operations to determine if such operations could be used to provide upstream storage for the species. Reclamation indicated it did not believe it has discretion to coordinate Middle and Rio Grande Project storage operations to provide upstream operations benefitting the subject species while also maintaining Compact compliance and serving primary Project purposes.

Further, the Service reported it did not work on the refined joint BA during the fall of 2015 due to a request by Reclamation to focus first on development of a biological opinion for the Rio Grande Project Operating Agreement Environmental Impact Statement (RGP EIS). That BO was completed in February 2016. New Mexico asked, as it did during scoping, if the RGP EIS consultation considered the indirect impacts of Elephant Butte and Caballo reservoir operations on operations of post-compact reservoirs and, consequently, the ability to implement the Service's first two commitment goals. The Service indicated they did not conduct such an assessment.

In September 2015, the Federal Judge presiding over the litigation filed by Wild Earth Guardians against Reclamation and the Corps ruled on various motions to dismiss the case. In 2014, the Wild Earth Guardians alleged that Reclamation made arbitrary and capricious decisions to depart from some 2003 Biological Opinion requirements and that the scope of its on-going consultation was improper and too narrow. Subsequently, the MRGCD intervened in the case. In addition, Wild Earth Guardians alleged the Corps is required to consult and is not exercising discretion it has to modify its reservoir operations to benefit endangered species. The Judge ruled that Reclamation's decision to depart from the 2003 Biological Opinion and the Corps decision not to consult will be heard on their merits. He ruled the consultation claim against Reclamation is not subject to judicial review because it is not a final agency action. Reclamation and the Corps both indicated the merits of the case will not be heard before the summer of 2016.

### **URGWOM Accounting Model**

During 2015, representatives of Reclamation, Corps, and NMISC conducted quality assurance on model input river flow and reservoir data for the middle and upper Rio Grande in New Mexico. They also reviewed San Juan-Chama (SJC) contractor releases and water exchanges. Issues discussed included plans for the El Vado Reservoir deviation resolution approved by the Rio Grande Compact Commission during its 76<sup>th</sup> annual meeting in support of Rio Grande silvery minnow spawn, accuracy of data, and importing final USGS data into the model.

### **Compliance by Federal and State Agencies with State Water Law**

The NMISC continues to track habitat restoration projects implemented by various federal and state agencies and accounts and reports for depletions related to them in the MRG. It coordinates with the New Mexico Office of the State Engineer (NMOSE) to determine if a permit is needed and to ensure the depletions are offset by the project sponsors. The NMISC reported it coordinated with the Corps on several planned habitat restoration projects to ensure the Corps projects will be depletions neutral and/or that water rights or offsets will be provided. In addition, due to the fifth year in a row of below average spring snowmelt runoff flows in 2015, very few habitat restoration sites received water at that time. Consequently, only a very

limited volume of depletions needed to be offset.

### **San Acacia Levee Project**

The NMISC reported that construction of the Socorro Levee portion (Segment 1) of the Corps San Acacia Levee Project was ongoing and ahead of schedule for 2015. Construction began the first week of January 2015 and there are currently two contractors working concurrently on separate phases of the project. The NMISC continues to work with the Corps and the MRGCD on the project, including planning for subsequent phases. The MRGCD and NMISC are local and cost share sponsors, respectively. The sponsors' non-federal cost share requirement will be approximately 15 percent of the total project cost, including money the Corps has spent to date.

The Corps reported that the lawsuit filed by the Wild Earth Guardians alleging violations of NEPA by the Corps for the Levee Project and violation of the ESA by the Service was stayed until April 2016 and that on-going work has not been disrupted.

### **Elephant Butte Delta Channel Project**

The Delta Channel (formerly termed the Pilot Channel) was successful in conveying the 2015 snowmelt runoff into the active reservoir pool at Elephant Butte Reservoir. The channel did not experience the higher than average flows from monsoonal precipitation that characterized the previous two years and the Delta Channel successfully conveyed all flow into Elephant Butte Reservoir during 2015. During January and February of 2015, an NMISC contractor conducted in-channel maintenance in a few areas LFCC, re-aligned a portion of access road and mowed vegetation to maintain access. Since 2003, New Mexico has spent nearly \$17 million to construct and maintain the Delta Channel.

All necessary environmental compliance for the Project remains in effect for the 2015-2106 maintenance season and NMISC continues to coordinate with Reclamation, New Mexico State Parks, and other stakeholders on a Southwestern Willow Flycatcher habitat restoration project below Elephant Butte Reservoir as Project mitigation.

### **Relinquishment Update**

The total amount of Accrued Credit relinquished by Colorado since 2013 is 3,000 acre-feet. In 2013 and 2014, Colorado stored 1,749 acre-feet of this relinquishment credit in Platoro Reservoir, but did not store any in 2015. This leaves a balance of 1,251 acre-feet in Colorado's relinquishment account.

The total amount of Accrued Credit relinquished by New Mexico since 2003 is 380,500 acre-feet. In 2015, Reclamation stored 8,416 acre-feet of relinquishment water in El Vado Reservoir. Of the 8,416 acre-feet, 2,000 acre-feet were stored by Reclamation on behalf of the New Mexico Interstate Stream Commission. Relinquishment water storage to date totals 264,037 acre-feet, leaving a balance of 116,463 acre-feet available to be stored in future years when Article VII storage restrictions are in effect.

### **Gaging Station Review**

At the Otowi gage, the USGS reported they had concerns with rating #36 due to the shifts being positive on the lower end and going negative at the higher end. Therefore, rating #37 was developed to more accurately reflect the stage-discharge relationship with regards to the recent Acoustic Doppler Current Profiler (ADCP) measurements and previous low flow measurements below 600 cfs. The low end of rating #37 is defined by all wading and ADCP measurements made since the high flow event of September 2013, along with the low flow measurements made during 2003 and 2004, which reflect the same control condition as now. The USGS is still dealing with sediment entering the river from Los Alamos Canyon as a result of the Las Conchas fire and summer monsoon flows. The USGS indicated they may need to change rating tables relatively frequently in the near future to account for these sediment-caused changes to the control. The USGS indicated that they still are having issues with gage access with San Ildefonso Pueblo, but they are hopeful that they have worked out an acceptable access agreement with the Pueblo. Largely because of the sediment issues, the NMISC does measure the flows at the Otowi gage under an access agreement with the Pueblo and provides this information to the USGS. The USGS stated that they believe these measurements from NMISC are accurate but that they have a standing policy that no measurements from outside agencies will be used in the development of their streamflow record. However, they will use the

measurements to verify existing USGS data and to assist in the development of rating tables.

During 2015, the USGS reported that they reviewed and approved the 2015 Rio Grande below Caballo Reservoir flow records developed by Reclamation. After initial questions and concerns from the Engineer Advisers about the extent of the USGS review process, the USGS provided the Engineer Advisers with a written record of the review and the findings for the Caballo gage record, as well as suggestions on how to improve the record in the future. The Engineer Advisers will require this type of written review on all compact streamflow records in the future.

The Engineer Advisers did not receive any information from Reclamation indicating whether they had received the 2015 Rio Grande below Elephant Butte Reservoir flow records developed by the USGS. Additionally, no information was provided by Reclamation on whether they had attempted or completed a review of this record as has been requested of them in the past by the Engineer Advisers.

During 2015, the NMISC continued its survey of water level elevations in Elephant Butte and Caballo Reservoirs. The results generally indicated that Reclamation's reservoir stage elevations were within the agreed upon threshold criteria ( $< 0.05$  ft) at both reservoirs except during December 2015, when the difference was 0.07 ft at Elephant Butte Reservoir. Reclamation recently changed part of its method for measuring reservoir stage elevation and the NMISC and Reclamation will compare accuracy of the two methods during 2016.

### **Mass Balance Review**

The NMISC conducted a mass balance analysis for the Rio Grande between the Elephant Butte and Caballo gages for calendar year 2015. The mass balance analysis indicated that the reach gained water in eleven out of twelve months with a total calculated gain of 36,600 acre-feet. Most of the gain occurred during the June through September rainy period.

### **Gaging Station Operating Costs**

The three Compact states equally split the costs of their operations in support of the Compact, including operation and maintenance of the Compact gaging stations. The Compact gaging stations are operated by the Colorado Division of Water Resources (CDWR), USGS and Reclamation. For the fiscal year ending on June 30, 2016, the costs charged by the CDWR average \$10,767 per gage, the costs charged by the USGS average \$11,404 per gage, and the cost charged by Reclamation to operate one gage, the gage below Caballo Reservoir, for 2015 was \$37,453. The projected cost for 2016 for the same gage is \$37,094, slightly less than for 2015.

During the 2015 Annual Compact Commission Meeting, the Compact Commissioners expressed concern about the large difference in costs between what Reclamation needs to operate the gage below Caballo Reservoir as compared to what the CDWR and USGS charge on average. The Compact Commissioners requested Reclamation provide a detailed cost estimate for the operation of the below Caballo Gage as well as differentiating Operating Agreement measurements versus Compact measurements. Reclamation provided operations costs for 2015 and estimates for 2016. To date, the EAs have not received a projection for 2017. In the 2015 and 2016 costs, Reclamation did not differentiate between costs incurred for project operations versus Compact purposes. From the information provided, it appears the majority of the high cost is associated with the number of measurements performed. The stated reason for the very high number of measurements is a provision in the 2008 Rio Grande Project Operating Agreement that requires Reclamation to measure the flow at the gage whenever the flow changes by  $\pm 100$  cfs.

The Engineer Advisers request that Reclamation provide a breakdown of project operations versus Compact purposes. This information is needed for Compact budget purposes which is further discussed in the budget section of this report. In addition, the Engineer Advisers request that Reclamation investigate ways to ensure accurate flow data are obtained for this gage in a cost effective manner.

### **Review of Compact Accounting Data EA's**

Based upon communication with the agencies providing data to the USGS and the Engineer Advisers for annual Compact accounting, the Engineer Advisers moved the annual Engineer Advisers' meeting to the first week in March. The change was made to allow more time for developing, reviewing, and finalizing required Compact accounting records.

The Engineer Advisers circulated a draft document describing the planned process, schedule, and timeline for submittal and finalization of data, records, and documents prior to the annual EA meeting. They received comments from Reclamation and the USGS and refined the document. It is attached to this Report and is the subject of a separate request for authorization by the Commission.

## **YEAR 2015 OPERATIONS**

In 2015, there were no significant wildfire impacts to the Rio Grande watershed in either Colorado or New Mexico. This stands in significant contrast to 2013, when several major wildfires impacted the Rio Grande watershed in both New Mexico and Colorado. The effects of previous wildfires on the watershed are likely to continue for many years.

### **Snow Melt Runoff Forecasting**

Joe Busto with the Colorado Water Conservation Board (CWCB) and Paul McKee with the National Weather Service (NWS) presented information to the Engineer Advisers on efforts to increase the accuracy of streamflow forecasting for sites in Colorado and the potential for a similar process to take place in New Mexico. Recent forecasts have sometimes lacked the accuracy and reliability needed to administer the Rio Grande in Colorado on a consistent basis.

The CWCB, in cooperation with the Colorado Division of Water Resources (CDWR) and other agencies, has funded multiple new methods to gather information on the snowpack and the amount of water that it holds. These methods include installing several temporary radars in the Upper Rio Grande Basin, having National Aeronautics and Space Administration (NASA) fly their Airborne Snow Observatory (ASO) airplane to collect snowpack data using lidar, installing several new 'Snotel-Lite' ground stations in the Conejos Basin, etc. The NWS is using a separate streamflow forecasting model that has shown promise in increased accuracy.

### **Closed Basin Project**

Reclamation reported the total production of the Closed Basin Project in 2015 was 11,684 acre-feet, with 8,296 acre-feet of that amount delivered to the Rio Grande. The remainder of the water produced was delivered to various federal lands along the project to be used as mitigation for the project footprint. All of the water delivered to the Rio Grande in 2015

was of sufficient quality to qualify for credit under the Compact. Reclamation continues to address problems of biofouling in the production wells of the Closed Basin Project. Reclamation replaced five wells in 2015 that were most affected by iron bacteria and rehabilitated numerous other wells. Updating numbers reported in past EA reports, it is known that 68 of the 170 original wells have been replaced as of the end of 2015. Some of the 68 wells (11) have been replaced more than one time. Wells will continue to be replaced as budgetary constraints allow in an effort to help maintain production of the project. The new replacement wells have been equipped with variable frequency drive pumps. This is another effort to maximize efficiency of the Project. The Closed Basin Operating Committee continues to monitor groundwater levels and groundwater production and adjust project operations pursuant to the enabling legislation.

### **Platoro Reservoir**

The Colorado Engineer Adviser reported that, during May and June 2015, the Conejos Water Conservancy District stored pre-compact direct flow water by exchange in Platoro Reservoir. The majority of this occurred while out of the Article VII storage restrictions. This pre-Compact water was re-regulated and released later in the summer to better meet crop irrigation requirements. This operation is done routinely pursuant to a Colorado Water Court decree which allows pre-compact irrigation water, which otherwise would have been diverted to irrigate crops, to be stored for a short time in Platoro Reservoir and then released later in the same season to meet irrigation demands. The Colorado Engineer Adviser indicated all of the re-regulated water was accounted for and released during the summer of 2015, thereby not affecting the Conejos index supply.

The Engineer Adviser for Texas points out that while this action has occurred and been reported historically, Article VII of the Compact says “Neither Colorado nor New Mexico shall increase the amount of water in storage in reservoirs constructed after 1929 whenever there is less than 400,000 acre-feet of usable water in project storage...”

### **Colorado Groundwater Regulations**

After many years of work, the State Engineer of Colorado has completed the rules and regulations concerning the use of groundwater in the Upper Rio Grande Basin in Colorado. These rules require the owners of most large capacity wells in the Rio Grande Basin in Colorado

to sustain the aquifers and augment injurious depletions due to their pumping, either with a plan for augmentation or joining a subdistrict to meet the goals through a groundwater management plan. As an integral part of these rules, the State Engineer has also completed the development of the Rio Grande Decision Support System Model. This model captures the interaction between surface and groundwater and shows the effect that wells have on senior surface water rights. The rules have been submitted to the Division 3 Water Court in Alamosa for formal adoption. This water court process allows persons that are concerned with the rules the opportunity to object to them, and the rules garnered 30 statements of opposition. A two month trial to hear the objections to the rules has been set for early 2018.

### **Nichols and McClure Reservoirs Outlet Reconstruction**

In 2015, the City of Santa Fe finished reconstruction of the outlet works at McClure Reservoir. A similar project at Nichols Reservoir project was completed in May 2014. McClure was empty through November of 2015 and storage in McClure resumed by the end of 2015. The total amount of water in Santa Fe reservoir system storage at the end of 2015 was 662 acre-feet.

### **Reclamation's Middle Rio Grande Supplemental Water Program**

Reclamation's supplemental water program is intended to provide additional water, primarily obtained through the voluntary leasing of SJC Project water, for endangered species needs and compliance with the 2003 BiOp. In 2015, Reclamation reported it released a total of 12,661 acre-feet of leased SJC Project water, and 9,594 acre-feet of Emergency Drought Water Agreement (EDWA) water to ensure compliance with BO flow requirements. Of the 9,594 acre-feet of EDWA water released, 758 acre-feet was released on behalf of the New Mexico Interstate Stream Commission as part of their commitment to the new Biological Opinion. The water releases were made as needed from early July through early October.

Reclamation indicated it continued to maintain portable pumping stations at four locations on the LFCC in the San Acacia reach. The pumps were operated from mid-August through October 21, 2015 to pump 5,790 acre-feet from the LFCC to the Rio Grande under a permit issued by the NMOSE.

### **Six Middle Rio Grande Pueblos Prior and Paramount Operations**

Reclamation and BIA each reported that their 2015 projected storage volume for the six Middle Rio Grande Pueblo P&P operation was 21,687 acre-feet, the entirety of which was stored in El Vado. Article VII restrictions were in place during the entire time of this storage. During the 2015 irrigation season, none of the water was released because sufficient natural direct flow occurred. The stored water suffered 492 acre-feet of evaporative loss leaving 21,195 acre-feet in El Vado Reservoir at the end of the irrigation season. In accordance with historic practice when the storage occurred during the Article VII storage restriction, Reclamation released the water from the reservoir and delivered it to Elephant Butte Reservoir after the irrigation season. This release occurred between November 5 and December 24, 2015.

Based on the February 3, 2016 most probable snowmelt runoff forecast, the BIA reported that Reclamation will likely store about 14,750 acre-feet for their P&P operation in 2016. Additional forecasts in April and May may change this storage target.

The BIA reported that it has not taken a position on the carryover issue and is discussing the matter with Department of Interior officials. A meeting was being held the week of February 29, 2016 between a BOR official from Washington D.C. and the six Pueblos regarding the carryover of stored water not needed to meet the BIA's diversion demand for the Pueblo's senior lands. The Engineer Advisers do not support the carryover of unused stored water.

The Engineer Advisers remain concerned about the procedures for quantifying storage, release and delivery of water for the P&P lands of the six Middle Rio Grande Pueblos. The Texas Engineer Adviser remains concerned about the storage of native Rio Grande water in El Vado Reservoir by Reclamation when the storage restrictions of Article VII are in effect.

### **Rio Grande Project Operations**

Reclamation reported a final 2015 release from Caballo Reservoir of 434,528 acre-feet for all three Rio Grande Project water users: El Paso County Water Improvement District No. 1 (EP No. 1), Elephant Butte Irrigation District (EBID), and Mexico. Reclamation reported it used the 2008 Operating Agreement methodology to make end of year allocations to EBID at the diversion headings of 170,592 acre-feet (143,404 acre-feet were delivered, resulting in an unused allocation of 27,188 acre-feet to 2015), and to EP No.1 of 188,663 acre-feet (165,872 acre-feet were delivered resulting in an unused allocation of 22,791 acre-feet). During 2014,

Mexico's diversion allocation was 35,355 acre-feet; 33,772 acre-feet were delivered. Reclamation's report indicates flows into Hudspeth County Water Conservation and Reclamation District No. 1 during 2015 were 20,387 acre-feet. They reported deliveries by EP No.1 to the City of El Paso were 32,982 acre-feet.

Reclamation reported that Project releases started on May 11, 2015 and continued through September 28, 2015. The USGS reported the total annual flow at the gage below Elephant Butte dam was 412,775 acre-feet. Elephant Butte Reservoir peaked at 399,970 acre-feet on May 30, 2015, and storage at Caballo Reservoir peaked at 52,055 acre-feet on May 25, 2015. End-of-year storage at Elephant Butte Reservoir was 322,516 acre-feet, with no SJCP water in storage. The end of year storage at Caballo Reservoir was 27,687 acre-feet.

The New Mexico Engineer Adviser expressed concern about continued use of the 2008 Operating Agreement for Rio Grande Project Operations, changes in Reclamation's reported annual allocation and delivery values since 2008, and that Rio Grande Project operational changes have been made that are not consistent with the Operating Manual.

Reclamation indicated it will continue to conduct start of the irrigation season and end of season update meetings for the Engineer Advisers. This procedure began in 2014.

## **ADDITIONAL FEDERAL AGENCY REPORTED INFORMATION**

Representatives of USGS, Reclamation, Corps, Service, and IBWC presented additional information to the Engineer Advisers as summarized below:

### **U. S. Geological Survey**

The Engineer Advisers received reports from the USGS on their Upper Rio Grande Basin projects. The USGS initiated a WaterSmart Focus Area Study in October 2015 to assess water availability from the headwaters in southern Colorado to Fort Quitman, Texas. Water availability will be evaluated by assessing groundwater, surface water, and snow processes, and estimating evapotranspiration and water use. The study is being conducted by personnel from the USGS Colorado, New Mexico, and Texas Water Science Centers with additional resources from other offices throughout the USGS.

The USGS, in cooperation with Reclamation, is developing an improved model of the transboundary aquifers and interconnected surface waters of the Palomas and Mesilla Basins in

New Mexico and Texas and the Conejos-Médanos Basin of northern Mexico. The model is operational and final calibration and report documentation is scheduled to be completed by September 2017.

### **Corps Rio Grande Environmental Management Program**

The Corps reported that its Rio Grande Environmental Management Program was re-authorized in WRDA 2014 to go through 2019. In addition, the Corps received funding to conduct work within a specific area: the reach of the Rio Grande between the southern boundary of Sandia Pueblo and the northern boundary of Isleta Pueblo in the MRG. The Corps is waiting on guidance from headquarters before proceeding with the effort.

### **Zebra Mussels/Quagga Mussels**

The Engineer Advisers continue to be concerned about the possible infestation of Zebra and Quagga mussels in the Upper Rio Grande basin and their possible spread throughout the entire basin. Three reservoirs in New Mexico; Sumner, El Vado and Navajo, had been suspect in the past due to positive microscopic veliger tests. In fact, in 2015, RDLES had positive microscopy tests for PCR for samples taken in the vicinity of Simms Marina on Navajo Reservoir. Subsequent inspections of the anchored structures in and around Simms Marina did not reveal any adult mussel presence. Using established waterbody designations, NMDGF has re-designated Navajo Reservoir as inconclusive for invasive species. NMDGF is planning an increased monitoring effort at Navajo Reservoir for 2016 monitoring season. Continued vigilance is important regarding invasive mussels.

### **Rio Grande Silvery Minnow**

The Service and Reclamation reported on the 2015 monitoring results for the Rio Grande silvery minnow and the October catch per unit effort (CPUE) data that is typically used to report long-term trends in relative abundance. During the October survey silvery minnows were detected at 10 of the 20 sites with an estimated density of 0.16 silvery minnow/100 sq-meters. The Service reported that this was an improvement over the previous four years but is still very low. Other monitoring efforts, such as by Reclamation's electrofishing surveys, found both marked and unmarked silvery minnow between Bernalillo and the Delta Channel.

In 2015, Rio Grande silvery minnow spawning occurred in May and June as documented by the egg monitoring results and collection of 15,057 silvery minnow eggs in those months in the MRG (Angostura, Isleta, San Acacia). The Service reported that captive spawning of adult broodstock from the 2012 year class occurred and a total of 200,448 silvery minnows harvested from the NMISC's Los Lunas Silvery Minnow Refugium (LLSMR), the City of Albuquerque's BioPark and Southwestern Native Aquatic Resources and Recover Center (ARRC) and stocked to augment the wild fish in the MRG.

The Service reported that 17.4 miles of the main channel of the MRG became intermittent in the Isleta reach (5.2 miles) and San Acacia reach (12.2 miles). In 2015, 1,249 live silvery minnow, primarily young of year, were found in isolated pools within the river. Eleven silvery minnow were found dead due to water operations. The incidental take authorized in 2015 was 550 silvery minnows (11 observed take multiplied by 50).

### **Middle Rio Grande Project Channel Maintenance**

Reclamation's report indicates it is pursuing work at 16 active priority sites along the MRG Project reach where bank erosion or reduced channel capacity could cause levee failure. Of the active priority sites, six require an annual review of channel capacity and possible maintenance due to sediment accumulation. In 2015, Reclamation completed work at five sites (Drain Unit 7, Truchas Arroyo, and three sites on San Felipe Pueblo lands; River Mile 210, 210.1, and 210.3).

In addition, Reclamation indicated it has been studying, and will soon begin an Environmental Impact Statement, on a plan to realign between 7 and 9 miles of the Rio Grande near and within the Bosque del Apache National Wildlife Refuge. The purpose of the project is to reduce the likelihood of a catastrophic levee breach, improve habitat for endangered species, and allow for improved water and sediment movement through the area.

### **Vegetation Management at Elephant Butte and Caballo Reservoirs**

Reclamation continued vegetation management efforts at Elephant Butte and Caballo Reservoirs in 2015 through a cooperative agreement funded by the NMISC. Reclamation reported that during their 2015 fiscal year, a total of 3,240 acres were treated at Caballo Reservoir under the program by mowing, and mulching. Reclamation reported that no herbicide

treatments occurred at Caballo Reservoir in fiscal year 2015.

### **Southwestern Willow Flycatcher**

Reclamation conducted surveys and nest monitoring of the flycatcher in New Mexico during the summer of 2015 along about 250 miles of the Rio Grande between Isleta Pueblo and Elephant Butte Reservoir. Other areas of monitoring surveyed included above Cochiti Lake, near Taos, and select locations between Caballo Reservoir and El Paso, Texas. In 2015, 412 flycatcher territories were detected in New Mexico with the majority of them in the San Marcial/Elephant Butte Reservoir area (344 territories and 83 percent of New Mexico Rio Grande detections). In addition, the Service reported that approximately 60 territories were detected in the Rio Grande Basin of Colorado. Nest success was markedly higher in 2015 (40 percent) than in 2014 (28 percent). The poor success rate in 2014 did not appear to impact the 2015 success rate, as previously anticipated.

In October 2014, the Service reopened the comment period on its proposal to designate 546,335 acres of critical habitat for the cuckoo in nine western states and received comments through January 2015. A new proposal for critical habitat based on comments received is anticipated to be published in the near future. Reclamation surveys conducted for the Southwestern Willow Flycatcher also records Yellow-billed Cuckoo detections. In the summer of 2015, 99 territories of Yellow-billed Cuckoo were estimated as derived from 338 detections. The territories and detections were most concentrated in the southern portion of the San Marcial/Elephant Butte Reservoir area.

The tamarisk leaf beetle (*Diorhabda* spp) continued to move south from the Rio Puerco and north from Radium Springs and is expected to merge at Elephant Butte Reservoir soon. The impact this will have on nesting areas for the Southwestern Willow Flycatcher is uncertain but there remains a concern that saltcedar defoliation could impact nesting success.

### **Reclamation's Rio Grande Project Operations Plan for 2016**

Reclamation reported that preliminary allocations to the districts will be made mid-March 2016. As of February 19, 2016 there was 412,196 acre-feet in storage and 396,954 acre-feet of Useable Water, based upon the use of Accounting Method 1. Reclamation's preliminary allocations as of February 19, 2016 are 124,107 acre-feet for EBID, 145,155 acre-feet for EP No.

1, and 23,083 acre-feet for Mexico. Reclamation indicated that the irrigation season is projected to begin on March 27 and end September 30, 2016. Mexico and EP No. 1 will start diversions April 1 and EBID will start diversions April 15 at Arrey Canal. Reclamation does not anticipate a full allocation for 2016.

### **Silvery Minnow 10(j) Reintroduction in Big Bend-Texas**

Monitoring of the Big Bend 10(j) population in Texas occurred during March 2015. Three silvery minnow were captured during sampling downstream of the San Francisco spring run. The Service reported that 132,500 silvery minnow were harvested from Uvalde Fish Hatchery (UFH) and stocked at Shaffer's Crossing on October 14, 2015. An Additional 180,118 were reared at Southwestern Native ARRC and stocked at Shaffer's Crossing and Terlingua in 2014. These sections have been selected for stocking and research as they are influenced by spring flows and have perennial, flowing water.

### **Additional Listing Information Provided by the Service**

The Fish and Wildlife Service received petitions in 2013 and 2014 from the Wild Earth Guardians requesting that the Rio Grande Chub and Rio Grande Sucker both be listed as threatened or endangered. The Service has conducted a 90-Day Finding on both species and has determined that a one year review is warranted. This review will run until next spring, and then a decision on whether to list will be made.

### **International Boundary and Water Commission Activities**

The IBWC provided a report of its activities along the Rio Grande in New Mexico and Texas during 2015. IBWC discussed the status of their River Management Plan. Major portions of the plan completed in 2014 were the Floodplain Management Plan, Endangered Species Management Plan. The Channel Maintenance Plan has not been completed. The Channel Maintenance Alternatives (CMA) and Sediment Transport Modeling Study was completed by a contractor in November 2015. The purpose is to address sediment issues consistent with the Record of Decision and investigate CMAs at nine problem locations. Sediment removal in 2015 and 2016 totaled 306,823 cubic yards at 14 locations through the Rio Grande Rectification Project and the Rio Grande Canalization Project. For 2016, IBWC is planning two sediment trap

pilot projects, the Thurman 1 and 2 Sediment Traps on land under their jurisdiction. Disposal of the sediment continues to be an issue. The IBWC indicated it can only address sediment on land under their jurisdiction. IBWC reported that the sediment problem is a watershed issue, in addition to a river issue, and that partners are needed to successfully address the problem.

IBWC indicated that Mexico was allocated 59% of a full supply 35,355 acre-feet. 2016 is projected to be less than a full supply with an initial allocation of 23,083 acre-feet. Mexico has agreed to begin taking water when the EP No. 1 starts taking water, currently anticipated to be April 1, 2016.

The IBWC discussed their Rio Grande rectification levee projects and their levee rehabilitation projects to meet FEMA accreditation standards. Currently no levees meet the FEMA standards, although several areas have been submitted for approval. IBWC continues to work with FEMA in providing responses to their comments. Environmental restoration activities are occurring at eleven sites with an estimated 20,000 trees planted from 2012 to 2015. In 2016, 3,000 trees have been planted with up to 7,000 more anticipated to be planted this year.

## **ENGINEER ADVISER RECOMMENDATIONS**

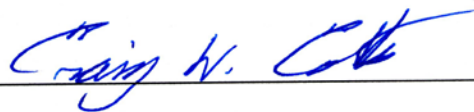
As directed by the Commission, the Engineer Advisers drafted proposed amendments to the Rules and Regulations for Administration of the Compact. The amendments were sent to the Legal Committee for consideration. The proposed amendments include, but are not limited, that the annual meeting of the Commission will occur between mid-March and mid-April of any year; rotation of the location of the annual meeting in sequence between Colorado, New Mexico, and Texas; and to put into Rule certain USGS activities associated with the Compact gaging stations.

## BUDGET

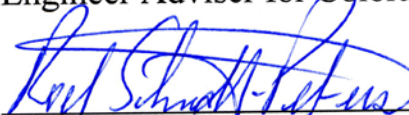
The Engineer Advisers reviewed the cost of operation for the year ending June 30, 2015 and the budget for the fiscal year ending June 30, 2017. As indicated in the Gaging Station Cost section, Reclamation did not present the Engineer Advisers with a formal cost estimate to operate the below Caballo gage for FY2017. Nor did they provide a detailed breakdown of costs to operate the gage associated with Rio Grande Project Operating Agreement versus compact purposes as requested by the Commission last year. The cost charged by Colorado, New Mexico, and the USGS for gaging stations in FY2017 will remain about the same as that charged in FY 2016. Therefore, the Engineer Advisers recommend that the charge for the below Caballo gage in the FY2017 budget be held the same as in FY 2016, which was \$20,524.

The Engineer Advisers found that the expenses for gaging stations and administration of the Compact for the year ending June 30, 2015 were \$201,072. The United States federal government bore \$54,390 of this total, with the balance of \$146,682 borne equally by the three states.


With the proposed change to the Reclamation charge as outlined above, the Engineer Advisers find that the proposed budget for the fiscal year ending June 30, 2017 indicates a total of \$208,280 will be spent for gaging and administration, with a proposed contribution by the United States federal government of \$58,681.



Craig W. Cotten  
Engineer Adviser for Colorado



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## **The Colorado Engineer Adviser's Addendum to the 2016 Engineer Advisers' Report**

**March 31, 2016**

At the 2016 Rio Grande Compact Commission (RGCC) Engineer Advisers' meeting held in Santa Fe and Albuquerque, New Mexico on February 29-March 4, 2016, the Engineer Advisers did not reach consensus on the 2015 Rio Grande Compact (Compact) Accounting. The lack of consensus stems from the continuing disagreement regarding Colorado and New Mexico Credit Water that Reclamation released in 2011 and possibly in 2012, the appropriate accounting of 2011 and 2012 Colorado and New Mexico deliveries that were affected by Reclamation's release beyond the available Usable Water, and the directly relevant 2006 direction of the RGCC to Reclamation. There was no release of credit water by Reclamation in 2015 and the Engineer Advisers did reach consensus on the accounting of the 2015 streamflow numbers for the Colorado gaging stations but not other stations in New Mexico. Because of this lack of agreement on some of the gaging station records as well as the effects of the releases of credit water in previous years, the accrued credits of Colorado and New Mexico in 2015 could not be agreed upon or finalized.

From 2011 to 2015, the Colorado Engineer Adviser has presented two methods for the Commission's consideration. However, in this addendum, the Colorado Engineer Adviser presents for the Commission's consideration only one method of accounting for the 2015 calendar year Compact Accounting, which is known as Method 2. Method 3, which has been presented as an alternative in the past, is still a viable and legal option in the view of the Colorado Engineer Adviser, but because of the very complicated accounting, and the fact that the accounting gets more difficult with each passing year in which there is not a unanimous agreement as to the method to be used, it is believed that narrowing the number of conflicting methods to only two is the best course of action at this time. Therefore, the following method is proposed:

Method 2: Colorado and New Mexico Credit Water was released during 2011, and accounted as being reduced in the month it was released, as in a relinquishment.

With this Method, the Credit Water will have been reduced for evaporation at the end of the calendar year – in accordance with Article VI of the Compact and the 2006 direction of the RGCC to Reclamation. The Colorado Engineer Adviser carried forward the end of 2014 accounting results for Method 2 used through the 2015 calendar year. This method complies with the last paragraph of Article VI of the Compact, wherein Credit Water in Elephant Butte Reservoir is "reduced annually to compensate for evaporation losses in the proportion that such credits (or debits) bore to the total amount of water...during the year." The results for 2015 for Method 2 are summarized below.

### **Method 2:**

Under this method, Reclamation released accrued Credit Water from Elephant Butte Reservoir during the summer of 2011 unilaterally and without the permission of Colorado or New Mexico. This unauthorized

release coupled with normal compact accounting resulted in 2015 Accrued Credits for Colorado that are less than those calculated in the Texas accounting method (Method 1). Method 2 results in Colorado having an Accrued Credit status for the end of year 2015 of 6,600 acre-feet.

The difference in Compact compliance status between the Texas method and Method 2 (minus 100 acre-feet for Colorado) illustrates the effect of Reclamation's 2011 release of Credit Water on Colorado Compact compliance carried forward through 2015. Unlike an authorized relinquishment, however, Colorado did not receive the Article VII benefit of being able to store a like amount of water to that released by Reclamation in 2011 in post-compact reservoirs in the future when Article VII of the Compact is in effect.

### **Summary**

The Colorado Engineer Adviser believes that the Texas method (Method 1) of accounting as put forth in the Texas addendum contravenes the last unnumbered paragraph of Article VI of the Compact and the unanimous direction of the Commission to Reclamation in 2006. Therefore, the Texas method is not acceptable to the Colorado Engineer Adviser.

No after-the-fact accounting can address the primary issues that occurred in 2011 and 2012 when Reclamation made its unauthorized releases of accrued Credit Water, which are:

- 1) Colorado and New Mexico have sole authority to decide the disposition of any of their respective accrued Credit Water; and
- 2) Reclamation's actions denied Colorado and New Mexico the benefits associated with relinquishments or other negotiated solutions under the Compact and eliminated Texas' incentive to negotiate the terms of a relinquishment or other negotiated solution during drought times.

The method proposed above is a suggestion for the Commission's consideration. The Colorado Engineer Adviser recognizes that no accounting method may be approved without the unanimous approval of the Commission, and that any accounting method must not violate the express terms of the Compact.

## **New Mexico Addendum to the 2016 Engineer Advisers' Report to the Rio Grande Compact Commission**

**March 2016**

At the 2016 Rio Grande Compact Commission (RGCC) Engineer Advisers' meeting, the Engineer Advisers again did not reach consensus on a method by which to finalize the Rio Grande Compact (Compact) Accounting. The lack of consensus stems from:

- 1) the continuing disagreement raised in litigation by New Mexico against the U.S. Bureau of Reclamation (Reclamation) regarding New Mexico and Colorado Credit Water that Reclamation unilaterally released from Elephant Butte Reservoir in 2011 without authorization from either Colorado or New Mexico;
- 2) the appropriate accounting of 2011, 2012, 2013, 2014, and 2015 New Mexico and Colorado deliveries that were affected by Reclamation's unilateral and unauthorized 2011 Credit Water release;
- 3) Reclamation's disregard for Article VI in the Compact<sup>1</sup> and the 2006 direction of the RGCC to Reclamation regarding the accounting and release of accrued Credit Water; and
- 4) Reclamation's continued use of Method 1 accounting (see attached Method 1 accounting spreadsheet) and the impacts on New Mexico of this accounting due to the differences in the timing and duration of the Article VII storage restriction on upstream reservoirs constructed after 1929.

In addition, this addendum contains information prepared by the New Mexico Engineer Adviser on the RGCC approved 2015 El Vado Reservoir Temporary Modification of Operations Resolution (2015 El Vado Resolution) and the Engineer Advisers' proposed resolution for 2016. It describes New Mexico's position concerning Spring 2015 operations at El Vado Reservoir, which are different from Reclamation's position. It also outlines Engineer Adviser recommended conditions on the proposed RGCC resolution and the rationale for them. The conditions are intended to separate various operations at El Vado Reservoir, to provide transparency and clarity for any modified operation that is authorized by the RGCC, and to

<sup>1</sup> Pursuant to Article VI of the Compact, "all credits and debits of Colorado and New Mexico shall be computed for each calendar year" and "such credits and debits shall be reduced annually to compensate for evaporation losses in the proportion that such credits or debits bore to the total amount of water in such reservoirs during the year."

allow for assessment of the effects of that operation in aiding a Rio Grande silvery minnow spawning flow.

**Compact Accounting by Texas/Reclamation using Method 1, as compared to New Mexico's use of Method 2**

The Texas Engineer Adviser conducted Compact accounting for the 2015 calendar year using a method (see attached Method 1 accounting spreadsheet) that reduces Credit Water for evaporation monthly during the calendar year. This same method was put forward to the Commission by Texas and Reclamation in 2012 and carried forward by them in subsequent years using the same accounting steps. Method 1 resulted in Accrued Credits at the beginning of 2016 of 6,700 acre-feet for Colorado and 10,000 acre-feet for New Mexico. This method, however, is contrary to Article VI of the Compact and the 2006 direction of the RGCC to Reclamation. The New Mexico Engineer Adviser has repeatedly apprised the Commission that approval of Method 1 would require the RGCC to disregard the explicit language of the Compact requiring annual accounting for evaporation and is contradictory to the unanimous RGCC directive in 2006. Therefore, Method 1 is not acceptable to the New Mexico Engineer Adviser.

The New Mexico Engineer Adviser conducted Compact accounting for the 2015 Calendar year using a method (referred to as Method 2, see attached accounting sheet ) that he and the Colorado Engineer Adviser proposed in 2012 (see the 2012 New Mexico and Colorado addendum to the 2012 Engineer Adviser Report). The method reduces Credit Water for evaporation at the end of the calendar year in accordance with Article VI of the Compact and the 2006 direction of the RGCC to Reclamation. The New Mexico Engineer Adviser carried forward the end of 2011 accounting results with Method 2 through the 2012, 2013, 2014, and 2015 calendar years using the same accounting steps for each year.

New Mexico and Colorado's Method 2 acknowledges Reclamation's unilateral, unlawful release of some of New Mexico and Colorado's accrued Credit Water from Elephant Butte Reservoir during the summer of 2011. Due, in part, to this unlawful Credit Water release, Method 2 accounting results in less Accrued Credit Water remaining in Elephant Butte Reservoir than calculated by Texas and Reclamation under Method 1. Method 2 accounting resulted in Accrued Credits at the beginning of 2015 of 6,700 acre-feet for Colorado and zero acre-feet for New Mexico. The New Mexico Engineer Adviser used these values as inputs for the 2015 Compact accounting. Consequently, the Compact compliance status for Colorado and New Mexico at the beginning of 2016, using Method 2, is 6,600 acre-feet and 400 acre-feet of Accrued Credits, respectively.

Again, the difference in Compact compliance status between Method 1 and Method 2 (minus 100 acre-feet for Colorado and minus 9,600 acre-feet for New Mexico) depicts the effect of Reclamation's 2011 unilateral and unlawful release of Credit Water on Colorado and New Mexico Compact compliance accounting carried forward through 2015.

If Reclamation's 2011 release had been an authorized relinquishment done in accordance with the Compact, New Mexico and Colorado would have received Article VII up-stream storage benefits (the ability to store and release 33,825 acre-feet of water when the Article VII storage restriction is in effect), to which they are entitled under the Compact. However, New Mexico and Colorado were denied these Article VII benefits because the releases by Reclamation were done unilaterally and were not authorized in accordance with Article VII. In addition, Reclamation's refusal to use Method 2 accounting to determine Useable Water in Rio Grande Project Storage affected its El Vado Reservoir operations in 2015. Doing so resulted in additional negative effects on New Mexico described in-depth below.

### **The Article VII Storage Restriction and Reclamation's Operation of El Vado Reservoir in 2015**

Under the terms of Article VII of the Compact and depending on certain other factors, neither Colorado nor New Mexico can increase the amount of water in storage in reservoirs upstream of Elephant Butte Reservoir that were constructed after 1929 whenever there is less than 400,000 acre feet of Usable Water in Rio Grande Project Storage. This is referred to as the Article VII storage restriction. Usable Water in Rio Grande Project Storage is all water in Elephant Butte Reservoir, exclusive of Credit Water and transmountain water, and all the water in Caballo Reservoir.

For New Mexico, the reservoirs constructed after 1929 are El Vado, Nichols, McClure, Heron, Abiquiu, Cochiti, and Jemez Canyon Dams. Of them, only El Vado, Nichols, and McClure reservoirs have State permits for storage of native Rio Grande water and, consequently, can store such water for later release to meet downstream demands within the Middle Rio Grande. El Vado Reservoir has a total storage capacity of about 185,000 acre-feet and the combined storage capacity of Nichols and McClure Reservoirs is less than 4,000 acre-feet. These reservoirs are small in comparison to Elephant Butte Reservoir; but many parties rely on releases of stored water from these smaller reservoirs to meet demands, especially during the summer.

When the Compact storage restriction is not in effect, Reclamation and the Middle Rio Grande Conservancy District (MRGCD) cooperate to operate El Vado Reservoir and the City of Santa Fe operates Nichols and McClure Reservoirs. El Vado Reservoir is generally operated to store

water in priority and then release it when irrigation demand in the Middle Rio Grande exceeds the naturally available flow. In addition, in recent years, El Vado Reservoir has been operated to help meet river flow targets for endangered species compliance purposes while supplying water for irrigation. It also provides river flows that support operations of the Albuquerque Bernalillo County Water Utility Authority Surface water diversion. The water from Nichols and McClure Reservoirs is used solely for domestic water supply in Santa Fe. It is New Mexico's responsibility to account, administer, and report to the RGCC the amount of water stored and released under various conditions.

As indicated earlier, Reclamation and New Mexico used Methods 1 and 2, respectively, during calendar year 2015 to separately determine Usable Water in Rio Grande Project Storage and, more specifically, to determine when the Article VII storage restriction applied. Figure 1, attached, shows the timing of Article VII for each accounting method as reported during the year.

#### *Reclamation's Article VII Storage Restriction Estimates*

Reclamation initially indicated, in Spring 2015, that using their Method 1 accounting the Article VII storage restriction was lifted on April 9<sup>th</sup> and was back in effect on June 9<sup>th</sup>. However, Reclamation's final accounting model shows the Article VII storage restriction lifted on April 11<sup>th</sup> and back in effect June 8<sup>th</sup>. The reason for the discrepancy is that Reclamation/Texas' Method 1 is determined, in part, upon the amount of Credit Water evaporated each day from Elephant Butte Reservoir. Despite having the data available to calculate daily evaporation of Credit Water, it appears Reclamation did not do so, which subsequently impacted their Method 1 accounting numbers. The difference in water stored between Reclamation's two sets of different dates was 2,350 acre-feet.

However, the difference in Article VII timing was not relevant because Reclamation stored inflowing water to El Vado Reservoir continuously from the start of the year through late May, paying no heed to any of the Article VII storage restriction dates. Reclamation only stopped storing water and began passing all inflow through El Vado Reservoir around June 15<sup>th</sup>. Reclamation reported they stored 81,600 acre-feet while the Article VII storage restriction was not in effect and about 8,400 acre-feet when the storage restriction was in effect. Reclamation further reported that it released the 8,400 acre-feet before June 15, 2015.

Reclamation's storage methodology has impacted New Mexico because of the conflicting Article VII trigger dates and ending dates, the different types and volumes of water accounted as stored (see actual and hypothetical operations description below), and because operations of El Vado Reservoir can affect New Mexico's ability to comply with its Article IV delivery

requirements. New Mexico has created an estimate of the effect of Reclamation's actions on New Mexico, explained in depth below.

### *New Mexico's Article VII Storage Restriction Estimates*

Based on Method 2, New Mexico determined during 2015 that the Article VII storage restriction was lifted on April 4<sup>th</sup> and was back in effect on June 11<sup>th</sup>. But, the June 11<sup>th</sup> date does not take into account that El Vado Reservoir could have been operated in a different manner using Method 2 instead of Method 1. In order to reflect operations that could have occurred at El Vado Reservoir had Reclamation used Method 2 and, consequently, when the Article VII storage restriction would have gone back into effect, New Mexico had to do a hypothetical accounting of reservoir operations. That is because the amount of water reaching Elephant Butte Reservoir would be different under Method 2 from that reported by Reclamation under Method 1. New Mexico developed a parallel accounting model to that used by Reclamation to do so.

In the hypothetical operation, New Mexico stored all native water flowing into El Vado Reservoir from April 4<sup>th</sup> until Usable Water in Elephant Butte and Caballo reservoirs dropped below 400,000 acre-feet. At that time all inflow to El Vado Reservoir was bypassed. Figure 2 depicts the Method 2 hypothetical El Vado Reservoir operations. The hypothetical reservoir operations and resulting river flows at Compact gaging stations are shown in red on the Method 2 Compact accounting sheets and related water accounting tables (also attached). Given the hypothetical operation under Method 2, the Article VII storage restriction would have gone back into effect on June 7<sup>th</sup>.

Between April 4, 2015, and June 7, 2015, Reclamation could have stored 94,500 acre-feet, 12,900 acre-feet more than it reported storing when the Article VII storage restriction was not in effect. Therefore, the effect on New Mexico of the difference in timing of Article VII storage restrictions between the two methods was a loss of as much as 12,900 acre-feet. To put that into perspective, it is enough stored water for MRGCD to operate for almost two weeks in an average summer, or for Reclamation to meet biological opinion flow targets for several months.

### **Summary of New Mexico's Position on Compact Accounting**

In accordance with the Compact, New Mexico has the sole authority to offer to relinquish its accrued Credit Water and Reclamation cannot release Credit Water from Elephant Butte Reservoir. New Mexico receives benefits from negotiated relinquishments of Credit Water under the Compact because it then can store and release water from certain reservoirs upstream of Elephant Butte when otherwise prohibited to do so under Article VII.

Reclamation's unauthorized 2011 Credit Water release was a violation of the Compact that directly harmed New Mexico because New Mexico lost the ability to store approximately 33,000 acre-feet of water in its post-1929 reservoirs when the Article VII storage restriction was in effect. Further, Reclamation's release eliminated Texas' incentive under Article VII to meet with New Mexico to negotiate and accept a relinquishment during drought times. That incentive being the ability of downstream users to receive water from Elephant Butte Reservoir that otherwise would not be available under the Compact.

Moreover, because of the differences in accounting of Article VII storage restrictions and Reclamation's refusal to operate El Vado Reservoir using Method 2, in 2015 New Mexico's ability to account and administer water stored under the terms of the Compact and, potentially, its ability to meet Article IV delivery requirements was reduced (see section immediately above).

Given the lack of resolution on the above issues and absent an explicit agreement by Reclamation to abide by Article VI of the Compact and the RGCC's 2006 directives regarding the accounting and release of accrued Credit Water, the New Mexico Engineer Adviser recommends that the RGCC not approve any compact accounting for 2011, 2012, 2013, 2014, and 2015.

### **The RGCC 2015 and Proposed 2016 El Vado Resolution**

At the 2015 Engineer Adviser meeting, Reclamation requested the RGCC consider, via a resolution, allowing re-regulation of El Vado Reservoir during the Spring of 2015 when the Article VII storage restriction was in effect (2015 El Vado Resolution). The stated purpose was to help create a spawning flow for the Rio Grande silvery minnow in the middle Rio Grande in mid-May to early June. With the understanding that the storage restriction was likely to be in effect throughout the Spring of 2015 and that re-regulation at El Vado Reservoir during April, May, and June would result in essentially the same amount of water reaching Elephant Butte Reservoir by late June 2015, the RGCC approved the 2015 El Vado Resolution.

Reclamation's implementation of the 2015 El Vado Resolution proved controversial, created conflict, and resulted in different reports regarding the operation that occurred. However, some facts are clear. Largely because of Reclamation's delayed release operations at Elephant Butte and Caballo reservoirs in 2015, and the earlier than expected runoff, the Article VII storage restriction was not in effect for most of the time period allowed in the 2015 El Vado Resolution. In addition, as indicated earlier, Reclamation did not modify operations of El Vado Reservoir to honor any of the Article VII storage restriction dates or provide depletion offsets

for the operation. Rather, as shown on Figure 2, Reclamation stored continuously from the beginning of the year into mid-June.

Under Method 2, the operation contemplated by the 2015 El Vado Resolution did not occur to any significant degree. That's because the Article VII storage restriction was not in effect during the majority of the time period allowed by the 2015 Resolution. The allowed time period was between April 1 and June 15, 2015, but the required Article VII storage restriction was not in effect between April 4 and June 11, 2015. From New Mexico's perspective, Reclamation: 1) disregarded New Mexico's objections and directives regarding the Resolution; 2) disregarded the timing of Article VII storage restrictions and stored continuously during the Spring of 2015; and 3) only began to bypass some inflow to El Vado Reservoir in late May to help create a silvery minnow spawning flow. This impacted New Mexico by reducing New Mexico's ability to account and administer stored water under the terms of the Compact and, potentially, its ability to meet Article IV delivery requirements.

In 2016, Reclamation again asked the RGCC to implement a temporary modification of operations at El Vado Reservoir during the Spring of 2016 if/when the Article VII storage restriction is in effect (Proposed 2016 Resolution). New Mexico has been supportive, and in fact proactive, in the past by allowing Corps deviations at its reservoirs and for Reclamation and MRGCD to modify operations at El Vado Reservoir in 2015. Reclamation's disregard for Compact limitations in 2015 and the impacts their actions have had on storage opportunities for New Mexico have limited what New Mexico will support this year. The 2015 Resolution was intended to provide silvery minnow spawning benefits in May and June 2015 while delivering the same amount of water into Elephant Butte Reservoir.

Based on the 2015 Resolution, and the outcomes that came from that action, the Engineer Advisers developed a refined resolution in the form of the Proposed 2016 Resolution for RGCC consideration at its March 2016 meeting. The Proposed 2016 Resolution (attached) allows for temporary modification of operations at El Vado Reservoir in May and June 2016 subject to a number of conditions. In particular, the Article VII storage restriction must be in effect by all proposed accounting methods before the modified operation can begin and, when it occurs, must be conducted solely for the purpose of aiding to create a silvery minnow spawning flow. The New Mexico Engineer Adviser is hopeful the 2016 Resolution will be beneficial to the silvery minnow while minimizing the type of conflict amongst water managers that occurred in 2015.

## 2015 STORAGE IN RESERVOIRS IN NEW MEXICO

ACRE-FEET														
RESERVOIR	ITEM	2012 DEC	2013 JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	2013 DEC
ABOVE OTOWI BRIDGE														
EL VADO	TOTAL	13,928	13,949	18,033	35,796	62,602	127,412	133,319	126,975	119,107	100,358	89,557	70,301	36,503
	TRANS-MTN	(11,294)	(7,611)	(6,552)	(5,304)	(8,351)	(8,376)	(5,501)	(572)	(10,366)	(15,047)	(11,109)	(21,595)	(24,409)
ABIQUIU	TOTAL	128,586	132,159	133,789	133,522	129,114	125,402	122,049	120,075	121,594	141,580	147,505	135,392	130,533
	TRANS-MTN	(129,078)	(132,352)	(133,417)	(133,414)	(129,254)	(124,960)	(121,746)	(120,104)	(121,465)	(141,409)	(147,435)	(135,200)	(129,972)
	ACC. SED	(75)	(76)	(76)	(76)	(80)	(111)	(137)	(147)	(179)	(227)	(234)	(245)	(295)
SUBTOTAL RIO GRANDE		2,067	6,069	11,777	30,524	54,031	119,367	127,984	126,227	108,691	85,255	78,284	48,653	12,360
OTOWI BRIDGE TO SAN MARCIAL														
McCLURE	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	220
	PRE-COMP	0	0	0	0	0	0	0	0	0	0	0	0	220
	TRANS-MTN	0	0	0	0	0	0	0	0	0	0	0	0	0
NICHOLS	TOTAL	443	299	258	526	533	537	406	377	251	79	251	539	442
	PRE-COMP	(166)	(22)	0	(268)	(248)	(137)	0	(19)	0	(1)	(173)	(461)	(364)
	TRANS-MTN	-277	(277)	(258)	(258)	(258)	(258)	(258)	(258)	(251)	(78)	(78)	(78)	(78)
COCHITI	TOTAL	45,774	48,226	48,852	48,707	48,459	47,433	48,163	48,641	48,214	46,993	47,346	46,741	46,764
	TRANS-MTN	(46,136)	(47,909)	(48,622)	(48,276)	(47,925)	(47,739)	(47,286)	(47,155)	(46,725)	(46,382)	(46,381)	(46,242)	(46,180)
	ACC. SED	(315)	(320)	(326)	(353)	(373)	(452)	(490)	(535)	(565)	(583)	(588)	(606)	(630)
GALISTEO	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
JEMEZ	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
	TRANS-MTN	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACC.SED. <sup>1</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
ACOMITA	TOTAL <sup>2</sup>													
SEAMA	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL RIO GRANDE		(677)	(3)	(96)	78	188	(616)	535	1,051	924	28	377	(107)	394
NEW MEXICO														
TOTAL RIO GRANDE		1,390	6,066	11,681	30,602	54,219	118,751	128,519	127,278	109,615	85,283	78,661	48,546	12,754

<sup>1</sup> accumulated sediment (312 acre-feet) omitted from the accounting while Jemez Reservoir is dry by decision of the Engineer Advisers, March 4, 2005<sup>2</sup> storage omitted from accounting by action of the Commission on March 23, 2000

Table 12: Evaporation Loss On Rio Grande Water Stored In Reservoirs Above Otowi and Total Rio Grande Storage At El Vado and Abiquiu

(unit = acre-feet)

Table 12: Evaporation Above Otowi	El Vado and Abiquiu Rio Grande Storage	Rio Grande Compact Debt Water Stored In El Vado	Losses On Rio Grande Compact Debt Water Stored In El Vado	Losses On Rio Grande Stored in El Vado	Losses on Rio Grande Stored In Abiquiu	Otowi Evaporation Adjustment
Month	(1)	(2)	(3)	(4)	(5)	(6) = (4) + (5)
January	6070	0	0	0	0	0
February	11777	0	0	0	-1	-1
March	30524	0	0	63	8	71
April	54031	0	0	273	1	274
May	119387	0	0	329	4	333
June	127999	0	0	492	8	500
July	126244	0	0	464	2	466
August	108707	0	0	444	9	453
September	85271	0	0	357	0	357
October	78300	0	0	232	-3	229
November	48657	0	0	156	0	156
December	12363	0	0	101	0	101
Annual		0	0	2911	28	2939

- (1) Sum of natural storage in El Vado and Abiquiu.
- (2) Amount of debt water in storage in El Vado.
- (3) Actual net evaporation loss to debt water in El Vado.
- (4) Actual net evaporation loss to natural pool in El Vado.
- (5) Actual net evaporation loss to natural pool in Abiquiu.
- (6) Sum of net evaporation losses in El Vado and Abiquiu.

**RIO GRANDE COMPACT COMMISSION REPORT**  
**2015 Evaporation Loss On Rio Grande Compact Water Stored in Elephant Butte Reservoir**  
 (Unit = Acre-Feet) Except Col. (8)  
 (New Mexico Accounting Method-2)

Month	Total Rio Grande Stored in Elephant Butte (Ac-Ft)	Total Net Evap on Rio Grande Stored in Elephant Butte (Ac-Ft)	Colorado's Rio Grande Compact Credit Water Stored in Elephant Butte (Ac-Ft)	Colorado's Credit Water Evaporation Adjustment (Ac-Ft)	New Mexico's Rio Grande Compact Credit Water Stored in Elephant Butte (Ac-Ft)	New Mexico's Credit Water Evaporation Adjustment (Ac-Ft)	Total Credit Water Evaporation Adjustment (Ac-Ft)	Total Rio Grande Usable Water Stored in Elephant Butte (Kaf)	Total Water Relinquished (Ac-Ft)	CO Credit Water Relinquished (Ac-Ft)	NM Credit Water Relinquished (Ac-Ft)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
BOY Credit (2015)			6700		0						
January	287485	691	6684	16	0	0	16	281	0	0	0
February	325173	3155	6619	65	0	0	65	319	0	0	0
March	364930	4286	6541	78	0	0	78	358	0	0	0
April	389801	7685	6412	129	0	0	129	383	0	0	0
May	388168	9442	6256	156	0	0	156	382	0	0	0
June	325549	9660	6071	186	0	0	186	319	0	0	0
July	267133	6602	5921	150	0	0	150	261	0	0	0
August	169670	5813	5718	203	0	0	203	164	0	0	0
September	152827	3612	5583	135	0	0	135	147	0	0	0
October	167631	2048	5515	68	0	0	68	162	0	0	0
November	232406	1907	5469	45	0	0	45	227	0	0	0
December	322516	1885	5437	32	0	0	32	317	0	0	0
Annual		56785		1263		0	1263		0	0	0

(8) = (1) - [(3) + (5)] Total usable Rio Grande water in Elephant Butte Reservoir.

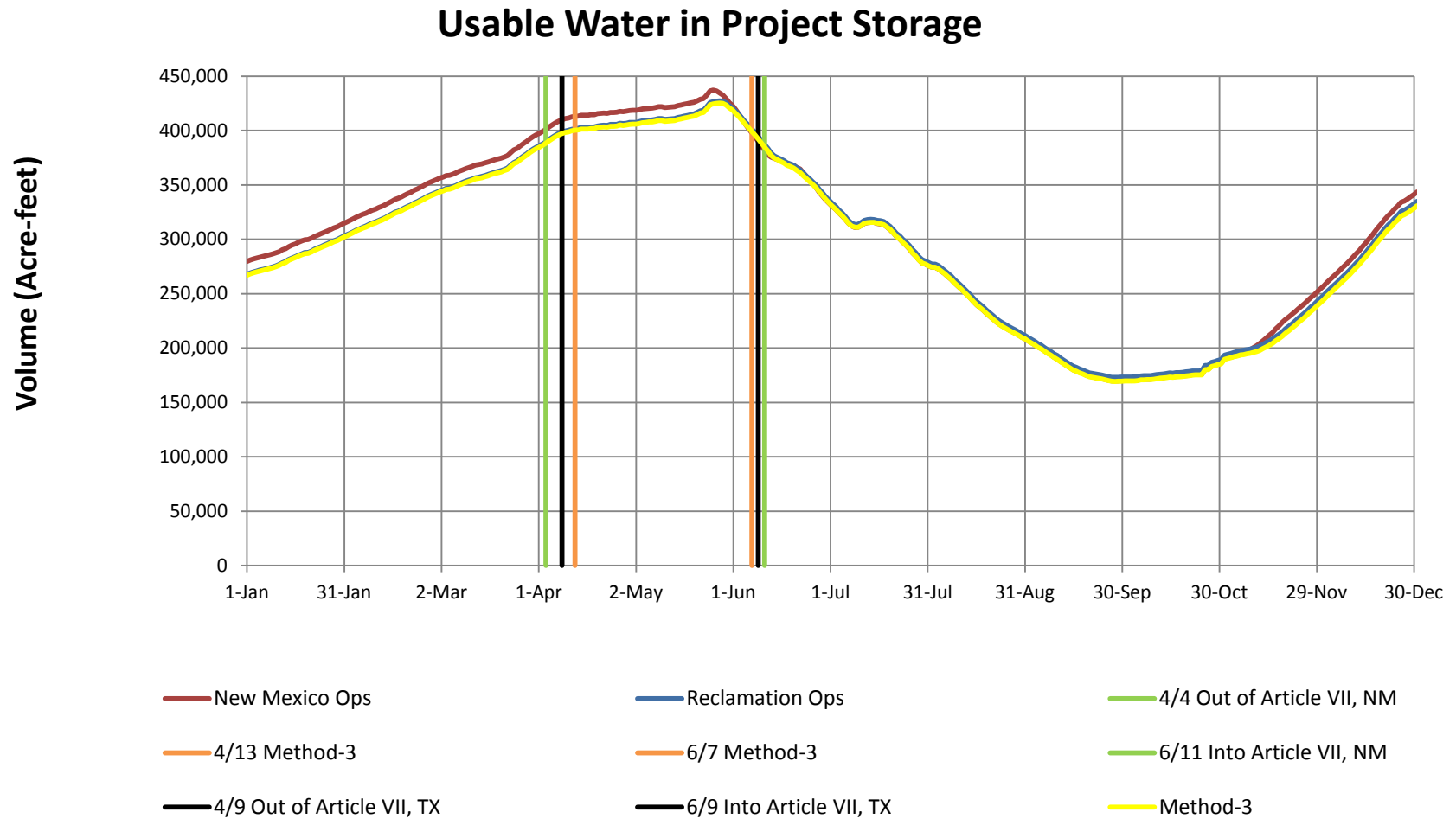


Figure 1: Timing of Article VII Using Different Accounting Methods  
(As announced during the year)

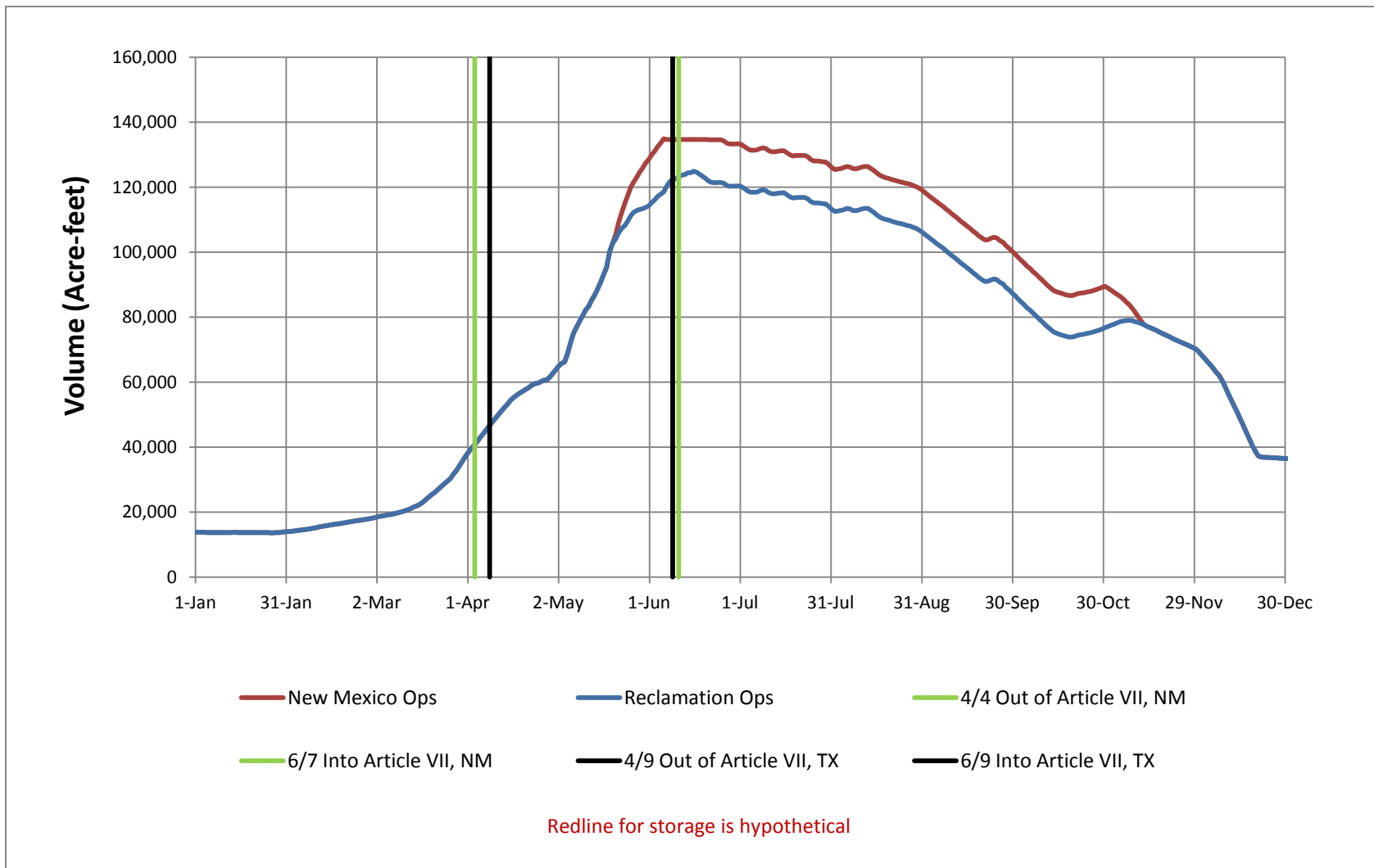


Figure 2: El Vado Storage Operations for Method 1 (Reclamation) and Method 2 (New Mexico)

**Addendum Engineer Advisers Report  
Texas Engineer Adviser  
March 31, 2016**

The Engineer Advisers to the Rio Grande Compact Commission (Commission) were unable to reach agreement on the Accounting of water deliveries for 2015. The issue centered on how the evaporation losses on Credit Water are calculated and tabulated and are carried forward from the 2011 and 2012 Water Accounting. Three separate accountings were developed in 2014 and labeled as Method 1, 2, and 3. The Texas Engineer Adviser proposes that Method 1 be accepted and thus bases his calculations on that method.

The history of this issue is addressed in a memorandum from the Engineer Advisers to the Commission dated March 23, 2006. As described in the memorandum, the Commission has been inconsistent in the way it has tabulated Credit Water in storage based on evaporation losses during the year. There are times when the Commission has approved an accounting where Credit Water is held constant each month and the Credit Water is only reduced at the end of the year, even though the calculation of Credit Water evaporation is a summation of monthly evaporation amounts. Under Method 3, whenever Usable Water amounts go negative and Credit Water was released, those amounts were repaid immediately as inflows occur. The Commission has on occasion approved this method. Under Method 2, whenever Usable Water amounts go negative and Credit Water was released, those amounts were never repaid. As understood by the Texas Engineer Adviser, the Commission has never approved Method 2. Also, there are times when the Commission has approved the evaporation of Credit Water monthly (Method 1). That is, Credit Water and Usable Water are subject to evaporation as it occurs. Under this method, the Texas Engineer Adviser understands that Usable Water has not gone negative.

The Engineer Advisers presented recommendations to the Commission on this issue in 2006. The Commission approved three recommendations. The recommendations were:

1. The Commission direct that accrued Credit Water be held constant during the year.
2. The Commission direct the Engineer Advisers to meet if the total combined accrued Credit Water exceeds 150,000 acre-feet and Usable Water is less than a full allocation or if the combined accrued Credit Water exceeds 50% of Project Storage and make a recommendation to the Commission regarding optimum use of water in Project Storage for Commission approval.
3. The Commission direct Reclamation to allocate or release Credit Water only as directed by the Commission.

The Engineer Advisers have not agreed on a recommendation and the Commission has not approved a proposal to optimize the use of water in Project Storage. Therefore, since one of the methods historically approved by the Commission was to tabulate evaporation of credit water on a monthly basis, the U. S. Bureau of Reclamation operates the Rio Grande Project with this historical practice and allocates the monthly tabulated evaporation of Credit Water to Usable Water.

**COMPACT ACCOUNTING 2015 - METHOD 1**

The Texas Engineer Adviser has reviewed the streamflow and reservoir storage records and other pertinent data for calendar year 2015. This method, recommended by the Texas Engineer Adviser, reduces the Credit Water evaporation monthly. The scheduled and actual deliveries, release of Usable Water for the year 2015, and balances as of January 1, 2016 are as follows:

**(a) Deliveries by Colorado at the State line:**

Balance as of January 1, 2015	6,800 acre-feet
Scheduled delivery	259,200 acre-feet
Actual delivery at Lobatos plus 10,000 acre-feet	260,400 acre-feet
Reduction of credit water on account of evaporation	1,300 acre-feet
Accrued credit January 1, 2016	6,700 acre-feet

**(b) Deliveries by New Mexico at Elephant Butte Dam:**

Balance as of January 1, 2015	11,800 acre-feet
Scheduled delivery	482,100 acre-feet
Actual delivery	482,500 acre-feet
Reduction of credit on account of evaporation	2,200 acre-feet
Accrued credit January 1, 2016	10,000 acre-feet

**(c) Project Storage and Releases:**

Accrued departure (credit) as of January 1, 2015	1,715,800 acre-feet
Actual release of Usable Water	435,900 acre-feet
Normal release for year	790,000 acre-feet
Accrued departure (credit) as of January 1, 2016	1,865,800 acre-feet
Under release capped at 150,000	

RIO GRANDE COMPACT - DELIVERIES BY COLORADO AT STATE LINE  
YEAR 2015 - Method 1

Quantities in thousands of acre feet to nearest hundred

MONTH	CONEJOS INDEX SUPPLY										RIO GRANDE INDEX SUPPLY								DELIVERIES			
	MEASURED FLOW				ADJUSTMENTS				SUPPLY		RECORDED FLOW NEAR DEL NORTE	ADJUSTMENTS					SUPPLY		CONEJOS RIVER AT MOUTH NEAR LASAUCES	RIO GRANDE LESS CONEJOS RIVER	RIO GRANDE AT LOBATOS	ACCUMULATED TOTAL AT LOBATOS
	CONEJOS AT MOGOTE	LOS PINOS NEAR ORTIZ	SAN ANTONIO AT ORTIZ	TOTAL	STORAGE AT END OF MONTH <sup>d</sup>	CHANGE IN STORAGE <sup>e</sup>	OTHER ADJUSTMENTS	NET ADJUSTMENTS	SUPPLY IN MONTH	ACCUMULATED TOTAL		STORAGE AT END OF MONTH	CHANGE IN STORAGE	TRANSMOUNTAIN DIVERSIONS <sup>b</sup>	OTHER ADJUSTMENTS <sup>a</sup>	NET ADJUSTMENTS	SUPPLY IN MONTH	ACCUMULATED TOTAL				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	-----	-----	-----	-----	7.5	-----	-----	-----	-----	0.0	-----	0.2	-----	-----	-----	-----	-----	0.0	-----	-----	-----	0.0
JAN	2.5	-----	-----	2.5	7.6	0.1		0.1	2.6	2.6	11.8	0.2	0.0			0.0	11.8	11.8	2.8	13.1	15.9	15.9
FEB	2.3	-----	-----	2.3	7.8	0.2		0.2	2.5	5.1	11.8	0.2	0.0			0.0	11.8	23.6	3.7	15.8	19.5	35.4
MAR	6.8	-----	-----	6.8	8.9	1.1		1.1	7.9	13.0	30.7	0.2	0.0			0.0	30.7	54.3	11.0	30.4	41.4	76.8
APR	12.2	11.0	3.2	26.4	9.0	0.1		0.1	26.5	39.5	50.0	0.2	0.0			0.0	50.0	104.3	3.6	12.1	15.7	92.5
MAY	32.6	20.7	2.1	55.4	9.1	0.1	0.1	0.2	55.6	95.1	119.2	0.2	0.0			0.0	119.2	223.5	2.6	9.8	12.4	104.9
JUN	68.9	15.6	0.4	84.9	23.5	14.4	0.1	14.5	99.4	194.5	236.2	0.2	0.0			0.0	236.2	459.7	17.1	26.1	43.2	148.1
JUL	24.0	3.4	0.3	27.7	20.2	-3.3	0.0	-3.3	24.4	218.9	96.1	0.2	0.0	-1.6	0.2	-1.4	94.7	554.4	11.3	30.5	41.8	189.9
AUG	11.3	1.6	0.1	13.0	14.1	-6.1	0.1	-6.0	7.0	225.9	32.5	0.2	0.0			0.0	32.5	586.9	2.0	7.8	9.8	199.7
SEPT	6.2	1.0	0.0	7.2	12.5	-1.6	0.1	-1.5	5.7	231.6	21.7	0.2	0.0			0.0	21.7	608.6	0.0	5.6	5.6	205.3
OCT	5.5	1.2	0.1	6.8	11.5	-1.0	0.1	-0.9	5.9	237.5	26.2	0.2	0.0			0.0	26.2	634.8	0.0	5.3	5.3	210.6
NOV	3.9	-----	-----	3.9	11.3	-0.2	0.0	-0.2	3.7	241.2	16.6	0.2	0.0			0.0	16.6	651.4	3.1	18.1	21.2	231.8
DEC	3.8	-----	-----	3.8	10.1	-1.2	0.0	-1.2	2.6	243.8	12.1	0.2	0.0			0.0	12.1	663.5	4.4	14.2	18.6	250.4
YEAR	180.0	54.5	6.2	240.7	-----	2.6	0.5	3.1	243.8	-----	664.9	-----	0.0	-1.6	0.2	-1.4	663.5	-----	61.6	188.8	250.4	-----
<div>Remarks: Cols. 6 and 13 do not include transmountain water. <sup>a</sup> Evaporation loss post-compact reservoirs; report of the Engineer Adviser for Colorado. <sup>b</sup> 1,813 ac-ft minus 243 ac-ft pre-compact; report of the Engineer Adviser for Colorado. <sup>c</sup> Reduction of Credit for Evaporation calculated on a monthly basis. <sup>d</sup> Note: No storage of relinquishment credit accrued in Platoro Reservoir during 2015. Storage of relinquished credit to date has totaled 1,749 acre- feet; balance remaining is 1,251 acre-feet. <sup>e</sup> See Engineer Adviser report in regards to change of storage.</div>											SUMMARY OF DEBITS AND CREDITS											
											ITEM		DEBIT	CREDIT	BALANCE							
											C1	Balance at Beginning of Year	-----	-----	Cr. 6.8							
											C2	Scheduled Delivery from Conejos River	71.3	-----	Dr. 64.5							
											C3	Scheduled Delivery from Rio Grande	187.9	-----	Dr. 252.4							
											C4	Actual Delivery at Lobatos plus 10,000 Acre Feet	-----	260.4	Cr. 8.0							
											C5	Reduction of Debits o/c Evaporation	-----									
											C6	Reduction of Credits o/c Evaporation	1.3	-----	Cr. 6.7							
											C7											
C8	Balance at End of Year	-----	-----	Cr. 6.7																		

APPROVED:  
Engineer Adviser for Colorado \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for New Mexico \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for Texas \_\_\_\_\_ Date: \_\_\_\_\_

RIO GRANDE COMPACT - DELIVERIES BY NEW MEXICO AT ELEPHANT BUTTE  
YEAR 2015 - Method 1

Quantities in thousands of acre feet to nearest hundred

MONTH	OTOWI INDEX SUPPLY									Total Water Stored in New Mexico Above San Marcial at End of Month <sup>a, b</sup>	ELEPHANT BUTTE EFFECTIVE SUPPLY				
	Recorded Flow at Otowi Bridge	ADJUSTMENTS						INDEX SUPPLY			STORAGE IN ELEPHANT BUTTE RESERVOIR		Recorded Flow Below Elephant Butte Dam	Effective Supply	
		RESERVOIRS: LOBATOS TO OTOWI			Other Adjustments	Trans-mountain Diversions	Net Adjustments	During Month	Accumulated Total		End of Month <sup>a</sup>	Change Gain (+) Loss (-)		During Month	Accumulated Total
		Storage End of Month <sup>a, b, d</sup>	Change in Storage	Reservoir Evaporation											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	-----	2.1	-----	-----	-----	-----	-----	-----	-----	1.4	252.8	-----	-----	-----	-----
JAN	38.5	6.1	4.0	0.0		-2.7	1.3	39.8	39.8	6.1	287.5	34.7	0.0	34.7	34.7
FEB	41.4	11.8	5.7	0.0		-1.1	4.6	46.0	85.8	11.7	325.2	37.7	0.1	37.8	72.5
MAR	76.9	30.5	18.7	0.1		-1.8	17.0	93.9	179.7	30.6	364.9	39.7	0.1	39.8	112.3
APR	71.3	54.0	23.5	0.3		-2.9	20.9	92.2	271.9	54.2	389.8	24.9	0.1	25.0	137.3
MAY	117.4	105.8	51.8	0.3		-3.4	48.7	166.1	438.0	105.2	396.1	6.3	51.2	57.5	194.8
JUN	126.1	115.0	9.2	0.5		-4.4	5.3	131.4	569.4	115.6	338.7	-57.4	112.2	54.8	249.6
JUL	90.3	113.3	-1.7	0.4		-7.6	-8.9	81.4	650.8	114.4	279.8	-58.9	114.7	55.8	305.4
AUG	68.3	95.8	-17.5	0.4		-13.6	-30.7	37.6	688.4	96.8	182.2	-97.6	113.5	15.9	321.3
SEPT	45.0	72.5	-23.3	0.3		-3.0	-26.0	19.0	707.4	72.5	165.2	-17.0	20.7	3.7	325.0
OCT	36.5	65.5	-7.0	0.2		-1.6	-8.4	28.1	735.5	65.9	179.9	14.7	0.1	14.8	339.8
NOV	69.1	48.7	-16.8	0.1		-11.6	-28.3	40.8	776.3	48.6	232.4	52.5	0.0	52.5	392.3
DEC	82.0	12.4	-36.3	0.1		-6.5	-42.7	39.3	815.6	12.8	322.5	90.1	0.1	90.2	482.5
YEAR	862.8	-----	10.3	2.7		-60.2	-47.2	815.6	-----	-----	-----	69.7	412.8	482.5	-----
<div>Remarks: a Cols. 3, 11, and 12 do not include transmountain water.  b Note: In 2015, 8,416 acre-feet of relinquishment credit under previous relinquishment agreements were stored in El Vado Reservoir. Storage of relinquished credit to date has totaled 264,037 acre-feet; balance remaining is 116,463 acre-feet.  c Reduction of Credit for Evaporation calculated on a monthly basis.  d Storage in April, May, and June includes water stored for El Vado deviation resolution.</div>							SUMMARY OF DEBITS AND CREDITS								
							ITEM		DEBIT		CREDIT		BALANCE		
							NM1	Balance at Beginning of Year		-----		-----		Cr. 11.8	
							NM2	Scheduled Delivery at Elephant Butte		482.1		-----		Dr. 470.3	
							NM3	Actual Elephant Butte Effective Supply		-----		482.5		Cr. 12.2	
							NM4	Reduction of Debits o/c Evaporation		-----					
							NM5	Reduction of Credits o/c Evaporation and Spill		2.2		-----		Cr. 10.0	
							NM6					-----			
							NM7								
NM8	Balance at End of Year		-----		-----		Cr. 10.0								

APPROVED:  
Engineer Adviser for Colorado \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for New Mexico \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for Texas \_\_\_\_\_ Date: \_\_\_\_\_

RIO GRANDE COMPACT - RELEASE AND SPILL FROM PROJECT STORAGE  
YEAR 2015 - Method 1

Quantities in thousands of acre feet to nearest hundred

MONTH	<sup>a</sup> Total Project Storage Capacity Available at End of Month	USABLE WATER IN STORAGE			Unfilled Capacity of Project Storage at End of Month	CREDIT WATER IN STORAGE			Flood Water in Storage in Caballo Reservoir at End of Month	Total Water in Project Storage at End of Month	RIO GRANDE BELOW CABALLO DAM								
		Elephant Butte Reservoir	Caballo Reservoir	Total at End of Month		<sup>c</sup> Colorado Credit Water	<sup>c</sup> New Mexico Credit Water	Total at End of Month			Measured Flow at Caballo Gaging Station	Intervening Diversions to Canals	Total Release and Spill	SPILL FROM STORAGE			USABLE RELEASE		
														Caballo Flood Water	Credit Water	Usable Water	Net During Month	Accumulated Total	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
	1,999.6	<sup>b</sup> 188.5	32.4	<sup>b</sup> 220.9	1,797.4	<sup>b</sup> 6.8	<sup>b</sup> 11.8	<sup>b</sup> 64.3		285.2	-----	-----	-----	-----	-----	-----	-----	0.0	
JAN	1,999.6	268.9	33.8	302.7	1,696.9	6.8	11.8	18.6		321.3	0.0	0.0	0.0				0.0	0.0	
FEB	1,999.6	306.8	35.3	342.1	1,657.5	6.7	11.7	18.4		360.5	0.0	0.2	0.2				0.2	0.2	
MAR	1,999.6	346.8	36.1	382.9	1,616.7	6.6	11.5	18.1		401.0	0.1	0.0	0.1				0.1	0.3	
APR	1,974.6	372.0	35.3	407.3	1,567.3	6.5	11.3	17.8		425.1	0.1	0.1	0.2				0.2	0.5	
MAY	1,974.6	378.7	44.3	423.0	1,551.6	6.4	11.0	17.4		440.4	34.3	0.2	34.5				34.5	35.0	
JUN	1,974.6	321.8	17.3	339.1	1,635.5	6.2	10.7	16.9		356.0	141.6	0.2	141.8				141.8	176.8	
JUL	1,974.6	263.4	16.8	280.2	1,694.4	6.0	10.4	16.4		296.6	118.8	0.1	118.9				118.9	295.7	
AUG	1,974.6	166.3	45.6	211.9	1,762.7	5.8	10.1	15.9		227.8	90.3	0.1	90.4				90.4	386.1	
SEPT	1,974.6	149.6	23.8	173.4	1,801.2	5.7	9.9	15.6		189.0	49.6	0.1	49.7				49.7	435.8	
OCT	1,999.6	164.5	25.1	189.6	1,810.0	5.6	9.8	15.4		205.0	0.1	0.0	0.1				0.1	435.9	
NOV	1,999.6	217.1	26.3	243.4	1,756.2	5.6	9.7	15.3		258.7	0.0	0.0	-				0.0	435.9	
DEC	1,999.6	307.4	27.7	335.1	1,664.5	5.5	9.6	15.1		350.2	0.0	0.0	-				0.0	435.9	
YEAR	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	434.9	1.0	435.9	0.0	0.0	0.0	435.9	-----	
<div>Remarks: Cols. 2, 6 and 11 reflect implementation of revised area-capacity tables from Elephant Butte and Caballo Reservoirs, effective Jan 1, 2009</div> <div><sup>a</sup> Project Storage Capacity is 1,974,600 acre-feet (April to September) and 1,999,600 acre-feet (October to March) as adopted by the Rio Grande Compact Commission on March 31, 2009 with flood control storage reservation at Elephant Butte Reservoir of 50,000 acre-feet from April through September and 25,000 acre-feet from October through March.</div> <div><sup>b</sup> Based on Balance at Beginning of Year (C1 and NM1).</div> <div><sup>c</sup> Calculated on a monthly basis.</div>											ACCRUED DEPARTURE FROM NORMAL RELEASE								
											ITEM			DEBIT	CREDIT	BALANCE			
											P1	Accrued Departure at Beginning of Year			-----	-----	Cr.1715.8		
											P2	Actual Release during Year			435.9	-----	Cr. 1279.9		
											P3	Normal Release for Year			-----	790.0	Cr. 2069.9		
											P4	Under Release in Excess of 150.0			204.1	-----	Cr.1865.8		
											P5				-----				
											P6								
											P7	Accrued Departure at End of Year			-----	-----	Cr.1865.8		

APPROVED:  
Engineer Adviser for Colorado \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for New Mexico \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for Texas \_\_\_\_\_ Date: \_\_\_\_\_

RIO GRANDE COMPACT - DELIVERIES BY COLORADO AT STATE LINE  
YEAR 2015 - Method 2

Quantities in thousands of acre feet to nearest hundred

MONTH	CONEJOS INDEX SUPPLY										RIO GRANDE INDEX SUPPLY								DELIVERIES			
	MEASURED FLOW				ADJUSTMENTS				SUPPLY		RECORDED FLOW NEAR DEL NORTE	ADJUSTMENTS					SUPPLY		CONEJOS RIVER AT MOUTH NEAR LASAUCES	RIO GRANDE LESS CONEJOS RIVER	RIO GRANDE AT LOBATOS	ACCUMULATED TOTAL AT LOBATOS
	CONEJOS AT MOGOTE	LOS PINOS NEAR ORTIZ	SAN ANTONIO AT ORTIZ	TOTAL	STORAGE AT END OF MONTH <sup>d</sup>	CHANGE IN STORAGE <sup>e</sup>	OTHER ADJUSTMENTS	NET ADJUSTMENTS	SUPPLY IN MONTH	ACCUMULATED TOTAL		STORAGE AT END OF MONTH	CHANGE IN STORAGE	TRANSMOUNTAIN DIVERSIONS <sup>b</sup>	OTHER ADJUSTMENTS <sup>a</sup>	NET ADJUSTMENTS	SUPPLY IN MONTH	ACCUMULATED TOTAL				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	-----	-----	-----	-----	7.5	-----	-----	-----	-----	0.0	-----	0.2	-----	-----	-----	-----	-----	0.0	-----	-----	-----	0.0
JAN	2.5	-----	-----	2.5	7.6	0.1		0.1	2.6	2.6	11.8	0.2	0.0			0.0	11.8	11.8	2.8	13.1	15.9	15.9
FEB	2.3	-----	-----	2.3	7.8	0.2		0.2	2.5	5.1	11.8	0.2	0.0			0.0	11.8	23.6	3.7	15.8	19.5	35.4
MAR	6.8	-----	-----	6.8	8.9	1.1		1.1	7.9	13.0	30.7	0.2	0.0			0.0	30.7	54.3	11.0	30.4	41.4	76.8
APR	12.2	11.0	3.2	26.4	9.0	0.1		0.1	26.5	39.5	50.0	0.2	0.0			0.0	50.0	104.3	3.6	12.1	15.7	92.5
MAY	32.6	20.7	2.1	55.4	9.1	0.1	0.1	0.2	55.6	95.1	119.2	0.2	0.0			0.0	119.2	223.5	2.6	9.8	12.4	104.9
JUN	68.9	15.6	0.4	84.9	23.5	14.4	0.1	14.5	99.4	194.5	236.2	0.2	0.0			0.0	236.2	459.7	17.1	26.1	43.2	148.1
JUL	24.0	3.4	0.3	27.7	20.2	-3.3	0.0	-3.3	24.4	218.9	96.1	0.2	0.0	-1.6	0.2	-1.4	94.7	554.4	11.3	30.5	41.8	189.9
AUG	11.3	1.6	0.1	13.0	14.1	-6.1	0.1	-6.0	7.0	225.9	32.5	0.2	0.0			0.0	32.5	586.9	2.0	7.8	9.8	199.7
SEPT	6.2	1.0	0.0	7.2	12.5	-1.6	0.1	-1.5	5.7	231.6	21.7	0.2	0.0			0.0	21.7	608.6	0.0	5.6	5.6	205.3
OCT	5.5	1.2	0.1	6.8	11.5	-1.0	0.1	-0.9	5.9	237.5	26.2	0.2	0.0			0.0	26.2	634.8	0.0	5.3	5.3	210.6
NOV	3.9	-----	-----	3.9	11.3	-0.2	0.0	-0.2	3.7	241.2	16.6	0.2	0.0			0.0	16.6	651.4	3.1	18.1	21.2	231.8
DEC	3.8	-----	-----	3.8	10.1	-1.2	0.0	-1.2	2.6	243.8	12.1	0.2	0.0			0.0	12.1	663.5	4.4	14.2	18.6	250.4
YEAR	180.0	54.5	6.2	240.7	-----	2.6	0.5	3.1	243.8	-----	664.9	-----	0.0	-1.6	0.2	-1.4	663.5	-----	61.6	188.8	250.4	-----
<div>Remarks: Cols. 6 and 13 do not include transmountain water.</div> <div><sup>a</sup> Evaporation loss post-compact reservoirs; report of the Engineer Adviser for Colorado.</div> <div><sup>b</sup> 1,813 ac-ft minus 243 ac-ft pre-compact; report of the Engineer Adviser for Colorado.</div> <div><sup>c</sup> Evaporation of credit water accounted as described in Article VI of the Rio Grande Compact.</div> <div><sup>d</sup> Note: No storage of relinquishment credit accrued in Platoro Reservoir during 2015. Storage of relinquished credit to date has totaled 1,749 acre-feet; balance remaining is 1,251 acre-feet.</div> <div><sup>e</sup> See Engineer Adviser report in regards to change of storage.</div>											SUMMARY OF DEBITS AND CREDITS											
											ITEM		DEBIT	CREDIT	BALANCE							
											C1	Balance at Beginning of Year	-----	-----	Cr. 6.7							
											C2	Scheduled Delivery from Conejos River	71.3	-----	Dr. 64.6							
											C3	Scheduled Delivery from Rio Grande	187.9	-----	Dr. 252.5							
											C4	Actual Delivery at Lobatos plus 10,000 Acre Feet	-----	260.4	Cr. 7.9							
											C5	Reduction of Debits o/c Evaporation	-----									
											C6	Reduction of Credits o/c Evaporation <sup>c</sup>	1.3	-----	Cr. 6.6							
											C7											
C8	Balance at End of Year	-----	-----	Cr. 6.6																		

APPROVED:  
Engineer Adviser for Colorado \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for New Mexico \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for Texas \_\_\_\_\_ Date: \_\_\_\_\_

RIO GRANDE COMPACT - DELIVERIES BY NEW MEXICO AT ELEPHANT BUTTE  
YEAR 2015 - Method 2

Quantities in thousands of acre feet to nearest hundred

MONTH	OTOWI INDEX SUPPLY									Total Water Stored in New Mexico Above San Marcial at End of Month <sup>a, b</sup>	ELEPHANT BUTTE EFFECTIVE SUPPLY				
	Recorded Flow at Otowi Bridge	ADJUSTMENTS						INDEX SUPPLY			STORAGE IN ELEPHANT BUTTE RESERVOIR		Recorded Flow Below Elephant Butte Dam	Effective Supply	
		RESERVOIRS: LOBATOS TO OTOWI			Other Adjustments	Trans-mountain Diversions	Net Adjustments	During Month	Accumulated Total		End of Month <sup>a</sup>	Change Gain (+) Loss (-)		During Month	Accumulated Total
		Storage End of Month <sup>a, b</sup>	Change in Storage	Reservoir Evaporation											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	-----	2.1	-----	-----	-----	-----	-----	-----	-----	1.4	252.8	-----	-----	-----	-----
JAN	38.5	6.1	4.0	0.0		-2.7	1.3	39.8	39.8	6.1	287.5	34.7	0.0	34.7	34.7
FEB	41.4	11.8	5.7	0.0		-1.1	4.6	46.0	85.8	11.7	325.2	37.7	0.1	37.8	72.5
MAR	76.9	30.5	18.7	0.1		-1.8	17.0	93.9	179.7	30.6	364.9	39.7	0.1	39.8	112.3
APR	71.3	54.0	23.5	0.3		-2.9	20.9	92.2	271.9	54.2	389.8	24.9	0.1	25.0	137.3
MAY	105.9	119.4	65.4	0.3		-3.4	62.3	168.2	440.1	118.8	388.2	-1.6	51.2	49.6	186.9
JUN	124.4	128.0	8.6	0.5		-4.4	4.7	129.1	569.2	128.5	325.5	-62.7	112.2	49.5	236.4
JUL	90.4	126.2	-1.8	0.5		-7.6	-8.9	81.5	650.7	127.3	267.1	-58.4	114.7	56.3	292.7
AUG	68.3	108.7	-17.5	0.4		-13.6	-30.7	37.6	688.3	109.6	169.7	-97.4	113.5	16.1	308.8
SEPT	45.0	85.3	-23.4	0.4		-3.0	-26.0	19.0	707.3	85.3	152.8	-16.9	20.7	3.8	312.6
OCT	36.5	78.3	-7.0	0.2		-1.6	-8.4	28.1	735.4	78.7	167.6	14.8	0.1	14.9	327.5
NOV	81.9	48.7	-29.6	0.2		-11.6	-41.0	40.9	776.3	48.5	232.4	64.8	0.0	64.8	392.3
DEC	82.0	12.4	-36.3	0.1		-6.5	-42.7	39.3	815.6	12.8	322.5	90.1	0.1	90.2	482.5
YEAR	862.5	-----	10.3	3.0		-60.2	-46.9	815.6	-----	-----	-----	69.7	412.8	482.5	-----
<div>Remarks:</div> <div><sup>a</sup> Cols. 3, 11, and 12 do not include transmountain water.</div> <div><sup>b</sup> Note: In 2015, 8,416 acre-feet of relinquishment credit under previous relinquishment agreements were stored in El Vado Reservoir. Storage of relinquished credit to date has totaled 264,037 acre-feet; balance remaining is 116,463 acre-feet</div> <div><sup>c</sup>Evaporation of credit water accounted as described in Article VI of the Rio Grande Compact.</div> <div>Note: Numbers in red are based on the hypothetical water operation described in NM EA report addendum.</div>							SUMMARY OF DEBITS AND CREDITS								
							ITEM		DEBIT		CREDIT		BALANCE		
							NM1	Balance at Beginning of Year	-----		-----		Cr. 0.0		
							NM2	Scheduled Delivery at Elephant Butte	482.1		-----		Dr. 482.1		
							NM3	Actual Elephant Butte Effective Supply	-----		482.5		Cr. 0.4		
							NM4	Reduction of Debits o/c Evaporation	-----						
							NM5	Reduction of Credits o/c Evaporation and Spill <sup>c</sup>			-----		Cr. 0.4		
							NM6				-----				
							NM7								
							NM8	Balance at End of Year	-----		-----		Cr. 0.4		

APPROVED:  
Engineer Adviser for Colorado \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for New Mexico \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for Texas \_\_\_\_\_ Date: \_\_\_\_\_

RIO GRANDE COMPACT - RELEASE AND SPILL FROM PROJECT STORAGE  
YEAR 2015 - Method 2

Quantities in thousands of acre feet to nearest hundred

MONTH	<sup>a</sup> Total Project Storage Capacity Available at End of Month	USABLE WATER IN STORAGE			Unfilled Capacity of Project Storage at End of Month	CREDIT WATER IN STORAGE			Flood Water in Storage in Caballo Reservoir at End of Month	Total Water in Project Storage at End of Month	RIO GRANDE BELOW CABALLO DAM								
		Elephant Butte Reservoir	Caballo Reservoir	Total at End of Month		<sup>c</sup> Colorado Credit Water	<sup>c</sup> New Mexico Credit Water	Total at End of Month			Measured Flow at Caballo Gaging Station	Intervening Diversions to Canals	Total Release and Spill	SPILL FROM STORAGE			USABLE RELEASE		
														Caballo Flood Water	Credit Water	Usable Water	Net During Month	Accumulated Total	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
	1,999.6	246.1	32.4	278.5	1,721.1	6.7 <sup>b</sup>	0 <sup>b</sup>	6.7		285.2	-----	-----	-----	-----	-----	-----	-----	0.0	
JAN	1,999.6	280.8	33.8	314.6	1,685.0	6.7	0.0	6.7		321.3	0.0	0.0	0.0				0.0	0.0	
FEB	1,999.6	318.5	35.3	353.8	1,645.8	6.7	0.0	6.7		360.5	0.0	0.2	0.2				0.2	0.2	
MAR	1,999.6	358.2	36.1	394.3	1,605.3	6.7	0.0	6.7		401.0	0.1	0.0	0.1				0.1	0.3	
APR	1,974.6	383.1	35.3	418.4	1,556.2	6.7	0.0	6.7		425.1	0.1	0.1	0.2				0.2	0.5	
MAY	1,974.6	381.5	44.3	425.8	1,548.8	6.7	0.0	6.7		432.5	34.3	0.2	34.5				34.5	35.0	
JUN	1,974.6	318.8	17.3	336.1	1,638.5	6.7	0.0	6.7		342.8	141.6	0.2	141.8				141.8	176.8	
JUL	1,974.6	260.4	16.8	277.2	1,697.4	6.7	0.0	6.7		283.9	118.8	0.1	118.9				118.9	295.7	
AUG	1,974.6	163.0	45.6	208.6	1,766.0	6.7	0.0	6.7		215.3	90.3	0.1	90.4				90.4	386.1	
SEPT	1,974.6	146.1	23.8	169.9	1,804.7	6.7	0.0	6.7		176.6	49.6	0.1	49.7				49.7	435.8	
OCT	1,999.6	160.9	25.1	186.0	1,813.6	6.7	0.0	6.7		192.7	0.1	0.0	0.1				0.1	435.9	
NOV	1,999.6	225.7	26.3	252.0	1,747.6	6.7	0.0	6.7		258.7	0.0	0.0	-				0.0	435.9	
DEC	1,999.6	315.8	27.7	343.5	1,656.1	6.7	0.0	6.7		350.2	0.0	0.0	-				0.0	435.9	
YEAR	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	434.9	1.0	435.9	0.0	0.0	0.0	435.9	-----	
<div>Remarks: Cols. 2, 6 and 11 reflect implementation of revised area-capacity tables from Elephant Butte and Caballo Reservoirs, effective Jan 1, 2009</div> <div><sup>a</sup> Project Storage Capacity is 1,974,600 acre-feet (April to September) and 1,999,600 acre-feet (October to March) as adopted by the Rio Grande Compact Commission on March 31, 2009 with flood control storage reservation at Elephant Butte Reservoir of 50,000 acre-feet from April through September and 25,000 acre-feet from October through March.</div> <div><sup>b</sup> Based on Balance at Beginning of Year (C1 and NM1).</div> <div><sup>c</sup> Credit water held constant during the year in accordance with Article VI and per direction of Compact Commisssion in March 2006. Evaporation for credit water is accounted at end of calendar year in the proportion that the Credit Water bore to the total amount of water in Elephant Butte Reservoir during the year. If loan had been approved, Credit Water would have been decreased by the amount of the negative usable water.</div> <div><sup>d</sup> Due to Caballo release discrepancies during 2011, data was not approved for 2011; consequently, the accrued departure at the beginning of 2012,2013,2014 and 2015 could not be computed.</div>											ACCRUED DEPARTURE FROM NORMAL RELEASE								
											ITEM		DEBIT		CREDIT	BALANCE			
											P1	Accrued Departure at Beginning of Year <sup>d</sup>		-----	-----	Cr.			
											P2	Actual Release during Year		435.9	-----	Cr.			
											P3	Normal Release for Year		-----	790.0	Cr.			
											P4				-----	Cr.			
											P5			-----					
											P6								
											P7	Accrued Departure at End of Year		-----	-----	Cr.			

APPROVED:  
Engineer Adviser for Colorado \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for New Mexico \_\_\_\_\_ Date: \_\_\_\_\_ Engineer Adviser for Texas \_\_\_\_\_ Date: \_\_\_\_\_

**BUDGET FOR FISCAL YEAR ENDING JUNE 30, 2015**

Item	Total Cost	Borne by United States	Borne by		
			Colorado	New Mexico	Texas
<b>GAGING STATIONS</b>					
In Colorado	\$73,050		\$73,050		
In New Mexico, above Caballo Reservoir	\$75,062	\$41,142		\$33,920	
In New Mexico, Caballo Reservoir and below	\$30,546	\$7,364		\$3,256	\$19,926
Subtotal	\$178,658	\$48,506	\$73,050	\$37,176	\$19,926
<b>ADMINISTRATION</b>					
U.S.G.S. Technical Services	\$19,414	\$5,884	\$4,510	\$4,510	\$4,510
Other expenses <sup>1</sup>	\$3,000		\$1,000	\$1,000	\$1,000
Subtotal	\$22,414	\$5,884	\$5,510	\$5,510	\$5,510
<b>GRAND TOTAL</b>	\$201,072	\$54,390	\$78,560	\$42,686	\$25,436
<b>EQUAL SHARES</b>			\$48,894	\$48,894	\$48,894

<sup>1</sup>Includes cost of court reporter and publication of Annual Report.

**BUDGET FOR FISCAL YEAR ENDING JUNE 30, 2017**

Item	Total Cost	Borne by United States	Borne by		
			Colorado	New Mexico	Texas
<b>GAGING STATIONS</b>					
In Colorado	\$75,370		\$75,370		
In New Mexico, above Caballo Reservoir	\$75,062	\$41,142		\$33,920	
In New Mexico, Caballo Reservoir and below	\$35,434	\$11,655		\$3,255	\$20,524
Subtotal	\$185,866	\$52,797	\$75,370	\$37,175	\$20,524
<b>ADMINISTRATION</b>					
U.S.G.S. Technical Services	\$19,414	\$5,884	\$4,510	\$4,510	\$4,510
Other expenses <sup>1</sup>	\$3,000		\$1,000	\$1,000	\$1,000
Subtotal	\$22,414	\$5,884	\$5,510	\$5,510	\$5,510
<b>GRAND TOTAL</b>	\$208,280	\$58,681	\$80,880	\$42,685	\$26,034
<b>EQUAL SHARES</b>			\$49,866	\$49,866	\$49,866

<sup>1</sup>Includes cost of court reporter and publication of Annual Report.

Agreement No: 16CRNM000000012  
 Customer No:  
 6000001029/6000001775/6000000631  
 Project No: RG209L7  
 Tax ID: 84-0644739 (CO)  
 85-6000565 (NM)  
 74-1694284 (TX)  
 Fixed-price agreement

### COOPERATIVE AGREEMENT FOR INVESTIGATION OF WATER RESOURCES

THIS AGREEMENT, entered into this 1<sup>st</sup> day of July, 2016 by and between the United States Geological Survey, party of the first part, and each of the Commissioners representing the three signatory states and the Representative of the United States, constituting the Rio Grande Compact Commission, party of the second part.

In consideration of the mutual promises and agreements herein contained, it is agreed by and between the parties hereto as follows:

1. The parties agree that, subject to the availability of appropriations and in accordance with their respective authorities, there shall be maintained a cooperative program for duties as stated in the attached Statement of Work, for the Rio Grande Compact Commission within and among the three states in accordance with the terms of the Rio Grande Compact, incorporated herein by reference.

The parties further agree that this agreement shall in no manner affect any other agreement between the United States Geological Survey and any of the three states of the basin concerning the collection of hydrologic data, but in each case where there is or may be another agreement covering the collection of such data, the duty of the United States Geological Survey as provided here, shall be to compile, correlate, and present hydrographic data that has been collected under such agreements.

2. The parties agree to contribute to this program in the amounts specified or as are from time to time agreed upon in writing, funds needed and available to cover all the cost of the necessary field and office work directly related to the program, excluding any general administrative or accounting work in the office of any of the parties, and excluding the costs of publication by any of the parties of the results of the program.

3. The United States Geological Survey and state members of the Rio Grande Compact agree to contribute to the program during the period from July 1, 2016 to June 30, 2017, the following amounts:

(a)	U.S. Geological Survey	\$5,884
(b)	State of Colorado	\$4,510
(c)	State of New Mexico	\$4,510
(d)	State of Texas	\$4,510

4. So far as may be mutually agreed, all expenses shall be paid in the first instance by the United States Geological Survey with appropriate reimbursement thereafter by the other parties hereto. Each of the parties shall furnish to each of the other parties such statements or reports of expenditures as may be needed to satisfy fiscal requirements.

5. Unless previously terminated by the parties hereto, this agreement shall terminate on June 30, 2017, provided it may be renewed by the mutual agreement of the United States Geological Survey and each of the Commissioners representing the three signatory states to the Rio Grande Compact, as the voting members of the Rio Grande Compact Commission, on or before June 30, 2017, for a period of 1 year, and may be renewed in a like manner on or before June 30th of any year thereafter for a similar period. Any party may terminate this agreement by providing 60 day's written notice to the other party. When an accepted agreement is terminated by the State members of the Rio Grande Compact Commission, the USGS is authorized to collect costs incurred prior to the effective date of termination of the agreement plus any termination cost.

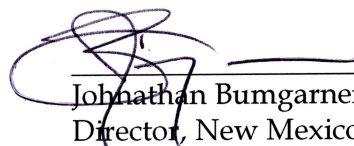
6. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other parties.

7. In the event this Agreement is renewed as herein provided, the amounts to be contributed by the parties for each renewal period may be determined by mutual agreement and set forth by exchange of letters between the parties at or near the beginning of each such period.

8. Billing for this agreement will be rendered semi-annually in January 2017 and July 2017. 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-B212222, August 23, 1983.)

9. The Legal authorities for the U.S. Geological Survey to enter into this Agreement are 43 USC 36C; 43 USC 50; and 43 USC 50b.

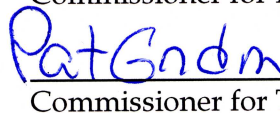
#### UNITED STATES GEOLOGICAL SURVEY

  
Johnathan Bumgarner 3/15/2016  
Director, New Mexico Water Science Center

#### RIO GRANDE COMPACT COMMISSION

 3/31/16  
Commissioner for Colorado Date

  
Commissioner for New Mexico Date

  
Commissioner for Texas Date

 3/31/16  
Representative of the United States Date

**Statement of Work  
for  
16CRNM000000012**

The duties of the United States Geological Survey are as follows:

1. Obtain data for yearly accounting from U.S. Geological Survey in New Mexico and Colorado as well as U.S. Bureau of Reclamation, Albuquerque and El Paso Offices, and Colorado Division of Water Resources.
2. Prepare and submit provisional water accounting reports on the deliveries of the Rio Grande water.
3. Compile Rio Grande Compact Commission water accounting from the data supplied by various agencies. Present annual accounting at the Engineer Advisor's Meeting. Obtain signature of Engineer Advisors on approved accounting sheets.

## **Schedule for Review and Approval of Rio Grande Compact Accounting Records for the Previous Year**

**Authorized in March 2016**

The Engineer Advisers (EAs) and agencies that participate in Rio Grande Compact (Compact) accounting (participating agencies) have discussed the importance of having timely and accurate streamflow and reservoir data for administration of the Compact. In order to ensure receipt of necessary data, the EAs determined that delaying their regular annual meeting by one week would benefit overall administration of the Compact, and be in the best interest of participating agencies which provide data to, or rely upon data from, the United State Geological Survey (USGS). Therefore, the annual meeting of the EAs will henceforth normally be held the first week in March of each year, in order to provide additional time for developing, reviewing, and finalizing required Compact accounting records.

The EAs recommend the following general process and schedule for development, evaluation, and approval of required RGCC accounting records:

### **During the Calendar Year**

Each agency collect, review and approve streamflow and reservoir data used for administration of the Compact every two months during the calendar year. Data will be approved by the agency responsible for its collection by the fifteenth of the month following the previous two months and transmitted to the New Mexico USGS Compact technical staff person (USGS Technical Staff Person). The USGS Technical Staff Person will compile the approved data and submit a quarterly report in writing to each state for review. The USGS Technical Staff Person will submit quarterly data reports to each state by the end of the month following each quarter.

### **January of Each Year – Completion and Internal Review of Annual Accounting Records**

#### **By end of third full week in January**

- Colorado prepares and approves streamflow records for Compact gages located within their state as well as reservoir records, and transmountain water data and information. Colorado submits compact streamflow gage records to Colorado USGS for review.
- Reclamation submits approved streamflow record for the gage below Caballo dam to New Mexico USGS for review.
- USGS in Colorado and New Mexico, as appropriate, begin final review of the Colorado Rio Grande and Conejos, the Otowi, the below Elephant Butte, and the below Caballo streamflow gage records. Changes to previously approved data should not be made without notifying the EAs. The USGS in Colorado and New Mexico will prepare annual

summary reports for each Compact streamflow gage in accordance with the attached outline.

- Reclamation and Corps submit their approved reservoir accounting information for the previous calendar year to New Mexico USGS.
- The New Mexico USGS sends approved Nichols and McClure reservoir data to the City of Santa Fe and New Mexico.

By the end of January

- Reclamation prepares draft annual Water Accounting Report with San Juan Chama Project accounting records and submits to the EAs for review.
- The City of Santa Fe submits their operations and reservoir pool allocation data for McClure and Nichols Reservoirs to NMISC for review.

**February of Each Year - Compilation of All Required RGCC Records**

First week in February

- New Mexico prepares operations and accounting report for Nichols and McClure reservoirs and submits to the New Mexico USGS and to the EAs.
- EAs may hold a one to one-and-a half day meeting to review final information from the Compact gaging stations and plan for annual EA and RGCC meetings.

End of third week of February

- All final water accounting reports to be submitted to USGS Technical Staff Person for Annual Accounting purposes.

A week prior to the EA meeting

- The Federal agencies provide their draft annual report's to the RGCC to the EAs for review.
- USGS Technical Staff Person sends Compact accounting information and the USGS Compact Streamflow gaging summary reports to EAs for review.

**EA Review and Approval of Required RGCC Records**

Last week in February or First week of March

- The annual meeting of the EAs will normally be held the first week in March each year. The Engineer Advisers will have the discretion to change the meeting dates. The annual EA meeting will most often be held in Santa Fe and/or Albuquerque New Mexico but may be held at other locations at the EA's discretion. During the course of the meeting, at the minimum, the EAs will:

- review and provide their final approval for streamflow and reservoir data required for administration of the Compact.
- meet with representatives of the USGS, Reclamation, Corps, USF&WS, IBWC, BIA, and/or other invited guests to review and discuss significant developments and operations for the previous year.
- prepare draft minutes of the previous year Compact Commission meeting.
- prepare draft Compact water operations accounting for the previous calendar year.
- prepare a draft budget for the coming fiscal year as well as finalize the budget for the previous fiscal year.
- Prepare letters to the Governor's of Colorado, New Mexico, and Texas regarding the previous calendar year Compact accounting.
- prepare a report of the operations and significant events of the previous calendar year for the Compact Commission.

#### **Annual Rio Grande Compact Commission Meeting**

- The annual meeting of the Rio Grande Compact Commission (RGCC) will normally be held the last week in March or first week in April each year. The meeting location will be rotated in sequence between Colorado, New Mexico, and Texas.

**RESOLUTION****RIO GRANDE COMPACT COMMISSION****REGARDING TEMPORARY MODIFICATION OF OPERATIONS AT EL VADO  
RESERVOIR IN NEW MEXICO DURING MAY AND JUNE 2016**

March 31, 2016

WHEREAS, the states of Colorado, New Mexico, and Texas, in 1938, signed the Rio Grande Compact apportioning the waters of the Rio Grande above Fort Quitman, Texas; and

WHEREAS, the Rio Grande Compact was passed as Public Act No. 96 by the 76<sup>th</sup> Congress of the United States and approved by the President on May 31, 1939; and

WHEREAS, the agencies of the United States operate numerous reservoirs and other water-related facilities in the Rio Grande basin; and

WHEREAS, the U.S. Bureau of Reclamation (Reclamation) operates El Vado Reservoir on the Rio Chama, a major tributary to the Rio Grande in New Mexico, in coordination with the Middle Rio Grande Conservancy District (MRGCD); and

WHEREAS, El Vado Reservoir is a post -1929 reservoir and is required to be operated in compliance with the Rio Grande Compact; and

WHEREAS, storage of native Rio Grande water in El Vado Reservoir is prohibited under Article VII of the Rio Grande Compact when either Usable Water in Rio Grande Project Storage is less than 400,000 acre-feet and New Mexico has not made relinquishment credit available to store, or the Rio Grande Compact Commission has not specifically authorized such storage; and

WHEREAS, while the Article VII storage restriction of the Rio Grande Compact is not currently in effect, it has been in effect for much of the past five years, and is projected to go back into effect in May 2016; and

WHEREAS, the Engineer Advisers to the Rio Grande Compact Commission propose to coordinate with Reclamation and the MRGCD to modify operations at El Vado Reservoir in 2016 for the limited purpose of creating a spawning flow for the benefit of the Rio Grande silvery minnow in the middle Rio Grande in accordance with the Rio Grande Compact and the Resolutions set forth herein.

NOW, THEREFORE, BE IT RESOLVED, the Rio Grande Compact Commission authorizes Reclamation and the MRGCD to temporarily modify operations at El Vado Reservoir in 2016 to aid in creating a spawning flow for the benefit of the Rio Grande silvery minnow in the Middle Rio Grande should the Article VII storage restriction go back into effect (Temporary Modification). For purposes of this Temporary Modification, determination of the date Article VII goes back into effect shall be based on the later of either of the two Article VII triggering dates for Article 7 storage restrictions under the Compact accounting Methods 1 or 2; and

BE IT FURTHER RESOLVED that once the New Mexico Engineer Adviser determines that Article VII is back in effect, he will coordinate with the Engineer Advisers, and notify Reclamation and the MRGCD to undertake the Temporary Modification by storing and releasing water from El Vado Reservoir. The operation will be conducted to match the timing, fill low flows, and/or augment the natural peak snowmelt runoff from the mainstem Rio Grande at the Otowi gage as measured by the 30-year average; provided:

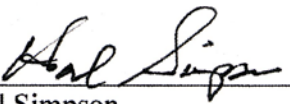
1. The United States Fish and Wildlife Service (Service) indicates this modification will provide a definite benefit for the Rio Grande silvery minnow;
2. Reclamation and the MRGCD will not store native water for any other purpose than to aid in creating a spawning flow for the benefit of the Rio Grande silvery minnow in the Middle Rio Grande while conducting the Temporary Modification;
3. All actions related to the Temporary Modification will be completed prior to June 15, 2016; and,
4. Reclamation will provide detailed daily accounting in weekly reports to the Engineer Advisers during the Temporary Modification.

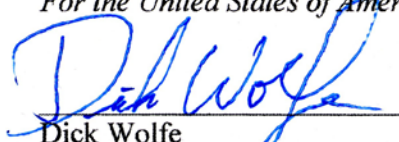
BE IT FURTHER RESOLVED that since New Mexico is not in an Accrued Debit under Article VI, the Rio Grande Compact Commission hereby advises and consents to the Temporary Modification during 2016 to aid in creating a spawning flow for the Rio Grande silvery minnow; provided, however, that the Temporary Modification will in no way negatively affect the timing of Article VII (prevent Usable Water in Project Storage from rising above 400,000 acre-feet), and that any and all additional depletions resulting from the Temporary Modification shall be offset using rights in the New Mexico Strategic Water Reserve; and


BE IT FURTHER RESOLVED that Reclamation, New Mexico, and the Service must report the details of the Temporary Modification to the Engineer Advisers and the Rio Grande Compact Commission at its 78<sup>th</sup> annual meeting; and

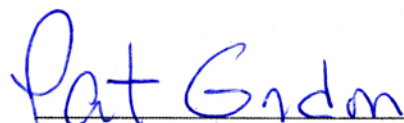
BE IT FURTHER RESOLVED that the New Mexico Engineer Adviser to the Rio Grande Compact Commission shall transmit copies of this resolution to the Albuquerque Area Office Manager of Reclamation, the Regional Director of Reclamation, the New Mexico Ecological Services Field Office Supervisor of the Service, the Regional Director of the Service, and the Chairman of the Board of the Middle Rio Grande Conservancy District; and,

BE IT FINALLY RESOLVED that nothing herein represents a waiver or admission of any legal or factual matter by any Commissioner, Engineer Adviser, the states of Colorado, New Mexico and Texas or the United States.

  
Hal Simpson  
Chairman and Commissioner  
For the United States of America

  
Dick Wolfe  
Commissioner for Colorado

  
Tom Blaine  
Commissioner for New Mexico

  
Patrick R. Gordon  
Commissioner for Texas

## RESOLUTION

### RIO GRANDE COMPACT COMMISSION

Honoring Herman R. Settemeyer, P.E.

March 31, 2016

**WHEREAS**, Herman R. Settemeyer, P.E. dedicated his professional career at the Texas Water Commission, now known as the Texas Commission on Environmental Quality, to the protection of water quantity and water quality; and

**WHEREAS**, Herman R. Settemeyer, P.E. worked on technically challenging water right adjudications such as the Brownsville Weir and Reservoir project and the Presidio Farms water rights and politically difficult issues such as proper interpretation of the 1906 Convention and the Rio Grande Compact, and assisted the U.S. in negotiations with Mexico on the 1944 Treaty, and is regarded as an expert in the field of water, and

**WHEREAS**, among Herman R. Settemeyer, P.E.'s most distinct qualities are a keen and calm demeanor, love of travel and penchant for making a point; and

**WHEREAS**, Herman R. Settemeyer, P.E.'s skills were recognized and he was thereby chosen to work on the Rio Grande Compact in 1987 and the other water compacts to which Texas is a signatory and eventually became the Engineer Adviser for all five Texas water compacts; and

**WHEREAS**, Herman R. Settemeyer, P.E. quickly navigated the difficult nuances of compacts and treaties, those written, spoken and unspoken, with the ease of an expert and in time, became the seasoned veteran we all know and love today; and

**WHEREAS**, Herman R. Settemeyer rendered meritorious service to the Rio Grande Compact Commission as the Engineer Adviser for the State of Texas in matters related to the conservation, utilization and development of the water and land resources within the Rio Grande Basin; and

**WHEREAS**, Herman R. Settemeyer, as a result of his long, long distinguished career, is now focused on his wonderful wife Becky, his children Amy, Wendy and Jamie, and grandchildren Jackson and Scott, and raising a few cows in between, and

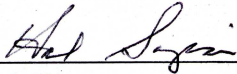
**WHEREAS** Herman R. Settemeyer has, at times, expressed a very slight preference for the fighting Aggies of Texas A&M University.

**NOW, THEREFORE, BE IT RESOLVED**, that the Rio Grande Compact Commission, at its 77<sup>th</sup> annual meeting held in Alamosa, Colorado on March 31, 2016, does hereby express its gratitude and appreciation of the commission and staff for the untiring service and counsel

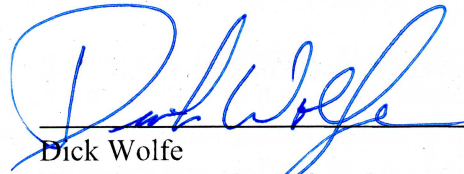
rendered by Herman R. Settemeyer, P.E. in addressing the many technical, legal and political water resource problems that have been confronted during his service to, and tenure as the Engineer Adviser for the State of Texas.

**BE IT FURTHER RESOLVED**, that the Rio Grande Compact Commission, its advisers and staff sincerely wish Herman R. Settemeyer, P.E., his wife Becky and their family the best of health, happiness and prosperity in their future endeavors, and


**BE IT FURTHER RESOLVED**, that the Texas Engineer Adviser of the Rio Grande Compact Commission is hereby directed to furnish copies of this unanimously adopted resolution to Herman R. Settemeyer, P.E. and the Governor of the State of Texas, and to cause said resolution to be included in the Minutes of the 77<sup>th</sup> annual meeting of the Rio Grande Compact Commission.



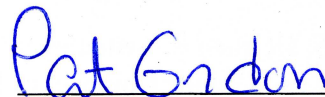
Hal Simpson  
*Chairman and Commissioner  
for the United States of America*



Dick Wolfe  
*Commissioner for Colorado*



Tom Blaine  
*Commissioner for New Mexico*



Patrick R. Gordon  
*Commissioner for Texas*

## RESOLUTION

### RIO GRANDE COMPACT COMMISSION

Honoring D. Michael Roark

March 31, 2016

**WHEREAS**, D. Michael Roark *was for over 40 years a valued employee for the United States Geological Survey, New Mexico Water Science Center;*

**WHEREAS**, *during that time Mr. Roark did faithfully and conscientiously carry out his assigned duties to the overall benefit of not only the United States Geological Survey but to the three states party to the Rio Grande Compact;*

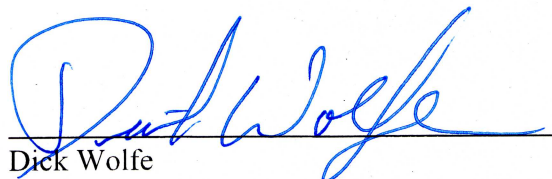
**AND WHEREAS**, *during his tenure as a United States Geological Survey employee, the Rio Grande Compact Commissioners and Engineer Advisers of the states of Colorado, New Mexico, and Texas did develop great admiration, respect, and appreciation for Mr. Roark and his work;*

**NOW THEREFORE, BE IT RESOLVED** *that the Rio Grande Compact Commission assembled in its 77<sup>th</sup> annual meeting held in Alamosa, Colorado acknowledges the devoted service of D. Michael Roark to the people of the Rio Grande basin which greatly benefited the Rio Grande Compact Commission, and this commission extends to Mr. Roark its best wishes for a prosperous and enjoyable future; and*

**BE IT FURTHER RESOLVED**, *that the New Mexico Engineer Adviser is hereby directed to furnish copies of this unanimously adopted resolution to D. Michael Roark, and to cause said resolution to be included in the Minutes of the 77<sup>th</sup> annual meeting of the Rio Grande Compact Commission.*



Hal Simpson  
Chairman and Commissioner  
for the United States of America



Dick Wolfe  
Commissioner for Colorado



Tom Blaine  
Commissioner for New Mexico



Patrick R. Gordon  
Commissioner for Texas

## WATER RESOURCES DATA

### ACKNOWLEDGMENTS

This report was prepared by the U.S. Geological Survey, secretary to the Rio Grande Compact Commission. The water-supply data contained in this report have been provided by various Federal and State agencies.

The office of the State Engineer of Colorado provided records of transmountain diversions and of storage for the following:

Squaw Lake	Jumper Creek Reservoir	Mill Creek Reservoir
Rito Hondo Reservoir	Big Meadows Reservoir	Fuchs Reservoir
Hermit Lakes Reservoir No. 3	Alberta Park Reservoir	Platoro Reservoir
Troutvale No. 2 Reservoir	Shaw Lake Enlargement	Trujillo Meadows Reservoir

The office of the State Engineer of Colorado provided records of discharge for the following:

Rio Grande near Del Norte, Colo.	Los Pinos River near Ortiz, Colo.
Conejos River below Platoro Reservoir, Colo.	Conejos River near Lasauces, Colo.
Conejos River near Mogote, Colo.	Rio Grande near Lobatos, Colo.
San Antonio River at Ortiz, Colo.	

The U.S. Bureau of Reclamation, Albuquerque, N. Mex., provided the following records:

Azotea Tunnel at Outlet, near Chama, N. Mex.	Willow Creek below Heron Dam, N. Mex.
Willow Creek above Heron Res., near Los Ojos, N. Mex.	
Storage in El Vado Reservoir near Tierra Amarilla, N. Mex.	
Storage in Heron Reservoir near Los Ojos, N. Mex.	

The U.S. Geological Survey, in cooperation with the U.S. Bureau of Reclamation, Albuquerque, N. Mex, provided the following records:

Storage in Nambe Falls Reservoir near Nambe, N. Mex.  
Rio Nambe below Nambe Falls Dam, near Nambe, N. Mex.

The U.S. Geological Survey supplied the record for Rio Grande below Elephant Butte Dam, and in cooperation with the New Mexico Interstate Stream Commission, also provided the following:

Rio Chama below El Vado Dam, N. Mex.	Santa Fe River near Santa Fe, N. Mex.
Rio Grande at Otowi Bridge, near San Ildefonso, N. Mex.	
Storage in Nichols and McClure Reservoir near Santa Fe, N. Mex.	

The U.S. Geological Survey, in cooperation with the Corps of Engineers, Albuquerque, N. Mex., also provided the following records:

Rio Chama below Abiquiu Dam, N. Mex.	Rio Grande below Cochiti Dam, N. Mex.
Galisteo Creek below Galisteo Dam, N. Mex.	Jemez River below Jemez Canyon Dam, N. Mex.

The Corps of Engineers, Albuquerque, N. Mex., provided the following records of storage:

Abiquiu Reservoir.	Galisteo Reservoir.	Jemez Canyon Reservoir.	Cochiti Lake.
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The U.S. Bureau of Reclamation, El Paso, Texas, provided the following records:

Storage in Elephant Butte Reservoir at Elephant Butte, N. Mex.  
Storage in Caballo Reservoir near Arrey, N. Mex.  
Rio Grande below Caballo Dam, N. Mex.  
Bonito ditch below Caballo Dam, N. Mex.

The Rio Grande Compact Commission gratefully acknowledges the cooperation received from the agencies listed above.

## ACCURACY OF RECORDS

The Rules and Regulations of the Commission state that the equipment, method, and frequency of measurement at each gaging station shall be sufficient to obtain records at least equal in accuracy to those classified as "good" by the U.S. Geological Survey. Within the physical limitations of stream gaging, the agencies obtaining the records at Compact gaging stations have complied with these regulations.

The accuracy of streamflow records depends primarily on (1) the stability of the stage- discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description states the degree of accuracy attributed to the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent of the true value; "good" within 10 percent; and "fair" within 15 percent. Records that do not meet the criteria mentioned are rated "poor." Different accuracies may be attributed to different parts of a given record. The probable error in a monthly or annual mean discharge depends more on the distribution of the daily errors between the limits than it does on the limits themselves. For this reason, monthly and annual records are more accurate than most daily records.

## STREAMFLOW

## Rio Grande near Del Norte, Colo

Location. -- Water-stage recorder, lat 37°41'19.0", long 106°27'35.5", in NW1/4 NW 1/4 sec. 29, T. 40 N., R. 5 E., on right bank, 40 ft downstream from county highway bridge, 6 mi west of Del Norte, and 5.0 mi upstream from Pinos Creek. Datum of gage is 7,980.25 ft above National Geodetic Vertical Datum of 1929. Prior to May 16, 1908, staff gage at site 4 mi downstream at different datum. Records are equivalent.

Drainage area. -- 1,320 sq mi, approximately

Average discharge. -- 126 years (1890-2015), 880 ft<sup>3</sup>/s (637,500 acre-ft per year).

Extremes. -- 1889-2015: Maximum discharge, 18,000 ft<sup>3</sup>/s Oct. 5, 1911 (gage height, 6.80 ft), from rating curve extended above 12,900 ft<sup>3</sup>/s; minimum daily, 74 ft<sup>3</sup>/s Nov. 16, 1956.

Remarks. -- Records good except for estimated for estimated daily discharges, which are poor.

Flow regulated by four reservoirs, total capacity 126,100 acre-ft, and by several smaller ones. Six transmountain diversions import water into basin above station.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	5,980	210	170	193	11,800
February	5,960	250	160	213	11,800
March	15,500	863	185	500	30,700
April	25,200	1,020	742	840	50,000
May	60,100	3,090	1,160	1,940	119,200
June	119,000	5,720	2,300	3,970	236,200
July	48,400	2,410	633	1,560	96,100
August	16,400	856	381	529	32,500
September	10,900	556	303	364	21,700
October	13,200	669	303	426	26,200
November	8,360	420	190	278	16,600
December	6,080	225	160	196	12,100
Calendar year 2015	335,080	5,720	160	917	664,900

## Conejos River below Platoro Reservoir, Colo.

Location. -- Water-stage recorder and concrete control, lat 37°21'17.65", long 106°32'39", in SW 1/4NW 1/4 sec. 22, T. 36 N., R. 4 E., on left bank 1,100 ft downstream from valve house for Platoro Reservoir, and 0.7 mi northwest of Platoro.

Datum of gage is 9,866.60 ft above National Geodetic Vertical Datum of 1929 (levels by Bureau of Reclamation).

Drainage area. -- 40 sq mi, approximately.

Average discharge. -- 63 years (1890-2015), 90 ft<sup>3</sup>/s (64,880 acre-ft per year).

Extremes. -- 1952-2015: Maximum discharge, 1,160 ft<sup>3</sup>/s Nov. 1, 1957; maximum gage height, 4.29 ft June 15, 1958; no flow Oct. 16-20, 1955.

Remarks. -- Records good except for estimated daily discharges, which are poor. No diversions above station. Flow completely regulated by Platoro Reservoir (capacity, 59,570 acre-ft).

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	247	11	7.2	8.0	490
February	214	7.9	7.5	7.6	425
March	245	8.6	7.5	7.9	487
April	1,600	79	41.0	53	3,170
May	4,190	277	83	135	8,310
June	9,100	486	102	303	18,000
July	5,450	362	59	176	10,800
August	3,750	152	72	121	7,430
September	1,460	81	26	49	2,910
October	1,040	60	14	34	2,070
November	609	33	12	20	1,210
December	1,010	33	32	32	2,000
Calendar year 2015	28,915	486	7.2	79	57,302

## STREAMFLOW

## Conejos River near Mogote, Colo

Location. -- Water-stage recorder, lat 37°03'14", long 106°11'13", in SE 1/4SE 1/4 sec. 34, T. 33 N., R. 7 E., on left bank 75 ft downstream from bridge on State Highway 174, 0.4 mi downstream from Fox Creek, and 5.3 mi west of Mogote, and 10 mi west of Antonito. Datum of gage is 8,269.39 ft above National Geodetic Vertical Datum of 1929.

Drainage area. -- 282 sq mi.

Average discharge. -- 105 years (1904, 1912-2015), 317 ft<sup>3</sup>/s (229,800 acre-ft per year).

Extremes. -- 1903-05, 1911-2015: Maximum discharge, 9,000 ft<sup>3</sup>/s Oct. 5, 1911 (gage height, 8.50 ft), from rating curve extended above 3,100 ft<sup>3</sup>/s; minimum daily determined, 10 ft<sup>3</sup>/s July 18, 1904, also occurred Aug. 19, 2002.

Remarks. -- Records good except for estimated daily discharges, which are poor. Diversions above station for irrigation of about 500 acres. Since 1951 flow partly regulated by Platoro Reservoir.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	1,240	48	33	40	2,460
February	1,170	46	28	42	2,320
March	3,420	199	48	110	6,790
April	6,150	257	168	205	12,200
May	16,500	869	300	531	32,600
June	34,700	1,790	531	1,160	68,900
July	12,100	698	140	391	24,000
August	5,710	273	127	184	11,300
September	3,150	147	69	105	6,240
October	2,750	145	66	89	5,460
November	1,970	88	48	66	3,910
December	1,920	76	50	62	3,800
Calendar year 2015	90,780	1,790	28	249	179,980

## San Antonio River at Ortiz, Colo

Location. -- Water-stage recorder, lat 36°59'35", long 106°02'17", in New Mexico in NE1/4 SE1/4, sec. 24, T. 32 N., R. 8 E., on left bank 800 ft south of New Mexico-Colorado State line, 0.4 mi southeast of Ortiz, and 0.4 mi upstream from Los Pinos River. Altitude of gage is 7,970 ft above National Geodetic Vertical Datum of 1929.

Drainage area. -- 110 sq mi.

Average discharge. -- 75 years (1941-2015), 24 ft<sup>3</sup>/s (17,370 acre-ft per year).

Extremes. -- 1920, 1925-2015: Maximum discharge, 1,750 ft<sup>3</sup>/s Apr. 15, 1937 (gage height, 5.38 ft), from rating curve extended above 1,100 ft<sup>3</sup>/s; no flow at times.

Remarks. -- Records good except for discharges less than 3.0 ft<sup>3</sup>/s, and estimated daily discharges, which are poor. A few small diversions above station for irrigation.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	81	4.1	1.1	2.6	160
February	122	5.2	3.5	4.4	243
March	1,130	99	3.3	36	2,240
April	1,610	83	32.0	54	3,190
May	1,060	60	18.0	34	2,110
June	207	17	1.8	6.9	410
July	171	72	0.07	5.5	339
August	35	8.2	0.0	1.1	70
September	7.70	1.9	0.0	0.26	15
October	48	5.6	0.37	1.6	95
November	64	3.0	1.7	2.1	127
December	64	2.9	1.5	2.1	128
Calendar year 2015	4,600	99	0.0	12	9,127

## STREAMFLOW

## Los Pinos River near Ortiz, Colo

Location. -- Water-stage recorder, lat 36°58'56", long 106°04'23", in New Mexico on line between secs. 26 and 27, T. 32 N., R. 8 E., on left bank 0.9 mi south of New Mexico-Colorado State line, 2.1 mi southwest of Ortiz, and 2.9 mi upstream from mouth. Altitude of gage is 8,040 ft. above National Geodetic Vertical Datum of 1929.

Drainage area. -- 167 sq mi.

Average discharge. -- 97 years (1915-20, 1925-2015), 115 ft<sup>3</sup>/s (83,570 acre-ft per year).

Extremes. -- 1915-20, 1925-2015: Maximum discharge, 3,160 ft<sup>3</sup>/s May 12, 1941 (gage height, 5.77 ft, site and datum then in use), from rating curve extended above 1,600 ft<sup>3</sup>/s; minimum observed, 1.7 ft<sup>3</sup>/s Aug. 27, 2002.

Remarks. -- Records good except for estimated daily discharges, which are poor. Diversions above station for irrigation.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	523	23	13	17	1,040
February	676	27	20	24	1,340
March	2,060	230	20	66	4,080
April	5,520	252	151	184	10,900
May	10,400	466	236	337	20,700
June	7,880	484	58	263	15,600
July	1,710	105	28	55	3,380
August	783	59	15	25	1,550
September	512	32	13	17	1,020
October	625	33	14	20	1,240
November	632	24	16	21	1,250
December	552	20	14	18	1,090
Calendar year 2015	31,873	484	13.0	87	63,190

## Conejos River near Lasauses, Colo

Location. -- Water-stage recorder, lat 37°18'01", long 105°44'47", in SW 1/4 SW 1/4 sec. 2, T. 35 N., R. 11 E., on left bank of main channel 125 ft downstream from bridge on State Highway 158, 2.1 mi north of Lasauses, and on left bank of secondary channel 1,550 ft upstream from bridge, 1.0 mi upstream from mouth, and 1.5 mi north of Lasauses. Datum of gage on main channel is 7,495.02 ft and on secondary (south) channel is 7,499.86 ft above main sea level (levels by Bureau of Reclamation).

Drainage area. -- 887 sq mi.

Average discharge. -- 94 years (1922-2015), 170 ft<sup>3</sup>/s (122,800 acre-ft per year).

Extremes. -- 1921-2015: Maximum discharge, 3,890 ft<sup>3</sup>/s May 15, 1941; no flow at times in some years.

Remarks. -- Records good except for estimated daily discharge, which are poor. Diversions above station for irrigation of about 75,000 acres above station.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	1,430	63	36	46	2,840
February	1,870	84	43	67	3,720
March	5,530	443	65	178	11,000
April	1,820	327	24	61	3,620
May	1,330	197	1.7	43	2,630
June	8,640	491	22	288	17,100
July	5,690	465	35	184	11,300
August	979	121	0.56	32	1,940
September	2.1	0.57	0.0	0.07	4.1
October	0.0	0.0	0.0	0.0	0.0
November	1,550	90	2.1	52	3,070
December	2,200	96	53	71	4,360
Calendar year 2015	31,041	491	0.0	85	61,584

## STREAMFLOW

## Rio Grande near Lobatos, Colo

Location. -- Water-stage recorder, lat 37°04'43", long 105°45'25", in NE1/4 NW1/4 sec. 27, T. 33 N., R. 11 E., on right bank at highway bridge, 5.7 mi north of Colorado-New Mexico State line, 11 mi east of Lobatos, and 14 mi east of Antonito. Datum of gage is 7,427.63 ft above National Geodetic Vertical Datum of 1929.

Drainage area. -- 7,700 sq mi, approximately (includes 2,940 sq mi in closed basin in San Luis Valley).

Average discharge. -- 32 years (1900-30), 846 ft<sup>3</sup>/s (612,900 acre-ft per year); 84 years (1931-2015) 426 ft<sup>3</sup>/s (308,800 acre-ft per year).

Extremes. -- 1899-2015: Maximum discharge observed, 13,200 ft<sup>3</sup>/s June 8, 1905 (gage height, 9.1 ft); from rating curve extended above 8,000 ft<sup>3</sup>/s; no flow at times in 1950-51, 1956.

Remarks. -- Records good except for estimated daily discharges, which are poor. Natural flow of stream affected by transmountain diversions, storage reservoirs, ground-water withdrawals and diversions for irrigation, and return flow from irrigated areas.

## Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	8,010	280	225	258	15,900
February	9,840	420	280	351	19,500
March	20,900	1,150	338	673	41,400
April	7,900	1,180	125	264	15,700
May	6,260	368	116	202	12,400
June	21,800	1,230	159	727	43,200
July	21,100	1,240	339	680	41,800
August	4,940	321	93	159	9,800
September	2,850	154	55	95	5,650
October	2,650	150	54	85	5,250
November	10,700	433	54	357	21,200
December	9,350	480	195	302	18,600
Calendar year 2015	126,300	1,240	54	346	250,400

## Willow Creek above Heron Reservoir, near Los Ojos, N. Mex.

Location. -- Water-stage recorder, lat 36°44'33", long 106°37'34", in Tierra Amarilla Grant, on right bank 200 ft downstream from bridge, 0.2 mi downstream from Iron Spring Creek, 3.3 mi west of Los Ojos, and at mi 9.7. Datum of gage is 7,196.29 ft above mean sea level. Prior to Apr. 1, 1971, at site 900 ft downstream.

Drainage area. -- 112 sq mi.

Average discharge. -- 7 years (1963-69), 11.5 ft<sup>3</sup>/s (8,330 acre-ft per year) prior to completion of Azotea tunnel; 45 years (1970-2015) 132 ft<sup>3</sup>/s (95,800 acre-ft per year) subsequent to completion of Azotea tunnel.

Extremes. -- 1962-2015: Maximum discharge, 1,610 ft<sup>3</sup>/s Mar. 12, 1985 (gage height, 6.65 ft); no flow at times.

Remarks. -- Records good except those for winter months, which are fair. Subsequent to Nov. 16, 1970, flow affected by transmountain diversions through Azotea tunnel. Flow in Rutheron Drain included prior to Apr. 1, 1971.

## Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	4.5	3.5	0.0	0.0	9.0
February	629	52.4	7.6	7.8	1,250
March	4,470	288	6.0	34	8,870
April	4,510	291	87.7	243	8,950
May	12,900	1,000	87.7	343	25,600
June	19,200	894	254	337	38,000
July	4,610	343	18.6	35	9,150
August	478	91	0.0	14	948
September	39	18	0.0	12	77.7
October	492	70	0.0	24	975
November	484	22	9.1	7.0	960
December	155	8.6	1.5	0.0	307
Calendar year 2015	47,992	1,005	0.0	131	95,200

## STREAMFLOW

## Horse Lake Creek above Heron Reservoir, near Los Ojos, N. Mex.

Location. -- Water-stage recorder, lat 36°42'24", long 106°44'42", in Tierra Amarilla Grant, on right bank 3.7 mi northwest of Heron Dam, 7.8 mi downstream from Horse Lake, and 9.9 mi west of Los Ojos. Datum of gage is 7,188.85 ft above National Geodetic Vertical Datum of 1929. Prior to July 1, 1971, at site 1,100 ft upstream.

Drainage area. -- 45 sq mi, approximately.

Average discharge. -- 12 years (1963-73,1986), 1.17 ft<sup>3</sup>/s (848 acre-ft per year).

Extremes. -- 1963-2011: Maximum discharge, 3,960 ft<sup>3</sup>/s July 30, 1968 (gage height, 4.9 ft); no flow most of time.

Remarks. -- Records good for period of record. Diversions above station for irrigation of meadows and for off-channel stock tanks. Seasonal gage discontinued in 2011.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	---	---	---	---	---
February	---	---	---	---	---
March	---	---	---	---	---
April	---	---	---	---	---
May	---	---	---	---	---
June	---	---	---	---	---
July	---	---	---	---	---
August	---	---	---	---	---
September	---	---	---	---	---
October	---	---	---	---	---
November	---	---	---	---	---
December	---	---	---	---	---
Calendar year 2015	---	---	---	---	---

## Willow Creek below Heron Dam, N. Mex.

Location. -- Totalizing flowmeters, lat 36°39'46", long 106°42'20", in Tierra Amarilla Grant, in outlet conduits at Heron Dam, 0.2 mi upstream from Rio Chama, 5.1 mi northeast of El Vado Dam, and 8.7 mi southwest of Los Ojos.

Drainage area. -- 193 sq mi.

Average discharge. -- 45 years (1971-2015), 127 ft<sup>3</sup>/s (92,040 acre-ft per year).

Extremes. -- 1971-2012: Maximum daily discharge, 2,780 ft<sup>3</sup>/s Dec. 18, 19, 1982; no flow at times each year.

Remarks. -- Records excellent. Flow completely regulated by Heron Dam.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	1,270	42	40	41	2,510
February	1,120	40	40	40	2,220
March	1,920	90	40	62	3,800
April	2,330	90	41	78	4,620
May	1,300	43	41	42	2,570
June	1,330	46	43	44	2,650
July	1,490	100	30	48	2,950
August	13,600	600	100	439	27,000
September	14,500	600	16	484	28,800
October	2,220	200	0.0	71	4,400
November	6,000	200	200	200	11,900
December	2,330	200	0.0	75	4,620
Calendar year 2015	49,442	600	0.0	135	98,067

## STREAMFLOW

## Rio Chama below El Vado Dam, N. Mex

Location. -- Water-stage recorder with satellite telemetry, lat 36°34'49.38", long 106°43'29.16", in Tierra Amarilla Grant, on left bank 1.5 mi downstream from El Vado Dam, 2.8 mi upstream from Rio Nutrias, and 13 mi southwest of Tierra Amarilla.

Datum of gage is 6,696.12 ft above National Geodetic Vertical Datum of 1929. Prior to October 1935, at site 1.5 mi upstream and October 1935 to September 1938, at site 1.1 mi upstream at different datums.

Drainage area. -- 877 sq mi, of which about 100 sq mi is probably noncontributing.

Average discharge. -- 4 years (1914, 1921-23), 448 ft<sup>3</sup>/s (324,600 acre-ft per year), prior to completion of El Vado Dam; 35 years (1936-70), 373 ft<sup>3</sup>/s (270,200 acre-feet per year), prior to release of transmountain water; 44 years (1971-2015) 448 ft<sup>3</sup>/s (324,300 acre-feet per year).

Extremes. -- 1914-16, 1920-24, 1936-2013; Maximum discharge observed, 9,000 ft<sup>3</sup>/s May 22, 1920 (gage height, 12 ft); no flow Mar. 25, 26, 31, 1955.

Remarks. -- Records good. Diversions above station for irrigation of about 10,600 acres. Since 1935 flow regulated by El Vado Reservoir and since October 1970 flow partly regulated by Heron Reservoir. Subsequent to May 1971 flow affected by releases of transmountain water from Heron Reservoir.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	3,170	129	78	102	6,280
February	1,600	80	54	57	3,180
March	1,680	59	52	54	3,340
April	6,710	446	79	224	13,300
May	13,300	1,010	108	431	26,500
June	16,700	853	199	556	33,100
July	9,740	618	143	314	19,300
August	19,100	941	188	615	37,800
September	25,300	1,000	511	845	50,300
October	9,900	512	71	319	19,600
November	11,300	498	70	376	22,400
December	22,000	1,150	103	709	43,600
Calendar year 2015	140,500	1,150	52	384	278,700

## Rio Chama below Abiquiu Dam, N. Mex.

Location. -- Water-stage recorder with satellite telemetry, lat 36°14'14", long 106°25'02.7", on right bank 0.8 mi downstream from Abiquiu Dam and 5.9 mi northwest of Abiquiu. Altitude of gage is 6,040 ft above National Geodetic Vertical Datum of 1929 (from river-profile map and topographic map).

Drainage area. -- 2,147 sq mi, of which about 100 sq mi is probably noncontributing.

Average discharge. -- 9 years (1962-70), 384 ft<sup>3</sup>/s (278,200 acre-ft per year), prior to release of transmountain water; 43 years (1971-2015), 499 ft<sup>3</sup>/s (361,700 acre-feet per year).

Extremes. -- 1961-2015; Maximum discharge, 2,990 ft<sup>3</sup>/s July 1, 1965 (gage height, 6.69 ft); minimum, about 0.5 ft<sup>3</sup>/s Mar. 17, 1966, Jan. 28, 1972.

Remarks. -- Records good. Flow regulated by Heron, El Vado, and Abiquiu Reservoirs. Diversions above station for irrigation of about 17,600 acres. Subsequent to May 1971 flow affected by the release of transmountain water from Heron Reservoir.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	1,710	70	49	55	3,390
February	1,420	53	49	51	2,820
March	3,360	215	49	109	6,670
April	10,000	496	152	335	19,900
May	19,100	1,310	244	617	37,900
June	19,800	987	340	660	39,200
July	12,100	660	211	389	23,900
August	19,400	934	211	625	38,400
September	15,200	699	222	506	30,100
October	7,000	448	66	225	13,800
November	17,700	838	81	590	35,100
December	26,300	1,310	70	850	52,300
Calendar year 2015	153,090	1,310	49	418	303,480

## STREAMFLOW

## Rio Nambe below Nambe Falls Dam, near Nambe, N. Mex.

Location. -- Water-stage recorder with satellite telemetry, lat 35°50'46", long 105°54'35", on Nambe Indian Reservation, in outlet conduits at Nambe Falls Dam, 300 ft upstream from Nambe Falls, 2.6 mi upstream from confluence of Rio Nambe and Rio En Medio, 4.4 mi southeast of Nambe Pueblo, and 5.4 mi southeast of Nambe. Datum of gage is 6,840 ft above National Geodetic Vertical Datum of 1929, from topographic map.

Drainage area. -- 34.1 sq mi.

Average discharge. -- 37 years (1979-2015), 13 ft<sup>3</sup>/s (9,270 acre-feet per year).

Extremes. -- 1979-2015; Maximum discharge, 250 ft<sup>3</sup>/s June 9, 1979 at site 1,100 ft downstream; no flow December 31, 1993.

Remarks. -- Records good. Flow completely regulated by Nambe Falls Reservoir.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	119	4.3	1.4	3.8	236
February	21	1.4	0.33	0.75	42
March	104	20	0.45	3.3	205
April	476	26	9.6	16	943
May	995	64	11	32	1,970
June	1,220	60	20	41	2,420
July	700	42	17	23	1,390
August	769	34	18	25	1,530
September	562	28	6.8	19	1,110
October	202	8.3	1.1	7.0	401
November	35	2.5	1.1	1.2	70
December	124	5.0	3.0	4.0	247
Calendar year 2015	5,327	64	0.3	15	10,564

## Rio Grande at Otowi Bridge, near San Ildefonso, N. Mex.

Location. -- Water-stage recorder with satellite telemetry, lat 35°52'28.2", long 106°08'32.8", in San Ildefonso Pueblo Grant, 400 ft downstream from bridge on State Highway 502, 1.8 mi southwest of San Ildefonso Pueblo, 2.5 mi downstream from Pojoaque River, and 6.8 mi west of Pojoaque. Datum of gage is 5,488.48 ft above National Geodetic Vertical Datum of 1929. Prior to May 19, 1904, and July 25 to Oct 1, 1904, staff gage at site 180 ft upstream at datum 2.02 ft lower.

Drainage area. -- 14,300 sq mi, approximately (includes 2,940 sq mi in closed basin in San Luis Valley, Colo.).

Average discharge. -- 115 years (1896-1905, 1910-2015), 1,480 ft<sup>3</sup>/s (1,072,000 acre-feet per year).

Extremes. -- 1895-1905, 1910-2015; Maximum discharge, 24,400 ft<sup>3</sup>/s May 23, 1920 (gage height, 14.1 ft); minimum daily, 195 ft<sup>3</sup>/s Aug. 4, 1977.

Remarks. -- Records good. Flow partly regulated by Heron, El Vado, and Abiquiu Reservoirs. Diversions above station for irrigation of about 620,000 acres in Colorado and 75,000 acres in New Mexico. Subsequent to May 1971 flow affected by releases of transmountain water from Heron Reservoir.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	19,400	711	542	627	38,500
February	20,900	843	683	746	41,400
March	39,000	1,960	741	1,250	76,900
April	36,000	2,170	901	1,200	71,300
May	59,200	4,080	912	1,910	117,400
June	63,600	3,130	1,370	2,120	126,100
July	45,500	2,460	1,060	1,470	90,300
August	34,400	1,420	883	1,110	68,300
September	22,700	927	480	756	45,000
October	18,400	945	462	594	36,500
November	34,900	1,510	487	1,160	69,100
December	41,300	1,830	629	1,330	82,000
Calendar year 2015	435,300	4,080	462	14,273	862,800

## STREAMFLOW

## Santa Fe River near Santa Fe, N. Mex.

Location. -- Water-stage recorder with satellite telemetry and concrete control, lat 35°41'11.2", long 105°50'37", in Santa Fe National Forest, on left bank 0.4 mi downstream from McClure Dam, and 5.3 mi east of Santa Fe at mile 36.6. Altitude of gage is 7,720 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Nov. 4, 1930, at site 1.5 mi downstream, and Apr. 11, 1931 to Sept. 30, 1947, at site 0.3 mi upstream, each at different datum.

Drainage area. -- 18.2 sq mi.

Average discharge. -- 103 years (1913-2015), 7.9 ft<sup>3</sup>/s (5,700 acre-feet per year).

Extremes. -- 1913-2015; Maximum discharge, 1,500 ft<sup>3</sup>/s Aug. 14, 1921 (gage height, 5.17 ft); from rating curve extended above 150 ft<sup>3</sup>/s; minimum, no flow Aug. 2-10, 2000.

Remarks. -- Records good. Flow regulated by McClure Reservoir, completed in 1926, raised in 1935, 1947 and again in 1989.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	48	1.9	1.3	1.6	96
February	61	2.7	1.6	2.2	122
March	250	17	2.3	8.1	496
April	278	14	6.2	9.3	551
May	740	47	6.4	24	1,470
June	527	32	6.2	18	1,040
July	248	15	5.2	8	492
August	217	14	2.5	7.0	431
September	55	2.6	1.3	1.8	109
October	80	8.4	1.2	2.6	160
November	165	9.6	0.58	5.5	328
December	19	2.9	0.0	0.62	38
Calendar year 2015	2,688	47	0.0	7.4	5,333

## Rio Grande below Cochiti Dam, N. Mex.

Location. -- Water-stage recorder with satellite telemetry, lat 35°37'04.8", long 106°19'26.2", in Pueblo de Cochiti Grant, 320 ft upstream from bridge on State Highway 22, 700 ft downstream from Cochiti Dam, and 1.4 mi northeast of Cochiti Pueblo, and at mile 1,587.6. Datum of gage is 5,226.08 ft above National Geodetic Vertical Datum of 1929. Prior to Nov. 14, 1973, at site 2.4 mi downstream at altitude 5,210 ft, from topographic map. Nov. 14, 1973 to Jan. 8, 1976, at site 320 ft downstream at datum 1.79 ft lower.

Drainage area. -- 14,900 sq mi, approximately (includes 2,940 sq mi in closed basin in San Luis Valley, Colo.).

Average discharge. -- 45 years (1971-2015), 1,274 ft<sup>3</sup>/s (923,000 acre-feet per year).

Extremes. -- 1971-2015; Maximum discharge, 10,300 ft<sup>3</sup>/s July 26, 1971 (gage height, 7.90 ft) at site 2.4 mi downstream prior to closure of Cochiti Dam; from rating curve extended above 2,600 ft<sup>3</sup>/s; minimum discharge 0.51 ft<sup>3</sup>/s Aug. 3-5, 1977, Aug. 27-28, 1978.

Remarks. -- Records good. Since Nov. 12, 1973, flow completely regulated by Cochiti Dam. Cochiti Eastside Main Canal on left bank and Sili Main Canal on right bank bypass station.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	17,500	666	353	564	34,700
February	19,100	791	541	683	37,900
March	34,300	1,780	546	1,110	68,000
April	28,400	1,790	717	945	56,200
May	51,800	3,380	716	1,672	103,000
June	58,800	2,830	1,380	1,961	117,000
July	40,500	2,230	918	1,310	80,300
August	27,800	1,260	752	898	55,200
September	17,600	757	344	586	34,900
October	13,100	860	308	424	26,000
November	35,200	1,700	308	1,170	69,800
December	44,800	2,010	616	1,440	88,900
Calendar year 2015	388,900	3,380	308	1,064	771,900

## STREAMFLOW

## Galisteo Creek below Galisteo Dam, N. Mex.

Location. -- Water-stage recorder with satellite telemetry, lat 35°27'52.75", long 106°12'48.2", in Mesita de Juana Lopez Grant, on right bank 0.4 mi downstream from Galisteo Dam, 5.3 mi northwest of Cerrillos, and at mile 11.4. Elevation of gage is 5,450 ft above National Geodetic Vertical Datum of 1929, from topographic map.

Prior to Dec. 21, 1981, at site 1,200 ft downstream at different datum.

Drainage area. -- 596 sq mi.

Average discharge. -- 45 years (1971-2015), 5.1 ft<sup>3</sup>/s (3,716 acre-feet per year).

Extremes. -- 1970-2015; Maximum discharge, 3,460 ft<sup>3</sup>/s Aug. 24, 1997 (gage height, 5.57 ft); no flow many days each year.

Remarks. -- Records poor. Flow regulated by Galisteo Reservoir 0.4 mi upstream. Capacity of outlet, 5,000 ft<sup>3</sup>/s when reservoir is full. Diversions for irrigation of about 50 acres above reservoir.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	0.0	0.0	0.0	0.0	0.0
February	1.1	0.40	0.0	0.04	2.2
March	9.0	0.81	0.12	0.29	18
April	0.4	0.1	0.0	0.01	0.90
May	18	17	0.0	0.58	36
June	99	77	0.0	3.3	166
July	657	430	0.0	21	1,300
August	641	579	0.0	21	1,270
September	0.00	0.00	0.0	0.0	0.0
October	286	166	0.0	9.2	568
November	1.6	0.8	0.0	0.05	3.1
December	0.0	0.0	0.0	0.0	0.0
Calendar year 2015	1,713	579	0.0	4.6	3,364

## Jemez River Outlet below Jemez Canyon Dam, N. Mex.

Location. -- Water-stage recorder with satellite telemetry, lat 35°23'41", long 106°32'41", in NE1/4 SW1/4 SW1/4 sec. 32, T. 14 N., R. 4 E., gage located at outlet pipe for Jemez Canyon Dam, 0.7 mi upstream from prior gage location.

Datum of gage is 5,162 ft above National Geodetic Vertical Datum of 1929, from topographic map. Gage replaces Jemez River below Jemez Canyon Dam. Discharge records for two gages are comparable except the period 2002-2009, when original gage was affected by siltation.

Drainage area. -- 1,034 sq mi.

Average discharge. -- 5 years (2010-2015), 32 ft<sup>3</sup>/s (22,970 acre-feet per year).

Extremes. -- 2015; Maximum discharge, 1,420 cfs Jul. 27, 2013, gage height 4.82; no flow many days each year.

Remarks. -- Records good. Flow regulated by Jemez Canyon Dam since October 1953. Diversions for irrigation of about 3,000 acres above station.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	467	48	3.5	15	927
February	1,070	68	4.3	38	2,100
March	3,000	227	30	97	6,000
April	2,920	181	53	98	5,800
May	4,920	419	45	159	9,800
June	1,000.0	161	0.0	34	2,000
July	1,940	461	8.3	62	3,800
August	443	124	0.0	14	878
September	19.0	15	0.0	0.6	37
October	1,330	582	0.0	43	2,600
November	825	80	4.0	28	1,600
December	669	39	13	22	1,300
Calendar year 2015	18,603	582	0.0	51	36,842

## STREAMFLOW

## Rio Grande below Elephant Butte Dam, N. Mex.

Location. -- Water-stage recorder with satellite telemetry, lat 33°08'54.64", long 107°12'24.42", in Pedro Armendariz Grant, on left bank 1.0 mi downstream from dam, 1.5 mi upstream from Cuchillo Negro River. Datum of gage is 4,241.09 ft above National Geodetic Vertical Datum of 1929. Prior to April 23, 1942, at several different sites and datums.

Drainage area. -- 29,450 sq mi approximately (includes 2,940 sq mi in closed basin in San Luis Valley, Colo.).

Average discharge. -- 101 years (1915-2015), 974 ft<sup>3</sup>/s (705,400 acre-feet per year).

Extremes. -- 1915-2015; Maximum daily discharge, 8,220 ft<sup>3</sup>/s May 22, 1942; no flow at times prior to 1929, Mar. 2-4, 1979.

Remarks. -- Records good. Flow regulated by Elephant Butte Reservoir. Diversions for irrigation of about 800,000 acres above station.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	14	0.67	0.31	0.45	28
February	16	0.79	0.41	0.58	32
March	19	0.91	0.45	0.62	38
April	56	13	0.39	1.80	110
May	25,800	2,050	27	833	51,200
June	56,600	1,930	1,840	1,890	112,200
July	57,800	2,050	1,500	1,860	114,700
August	57,200	2,000	1,060	1,850	113,500
September	10,500	768	0.48	349.0	20,700
October	22	9.3	0.08	0.70	43
November	8.6	0.56	0.02	0.28	17
December	40	8.4	0.00	1.3	79
Calendar year 2015	208,076	2,050	0.0	566	412,647

## Rio Grande below Caballo Dam, N. Mex.

Location. -- Water-stage recorder, lat 32°53'05.68", long 107°17'33.71", on left bank 2,000 ft upstream from Interstate Highway 25, 4,200 ft downstream from Caballo Dam, 1.2 mi downstream from Apache Canyon 1.3 mi upstream from Percha diversion dam, and 3 mi northeast of Arrey. Datum of gage is 4,140.90 ft above National Geodetic Vertical Datum of 1929. October 13, 1938 to December 31, 1945, at datum 5.0 ft higher.

Drainage area. -- 30,700 sq mi, approximately (includes 2,940 sq mi in closed basin in San Luis Valley, Colo.).

Average discharge. -- 78 years (1938-2015), 896 ft<sup>3</sup>/s (649,200 acre-feet per year).

Extremes. -- 1938-2015; Maximum daily discharge, 7,650 ft<sup>3</sup>/s May 20, 1942; minimum daily, 0.0 ft<sup>3</sup>/s May 9-15, 2012 and Oct 3, 2012

Remarks. -- Records good. Flow regulated by Elephant Butte Reservoir and Caballo Reservoirs. Diversions for irrigation of about 800,000 acres above station.

Monthly and yearly discharge, in cubic feet per second

Month	Second-foot-days	Maximum daily	Minimum daily	Mean	Runoff in acre-feet
January	15	0.52	0.47	0.49	30
February	15	0.60	0.50	0.54	30
March	27	1.1	0.62	0.87	53
April	37	1.3	1.1	1.2	73
May	17,300	2,680	1.2	557	34,300
June	71,400	2,720	2,160	2,380	142,000
July	59,900	2,100	1,650	1,930	119,000
August	45,500	1,950	921	1,470	90,300
September	25,000	1,200	0.94	833	49,600
October	28	0.94	0.81	0.90	56
November	21	0.81	0.59	0.70	41
December	14	0.58	0.35	0.47	29
Calendar year 2015	219,257	2,680	0.35	598	435,512

STREAMFLOW

Bonito Ditch below Caballo Dam, N. Mex.

Records available. -- January 1938 to current year. Published as supplementary data with Rio Grande below Caballo Dam in U.S.G.S. Water-Supply Papers and Water-Data Reports from October 1947 until September, 2005.

Remarks. -- Ditch diverts directly from Caballo Reservoir for irrigation of lands on right bank of river. The total release from Project Storage, as used in computations of Compact Commission, is the combined flow of this ditch and Rio Grande below Caballo Dam.

Diversion, in acre-ft	
January	0.0
February	155.0
March	17.6
April	100.0
May	198.1
June	203.6
July	105.2
August	105.2
September	116.9
October	0.0
November	0.0
December	0.0
Calendar year 2015	1,001.6

## Reservoirs in Rio Grande Basin in Colorado (constructed or enlarged since 1937)

Calendar Year 2015

Calendar Year 2015Calendar Year 2015Calendar Year 2015[illegible]

## Reservoirs in Rio Grande Basin in Colorado (constructed or enlarged since 1937)

Calendar Year 2015

[illegible]

Calendar Year 2015

[illegible]

Calendar Year 2015

[illegible]

Calendar Year 2015

[illegible]

## STORAGE IN RESERVOIRS

Reservoirs in Rio Grande Basin in Colorado  
(constructed or enlarged since 1937)

Mill Creek Reservoir. – In sec. 16, T. 39 N., R. 3 E., on Mill Creek. Completed in 1953; capacity, 43 acre-ft. Capacity based on elevation above bottom of outlet. Includes 43 acre-ft of transmountain water, by exchange, in 1976.

Month-end gage height, in feet, and contents, in acre-feet

Calendar Year 2015

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	-
Contents	41	41	41	41	41	41	41	41	41	41	41	41	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

Fuchs Reservoir. – Staff gage in sec. 2, T. 37 N., R. 4 E., on East Pinos Creek. Completed in 1939; capacity, 237 acre-ft with 2 ft of flash boards in spillway. Prior to calendar year 1999, contents reported as 238 acre-ft were actually 237 acre-ft. Pinos Creek enters Rio Grande below station near Del Norte.

Month-end gage height, in feet, and contents, in acre-feet

Calendar Year 2015

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	13.6	15.4	17.2	17.2	17.2	17.2	17.2	17.2	16.4	9.2	11.1	12.9	-
Contents	159	198	237	237	237	237	237	237	220	82	112	145	-
Change	+37	+39	+39	0	0	0	0	0	-17	-138	+30	+33	

Platoro Reservoir. – Water-stage recorder in NW1/4 sec. 22, T. 36 N., R. 4 E., on Conejos River. Completed in 1951; capacity, 59,570 acre-ft at crest of spillway. Reservoir is used for irrigation and flood control. Storage affects Conejos Index Supply. Contents include 3,000 acre-ft of transmountain water stored by exchange in April 1985 on behalf of the Colorado Division of Wildlife.

Month-end elevation, in feet, and contents, in acre-feet

Date	Elevation	Contents	Change in contents
December 31, 2014	9,964.23	10,531	-
January 31, 2015	9,964.36	10,591	+60
February 29	9,964.91	10,834	+243
March 31	9,967.25	11,893	+1059
April 30	9,967.44	11,982	+89
May 31	9,967.85	12,170	+188
June 30	9,993.85	26,546	+14376
July 31	9,988.39	23,185	-3361
August 31	9,977.79	17,099	-6086
September 30	9,974.72	15,502	-1597
October 31	9,972.68	14,483	-1019
November 30	9,972.36	14,367	-116
December 31, 2015	9,970.12	13,238	-1129
Calendar year 2015	-	-	+2707

Trujillo Meadows Reservoir. – In sec. 5, T. 32 N., R. 5 E., on Los Pinos River. Completed in 1957; capacity, 869 acre-ft, effective Jan. 1, 1999. Water is used for fish culture. Storage is transmountain water, by exchange, in 1959.

Month-end gage height, in feet, and contents, in acre-feet

Calendar Year 2015

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	-
Contents	869	869	869	869	889	869	869	869	869	869	869	869	-
Change	0.0	0.0	+86	0.0	+20	-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## STORAGE IN RESERVOIRS

Reservoirs in Rio Grande Basin in New Mexico  
(constructed or enlarged since 1929)

Heron Reservoir. – Water-stage recorder with satellite telemetry, lat 36°39'56", long 106°42'13", on Willow Creek.

Storage began in October 1970. Capacity, 401,300 acre-ft at elevation 7,186.1 ft (low point on crest of spillway); dead storage, 1,340 acre-ft at elevation 7,003.0 ft. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Used for storage of transmountain water.

Month-end elevation, in feet, and contents, in acre-feet

Date	Elevation	Contents	Change in contents
December 31, 2014	7,096.80	65,700	-
January 31, 2015	7,095.37	63,416	-2,284
February 28	7,094.99	62,821	-595
March 31	7,098.52	68,538	+5,717
April 30	7,100.60	72,110	+3,572
May 31	7,112.62	96,378	+24,268
June 30	7,126.89	134,560	+38,182
July 31	7,128.78	140,387	+5,827
August 31	7,119.93	114,627	-25,760
September 30	7,107.64	85,491	-29,136
October 31	7,106.10	82,373	-3,118
November 30	7,100.85	72,550	-9,823
December 31, 2015	7,098.53	68,555	-3,995
Calendar year 2015	-	-	+2,855

El Vado Reservoir. – Water-stage recorder and surface follower, lat 36°35'39", long 106°44'00", on Rio Chama. Storage

began in January 1935. Capacity, 186,250 acre-ft at gage height 6,902.0 ft (crest of spillway); dead storage, 480 acre-ft, below gage height 6,775.0 ft (invert of outlet works), as determined by survey in 1984. Datum of gage is 8.21 ft above National Geodetic Vertical Datum of 1929. Storage includes both Rio Grande and transmountain water.

Month-end gage height, in feet, and contents, in acre-feet

Date	Gage Height	Contents	Change in contents	Transmountain water
December 31, 2014	6,805.41	13,928	-	11,294
January 31, 2015	6,805.44	13,949	21	7,611
February 28	6,810.73	18,033	+4,084	6,552
March 31	6,828.72	35,796	+17,763	5,304
April 30	6,848.24	62,602	+26,806	8,351
May 31	6,874.85	113,847	+51,245	8,374
June 30	6,877.54	120,365	+6,518	5,494
July 31	6,874.94	114,060	-6,305	560
August 31	6,871.54	106,251	-7,809	10,352
September 30	6,862.50	87,557	-18,694	15,041
October 31	6,856.66	76,766	-10,791	11,105
November 30	6,852.93	70,301	-6,465	21,591
December 31, 2015	6,829.32	36,503	-33,798	24,405
Calendar year 2015	-	-	+22,575	-

## STORAGE IN RESERVOIRS

Reservoirs in Rio Grande Basin in New Mexico  
(constructed or enlarged since 1929)

Abiquiu Reservoir. -- Water-stage recorder, lat 36°14'24", long 106°25'44", on Rio Chama. Completed in February 1963; capacity, 1,192,800 acre-ft at elevation 6,350 feet (crest of spillway) by 1998 survey. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Reservoir is operated by Corps of Engineers for flood control and sediment storage. A resolution granting permission to store transmountain waters was approved by Rio Grande Compact Commission on May 3, 1974. Storage includes both Rio Grande and transmountain water.

Month-end elevation, in feet, and contents, in acre-feet

Date	Elevation	Contents	Change in contents	Transmountain water
December 31, 2014	6,204.29	128,586	-	129,078
January 31, 2015	6,205.37	132,159	+3,573	132,352
February 28	6,205.86	133,789	+1,630	133,417
March 31	6,205.78	133,522	-267	133,414
April 30	6,204.45	129,114	-4,408	129,254
May 31	6,203.32	125,402	-3,712	124,960
June 30	6,202.29	122,049	-3,353	121,746
July 31	6,201.68	120,075	-1,974	120,104
August 31	6,202.15	121,594	+1,519	121,465
September 30	6,208.17	141,580	+19,986	141,409
October 31	6,209.87	147,505	+5,925	147,435
November 30	6,206.34	135,392	-12,113	135,200
December 31, 2015	6,204.88	130,533	-4,859	129,972
Calendar year 2015	-	-	+1,947	-

Nambe Falls Reservoir. -- Water-stage recorder, lat 35°50'46", long 105°54'17", in NE1/4SW1/4 sec. 29, T. 19 N., R. 10 E., in Nambe Indian Reservation, on Rio Nambe. Completed in 1976; capacity 1,920 acre-ft at elevation 6,826.6 feet (crest of spillway) by 2004 survey, dead storage 121 acre-ft at elevation 6,760.9 ft. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by Bureau of Reclamation). Storage is transmountain water by exchange (see resolution adopted March 27, 1975).

Month-end elevation, in feet, and contents, in acre-feet

Date	Elevation	Contents	Change in contents
December 31, 2014	6,807.76	1,029	-
January 31, 2015	6,809.68	936	-93
February 28	6,815.85	1,191	+255
March 31	6,827.16	1,761	+570
April 30	6,827.12	1,759	-2
May 31	6,826.98	1,751	-8
June 30	6,826.72	1,736	-15
July 31	6,826.79	1,740	+4
August 31	6,819.08	1,340	-400
September 30	6,807.09	842	-498
October 31	6,808.94	908	+66
November 30	6,819.00	1,337	+429
December 31, 2015	6,822.16	1,493	+156
Calendar year 2015	-	-	+464

## STORAGE IN RESERVOIRS

Reservoirs in Rio Grande Basin in New Mexico  
(constructed or enlarged since 1929)

McClure (Granite Point) Reservoir. – Water-stage recorder, lat 35°41'18", long 105°50'06", in NE1/4SW1/4 sec. 24, T. 17 N., R. 10 E., on Santa Fe River. Original reservoir completed in 1926, capacity, 561 acre-ft; in 1935, permanent flash boards were installed in spillway increasing capacity to 650 acre-ft; in 1947 both dam and spillway were reconstructed increasing capacity to 2,615 acre-ft (gage height, 96.6 ft, crest of spillway). In 1953 spillway was equipped with radial gates that opened automatically, increasing capacity to over 3,000 acre-ft. In 1972, radial gates were removed decreasing capacity to 2,615 acre-ft. In 1989, modifications to the dam and spillway increased capacity to 2,813 acre-ft. In 1995, modification to the dam and spillway increased capacity to 3,257 acre-ft. No dead storage. Elevation of gage is 7,790 ft above National Geodetic Vertical Datum of 1929, from topographic map. Water is for municipal use in Santa Fe. Storage includes both Rio Grande water and transmountain water by exchange. Capacity includes 561 acre-ft for pre-Compact storage and additional capacity as may be available to accommodate up to a total of 1,061 acre-feet of pre-Compact storage in McClure and Nichols Reservoirs combined.

Month-end gage height, in feet, and contents, in acre-feet

Date	Gage height	Contents	Change in contents	Pre-Compact water	Transmountain water
December 31, 2014	0	0	-	0	0
January 31, 2015	0	0	0	0	0
February 28	0	0	0	0	0
March 31	0	0	0	0	0
April 30	0	0	0	0	0
May 31	0	0	0	0	0
June 30	0	0	0	0	0
July 31	0	0	0	0	0
August 31	0	0	0	0	0
September 30	0	0	0	0	0
October 31	0	0	0	0	0
November 30	0	0	0	0	0
December 31, 2015	7822.1	220	+220	0	0
Calendar year 2015	-		220		

Nichols Reservoir. – Water-stage recorder, lat 35°41'24", long 105°52'46", in SE1/4NE1/4 sec. 21, T. 17 N., R. 10 E., on Santa Fe River. Completed in 1942; capacity, 685 acre-ft at gage height 167.0 feet (crest of spillway), dead storage, 14 acre-ft at gage height 121.1 feet. Datum of gage is 7,313.2 feet above National Geodetic Vertical Datum of 1929. Water is for municipal use in Santa Fe. Storage includes both Rio Grande water and transmountain water by exchange. Capacity may include pre-Compact storage such that total pre-Compact storage in McClure and Nichols Reservoirs combined does not exceed 1,061 acre-ft.

Month-end gage height, in feet, and contents, in acre-feet

Date	Gage height	Contents	Change in contents	Pre-Compact water	Transmountain water
December 31, 2014	7,478.83	443	-	166	277
January 31, 2015	7,471.47	299	-144	22	277
February 28	7,469.07	258	-41	0	258
March 31	7,481.76	526	+268	268	258
April 30	7,482.01	533	+7	248	258
May 31	7,482.14	537	+4	137	258
June 30	7,476.79	406	-131	0	258
July 31	7,475.51	377	-29	19	258
August 31	7,468.60	251	-126	0	251
September 30	7,453.72	79	-172	1	78
October 31	7,468.61	251	+172	173	78
November 30	7,482.22	539	+288	461	78
December 31, 2015	7,478.39	442	-97	364	78
Calendar year 2015	-		-1		

## Reservoirs in Rio Grande Basin in New Mexico (constructed or enlarged since 1929)

Month-end elevation, in feet, and contents, in acre-feet

Galisteo Reservoir. – Water-stage recorder above elevation 5,500.3 ft, nonrecording below, lat 35°27'44", long 106°12'30" in NW1/4 sec. 9, T. 14 N., R. 7 E., on Galisteo Creek. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Storage records begin in October 1970. Capacity 88,990 acre-ft at elevation 5,608.0 ft (crest of spillway). No dead storage. Reservoir is operated by Corps of Engineers for flood control and sediment storage.

Calendar Year 2015

[illegible]

## STORAGE IN RESERVOIRS

Reservoirs in Rio Grande Basin in New Mexico  
(constructed or enlarged since 1929)

Jemez Canyon Reservoir. – Water-stage recorder, lat 35°23'40", long 106°32'50", in SW1/4SW1/4 sec. 32, T. 14 N., R. 4 E., on Jemez River. Completed in 1953; capacity, 259,423 acre-ft at elevation 5,271.20 ft. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Maximum controlled capacity at elevation 5,232.0 ft (floor of spillway) is 97,425 acre-ft by 1998 survey. Reservoir is operated by Corps of Engineers for flood control and sediment storage. A sediment pool of about 2,000 acre-ft of transmountain water has been maintained since August 1979.

Month-end elevation, in feet, and contents, in acre-feet

Date	Elevation	Contents	Change in contents	Transmountain water
December 31, 2014	5,155.00	0	-	0
January 31, 2015	5,155.00	0	0	0
February 29	5,155.00	0	0	0
March 31	5,155.00	0	0	0
April 30	5,155.00	0	0	0
May 31	5,158.06	0	0	0
June 30	5,155.00	0	0	0
July 31	5,155.00	0	0	0
August 31	5,155.00	0	0	0
September 30	5,155.00	0	0	0
October 31	5,155.00	0	0	0
November 30	5,155.00	0	0	0
December 31, 2015	5,158.07	129	+129	0
Calendar year 2015	-	-	+129	-

Acoma Reservoir. – Staff gage in SE1/4 sec. 29, T. 10 N., R. 7 W., on San Fidel Arroyo; water for reservoir is diverted from Rio San Jose. Completed in 1938; original capacity, 850 acre-ft; present capacity 650 acre-ft on basis of 1956 sediment survey. Water is used for irrigation on Acoma Indian Reservation. Storage omitted from accounting by action of Commission on March 23, 2000.

Month-end contents, in acre-feet

Calendar Year 2015

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Contents	-	-	-	-	-	-	-	-	-	-	-	-	-
Change	-	-	-	-	-	-	-	-	-	-	-	-	-

Seama Reservoir. – In sec. 36, T. 10 N., R. 7 W., off channel from Rio San Jose. Completed in October 1980; capacity approximately 400 acre-ft. Water is used for irrigation on Laguna Indian Reservation.

No storage during 2014.

## STORAGE IN RESERVOIRS

Reservoirs in Rio Grande Basin in New Mexico  
(project storage)

Elephant Butte Reservoir. – Water-stage recorder, lat 33°09'15", long 107°11'28", in NW1/4 sec. 30, T. 13 S., R. 3 W., on Rio Grande. Storage began Jan. 6, 1915; capacity, 2,023,400 acre-ft at gage height 4,407.0 ft (crest of spillway), by survey of 1999 with flood control storage reservation of 50,000 acre-ft from April through September and 25,000 acre-ft from October through March in accordance with Sept. 9, 1998 resolution of the Rio Grande Compact Commission. Datum of gage is 43.3 ft above National Geodetic Vertical Datum of 1929. Water is used for power development and irrigation in New Mexico and Texas. Records furnished by Bureau of Reclamation. Delivery of transmountain water for minimum recreation pool was initiated in December 1975. Beginning Jan. 1, 1977 gage readings are midnight readings.

Month-end gage height, in feet, and contents, in acre-feet

Date	Gage Height	Contents	Change in contents	Transmountain water
December 31, 2014	4,318.36	256,371	-	3,566
January 31, 2015	4,322.09	291,047	+34,676	3,562
February 29	4,325.89	328,717	+37,670	3,544
March 31	4,329.67	368,452	+39,735	3,522
April 30	4,331.92	393,277	+24,825	3,476
May 31	4,332.47	399,509	+6,232	3,421
June 30	4,327.18	342,023	-57,486	3,371
July 31	4,321.26	283,123	-58,900	3,335
August 31	4,309.44	185,445	-97,678	3,279
September 30	4,306.96	168,427	-17,018	3,243
October 31	4,309.11	183,134	+14,707	3,223
November 30	4,315.58	232,406	+49,272	0
December 31, 2015	4,325.28	322,516	+90,110	0
Calendar year 2015	-	-	+66,145	-

Caballo Reservoir. – Water-stage recorder, lat 32°53'47", long 107°17'30", in SE1/4SW1/4 sec. 19, T. 16 S., R. 4 W., on Rio Grande. Storage began Feb. 8, 1938; capacity, 326,700 acre-ft (by 1999 resurvey), at gage height 4,182.0 ft (above which spillway gates open automatically). Datum of gage is 43.3 ft above National Geodetic Vertical Datum of 1929.

Month-end gage height, in feet, and contents, in acre-feet

Date	Gage height	Contents	Change in contents
December 31, 2014	4,141.28	32,427	-
January 31, 2015	4,141.76	33,842	+1,415
February 28	4,142.24	35,302	+1,460
March 31	4,142.50	36,111	+809
April 30	4,142.23	35,271	-840
May 31	4,144.93	44,301	+9030
June 30	4,135.02	17,310	-26,991
July 31	4,134.74	16,758	-552
August 31	4,145.28	45,576	+28,818
September 30	4,137.99	23,801	-21,775
October 31	4,138.51	25,059	+1,258
November 30	4,139.02	26,329	+1,270
December 31, 2015	4,139.55	27,687	+1,358
Calendar year 2015	-	-	-4,740

STORAGE IN RESERVOIRS

Reservoirs in Rio Grande Basin in New Mexico  
(project storage)

Project storage. – The combined total storage in Elephant Butte and Caballo Reservoirs.

Month-end contents, in acre-feet

Date	Contents	Change in contents
December 31, 2014	288,798	-
January 31, 2015	324,889	+36,091
February 29	364,019	+39,130
March 31	404,563	+40,544
April 30	428,548	+23,985
May 31	443,810	+15,262
June 30	359,333	-84,477
July 31	299,881	-59,452
August 31	231,021	-68,860
September 30	192,228	-38,793
October 31	208,193	+15,965
November 30	258,735	+50,542
December 31, 2015	350,203	+91,468
Calendar year 2015		+61,405

NOTE.-- Values of combined contents may not agree with sum of individual values because of rounding.

TRANSMOUNTAIN DIVERSIONS

Pine River - Weminuche Pass ditch (Fuchs ditch).-- Water-stage recorder and 3-ft Parshall flume in sec. 33, T. 40 N., R. 4 W., at Weminuche Pass in Colorado. Diversion is from North Fork Los Pinos River in San Juan River Basin into Weminuche Creek in Rio Grande Basin. Second enlargement was completed in 1936. Diversion for irrigation is from Rio Grande above the Del Norte gaging station.

Weminuche Pass ditch (Raber-Lohr ditch).-- Water-stage recorder and 4-ft rectangular flume in sec. 33, T. 40 N., R. 4 W., at Weminuche Pass in Colorado. Diversion is from Rincon la Vaca Creek in San Juan River Basin into Weminuche Creek in Rio Grande Basin. Second enlargement was completed in 1936. Diversion for irrigation is from Rio Grande above the Del Norte gaging station.

Williams Creek - Squaw Pass ditch.-- Water-stage recorder and 2-ft Parshall flume in sec. 21, T. 39 N., R. 3 W., at Squaw Pass in Colorado. Diversion is from Williams Creek in San Juan River Basin into Squaw Creek in Rio Grande Basin. Constructed in 1938. Diversion for irrigation is from Rio Grande below Del Norte gaging station.

Tabor ditch.-- Water-stage recorder and 3-ft Parshall flume in sec. 35, T. 43 N., R. 3 W., at Spring Creek Pass in Colorado. Diversion is from Cebolla Creek in Gunnison River Basin into tributary of Clear Creek in Rio Grande Basin. Completed in 1910 or 1911. Diversion for irrigation is from Rio Grande below Del Norte gaging station.

Don La Font No. 1 & 2 ditches (Piedra Pass ditch).-- Water-stage recorder and 2-ft Parshall flume in sec. 4, T. 38 N., R. 1 W., at Piedra Pass in Colorado. Diversion is from tributaries of Piedra River in San Juan River Basin to South River in Rio Grande Basin. Original ditch completed in 1938, first enlargement completed in 1940. Water is imported by Colorado Game and Fish Department, beginning in 1959, to offset losses from fish culture reservoirs.

Treasure Pass diversion ditch.-- Water-stage recorder and 2-ft Parshall flume in sec. 31, T. 38 N., R. 2 E., at Wolf Creek Pass in Colorado. Diversion is from Wolf Creek in San Juan River Basin to a tributary of South Fork Rio Grande. Completed in 1923 or 1924. Water is diverted for irrigation from Rio Grande above the Del Norte gaging station, beginning in 1959. Prior to 1959 it was diverted below gaging station.

Azotea tunnel.-- Water-stage recorder and 10-ft Parshall flume, lat 36°51'12", long 106°40'18", at south portal of Azotea tunnel, San Juan-Chama Project. Diversion is from Rio Blanco, Little Navajo River, and Navajo River in Colorado and discharge is into Azotea in New Mexico. Construction completed in 1970.

Imported quantities, in acre-feet, 2015

Month	Pine River- Weminuche Pass ditch	Weminuche Pass ditch	Williams Creek- Squaw Pass ditch	Tabor ditch	Don La Font ditches	Treasure Pass diversion ditch	Azotea tunnel
January	0	0	0	0	0	0	28
February	0	0	0	0	0	0	974
March	0	0	0	0	0	0	6,890
April	0	0	0	19	0	3	8,163
May	64	456	0	110	0	16	24,470
June	533	2,015	311	760	200	264	38,438
July	127	388	90	206	96	11	8,581
August	0	0	36	90	13	1	889
September	0	4	31	60	0	2	126
October	34	83	0	51	0	2	811
November	0	0	0	2	0	0	862
December	0	0	0	0	0	0	334
Calendar year	758	2,946	468	1,298	309	299	90,566

## EVAPORATION AND PRECIPITATION

The last paragraph of Article VI of the Compact states, in part, --- "such credits and debits shall be reduced annually to compensate for evaporation losses in the proportion that such credits or debits bear to the total amount of water in such reservoirs during the year."

To provide the data needed for the computation of such evaporation losses, the Commission has encouraged the establishment and operation of evaporation stations near each major reservoir in the basin and at other selected locations.

Evaporation and other climatological data collected at the several stations in Colorado and New Mexico are tabulated on the next page. At some of the stations, it was not possible to obtain evaporation records throughout the winter period.

The measurements of evaporation were made in accordance with standard practice for the type of pan in use. Measurements of precipitation were made in standard 8-inch rain gages, which were supplemented at some of the stations by recording rain gages.

Records for the evaporation stations at the State University, Elephant Butte Dam, and El Vado Dam antedated the creation of the Commission; the stations at Abiquiu Dam, Cochiti Dam, and Jemez Canyon Dam were established by the Corps of Engineers. All others were established at the request of the Commission.

The Rio Grande Compact Commission gratefully acknowledges the cooperation of the National Oceanic and Atmospheric Administration, U.S. Army Corps of Engineers, and U.S. Bureau of Reclamation for furnishing the climatological records contained in this report.

Alamosa Airport.--Lat 37°27', long 105°52', in Alamosa County at airport near Alamosa, Colo. Standard class A pan, anemometer, maximum and minimum thermometers, standard 8-inch and recording rain gages at elevation 7,536 ft.

Platoro Dam.--Lat 37°21', long 106°30', in Conejos County near Platoro, Colo. Standard class A pan, anemometer, maximum and minimum thermometers, fan type psychrometer, standard 8-inch and recording rain gages at elevation 9,826 ft.

Heron Dam.--Lat 36°40', long 106°42', in Rio Arriba County about 4 mi. northeast of Heron Dam near Tierra Amarilla, N. Mex. Standard class A pan, maximum and minimum thermometers, and standard 8-inch rain gage at elevation 7,310 ft.

El Vado Dam.--Lat 36°36', long 106°44', in Rio Arriba County at El Vado Dam near Tierra Amarilla, N. Mex. Standard class A pan, anemometer, maximum and minimum thermometers, standard 8-inch and recording rain gages at elevation 6,750 ft.

Abiquiu Dam.--Lat 36°14', long 106°26', in Rio Arriba County at Abiquiu Dam near Abiquiu, N. Mex. Standard class A pan, maximum and minimum thermometers, standard 8-inch and recording rain gages at elevation 6,380 ft.

Nambe Falls Dam.--Lat 35°51', long 105°54', in Santa Fe County at Nambe Falls Dam, N. Mex. Standard class A pan, maximum and minimum thermometers, recording thermograph, standard 8-inch and recording rain gages at elevation 6,840 ft.

Cochiti Dam.--Lat 35°38', long 106°19', in Sandoval County at operations building, at Cochiti Dam, N. Mex. Standard class A pan, anemometer, maximum and minimum thermometers, standard 8-inch and recording rain gages at elevation 5,560 ft.

Jemez Canyon Dam.--Lat 35°23', long 106°32', in Sandoval County at Jemez Canyon Dam, N. Mex. Standard class A pan, anemometer, maximum and minimum thermometers, standard 8-inch and recording rain gages at elevation 5,388 ft.

Elephant Butte Dam.--Lat 33°09', long 107°11', in Sierra County at Elephant Butte Dam, N. Mex. Standard class A pan, anemometer, maximum and minimum thermometers, and standard 8-inch rain gage at elevation 4,576 ft.

Caballo Dam.--Lat 32°54', long 107°18', in Sierra County at Caballo Dam, N. Mex. Standard class A pan, anemometer, maximum and minimum thermometers, standard 8-inch and recording rain gages at elevation 4,190 ft.

New Mexico State University.--Lat 32°17', long 106°45', in Doña Ana County at University Park, N. Mex. Standard class A pan, anemometer, maximum and minimum thermometers, standard 8-inch and recording rain gages at elevation 3,881 ft.

EVAPORATION AND PRECIPITATION

Evaporation and precipitation, in inches  
2015

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.	Annual
Alamosa Airport	Evap.	-	-	-	-	-	-	-	-	-	-	-	-	-
	Precip.	0.33	1.01	0.40	0.43	1.77	1.19	1.34	0.50	0.78	0.98	0.44	0.25	9.42
Platoro Dam	Evap.	-	-	-	-	3.81	6.68	5.60	6.40	4.71	3.93	-	-	-
	Precip.	-	-	-	-	0.91	0.79	4.21	1.50	2.39	0.87	-	-	-
Heron Dam	Evap.	-	-	-	6.01	5.35	7.83	7.58	7.26	5.88	3.90	-	-	-
	Precip.	1.73	2.28	1.05	0.33	4.12	1.57	2.93	3.34	1.44	1.99	1.28	1.12	23.18
El Vado Dam	Evap.	-	-	-	6.52	6.12	7.74	7.65	7.64	6.11	3.75	-	-	-
	Precip.	1.75	1.74	1.15	0.31	3.95	2.67	1.74	3.07	0.82	1.89	0.85	0.74	20.68
Abiquiu Dam	Evap.	2.47	3.59	6.13	7.75	8.24	10.07	8.76	10.05	7.63	5.61	3.53	2.22	76.05
	Precip.	0.56	0.23	1.35	0.64	2.50	0.72	3.11	2.10	0.38	2.20	0.61	0.68	15.08
Nambe Canyon Dam	Evap.	-	-	-	8.57	8.21	9.93	8.26	9.01	7.87	4.76	-	-	-
	Precip.	1.72	0.80	0.07	0.13	2.95	1.48	3.19	0.80	0.41	2.50	2.29	0.93	17.27
Cochiti Dam	Evap.	2.79	4.14	7.05	6.43	6.15	8.41	7.02	8.16	6.62	3.6	3.21	2.83	66.41
	Precip.	1.15	0.51	0.50	0.51	2.38	0.58	4.11	0.55	0.49	2.86	0.79	0.62	15.05
Jemez Canyon Dam	Evap.	3.10	4.42	7.66	9.53	12.62	14.33	13.68	11.84	9.66	6.02	4.25	3.14	100.25
	Precip.	0.29	0.22	0.52	0.47	1.83	0.72	2.68	0.59	1.03	1.97	1.01	0.63	11.96
Elephant Butte Dam	Evap.	2.38	5.75	7.6	11.97	15.33	17.57	13.7	14.60	10.70	8.07	5.03	3.82	116.52
	Precip.	0.78	0.19	0.40	0.05	0.60	1.40	1.44	1.65	0.76	1.84	0.38	0.24	9.73
Caballo Dam	Evap.	3.20	5.50	7.60	12.60	14.10	14.80	13.10	14.50	10.20	7.00	5.50	3.70	111.8
	Precip.	1.74	0.10	0.53	0.05	0.25	1.08	1.92	1.16	1.43	1.30	0.64	0.17	10.37
State University	Evap.	2.10	4.30	6.00	8.50	11.90	13.10	12.60	11.30	8.50	5.90	3.70	2.50	90.4
	Precip.	1.28	0.10	0.23	0.44	0.53	0.34	3.15	1.02	0.31	3.33	0.91	0.96	12.6

## RIO GRANDE COMPACT

The State of Colorado, the State of New Mexico, and the State of Texas, desiring to remove all causes of present and future controversy among these States and between citizens of one of these States and citizens of another State with respect to the use of the waters of the Rio Grande above Fort Quitman, Texas, and being moved by considerations of interstate comity, and for the purpose of effecting an equitable apportionment of such waters, have resolved to conclude a Compact for the attainment of these purposes, and to that end, through their respective Governors, have named as their respective Commissioners:

For the State of Colorado  
For the State of New Mexico  
For the State of Texas

M. C. Hinderlider  
Thomas M. McClure  
Frank B. Clayton

who, after negotiations participated in by S. O. Harper, appointed by the President as the representative of the United States of America, have agreed upon the following articles, to- wit:

## ARTICLE I

(a) The State of Colorado, the State of New Mexico, the State of Texas, and the United States of America, are hereinafter designated "Colorado," "New Mexico," "Texas," and the "United States," respectively.

(b) "The Commission" means the agency created by this Compact for the administration thereof.

(c) The term "Rio Grande Basin" means all of the territory drained by the Rio Grande and its tributaries in Colorado, in New Mexico, and in Texas above Fort Quitman, including the Closed Basin in Colorado.

(d) The "Closed Basin" means that part of the Rio Grande Basin in Colorado where the streams drain into the San Luis Lakes and adjacent territory, and do not normally contribute to the flow of the Rio Grande.

(e) The term "tributary" means any stream which naturally contributes to the flow of the Rio Grande.

(f) "Transmountain Diversion" is water imported into the drainage basin of the Rio Grande from any stream system outside of the Rio Grande Basin, exclusive of the Closed Basin.

(g) "Annual Debits" are the amounts by which actual deliveries in any calendar year fall below scheduled deliveries.

(h) "Annual Credits" are the amounts by which actual deliveries in any calendar year exceed scheduled deliveries.

(i) "Accrued Debits" are the amounts by which the sum of all annual debits exceeds the sum of all annual credits over any common period of time.

(j) "Accrued Credits" are the amounts by which the sum of all annual credits exceeds the sum of all annual debits over any common period of time.

(k) "Project Storage" is the combined capacity of Elephant Butte Reservoir and all other reservoirs actually available for the storage of usable water below Elephant Butte and above the first diversion to lands of the Rio Grande Project, but not more than a total of 2,638,860 acre feet.

## RIO GRANDE COMPACT

(l) "Usable Water" is all water, exclusive of credit water, which is in project storage and which is available for release in accordance with irrigation demands, including deliveries to Mexico.

(m) "Credit Water" is that amount of water in project storage which is equal to the accrued credit of Colorado, or New Mexico, or both.

(n) "Unfilled Capacity" is the difference between the total physical capacity of project storage and the amount of usable water then in storage.

(o) "Actual Release" is the amount of usable water released in any calendar year from the lowest reservoir comprising project storage.

(p) "Actual Spill" is all water which is actually spilled from Elephant Butte Reservoir, or is released therefrom for flood control, in excess of the current demand on project storage and which does not become usable water by storage in another reservoir; provided, that actual spill of usable water cannot occur until all credit water shall have been spilled.

(q) "Hypothetical Spill" is the time in any year at which usable water would have spilled from project storage if 790,000 acre feet had been released therefrom at rates proportional to the actual release in every year from the starting date to the end of the year in which hypothetical spill occurs; in computing hypothetical spill the initial condition shall be the amount of usable water in project storage at the beginning of the calendar year following the effective date of this Compact, and thereafter the initial condition shall be the amount of usable water in project storage at the beginning of the calendar year following each actual spill.

## ARTICLE II

The Commission shall cause to be maintained and operated a stream gaging station equipped with an automatic water stage recorder at each of the following points, to-wit:

(a) On the Rio Grande near Del Norte above the principal points of diversion to the San Luis Valley;

(b) On the Conejos River near Mogote;

(c) On the Los Pinos River near Ortiz;

(d) On the San Antonio River at Ortiz;

(e) On the Conejos River at its mouths near Los Sauces;

(f) On the Rio Grande near Lobatos;

(g) On the Rio Chama below El Vado Reservoir;

(h) On the Rio Grande at Otowi Bridge near San Ildefonso;

(i) On the Rio Grande near San Acacia;

(j) On the Rio Grande at San Marcial;

(k) On the Rio Grande below Elephant Butte Reservoir;

(l) On the Rio Grande below Caballo Reservoir.

Similar gaging stations shall be maintained and operated below any other reservoir constructed after 1929, and at such other points as may be necessary for the securing of records required for the carrying out of the Compact; and automatic water stage recorders shall be maintained and operated on each of the reservoirs mentioned, and on all others constructed after 1929.

## RIO GRANDE COMPACT

Such gaging stations shall be equipped, maintained and operated by the Commission directly or in cooperation with an appropriate Federal or State agency, and the equipment, method and frequency of measurement at such stations shall be such as to produce reliable records at all times. (Note: See Resolution of Commission printed elsewhere in this report.)

## ARTICLE III

The obligation of Colorado to deliver water in the Rio Grande at the Colorado-New Mexico State Line, measured at or near Lobatos, in each calendar year, shall be ten thousand acre feet less than the sum of those quantities set forth in the two following tabulations of relationship, which correspond to the quantities at the upper index stations:

## DISCHARGE OF CONEJOS RIVER

Quantities in thousands of acre feet

Conejos Index Supply (1)	Conejos River at Mouths (2)
100	0
150	20
200	45
250	75
300	109
350	147
400	188
450	232
500	278
550	326
600	376
650	426
700	476

Intermediate quantities shall be computed by proportional parts.

(1) Conejos Index Supply is the natural flow of Conejos River at the U.S.G.S. gaging station near Mogote during the calendar year, plus the natural flow of Los Pinos River at the U.S.G.S. gaging station near Ortiz and the natural flow of San Antonio River at the U.S.G.S. gaging station at Ortiz, both during the months of April to October, inclusive.

(2) Conejos River at Mouths is the combined discharge of branches of this river at the U.S.G.S. gaging stations near Los Sauces during the calendar year.

## DISCHARGE OF RIO GRANDE EXCLUSIVE OF CONEJOS RIVER

Quantities in thousands of acre feet

Rio Grande at Del Norte (3)	Rio Grande at Lobatos less Conejos at Mouths (4)
200	60
250	65
300	75
350	86
400	98
450	112
500	127
550	144
600	162

RIO GRANDE COMPACT  
DISCHARGE OF RIO GRANDE EXCLUSIVE OF CONEJOS RIVER--Con.  
Quantities in thousands of acre feet

Rio Grande at Del Norte (3)	Rio Grande at Lobatos less Conejos at Mouths (4)
650	182
700	204
750	229
800	257
850	292
900	335
950	380
1,000	430
1,100	540
1,200	640
1,300	740
1,400	840

Intermediate quantities shall be computed by proportional parts.

(3) Rio Grande at Del Norte is the recorded flow of the Rio Grande at the U.S.G.S. gaging station near Del Norte during the calendar year (measured above all principal points of diversion to San Luis Valley) corrected for the operation of reservoirs constructed after 1937.

(4) Rio Grande at Lobatos less Conejos at Mouths is the total flow of the Rio Grande at the U.S.G.S. gaging station near Lobatos, less the discharge of Conejos River at its Mouths, during the calendar year.

The application of these schedules shall be subject to the provisions hereinafter set forth and appropriate adjustments shall be made for (a) any change in location of gaging stations; (b) any new or increased depletion of the runoff above inflow index gaging stations; and (c) any transmountain diversions into the drainage basin of the Rio Grande above Lobatos.

In event any works are constructed after 1937 for the purpose of delivering water into the Rio Grande from the Closed Basin, Colorado shall not be credited with the amount of such water delivered, unless the proportion of sodium ions shall be less than forty-five percent of the total positive ions in that water when the total dissolved solids in such water exceeds three hundred fifty parts per million.

#### ARTICLE IV

The obligation of New Mexico to deliver water in the Rio Grande at San Marcial, during each calendar year, exclusive of the months of July, August, and September, shall be that quantity set forth in the following tabulation of relationship, which corresponds to the quantity at the upper index station:

RIO GRANDE COMPACT  
DISCHARGE OF RIO GRANDE AT OTOWI BRIDGE AND AT SAN MARCIAL  
EXCLUSIVE OF JULY, AUGUST AND SEPTEMBER

Quantities in thousands of acre feet

Otowi Index Supply (5)	San Marcial Index Supply (6)
100	0
200	65
300	141
400	219
500	300
600	383
700	469
800	557
900	648
1,000	742
1,100	839
1,200	939
1,300	1,042
1,400	1,148
1,500	1,257
1,600	1,370
1,700	1,489
1,800	1,608
1,900	1,730
2,000	1,856
2,100	1,985
2,200	2,117
2,300	2,253

Intermediate quantities shall be computed by proportional parts.

(5) The Otowi Index Supply is the recorded flow of the Rio Grande at the U.S.G.S. gaging station at Otowi Bridge near San Ildefonso (formerly station near Buckman) during the calendar year, exclusive of the flow during the months of July, August and September, corrected for the operation of reservoirs constructed after 1929 in the drainage basin of the Rio Grande between Lobatos and Otowi Bridge.

(6) San Marcial Index Supply is the recorded flow of the Rio Grande at the gaging station at San Marcial during the calendar year exclusive of the flow during the months of July, August and September.

The application of this schedule shall be subject to the provisions hereinafter set forth and appropriate adjustments shall be made for (a) any change in location of gaging stations; (b) depletion after 1929 in New Mexico at any time of the year of the natural runoff at Otowi Bridge; (c) depletion of the runoff during July, August and September of tributaries between Otowi Bridge and San Marcial, by works constructed after 1937; and (d) any transmountain diversions into the Rio Grande between Lobatos and San Marcial.

Concurrent records shall be kept of the flow of the Rio Grande at San Marcial, near San Acacia, and of the release from Elephant Butte Reservoir to the end that the records at these three stations may be correlated. (Note: See Resolution of Commission printed elsewhere in this report.)

## RIO GRANDE COMPACT

## ARTICLE V

If at any time it should be the unanimous finding and determination of the Commission that because of changed physical conditions, or for any other reason, reliable records are not obtainable, or cannot be obtained, at any of the stream gaging stations herein referred to, such stations may, with the unanimous approval of the Commission, be abandoned, and with such approval another station, or other stations, shall be established and new measurements shall be substituted which, in the unanimous opinion of the Commission, will result in substantially the same results so far as the rights and obligations to deliver water are concerned, as would have existed if such substitution of stations and measurements had not been so made. (Note: See Resolution of Commission printed elsewhere in this report.)

## ARTICLE VI

Commencing with the year following the effective date of this Compact, all credits and debits of Colorado and New Mexico shall be computed for each calendar year; provided, that in a year of actual spill no annual credits nor annual debits shall be computed for that year.

In the case of Colorado, no annual debit nor accrued debit shall exceed 100,000 acre feet, except as either or both may be caused by holdover storage of water in reservoirs constructed after 1937 in the drainage basin of the Rio Grande above Lobatos. Within the physical limitations of storage capacity in such reservoirs, Colorado shall retain water in storage at all times to the extent of its accrued debit.

In the case of New Mexico, the accrued debit shall not exceed 200,000 acre feet at any time, except as such debit may be caused by holdover storage of water in reservoirs constructed after 1929 in the drainage basin of the Rio Grande between Lobatos and San Marcial. Within the physical limitations of storage capacity in such reservoirs, New Mexico shall retain water in storage at all times to the extent of its accrued debit. In computing the magnitude of accrued credits or debits, New Mexico shall not be charged with any greater debit in any one year than the sum of 150,000 acre-feet and all gains in the quantity of water in storage in such year.

The Commission by unanimous action may authorize the release from storage of any amount of water which is then being held in storage by reason of accrued debits of Colorado or New Mexico; provided, that such water shall be replaced at the first opportunity thereafter.

In computing the amount of accrued credits and accrued debits of Colorado or New Mexico, any annual credits in excess of 150,000 acre feet shall be taken as equal to that amount.

In any year in which actual spill occurs, the accrued credits of Colorado, or New Mexico, or both, at the beginning of the year shall be reduced in proportion to their respective credits by the amount of such actual spill; provided that the amount of actual spill shall be deemed to be increased by the aggregate gain in the amount of water in storage, prior to the time of spill, in reservoirs above San Marcial constructed after 1929; provided, further, that if the Commissioners for the States having accrued credits authorize the release of part, or all, of such credits in advance of spill, the amount so released shall be deemed to constitute actual spill.

In any year in which there is actual spill of usable water, or at the time of hypothetical spill thereof, all accrued debits of Colorado, or New Mexico, or both, at the beginning of the year shall be cancelled.

## RIO GRANDE COMPACT

In any year in which the aggregate of accrued debits of Colorado and New Mexico exceeds the minimum unfilled capacity of project storage, such debits shall be reduced proportionally to an aggregate amount equal to such minimum unfilled capacity.

To the extent that accrued credits are impounded in reservoirs between San Marcial and Courchesne, and to the extent that accrued debits are impounded in reservoirs above San Marcial, such credits and debits shall be reduced annually to compensate for evaporation losses in the proportion that such credits or debits bore to the total amount of water in such reservoirs during the year.

## ARTICLE VII

Neither Colorado nor New Mexico shall increase the amount of water in storage in reservoirs constructed after 1929 whenever there is less than 400,000 acre feet of usable water in project storage; provided, that if the actual releases of usable water from the beginning of the calendar year following the effective date of this Compact, or from the beginning of the calendar year following actual spill, have aggregated more than an average of 790,000 acre feet per annum, the time at which such minimum stage is reached shall be adjusted to compensate for the difference between the total actual release and releases at such average rate; provided, further, that Colorado, or New Mexico, or both, may relinquish accrued credits at any time, and Texas may accept such relinquished water, and in such event the state, or states, so relinquishing shall be entitled to store water in the amount of the water so relinquished.

## ARTICLE VIII

During the month of January of any year the Commissioner for Texas may demand of Colorado and New Mexico, and the Commissioner for New Mexico may demand of Colorado, the release of water from storage reservoirs constructed after 1929 to the amount of the accrued debits of Colorado and New Mexico, respectively, and such releases shall be made by each at the greatest rate practicable under the conditions then prevailing, and in proportion to the total debit of each, and in amounts, limited by their accrued debits, sufficient to bring the quantity of usable water in project storage to 600,000 acre feet by March first and to maintain this quantity in storage until April thirtieth, to the end that a normal release of 790,000 acre feet may be made from project storage in that year.

## ARTICLE IX

Colorado agrees with New Mexico that in event the United States or the State of New Mexico decides to construct the necessary works for diverting the waters of the San Juan River, or any of its tributaries, into the Rio Grande, Colorado hereby consents to the construction of said works and the diversion of waters from the San Juan River, or the tributaries thereof, into the Rio Grande in New Mexico, provided the present and prospective uses of water in Colorado by other diversions from the San Juan River, or its tributaries, are protected.

## ARTICLE X

In the event water from another drainage basin shall be imported into the Rio Grande Basin by the United States or Colorado or New Mexico, or any of them jointly, the State having the right to the use of such water shall be given proper credit therefor in the application of the schedules.

## ARTICLE XI

New Mexico and Texas agree that upon the effective date of this Compact all controversies between said States relative to the quantity or quality of the water of the Rio Grande are composed and settled; however, nothing herein shall be interpreted to prevent

## RIO GRANDE COMPACT

recourse by a signatory state to the Supreme Court of the United States for redress should the character or quality of the water, at the point of delivery, be changed hereafter by one signatory state to the injury of another. Nothing herein shall be construed as an admission by any signatory state that the use of water for irrigation causes increase of salinity for which the user is responsible in law.

## ARTICLE XII

To administer the provisions of this Compact there shall be constituted a Commission composed of one representative from each state, to be known as the Rio Grande Compact Commission. The State Engineer of Colorado shall be ex-officio the Rio Grande Compact Commissioner for Colorado. The State Engineer of New Mexico shall be ex-officio the Rio Grande Compact Commissioner for New Mexico. The Rio Grande Compact Commissioner for Texas shall be appointed by the Governor of Texas. The President of the United States shall be requested to designate a representative of the United States to sit with such Commission, and such representative of the United States, if so designated by the President, shall act as Chairman of the Commission without vote.

The salaries and personal expenses of the Rio Grande Compact Commissioners for the three States shall be paid by their respective States, and all other expenses incident to the administration of this Compact, not borne by the United States, shall be borne equally by the three States.

In addition to the powers and duties hereinbefore specifically conferred upon such Commission, and the members thereof, the jurisdiction of such Commission shall extend only to the collection, correlation and presentation of factual data and the maintenance of records having a bearing upon the administration of this Compact, and, by unanimous action, to the making of recommendations to the respective States upon matters connected with the administration of this Compact. In connection therewith, the Commission may employ such engineering and clerical aid as may be reasonably necessary within the limit of funds provided for that purpose by the respective States. Annual reports compiled for each calendar year shall be made by the Commission and transmitted to the Governors of the signatory States on or before March first following the year covered by the report. The Commission may, by unanimous action, adopt rules and regulations consistent with the provisions of this Compact to govern their proceedings.

The findings of the Commission shall not be conclusive in any court or tribunal which may be called upon to interpret or enforce this Compact.

## ARTICLE XIII

At the expiration of every five-year period after the effective date of this Compact, the Commission may, by unanimous consent, review any provisions hereof which are not substantive in character and which do not affect the basic principles upon which the Compact is founded, and shall meet for the consideration of such questions on the request of any member of the Commission; provided, however, that the provisions hereof shall remain in full force and effect until changed and amended within the intent of the Compact by unanimous action of the Commissioners, and until any changes in this Compact are ratified by the legislatures of the respective states and consented to by the Congress, in the same manner as this Compact is required to be ratified to become effective.

## ARTICLE XIV

The schedules herein contained and the quantities of water herein allocated shall never be increased nor diminished by reason of any increase or diminution in the delivery or loss of water to Mexico.

## RIO GRANDE COMPACT

## ARTICLE XV

The physical and other conditions characteristic of the Rio Grande and peculiar to the territory drained and served thereby, and to the development thereof, have actuated this Compact and none of the signatory states admits that any provisions herein contained establishes any general principle or precedent applicable to other interstate streams.

## ARTICLE XVI

Nothing in this Compact shall be construed as affecting the obligations of the United States of America to Mexico under existing treaties, or to the Indian Tribes, or as impairing the rights of the Indian Tribes.

## ARTICLE XVII

This Compact shall become effective when ratified by the legislatures of each of the signatory states and consented to by the Congress of the United States. Notice of ratification shall be given by the Governor of each state to the Governors of the other states and to the President of the United States, and the President of the United States is requested to give notice to the Governors of each of the signatory states of the consent of the Congress of the United States.

IN WITNESS WHEREOF, the Commissioners have signed this Compact in quadruplicate original, one of which shall be deposited in the archives of the Department of State of the United States of America and shall be deemed the authoritative original, and of which a duly certified copy shall be forwarded to the Governor of each of the signatory States.

Done at the City of Santa Fe, in the State of New Mexico, on the 18th day of March, in the year of our Lord, One Thousand Nine Hundred and Thirty-eight.

(Sgd.) M. C. HINDERLIDER

(Sgd.) THOMAS M. McCLURE

(Sgd.) FRANK B. CLAYTON

APPROVED:

(Sgd.) S. O. HARPER

RATIFIED BY:

Colorado, February 21, 1939

New Mexico, March 1, 1939

Texas, March 1, 1939

Passed Congress as Public Act No. 96, 76th Congress,

Approved by the President May 31, 1939

RESOLUTION ADOPTED BY RIO GRANDE COMPACT COMMISSION  
AT THE ANNUAL MEETING HELD AT EL PASO, TEXAS, FEBRUARY 22-24, 1948, CHANGING  
GAGING STATIONS AND MEASUREMENTS OF  
DELIVERIES BY NEW MEXICO

R E S O L U T I O N

Whereas, at the Annual Meeting of the Rio Grande Compact Commission in the year 1945, the question was raised as to whether or not a schedule for delivery of water by New Mexico during the entire year could be worked out, and

Whereas, at said meeting the question was referred to the Engineering Advisers for their study, recommendations and report, and

Whereas, said Engineering Advisers have met, studied the problems and under date of February 24, 1947, did submit their Report, which said Report contains the findings of said Engineering Advisers and their recommendations, and

Whereas, the Compact Commission has examined said Report and finds that the matters and things therein found and recommended are proper and within the terms of the Rio Grande Compact, and

Whereas, the Commission has considered said Engineering Advisers' Report and all available evidence, information and material and is fully advised:

Now, Therefore, Be it Resolved:

The Commission finds as follows:

- (a) That because of change of physical conditions, reliable records of the amount of water passing San Marcial are no longer obtainable at the stream gaging station at San Marcial and that the same should be abandoned for Compact purposes.
- (b) That the need for concurrent records at San Marcial and San Acacia no longer exists and that the gaging station at San Acacia should be abandoned for Compact purposes.
- (c) That it is desirable and necessary that the obligations of New Mexico under the Compact to deliver water in the months of July, August, September, should be scheduled.
- (d) That the change in gaging stations and substitution of the new measurements as hereinafter set forth will result in substantially the same results so far as the rights and obligations to deliver water are concerned, and would have existed if such substitution of stations and measurements had not been so made.

Be it Further Resolved:

That the following measurements and schedule thereof shall be substituted for the measurements and schedule thereof as now set forth in Article IV of the Compact:

"The obligation of New Mexico to deliver water in the Rio Grande into Elephant Butte Reservoir during each calendar year shall be measured by that quantity set forth in the following tabulation of relationship which corresponds to the quantity at the upper index station:

RIO GRANDE COMPACT COMMISSION REPORT  
DISCHARGE OF RIO GRANDE AT OTOWI BRIDGE AND ELEPHANT BUTTE EFFECTIVE  
SUPPLY

Quantities in thousands of acre-feet

Otowi Index Supply (5)	Elephant Butte Effective Index Supply (6)
100	57
200	114
300	171
400	228
500	286
600	345
700	406
800	471
900	542
1,000	621
1,100	707
1,200	800
1,300	897
1,400	996
1,500	1,095
1,600	1,195
1,700	1,295
1,800	1,395
1,900	1,495
2,000	1,595
2,100	1,695
2,200	1,795
2,300	1,895
2,400	1,995
2,500	2,095
2,600	2,195
2,700	2,295
2,800	2,395
2,900	2,495
3,000	2,595

Intermediate quantities shall be computed by proportional parts.

- (5) The Otowi Index Supply is the recorded flow of the Rio Grande at the U.S.G.S. gaging station at Otowi Bridge near San ildefonso (formerly station near Buckman) during the calendar year, corrected for the operation of reservoirs constructed after 1929 in the drainage basin of the Rio Grande between Lobatos and Otowi Bridge.
- (6) Elephant Butte Effective Index Supply is the recorded flow of the Rio Grande at the gaging station below Elephant Butte Dam during the calendar year plus the net gain in storage in Elephant Butte Reservoir during the same year or minus the net loss in storage in said reservoir, as the case may be.

## RIO GRANDE COMPACT

The application of this schedule shall be subject to the provisions hereinafter set forth and appropriate adjustments shall be made for (a) any change in location of gaging stations; (b) depletion after 1929 in New Mexico of the natural runoff at Otowi Bridge; and (c) any transmountain diversions into the Rio Grande between Lobatos and Elephant Butte Reservoir."

Be it Further Resolved:

That the gaging stations at San Acacia and San Marcial be, and the same are hereby abandoned for Compact purposes.

Be it Further Resolved:

That this Resolution has been passed unanimously and shall be effective January 1, 1949, if within 120 days from this date the Commissioner for each State shall have received from the Attorney General of the State represented by him, an opinion approving this Resolution, and shall have so advised the Chairman of the Commission, otherwise, to be of no force and effect.

(Note: The following paragraph appears in the Minutes of the Annual Meeting of the Commission held at Denver, Colorado, February 14-16, 1949.

"The Chairman announced that he had received, pursuant to the Resolution adopted by the Commission at the Ninth Annual Meeting on February 24, 1948, opinions from the Attorneys General of Colorado, New Mexico and Texas that the substitution of stations and measurements of deliveries by New Mexico set forth in said resolution was within the powers of the Commission").

RULES AND REGULATIONS FOR ADMINISTRATION OF  
THE RIO GRANDE COMPACT

A Compact, known as the Rio Grande Compact, between the States of Colorado, New Mexico and Texas, having become effective on May 31, 1939 by consent of the Congress of the United States, which equitably apportions the waters of the Rio Grande above Fort Quitman and permits each State to develop its water resources at will, subject only to its obligations to deliver water in accordance with the schedules set forth in the Compact, the following Rules and Regulations have been adopted for its administration by the Rio Grande Compact Commission; to be and remain in force and effect only so long as the same may be satisfactory to each and all members of the Commission, and provided always that on the objection of any member of the Commission, in writing, to the remaining two members of the Commission after a period of sixty days from the date of such objection, the sentence, paragraph or any portion or all of these rules to which any such objection shall be made, shall stand abrogated and shall thereafter have no further force and effect; it being the intent and purpose of the Commission to permit these rules to obtain and be effective only so long as the same may be satisfactory to each and all of the Commissioners.

(1) GAGING STATIONS /1, /2

Responsibility for the equipping, maintenance and operation of the stream gaging stations and reservoir gaging stations required by the provisions of Article II of the Compact shall be divided among the signatory States as follows:

(a) Gaging stations on streams and reservoirs in the Rio Grande Basin above the Colorado-New Mexico boundary shall be equipped, maintained, and operated by Colorado in cooperation with the U.S. Geological Survey.

(b) Gaging stations on streams and reservoirs in the Rio Grande Basin below Lobatos and above Caballo Reservoir shall be equipped, maintained and operated by New Mexico in cooperation with the U.S. Geological Survey to the extent that such stations are not maintained and operated by some other Federal agency.

(c) Gaging stations on Elephant Butte Reservoir and on Caballo Reservoir, and the stream gaging station on the Rio Grande below Caballo Reservoir shall be equipped, maintained and operated by or on behalf of Texas through the agency of the U.S. Bureau of Reclamation.

The equipment, method and frequency of measurements at each compact stream gaging station shall be sufficient to obtain stream flow records at least equal in accuracy to those classified as "good" by the U.S. Geological Survey. The stream flow records for each compact stream gaging station shall be reviewed annually by the U.S. Geological Survey to ensure accuracy. Water-stage recorders on the reservoirs specifically named in Article II of the Compact shall have sufficient range below maximum reservoir level to record major fluctuations in storage. Staff gages may be used to determine fluctuations below the range of the water-stage recorders on these and other large reservoirs, and staff gages may be used upon approval of the Commission in lieu of water-stage recorders on small reservoirs, provided that the frequency of observation is sufficient in each case to establish any material changes in water levels in such reservoirs.

/1 Amended at Eleventh Annual Meeting, February 23, 1950.

/2 Amended at Seventy-Seventh Annual Meeting, March 31, 2016.

## RULES AND REGULATIONS

(2) RESERVOIR CAPACITIES /1

Colorado shall file with the Commission a table of areas and capacities for each reservoir in the Rio Grande Basin above Lobatos constructed after 1937; New Mexico shall file with the Commission a table of areas and capacities for each reservoir in the Rio Grande Basin between Lobatos and San Marcial constructed after 1929; and Texas shall file with the Commission tables of areas and capacities for Elephant Butte Reservoir and for all other reservoirs actually available for the storage of water between Elephant Butte and the first diversion to lands under the Rio Grande Project.

Whenever it shall appear that any table of areas and capacities is in error by more than five per cent, the Commission shall use its best efforts to have a re-survey made and a corrected table of areas and capacities to be substituted as soon as practicable. To the end that the Elephant Butte effective supply may be computed accurately, the Commission shall use its best efforts to have the rate of accumulation and the place of deposition of silt in Elephant Butte Reservoir checked at least every three years.

(3) ACTUAL SPILL /2, /3, /4, /6

(a) Water released from Elephant Butte in excess of Project requirements, which is currently passed through Caballo Reservoir, prior to the time of spill, shall be deemed to have been Usable Water released in anticipation of spill, or Credit Water if such release shall have been authorized.

(b) Excess releases from Elephant Butte Reservoir, as defined in (a) above, shall be added to the quantity of water actually in storage in that reservoir, and Actual Spill shall be deemed to have commenced when this sum equals the total capacity of that reservoir to the level of the uncontrolled spillway less capacity reserved for flood purposes, i.e., 1,999,600 acre-feet in the months of October through March inclusive, and 1,974,600 acre-feet in the months of April through September, inclusive, as determined from the 2009 area-capacity table or successor area-capacity tables and flood control storage reservation of 50,000 acre-feet from April through September and 25,000 acre-feet from October through March.

(c) All water actually spilled at Elephant Butte Reservoir, or released therefrom, in excess of Project requirements, which is currently passed through Caballo Reservoir, after the time of spill, shall be considered as Actual Spill, provided that the total quantity of water then in storage in Elephant Butte Reservoir exceeds the physical capacity of that reservoir at the level of the sill of the spillway gates, i.e. -1,830,000 acre-ft in 1942.

(d) Water released from Caballo Reservoir in excess of Project requirements and in excess of water currently released from Elephant Butte Reservoir, shall be deemed Usable Water released, excepting only flood water entering Caballo Reservoir from tributaries below Elephant Butte Reservoir.

(4) DEPARTURES FROM NORMAL RELEASES /5

For the purpose of computing the time of Hypothetical Spill required by Article VI and for the purpose of the adjustment set forth in Article VII, no allowance shall be made for the difference between Actual and Hypothetical Evaporation, and any under-release of usable water from Project Storage in excess of 150,000 acre-ft in any year shall be taken as equal to that amount.

/1 Amended at Eleventh Annual Meeting, February 23, 1950.

/2 Adopted at Fourth Annual Meeting, February 24, 1943.

/3 Amended September 9, 1998.

/4 Amended March 22, 2001; made effective January 1, 2001.

/5 Adopted June 2, 1959; made effective January 1, 1952.

/6 Adopted March 31, 2009; made effective January 1, 2010.

## RULES AND REGULATIONS

(5) EVAPORATION LOSSES /6, /7, /8

The Commission shall encourage the equipping, maintenance and operation, in cooperation with the U.S. Weather Bureau or other appropriate agency, of evaporation stations at Elephant Butte Reservoir and at or near each major reservoir in the Rio Grande Basin within Colorado constructed after 1937 and in New Mexico constructed after 1929. The net loss by evaporation from a reservoir surface shall be taken as the difference between the actual evaporation loss and the evapo-transpiration losses which would have occurred naturally, prior to the construction of such reservoir. Changes in evapo-transpiration losses along stream channels below reservoirs may be disregarded.

Net losses by evaporation, as defined above, shall be used in correcting Index Supplies for the operation of reservoirs upstream from Index Gaging Stations as required by the provisions of Article III and Article IV of the Compact.

In the application of the provisions of the last unnumbered paragraph of Article VI of the Compact:

(a) Evaporation losses for which accrued credits shall be reduced shall be taken as the difference between the gross evaporation from the water surface of Elephant Butte Reservoir and rainfall on the same surface.

(b) Evaporation losses for which accrued debits shall be reduced shall be taken as the net loss by evaporation as defined in the first paragraph.

## (6) ADJUSTMENT OF RECORDS

The Commission shall keep a record of the location, and description of each gaging station and evaporation station, and, in the event of change in location of any stream gaging station for any reason, it shall ascertain the increment in flow or decrease in flow between such locations for all stages. Wherever practicable, concurrent records shall be obtained for one year before abandonment of the previous station.

## (7) NEW OR INCREASED DEPLETIONS

In the event any works are constructed which alter or may be expected to alter the flow at any of the Index Gaging Stations mentioned in the Compact, or which may otherwise necessitate adjustments in the application of the schedules set forth in the Compact, it shall be the duty of the Commissioner specifically concerned to file with the Commission all available information pertaining thereto, and appropriate adjustments shall be made in accordance with the terms of the Compact; provided, however, that any such adjustments shall in no way increase the burden imposed upon Colorado or New Mexico under the schedules of deliveries established by the Compact.

## (8) TRANSMOUNTAIN DIVERSIONS

In the event any works are constructed for the delivery of waters into the drainage basin of the Rio Grande from any stream system outside of the Rio Grande Basin, such waters shall be measured at the point of delivery into the Rio Grande Basin and proper allowances shall be made for losses in transit from such points to the Index Gaging Station on the stream with which the imported waters are comingled.

/6 Amended at Tenth Annual Meeting, February 15, 1949.

/7 Amended at Twelfth Annual Meeting, February 24, 1951.

/8 Amended June 2, 1959.

## RULES AND REGULATIONS

## (9) QUALITY OF WATER

In the event that delivery of water is made from the Closed Basin into the Rio Grande, sufficient samples of such water shall be analyzed to ascertain whether the quality thereof is within the limits established by the Compact.

(10) SECRETARY /8, /9, /10

The Commission may, on a yearly basis, employ appropriate entities to render such engineering and clerical aid as may reasonably be necessary for administration of the Compact. The entities may be employed to:

(1) Collect and correlate all factual data and other records having a material bearing on the administration of the Compact and keep each Commissioner advised thereof.

(2) Inspect all gaging stations required for administration of the Compact and make recommendations to the Commission as to any changes or improvements in methods of measurement or facilities for measurement which may be needed to insure that reliable records be obtained.

(3) Report to each Commissioner in writing within thirty days after the end of each quarter a summary of all hydrographic data then available for the current year - on forms prescribed by the Commission - pertaining to:

- (a) Deliveries by Colorado
- (b) Deliveries by New Mexico
- (c) Operation of Project Storage

(4) Make such investigations as may be requested by the Commission in aid of its administration of the Compact.

(5) Act as Secretary to the Commission and submit to the Commission at its regular meeting a report on its activities and a summary of all data needed for determination of debits and credits and other matters pertaining to administration of the Compact.

(11) COSTS /1, /2, /3

At its annual meeting, the Commission shall adopt a budget for the ensuing fiscal year beginning July first.

Such budget shall set forth the total cost of maintenance and operating of gaging stations, of evaporation stations, the cost of engineering and clerical aid, and all other necessary expenses excepting the salaries and personal expenses of the Rio Grande Compact Commissioners.

Contributions made directly by the United States and the cost of services rendered by the United States without cost shall be deducted from the total budget amount; the remainder shall then be allocated equally to Colorado, New Mexico and Texas.

/8 The substitution of this section for the section titled "Reports to Commissioners" was adopted at Ninth Annual Meeting, February 22, 1948.

/9 Amended March 31, 2009.

/10 Amended at Seventy-Seventh Annual Meeting, March 31, 2016.

/1 Amended at Eleventh Annual Meeting, February 23, 1950.

/2 Amended March 31, 2009.

/3 Amended at Seventy-Seventh Annual Meeting, March 31, 2016.

## RULES AND REGULATIONS

Expenditures made directly by any State for purposes set forth in the budget shall be credited to that State; contributions in cash or in services by any State under a cooperative agreement with any federal agency shall be credited to such State, but the amount of the federal contribution shall not so be credited; in event any State, through contractual relationships, causes work to be done in the interest of the Commission, such State shall be credited with the cost thereof, unless such cost is borne by the United States.

Costs incurred by the Commission under any cooperative agreement between the Commission and any U.S. Government Agency, not borne by the United States, shall be apportioned equally to each State, and each Commissioner shall arrange for the prompt payment of one-third thereof by his State.

The Commissioner of each State shall report at the annual meeting each year the amount of money expended during the year by the State that the Commissioner represents, as well as the portion thereof contributed by all cooperating federal agencies, and the Commission shall arrange for such proper reimbursement in cash or credits between States as may be necessary to equalize the contributions made by each State in the equipment, maintenance and operation of all gaging stations authorized by the Commission and established under the terms of the Compact.

It shall be the duty of each Commissioner to endeavor to secure from the Legislature of the State represented by the Commissioner an appropriation of sufficient funds with which to meet the obligations of that State, as provided by the Compact.

(12) MEETING OF COMMISSION /1, /10, /11

The Commission shall meet each year for the consideration and adoption of the annual report for the calendar year preceding, and for the transaction of any other business consistent with its authority. Other meetings as may be deemed necessary shall be held at any time and place set by mutual agreement, for the consideration of data collected and for the transaction of any business consistent with its authority.

No action of the Commission shall be effective until approved by the Commissioner from each of the three signatory States.

(Signed) M. C. HINDERLIDER

M. C. Hinderlider

Commissioner for Colorado

(Signed) THOMAS M. McCLURE

Thomas M. McClure

Commissioner for New Mexico

(Signed) JULIAN P. HARRISON

Julian P. Harrison

Commissioner for Texas

Adopted December 19, 1939.

/1 Amended at Eleventh Annual Meeting, February 23, 1950.

/10 Amended at Thirteenth Annual Meeting, February 25, 1952.

/11 Amended at Seventy-Seventh Annual Meeting, March 31, 2016.

## LEGEND

- ▲ STREAM-GAGING STATION
- CITY OR TOWN
- BASIN BOUNDARY
- - - COUNTY LINE
- - - CLOSED BASIN BOUNDARY
- TABOR TRANSMOUNTAIN DIVERSION

## EXPLANATION

## RIO GRANDE COMPACT STREAM-GAGING STATIONS

- ① Rio Grande near Del Norte
- ② Conejos River below Platoro Reservoir
- ③ Conejos River near Mogote
- ④ San Antonio River at Ortiz
- ⑤ Los Pinos River near Ortiz
- ⑥ Conejos River near Lasasues
- ⑦ Rio Grande near Lobatos
- ⑧ Azotea Tunnel at South Portal
- ⑨ Willow Creek above Heron Reservoir
- ⑩ Horse Lake Creek above Heron Reservoir
- ⑪ Willow Creek below Heron Reservoir, near Parkview
- ⑫ Rio Chama below El Vado Dam
- ⑬ Rio Chama below Abiquiu Dam
- ⑭ Rio Grande at Otowi Bridge
- ⑮ Santa Fe River near Santa Fe
- ⑯ Rio Grande below Cochiti Dam
- ⑰ Galisteo Creek below Galisteo Dam
- ⑱ Jemez River below Jemez Canyon Dam

NOTE: Screened areas denote reservoirs, whose capacity is all or in part subject to provisions of the Rio Grande Compact

Revised March 1989

## RIO GRANDE BASIN ABOVE BERNALILLO, NEW MEXICO

0 10 20 30 40 50 MILES

0 10 20 30 40 50 KILOMETERS

