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RIO GRANDE COMPACT COMMISSION

COLORADO

TEXAS

NEW MEXICO

April 05, 2017

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

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

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

Honorable Governors:

The 77th Annual Meeting of the Rio Grande Compact Commission was held in Santa Fe, New Mexico April 05, 2017. The meeting was held to discuss Compact accounting and matters related to the Compact administration. Public comment was also heard by the Commissioner.

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.

Upon printing, the 2016 Report of the Rio Grande Compact Commission will be provided under separate cover.

Respectfully,

Tom Blaine, Commissioner for New Mexico

Patrick R. Gordon, Commissioner for Texas

Dick Wolfe, Commissioner for Colorado

REPORT OF THE ENGINEER ADVISERS TO THE RIO GRANDE COMPACT COMMISSION April 5, 2017

The Engineer Advisers to the Rio Grande Compact Commission met in Albuquerque, New Mexico on January 20, and between February 27 and March 3, 2017 to:

- 1) receive reports,
- 2) prepare the 2016 Rio Grande Compact (Compact) water accounting,
- discuss continuing and new issues in preparation for the 2017 annual meeting of the Rio Grande Compact Commission (Commission), and
- 4) prepare the Engineer Advisers' report.

The Engineer Advisers 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), 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 2016 and are again unable to reach a consensus on the 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 2016 Compact Delivery Tables for Colorado and New Mexico and the Release and Spill from Project Storage Table. For 2016, as in previous years, each of the Engineer Advisers implemented accounting procedures described in the addenda to this report. At the 2016 meeting, the Commission did not approve any of the proposed accounting scenarios. In 2017, the Engineer Advisers used the accounting scenarios they individually prepared to carry forward Compact accounting for the 2016 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 in New Mexico.

RIO GRANDE BASIN CONDITIONS

Snowpack and snow-water equivalent amounts were near average for most of the 2015-2016 winter. Good early snow events in November and December 2015 started the season off well above average but a dry and warm late winter and early spring depleted the snowpack to approximately average conditions leading into the runoff. As a result, snowmelt runoff levels in 2016 were near average in most of the basin in Colorado and below average in New Mexico. Summer monsoon precipitation was near average in the Upper Rio Grande Basin in Colorado and New Mexico in 2016.

Platoro Reservoir reached a high of approximately 54 percent of capacity during June of 2016 as part of the Colorado direct flow storage regulation operation. The San Juan-Chama Project (SJCP) delivered 94,309 acre-feet through the Azotea Tunnel into the Rio Grande basin during the year which is approximately 98 percent of the estimated SJCP firm yield. At its March 2016 meeting, the Compact Commission approved a resolution for a 2016 El Vado Temporary Modification (Temporary Modification). The Temporary Modification resulted in the storage and release of 31,593 acre-feet of native water between May 2nd and June 14th 2016. El Vado Reservoir reached a high of approximately 128,160 acre-feet on May 20.

Usable Water in Rio Grande Project Storage was below the Article VII trigger of 400,000 acre-feet until February when Usable Water in storage exceeded 400,000 acre-feet. In April, 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 February and dropped below it in April 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.

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 2017 Commission meeting, including information obtained from the reports of the federal agencies at meetings with the Engineer Advisers or otherwise reported at the 2017 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

During 2016 Reclamation continued to manage and serve as the fiscal agency for the Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) as authorized by the Omnibus Appropriations Act of 2009 (P.L. 111-8). In FY 2016, total federal appropriations through Reclamation were \$5,000,000, of which \$3,000,000 was utilized for Collaborative Program activities and \$2,000,000 was utilized by Reclamation for water leasing, pumping, and Program administration activities. FY2016 Collaborative Program accomplishments include conducting a Rio Grande silvery minnow Genetics Project Peer Review and a catch per unit effort (CPUE) fish monitoring workshop, reviewing recommendations from the panelists of both efforts, and beginning to implement priority recommendations as funding allowed. Ongoing Collaborative Program activities included, but were not limited to, maintenance of four streamflow gages in the middle Rio Grande, species population monitoring (Rio Grande silvery minnow (silvery minnow), Southwestern willow flycatcher (flycatcher), and Yellow-billed cuckoo (cuckoo)), and silvery minnow captive fish propagation and augmentation efforts. In addition, Reclamation reported that a five-year contract with WEST, Inc. is in place to provide program management and scientific support to the Collaborative Program.

The New Mexico Interstate Stream Commission (NMISC) is providing the majority of the required 25% non-federal cost share through a combination of on-the-ground projects, and contracted professional services. In addition, the Corps, through a separate authorization, used approximately \$2.4 million to support Collaborative Program efforts. The Corps' efforts include continuation of a contract to formally establish an Adaptive Management Program, funding flycatcher and cuckoo monitoring, monitoring Corps' habitat restoration projects, and funding the Collaborative Program's contract for database management.

Further, the Minnow Action Team (MAT) met a number of times in 2016 to discuss, assess, and recommend potential water management actions to the Collaborative Program to address species' needs and hydrologic conditions. The MAT recommended managing the river during 2016 to meet the 2003 Biological Opinion (2003 BiOp) flow targets, create a pulse flow in May 2016 if feasible, monitor refugial areas in the Isleta Reach, and provide some amount of

supplemental water for selected refugial habitats. Coordinated efforts occurred to monitor fish response on floodplain habitats inundated as part of the Temporary Modification.

With the issuance of the new Biological and Conference Opinion for Reclamation, BIA, and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande (2016 BiOp), neither Reclamation nor the Service continues to support creation of the planned Recovery Implementation Program. Therefore, the Collaborative Program is reassessing its role in middle Rio Grande endangered species efforts. It will do so during April 2017 and plans to consider, in part, whether the Collaborative Program should focus its efforts on improved science and adaptive management within the middle Rio Grande.

Compliance with the 2003 Middle Rio Grande Programmatic BiOp

Until December 2, 2016, the 2003 BiOp remained in effect as consultation on the new biological opinion continued. Reclamation reported that it remained in compliance with the terms and conditions of the 2003 BiOp throughout the year. The river remained continuous until mid-July, well past the June 15 requirement for the dry year flow targets. This was due in part to the Commission authorized Temporary Modification. Reclamation reported that river drying occurred from July 13 through November 1 in parts of the San Acacia and Isleta reaches with periodic rewetting and that the North Boundary pumps in the Low Flow Conveyance Channel (LFCC) were only used for a couple days in July (July 11-13) to pump water to the river. Reclamation reported it released 12,020 acre-feet of supplemental water in 2016 to meet the flow targets. The Service reported it conducted fish rescue on 28.6 unique miles of drying river in 2016 compared to 17.4 miles in 2015, and 26.4 miles in 2014. With the issuance of the new biological opinion in early December 2016, the terms and conditions of the 2003 BiOp are no longer applicable.

Completion of a New Middle Rio Grande Water Operations and River Maintenance Biological Opinion

As reported for the past few years, formal ESA Section 7 consultation was initiated by the Service in February 2013. The consultation continued until December 2, 2016 when the Service issued the 2016 BiOp. The non-jeopardy opinion covers numerous species with reliance on completion of a number of conservation measures by Reclamation, the MRGCD, and the NMISC (BA Partners). The BA Partners worked closely throughout the consultation process with the Service in developing these conservation measures. The 2016 BiOp covers water

management and river maintenance operations in the Rio Grande basin from the Colorado/New Mexico stateline to Elephant Butte Reservoir for a period of 15 years, including maintenance of the Elephant Butte delta channel and deliveries to Elephant Butte Reservoir. Specific actions of most water users in the middle Rio Grande, including but not limited to MRGCD, the Six Middle Rio Grande Pueblos, the Rio Chama acequias, various municipalities, the New Mexico Office of the State Engineer (NMOSE), and the NMISC are included in the 2016 BiOp.

The new 2016 BiOp requires minimum annual silvery minnow and flycatcher densities, but does not specifically prescribe flow targets as did the 2003 BiOp. While the 2016 BiOp does not specifically mandate flow targets, prudent management of spring flows and low summer base flows will be necessary to help meet the densities. The required densities may be difficult to achieve during extended drought but the BA Partners will only be responsible if their actions cause the low densities. In addition, the Service indicated as long as the species densities remain above the 2016 BiOp requirements, take is allowed for all the BA Partners' activities described in the 2016 BiOp, excluding the Bernardo Siphon and Fort Craig to River Mile 60 projects.

Wild Earth Guardian's Litigation over the 2003 Biological Opinion

In 2014, the Wild Earth Guardians filed a lawsuit in Federal District Court alleging Reclamation made arbitrary and capricious decisions to depart from some 2003 BiOp 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 was required to consult with the Service and was not exercising discretion it has to modify its reservoir operations to benefit endangered species. The Judge has not ruled on the merits but did make a number of rulings. In particular, he ruled that the consultation claim against Reclamation was not subject to judicial review because it was not a final agency action. The ruling allowed the new biological opinion consultation to proceed as outlined above. Reclamation and the Corps both reported the litigation was stayed from December 2016 until March 2017. On March 1, 2017, in part due to the 2016 BiOp, the parties to the case voluntarily agreed to dismiss all claims against Reclamation. The remaining claims in the lawsuit are all against the Corps.

URGWOM Accounting Model

During 2016, 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 SJCP contractor releases and water exchanges. Issues discussed included development of watershed models and integration of the Upper Rio Grande Water Operations Model (URGWOM) in the Corps Water Management System (CWMS) model, development of a monthly timestep ruleset and model, and new storage accounts added to the El Vado and Abiquiu reservoirs in 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 depletions related to them in the middle Rio Grande. It coordinates with the NMOSE to determine if a permit is needed and to ensure the depletions are offset by the project sponsors. The NMISC reported it continues to coordinate with the Corps on several recently implemented habitat restoration projects to ensure the Corps project's depletions are offset. Spring flows under the Temporary Modification resulted in more sustained water across habitat restoration sites during the runoff than in previous years and the depletions due to the modification were offset by NMISC's Strategic Water Reserve.

San Acacia Levee Project

The NMISC reported construction of the Socorro Levee portion (Segment 1) of the Corps' San Acacia Levee Project was ongoing and ahead of schedule for 2016. The Corps conducted final inspection for phases 1, 2a, and 2b in early 2017. The construction contract for the last phase of Segment 1 (2c) was awarded in the fall of 2016, and construction is scheduled to begin in early 2017. The NMISC continues to work with the Corps and the MRGCD on the project, including planning for Segment 2 of the project. 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 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 through 2016 while consultation continued on the new biological opinion. There was no disruption in ongoing work related to the litigation.

Elephant Butte Delta Channel Project

The Delta Channel was successful in conveying the 2016 snowmelt runoff into the

active reservoir pool at Elephant Butte Reservoir. Monsoonal precipitation and corresponding river flows during 2016 were near or below average in the middle Rio Grande and the Delta Channel successfully conveyed all flow into Elephant Butte Reservoir during 2016. During January, February and March of 2016, an NMISC contractor conducted extensive in-channel maintenance, sandbar de-vegetation and access road grading throughout the Delta Channel Project area. Since 2003, New Mexico has spent nearly \$18 million to construct and maintain the Delta Channel.

All necessary environmental compliance for the Delta Channel Project remained in effect for the 2016 maintenance season. The 2016 BiOp includes the Delta Channel Project and thus supersedes the Delta Channel specific biological opinion. Therefore, NMISC is working to document completion of the flycatcher habitat restoration project below Elephant Butte Reservoir that had been required mitigation under the previous biological opinion.

Relinquishment Update

The total amount of Accrued Credit relinquished by Colorado since 2013 is 3,000 acrefeet. In 2013 and 2014, Colorado stored 1,749 acre-feet of relinquishment water in Platoro Reservoir and in 2016 stored 319 acre-feet for a total of 2,068 acre-feet of relinquished water stored. This leaves a balance of 932 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 2016, Reclamation did not store any of its allocated relinquishment water. However, 1,206 acre-feet of relinquished water previously stored by Reclamation on behalf of the NMISC was in storage in Reclamation's account in El Vado Reservoir as of December 31, 2015. This entire volume of water minus evaporative losses was released in September and October 2016. New Mexico relinquishment water storage to date totals 288,281 acre-feet, leaving a balance of 92,219 acre-feet available to be stored in future years when Article VII storage restrictions are in effect.

Gaging Station Review

At the Otowi gage (#08313000), the USGS reported that for the 2016 calendar year, they utilized rating #37. Starting in January 2017, they applied a new rating (#38) and will add a redundant sensor (radar) in the spring of 2017. Sediment entering the river from Los Alamos Canyon as a result of the Las Conchas fire and summer monsoon flows continues to create gaging issues. 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 previous gage access issues with San Ildefonso Pueblo have been resolved. Additionally, the USGS has installed a new gage (#08313150) upstream of the City/County of Santa Fe's Buckman Direct Diversion Project, located several miles downstream of the Otowi gage. This new gage is helping to improve the Otowi gage record.

The streamflow record for the Otowi gage was classified as fair by the USGS for 2016. During 2016, the NMISC performed routine flow measurements at the Otowi gage under an access agreement with the San Ildefonso Pueblo. The NMISC provides this data to the USGS, in part to assist with monitoring sedimentation issues. The USGS stated they believe these measurements from NMISC are accurate and indicated that 5 measurements were applied in the database.

During 2016, the USGS reported they reviewed and approved the 2016 Rio Grande below Caballo Dam gage (#08362500) flow records developed by Reclamation. After previous questions and concerns from the Engineer Advisers about the extent of the USGS review process of this record, the USGS provided the Engineer Advisers with a review and findings for the below Caballo Dam gage record for 2016, including suggestions for improvement of minor measurement issues. The streamflow record for this gage was classified as good by the USGS for 2016. The Engineer Advisers will continue to require this type of review on all Compact streamflow records in the future.

The USGS reported that during the 2016 calendar year, 44 stream flow measurements were conducted on the Rio Grande below Elephant Butte (#08361000). Of the 44 measurements, 22 were rated good, 13 were rated fair, and 9 were rated poor. Algae growth on the streambed at the USGS gaging station section has caused a low bias in gaged flow during certain months. This issue has occurred for an undetermined period of time but began to be addressed in 2016 and future action may be necessary. The gage record for 2016 reflects improved precision and the NMISC will continue to coordinate with the USGS to provide a more accurate gage record in the future. The streamflow record for this gage was classified as good by the USGS for 2016.

At the 2016 Engineer Advisers and Commission meetings, Reclamation indicated they would move the Rio Grande below Caballo gage station to the opposite side of the river. At the 2016 Rio Grande Project annual operating agreement end of season meeting, Reclamation reported they were no longer planning to relocate the gage. The Engineer Advisers request Reclamation report on the utilization of the Acoustic Doppler Velocity Meter (ADVM) purchased by the Commission and Reclamation for the below Caballo Dam gage. It is the

Engineer Advisers' position that the installation of the ADVM at this location will reduce costs and improve accuracy and reliability of the gage record over the long-term.

During 2016, the NMISC continued its survey of water level elevations in Elephant Butte and Caballo reservoirs. The results indicated that Reclamation's reservoir stage elevations were within the agreed upon threshold criteria (< 0.05 ft) at both reservoirs during 2016. NMISC and Reclamation will continue to perform side by side surveys at select times during 2017 to ensure the accuracy of the reservoir elevation data using new protocols proposed by Reclamation in June 2016 and accepted by the Engineer Advisers.

Mass Balance Review

The NMISC conducted a mass balance analysis for the Rio Grande between the Elephant Butte and Caballo gages for calendar year 2016. The mass balance analysis indicated that the reach gained water in nine out of twelve months with a total calculated gain of 27,500 acre-feet. Most of the gain occurred during June through September.

Gaging Station Operating Costs

Over the last several years, the Engineer Advisers and Commissioners have expressed concern over the large difference in costs between what Reclamation charges to operate the below Caballo Dam gage as compared to what the Colorado Division of Water Resources (CDWR) and USGS charge on average for other Compact gages. 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 CDWR, USGS and Reclamation. In 2016 the Commission and Engineer Advisers requested Reclamation provide a detailed cost estimate for the operation of the below Caballo Dam gage as well as differentiating costs due to the 2008 Rio Grande Project Operating Agreement (2008 OA) operational measurements versus measurements required for Compact accounting.

At the 2017 Engineer Advisers' meeting, Reclamation provided operations costs for Federal Fiscal Year (FY) 2016 and a cost projection for FY2017. As requested, Reclamation differentiated between measurements that were made for Compact purposes and measurements that were required for 2008 OA operations. The FY2016 Compact related cost was \$6,657.75 for equipment and maintenance and \$10,842.61 for the 20 Compact related measurements, for a total of \$17,500.36. The FY2017 Compact related cost projection is \$6,718.75 for equipment and maintenance and \$13,873.95 for an estimated 25 Compact related measurements, for a total of \$20,592.70.

The Engineer Advisers appreciate Reclamation providing this information and for decreasing their charged amount for this gage. However, there is still some concern over the difference in operational costs between Reclamation's gage and other entities gages. For the fiscal year ending on June 30, 2018, the costs charged by the CDWR average \$10,948 per gage, the costs charged by the USGS average \$11,646 per gage, and the costs estimated by Reclamation for the Compact portion of one gage, the below Caballo Dam gage, is \$20,592.70.

Review of Compact Accounting Data

Leading up to the 2016 annual meeting, the Engineer Advisers worked with Reclamation, the USGS, and the Corps to develop a proposed schedule which set out the activities during each year needed in order to review and approve the data required under the Compact. The document, titled "Schedule for Review and Approval of the Rio Grande Compact Accounting Records for the Previous Year" specifies data collection and schedule by agencies for Compact purposes, and was approved by the Commission in 2016.

By establishing this timeline, the Engineer Advisers hoped that the accounting done at the annual Engineer Advisers' meeting would be more easily and efficiently reviewed and finalized at the meeting. Based on the first year of implementation, the process was generally adhered to by the agencies. A few issues arose involving personnel changes, moving offices, and communication with other entities about required data. However, the Engineer Advisers were able to conduct a final review of the data and completed analysis using accounting methods 1 and 2. The Engineer Advisers believe the process was a success and that it will improve over time, allowing issues to be identified and resolved early.

Snow Melt Runoff Forecasting

Colorado and New Mexico rely heavily on accurate streamflow forecasts to determine their Compact obligations on a yearly basis. Recent forecasts have lacked the accuracy and reliability needed to proactively administer the Rio Grande, particularly in the Colorado area, on a consistent basis. The NRCS June 1 forecasts for the April through September streamflow at the Rio Grande near Del Norte gage (#08220000) have been on average nearly 119,000 acre-feet lower than what actually occurred over the last four years.

At the 2016 Engineer Advisers' meeting a presentation was made regarding the Colorado

Water Conservation Board's and National Weather Service's efforts to collect additional data and modeling efforts to improve the streamflow forecast estimates. An update was not presented in 2017, however, the Engineer Advisers feel that continued efforts are needed to collect additional data and improve the streamflow forecast models.

Colorado Groundwater Regulations

In late 2015, the State Engineer of Colorado completed the development of rules and regulations concerning the use of groundwater in the Upper Rio Grande Basin in Colorado. These rules require the owners of non-exempt wells in the Rio Grande Basin in Colorado to sustain the aquifers and augment injurious stream depletions caused by their groundwater withdrawals, either with a plan for augmentation or by joining a subdistrict to meet the goals through a groundwater management plan. As an integral part of these rules, the State Engineer of Colorado has also developed 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, and a number of water users have objected to portions of the rules. The Water Court has set an eight week trial starting in January 2018 to hear the objections. The State Engineer has been working diligently with the objectors to attempt to address their concerns, reach stipulated agreements, and hopefully avoid this lengthy court trial.

YEAR 2016 OPERATIONS

In 2016, there were no significant issues such as fire or flood in the Rio Grande watershed in Colorado, New Mexico or Texas that affected water operations. This stands in contrast to recent years, 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.

Closed Basin Project

The total production of the Closed Basin Project in calendar year 2016 was 12,110 acrefeet. This total includes 8,469 acre-feet delivered to the Rio Grande for Compact purposes; water that was exchanged for Colorado Parks and Wildlife water to be delivered to the Blanca Wildlife Habitat Area and to Head Lake; and water delivered to various federal lands along the project used as mitigation for the project footprint. All of the water delivered to the Rio Grande in 2016 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 2016 that were most affected by iron bacteria, and rehabilitated numerous other wells. Some of the new replacement wells were constructed using a glass bead filter pack to assist in the mitigation of biofouling issues. The new replacement wells have been equipped with variable frequency drive pumps. This is another effort to maximize efficiency of the Closed Basin Project. Updating numbers reported in past Engineer Advisers' reports, it is known that 73 of the 170 original wells have been replaced as of the end of 2016. Some of these 73 wells have been replaced more than one time. Reclamation reported it will continue to replace wells as budgetary constraints allow in an effort to help maintain production 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, from May 29 to June 22, 2016, the Conejos Water Conservancy District stored pre-Compact direct flow water by exchange in Platoro Reservoir. 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 2016, 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..."

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 SJCP water, for endangered species needs

and compliance with the 2003 BiOp. In 2016, Reclamation reported it released a total of 21,020 acre-feet of leased SJCP water, and 1,138 acre-feet of NMISC relinquishment credit water, to ensure compliance with 2003 BiOp flow requirements. Additionally, a small amount of water which had been provided by the Middle Rio Grande Pueblos on behalf of the Audubon Society was used to offset depletions in the Isleta Reach of the river. The water releases were made as needed from June 28 through October 31.

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 July 11 through November 2, 2016 to pump 7,199 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 the 2016 projected storage volume for the six Middle Rio Grande Pueblos' Prior and Paramount (P&P) operation was 14,473 acre-feet, the entirety of which was stored in El Vado Reservoir. Article VII restrictions were in place during the storage of 12,939 acre-feet of that total. During the 2016 irrigation season, 545 acre-feet of the water was released because insufficient natural direct flow occurred. The stored water suffered 821 acre-feet of evaporative loss, leaving 13,132 acre-feet in El Vado Reservoir at the end of the irrigation season. In accordance with historic practice, Reclamation released all the remaining water from the reservoir and delivered it to Elephant Butte Reservoir after the irrigation season. This release occurred between November 1 and December 31, 2016.

Based on the February 1, 2017 most probable snowmelt runoff forecast, the BIA reported that Reclamation will likely store about 14,445 acre-feet for their P&P operation in 2017. Additional forecasts in April and May could change this storage target.

The Pueblos have expressed interest in the past in being allowed to carry over water stored but not needed for the P&P operation. The BIA reported that it does not have a position on the carryover issue and is discussing the matter with Department of Interior (Interior) officials. Several meetings between the Pueblos and federal agencies have taken place. No formal response has been provided by Interior. 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

The 2008 OA and its manual(s) provide the procedures used since 2008 to operate the Rio Grande Project. A record of decision (ROD) for the final environmental impact statement was signed on January 4, 2017. This ROD allows the 2008 OA to remain in effect through 2050. Reclamation reported a final 2016 release from Caballo Reservoir of 544,167 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 OA methodology to make end of year allocations to EBID at the diversion headings of 180,695 acre-feet (175,199 acre-feet were reported delivered, resulting in an unused allocation of 5,496 acre-feet), and to EP No.1 of 268,386 acre-feet (216,309 acre-feet were reported delivered resulting in an unused allocation of 50,179 acre-feet). During 2016, Mexico's diversion allocation was 46,497 acre-feet; 43,787 acre-feet were reported delivered. Reclamation's report indicates flows into the Hudspeth County Water Conservation and Reclamation District during 2016 were 25,950 acre-feet.

Reclamation reported that Project releases started on March 21, 2016 and continued through September 8, 2016. The USGS reported the total annual flow at the gage below Elephant Butte dam was 532,400 acre-feet. Elephant Butte Reservoir peaked at 430,411 acre-feet on March 20, 2016, and storage at Caballo Reservoir peaked at 78,426 acre-feet on May 25, 2016. End-of-year storage at Elephant Butte Reservoir was 202,500 acre-feet, with no SJCP water in storage. End-of-year storage at Caballo Reservoir was 21,687 acre-feet.

Reclamation reported, using accounting method 1, Usable Water in Project Storage was below 400,000 acre-feet from January 1, 2016 through February 8, 2016. Project Storage was then above 400,000 acre-feet through April 27, 2016. And, Usable Water remained under 400,000 acre-feet for the remainder of the calendar year.

Toward the end of the 2016 irrigation season, the Caballo Reservoir intake structure became clogged with sediment and debris. The release rate dropped without a corresponding gate change and without the influence of any significant inflow from summer monsoons. Beginning August 16, 2016, Reclamation crews worked daily to keep debris away from the intake structure and maintain outflow, while working with the districts to reduce demand and maintain appropriate discharge. Cleaning of the intake structure was completed October 1, 2016. A release of 9,304 acre-feet from Elephant Butte Reservoir was made from October 14 to October 21, 2016 in order to raise the storage level at Caballo Reservoir. Then, a functional test of the Caballo outlet was performed on October 18, 2016. The test was successful, and release rates at a given gate opening returned to normal. Reclamation communicated with stakeholders during this time to provide information and weekly projections of reservoir elevations.

Reclamation conducted the start and end of irrigation season update meetings for the Engineer Advisers in 2016. Some data for the end of year irrigation meeting, held in November, was estimated at the time. The final 2016 data was sent to the Engineer Advisers in January 2017.

The New Mexico Engineer Adviser expressed concern about continued use of the 2008 OA 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 in the past that are not consistent with the Operating Manual.

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 is in the second year of a three-year WaterSmart Focus Area Study to assess water use and availability from the headwaters in southern Colorado to Fort Quitman, Texas. The study is investigating water budget components in sub-basin areas, designated via the eight digit hydrologic unit code (HUC-8). Data on water use, evapotranspiration, groundwater, surface water, and snow processes will be analyzed and made easily accessible for use by stakeholders. The study is being conducted by personnel from the USGS Water Science centers in Colorado, New Mexico, Utah, and Texas.

The USGS reported that, in cooperation with Reclamation, it continued development of 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 USGS reported the model is operational and final calibration and report documentation is scheduled to be completed by September 2017. Through the Mesilla Basin Monitoring Program, which is supported by several cooperators, the USGS continues to maintain an observation well network and to monitor water levels and salinity in shallow groundwater in the Mesilla Valley. It is also conducting a microgravity pilot study in the Las Cruces area which may aid in understanding surface water and ground water interactions.

Corps Rio Grande Environmental Management Program

The Corps reported the Water Resources Development Act of 2007 (WRDA 2007) provided authorization for the Rio Grande Environmental Management Program. This program includes the entire Rio Grande Basin and all tributaries from the headwaters in Colorado to the Gulf of Mexico. The program includes two basic parts: (1) a program for planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancements and (2) implementation of a long-term monitoring plan, computerized data inventory and analysis, applied research, and an adaptive management program. The authorization for this program was extended in WRDA 2014 through fiscal year 2019. The Corps began the first Feasibility Cost Share Agreement (FCSA) under this program in August 2016 with the MRGCD. The Study will evaluate additional ecosystem restoration along the Rio Grande from the southern boundary of the Pueblo of Sandia south to the northern boundary of the Pueblo of Isleta.

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. Information is being distributed to the public, and outreach activities are occurring at the New Mexico reservoirs where Quagga or Zebra mussel inspections occur. Since 2013, aquatic invasive species inspections have increased from two to eleven waterbodies. The number of watercraft inspections statewide increased from 9,346 in 2013 to 30,972 in 2016. Reclamation sampled seven of its New Mexico reservoir bodies under direction from the Reclamation Detection Laboratory for Exotic Species. All tests came back negative for 2016.

In 2016, samples collected by New Mexico Department of Game & Fish (NMDGF) at Navajo Reservoir were reported positive for Quagga mussel using PCR technology. Split samples were sent to additional labs (microscopy and PCR) but could not be confirmed as positive. Navajo Reservoir, with its proximity to Lake Powell and other positive Zebra and Quagga mussel waters, remains at high risk for invasive mussel introduction. NMDGF has designated it as inconclusive for Quagga mussels and increased monitoring from NMDGF is expected in 2017.

Rio Grande Silvery Minnow

The Service and Reclamation reported on the 2016 monitoring results for the silvery minnow in the middle Rio Grande and the October CPUE data typically used to report long-term trends in relative abundance. During the October CPUE survey, silvery minnows were detected at 19 of the 20 fixed sites with a calculated density of 7.2 silvery minnow per 100 square meters sampled. The vast majority of the fish collected in October were wild (river-born). The October 2016 CPUE represents a significant improvement over the October 2015 CPUE (reported to the Commission in 2016 as 1.6 CPUE: corrected in 2017 to 0.16 CPUE). The Service reported that the extended high spring flow of 2016 was a principle factor in this reported population increase.

The Service reported that despite nearly 30 miles of river drying during the summer months, the extended spring runoff provided the opportunity for silvery minnows to colonize and persist in much higher numbers than the past 5 years. New Mexico reported that monitoring of several inundated restoration areas during the spring runoff indicated numerous larval fish were able to grow, develop, and increase their chances of survival. Other monitoring efforts were conducted by Reclamation and the Service for various projects and in 2016 most of the silvery minnow collected were wild.

The Service reported that captive silvery minnows continued to be maintained at the City of Albuquerque BioPark, the Southwestern Native Aquatic Resources and Recovery Center (SNARRC, formerly the Dexter National Fish Hatchery), and the NMISC's Los Lunas Silvery Minnow Refugium. However, because the October 2016 CPUE was higher than in recent years, fewer silvery minnow were needed for stocking of the river. Middle Rio Grande releases of silvery minnow were as follows: 1) 20,888 VIE-marked fish released in the Angostura Reach; 2) 2,000 in the Isleta Reach 2; and 3) 43,000 in the San Acacia Reach.

Commission Authorized Temporary Modification of Operations at El Vado Reservoir in May and June 2016

At its March 2016 meeting in Alamosa, Colorado, subject to a number of conditions, the Commission authorized 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 silvery minnow in the middle Rio Grande should the Article VII storage restriction go back into effect. Reclamation, the New Mexico Engineer Adviser, and the Service were requested to report the details of the Temporary Modification to the other Engineer Advisers and to the Commission at its 78th annual meeting.

At the 2017 Engineer Adviser meeting, Reclamation, New Mexico Engineer Adviser staff, and the Service gave a detailed report on the modified operation. All the Commission conditions for conducting the Temporary Modification, with the exception of the report to the Commission at its 2017 meeting, have been met. The Temporary Modification began in early May and was completed by mid-June 2016. Peak runoff flows from Colorado and the Sangre de Cristos began around May 18 and continued through the first week of June. Peak storage at El Vado Reservoir for the Temporary Modification occurred on May 20 with 31,593 acre-feet of water in storage available for release. The water was then released over a period of 26 days.

During this time, a separate but concurrent operation was undertaken to improve overall ecological health on the Rio Chama between El Vado and Abiquiu reservoirs. A spike flow of just under 4,000 cfs was released from El Vado on May 25 for a period of 24 hours.

The NMISC reported that in collaboration with the Corps and through its contractor SWCA, a study was conducted to assess the use of six restored floodplains by eggs, larvae (i.e., the first 40 days of life), and adult silvery minnow. The results are encouraging in that silvery minnow of all three life stages were found. Of seven larval fish species found, silvery minnow were the most abundant, representing 72% of the total larvae caught. It appears fish spawned prior to and during the ascending spring flow, indicating the fish probably spawned in both the main channel and floodplains, but that the inundation provided timely access to warm, sheltered, productive habitats necessary for larval survival and recruitment.

The Service commended the Engineer Advisers and Commission for its resolution and authorization. They reported the Temporary Modification (and other actions taken by the water management agencies) was clearly beneficial to the silvery minnow. New Mexico reported it used the Final 2016 Riverware Accounting Model to determine the needed depletion offset for the Temporary Modification. The model showed additional depletions of 129 acre-feet at El Vado Reservoir and 507 acre-feet at Abiquiu Reservoir, for a total of 636 acre-feet. Those depletions plus an additional 18 acre-feet of depletions on habitat restoration sites were offset using senior consumptive use water rights in the New Mexico Strategic Water Reserve.

The NMOSE District Manager for the Rio Chama, with support from the Corps, reported the Temporary Modification had some unintended consequences on some water users and land owners along the Rio Chama downstream of Abiquiu Reservoir. Some traditional surface water agricultural infrastructure (presas) was negatively impacted by the sustained high flow releases from Abiquiu, and a number of land owners conveyed reports of increased bank erosion along property adjacent to the river channel. New Mexico and the Corps visited a number of sites on the Rio Chama during the Temporary Modification and reported they were not able to make a determination that the modified operation was the sole cause of these issues. All reservoir releases from Abiquiu Reservoir were within the Corps' allowable maximum channel capacity for the stretch of river in question.

Commission Direction to the Engineer Advisers – Future Temporary Modifications

In August 2016 the Commission held a special meeting to respond to Reclamation's written request to the Commission for a 15-year authorization for temporary modifications of reservoir operations. At the special meeting, the Commission directed the Engineer Advisers, upon a timely, written request of Reclamation to the Engineer Advisers, to work with Reclamation each year, as necessary, to:

- 1. evaluate possible modified operations requests for reservoirs in New Mexico; and
- evaluate the proposed modified operations in regard to Compact Commission authority and Compact constraints and effectiveness of modified operations; and
- bring request(s) for modified operations to the Commission at its annual meeting for consideration, as appropriate.

On February 17, 2017, Reclamation provided a written request to the Engineer Advisers to consider a resolution for a Temporary Modification at El Vado Reservoir again in spring 2017. The Engineer Advisers considered the request during the 2017 Engineer Adviser meeting. They did so with participation of Reclamation, the Corps, and the Service, and used URGWOM model runs. Based on the snowpack in the Rio Chama Basin on March 1, 2017, all the URGWOM model runs, and, most specifically, projected Abiquiu Reservoir operations during Spring 2017, the Engineer Advisers found a Temporary Modification at El Vado Reservoir in 2017 would have no effect on river flows in the middle Rio Grande. This is because all the modeled scenarios project the Corps will be making safe channel releases from Abiquiu Reservoir for an extended period of time including all of May and at least through early June 2017 (see graph below).



Therefore, the Engineer Advisers do not plan to bring a Temporary Modification request to the Commission at the 2017 annual Commission meeting. However, if conditions change significantly the Engineer Advisers agreed to confer and reassess the decision.

Middle Rio Grande Project Channel Maintenance

Reclamation's report indicates it is pursuing work at 16 active priority sites along the middle Rio Grande 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 2016, Reclamation completed work at three sites (Truchas Arroyo, Santa Ana River Mile (RM) 205.8, and Corrales Siphon).

In addition, Reclamation reported design and compliance work on a plan to realign a portion of the Rio Grande near and within the Bosque del Apache National Wildlife Refuge (BDA) over an 8 plus mile distance. 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. Reclamation is moving forward with a 2-plus mile section, entirely within the BDA boundary, as an initial step in project implementation.

Vegetation Management at Elephant Butte and Caballo Reservoirs

Reclamation reported it continued vegetation management efforts at Elephant Butte and Caballo reservoirs in 2016 with \$75,000 provided by the NMISC through a cooperative agreement. Reclamation reported that during their 2016 fiscal year, a total of 4,046 acres were treated at Caballo Reservoir by mowing, and mulching. Reclamation reported that no herbicide treatments occurred at Caballo Reservoir in fiscal year 2016.

At the Engineer Advisers' meeting, Reclamation and the Service indicated vegetation management actions at Elephant Butte Reservoir have been suspended. The Service further indicated that periodic inundation of habitat as the reservoir level fluctuates will be beneficial to the flycatcher and cuckoo over the long-term even though some take is expected and allowed. The New Mexico Engineer Adviser is concerned about potential long-term effects of the suspension of vegetation management on recreation and depletions at Elephant Butte Reservoir.

Southwestern Willow Flycatcher and Yellow-billed Cuckoo

Reclamation reported it conducted surveys and nest monitoring for the flycatcher during the summer of 2016 along about 250 miles of the Rio Grande between Isleta Pueblo and Elephant Butte Reservoir. Other areas surveyed included above Cochiti Lake, near Taos, and select locations between Caballo Reservoir and El Paso, Texas. In 2016, a slight increase was noted with 416 flycatcher territories detected in New Mexico with the majority of them in the San Marcial/Elephant Butte Reservoir area (303 territories and 73 percent of New Mexico. 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. A new proposal for critical habitat based on comments received is anticipated to be published no earlier than April 2017. Reclamation surveys have expanded for the cuckoo territories were detected in 2016 with the most concentrated areas in the San Marcial/Elephant Butte Reservoir area.

The tamarisk leaf beetle (*Diorhabda spp*) severely defoliated tamarisk throughout the majority of the middle Rio Grande this year. Because the defoliation occurred after nesting activity was complete for flycatchers, no adverse impacts were observed; however there remains a concern that tamarisk defoliation could impact nesting success in future years.

Reclamation's Rio Grande Project Operations Plan for 2017

Reclamation reported that preliminary allocations to the districts were made in mid-February 2017. Reclamation's preliminary allocations as of February 1, 2017 are 77,667 acrefeet for EBID, 117,418 acre-feet for EP No. 1, and 12,748 acre-feet for Mexico. Reclamation indicated that the irrigation season is projected to begin on March 31 for EP No. 1 and Mexico. The start of the irrigation season for EBID in the Rincon Valley will begin the third week of April; the start for EBID in Mesilla Valley is not known at this time. And, the end of irrigation season has not been established at this time. Based on the current storage in Elephant Butte and Caballo reservoirs and the February forecast, Reclamation expects 2017 will have a less than full allocation to the water users.

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

During 2016, as many as 300 silvery minnow were caught in Martin's Canyon, Foster's Spring, and some other locations in the Big Bend area of Texas. The vast majority of the catch (>200) was found in the Foster's Spring and run area. The Service has begun planning for silvery minnow surveys in this region during March, April, and May. In 2016, 290,175 young-of-year silvery minnows were marked with oxytetracycline and stocked into multiple locations within Big Bend National Park. This was the first year fish stocked into Big Bend were marked. With monitoring in the future this allows researchers to determine if the minnow was naturally-spawned or captive broodstock. The SNARRC provided 140,000 newly hatched larvae to the Uvalde National Fish Hatchery as grow out stock.

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 conducted a 90-Day Finding on both species in 2015 and determined that a Status Review was warranted. This review was initiated in the spring of 2016 and is ongoing, most probably continuing for another year. Once the reviews are complete, a decision will be made on whether a listing is warranted, and if so, whether to list these species as threatened or endangered.

International Boundary and Water Commission Activities

The IBWC provided a report of its activities along the Rio Grande in New Mexico and Texas during 2016. A brief discussion of IBWC's mission and international treaties was given. IBWC discussed the status of their River Habitat Restoration, Environmental Water Transaction Program, River Management Plan and Channel Maintenance Plan. These activities fall under the 2009 ROD for the Canalization Project.

In December 2016, the River Management Plan was finalized. The plan covers floodplain and endangered species management and a channel maintenance plan. It includes a five year plan for channel work priorities. The Channel Maintenance Plan also includes the Channel Maintenance Alternatives (CMA) and Sediment Transport Modeling Study. The Study included investigations at nine problem locations and identified the best two CMAs for each problem area. At this time, IBWC is working with contractors to design sediment traps for the Thurman I and II arroyos in Hatch, NM. Under the River Habitat Restoration, 15 of 30 sites are underway. From 2012 to 2016, 27,000 trees and 1,000 shrubs were planted. Ten thousand more trees will be planted in 2017. IBWC has also installed 55 shallow groundwater monitoring wells. For the Environmental Water Transaction Program, IBWC is working with EBID and Department of Justice to acquire 41.75 acres of irrigated land water rights in EBID as well as working with other entities to acquire water rights to meet requirements of the ROD. From 2014 to 2016, six irrigation events were held.

Sediment removal in 2015 and 2016 totaled 324,300 cubic yards. Priority sediment removal operations were performed at International and American Dam in preparation for the Corps to perform an inspection in December 2016. For 2017, IBWC is planning to remove 170,000 cubic yards of sediment. Sediment removal operations will stop March 31, 2017 due to the start of the irrigation season. In the Rio Grande above Ft. Quitman for 2017, IBWC plans to remove 20,000 cubic yards of sediment due to a plug at Arroyo Del Fraile. IBWC discussed a new Federal Working Group that has the objective of determining each federal agency's authority, resources, etc. to support sediment control initiatives. The initial meeting was February 2, 2017 and a subsequent meeting will occur in the spring of 2017.

Disposal of the removed sediment continues to be an issue. The IBWC indicated it can only address sediment on land under its jurisdiction; 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 77 percent of a full supply, 46,497 acre-feet

in 2016. 2017 is projected to be less than a full supply with an initial allocation, according to Reclamation, of 12,748 acre-feet. Mexico has agreed to begin taking water at the same time as EP No. 1. The release is anticipated to begin March 31, 2017.

ENGINEER ADVISER RECOMMENDATIONS

Due to a public comment at the 2016 Annual Commission meeting, the Engineer Advisers were directed to discuss options on making materials that will be considered at the Annual Meeting available to the public prior to the meeting. The Engineer Advisers recommend that this report, draft meeting minutes, and draft resolutions be made available to the public on a website prior to the Annual Commission meeting. This would be in addition to the regular practice of providing copies for the public at the annual meeting. New Mexico volunteered to host this information on the NMOSE/NMISC website this year as a test. The Engineer Advisers will continue to investigate a means to better make material available to the public before annual meetings.

BUDGET

The Engineer Advisers reviewed the cost of operation for the year ending June 30, 2016 and the budget for the fiscal year ending June 30, 2018.

The Engineer Advisers found that the expenses for gaging stations and administration of the Compact for the year ending June 30, 2016 were \$212,483. The United States federal government bore \$62,908 of this total, with the balance of \$149,575 borne equally by the three states.

The Engineer Advisers find that the proposed budget for the fiscal year ending June 30, 2018 indicates a total of \$208,491 will be spent for gaging and administration, with a proposed contribution by the United States federal government of \$56,033.

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Craig W. Cotten Engineer Adviser for Colorado

Rolf Schmidt-Petersen Engineer Adviser for New Mexico

Curtis Seaton Engineer Adviser for Texas

The Colorado Engineer Adviser's Addendum to the 2017 Engineer Advisers' Report

April 5, 2017

At the 2017 Rio Grande Compact Commission (RGCC) Engineer Advisers' meeting held in Albuquerque, New Mexico on February 27-March 3, 2017, the Engineer Advisers did not reach consensus on the 2016 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 2016 and the Engineer Advisers did reach agreement on the accounting of the 2016 streamflow numbers for the Colorado and New Mexico gaging stations. However, because of the lack of agreement on the effects of the releases of credit water in previous years, the accrued credit of Colorado and the accrued debit of New Mexico could not be agreed upon or finalized for 2016.

Therefore, the Colorado Engineer Adviser presents for the Commission's consideration the following method of accounting for the 2016 calendar year Compact Accounting:

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.

Method 2:

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 2015 accounting results for Method 2 used through the 2016 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."

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 2016 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 2016 of 7,300 acre-feet. Using Method 2, the Article VII restrictions on storage in post-compact reservoirs were not in effect from February 15 through April 21, 2016, inclusive.

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 2016. 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.

<u>Summary</u>

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 potentially 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 2017 Engineer Advisers' Report to the Rio Grande Compact Commission

March 2017

At the 2017 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:

- 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;
- the appropriate accounting of 2011, 2012, 2013, 2014, 2015, and 2016 New Mexico and Colorado deliveries that were affected by Reclamation's unilateral and unauthorized 2011 Credit Water release;
- Reclamation's disregard for Article VI in the Compact¹ 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 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.

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

The Texas Engineer Adviser conducted Compact accounting for the 2016 calendar year using a method (see 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 an Accrued Credit at the beginning of 2017 of 7,400 acre-feet for Colorado and an Accrued Debit of 12,800 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

¹ 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."

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 2016 Calendar year using a method (referred to as Method 2, see 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). Method 2 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 2016 calendar year using the same accounting steps. Values in red on the Method 2 accounting sheets denote where they differ from Method 1 accounting as described in the March 2016 New Mexico addendum and tables.

New Mexico and Colorado's Method 2 acknowledges the impact on New Mexico and Colorado of 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 for Colorado than calculated by Texas and Reclamation under Method 1 and a greater Accrued Debit, this year, for New Mexico. Method 2 accounting resulted in an Accrued Credit for 2016 of 6,600 acre-feet for Colorado and 400 acre-feet for New Mexico. The New Mexico Engineer Adviser used these values as inputs for the 2016 Compact accounting. Consequently, the Compact compliance status for Colorado and New Mexico for 2017, using Method 2, is 7,300 acre-feet of Accrued Credit and 20,300 acre-feet of Accrued Debit, respectively.

Again, the difference in Compact compliance status between Method 1 and Method 2 (minus 100 acre-feet for Colorado and minus 7,500 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 2016.

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 Usable Water in Rio Grande Project Storage affected its El Vado Reservoir operations in 2015 and 2016. Doing so resulted in additional negative effects on New Mexico described in-depth below.

<u>The Article VII Storage Restriction and Reclamation's Operation of El Vado Reservoir in</u> <u>2016</u>

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 the citizens of 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 2016 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 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 attached figures), and because operations of El Vado Reservoir can affect New Mexico's

ability to comply with its Article IV delivery requirements. The rationale and methodology employed to estimate the effect of Reclamation's actions on New Mexico are described in detail in the 2016 New Mexico Addendum. While Reclamation operated El Vado Reservoir in May and June 2016 in accordance with an RGCC approved resolution that addressed some New Mexico concerns, it otherwise continued operations in 2016 using accounting Method 1. The estimated effect on New Mexico of those accounting Method 1 operations was a loss of as much as 9,000 acre-feet of stored water. To put that into perspective, it is enough stored water for MRGCD to operate for more than one week in an average summer, or for Reclamation to meet biological opinion flow targets for up to two 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 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, Reclamation's refusal to use Method 2 accounting has resulted in El Vado Reservoir storage operations that have negatively affected 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.

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, 2015, and 2016.


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)

Red line for storage is hypothetical

2016 STORAGE IN RESERVOIRS IN NEW MEXICO

New Mexico Accounting Method 2

							ACRE-FEET							
RESERVOIR	ITEM	2015 DEC	2016JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	ОСТ	NOV	2016DEC
						ABC	VE OTOWI BR	DGE						
EL VADO	TOTAL	36,503	34,922	35,913	48,930	90,716	106,162	107,594	76,997	59,793	58,422	44,949	42,215	52,230
	TRANS-MTN	(24,405)	(20,891)	(16,819)	(14,381)	(15,880)	(14,227)	(16,927)	(18,679)	(17,392)	(34,327)	(31,866)	(37,091)	(52,092)
ABIQUIU	TOTAL	130,533	132,225	132,425	133,422	132,191	147,079	124,619	112,544	122,210	124,130	122,405	120,171	118,367
	TRANS-MTN	(129,972)	(131,335)	(132,130)	(132,701)	(131,895)	(128,550)	(124,110)	(111,888)	(121,689)	(123,592)	(121,862)	(119,627)	(117,722)
	ACC. SED	(295)	(295)	(296)	(296)	(297)	(411)	(452)	(486)	(523)	(541)	(543)	(544)	(545)
SUBTOTAL R	IO GRANDE	12,364	14,626	19,093	34,974	74,835	110,053	90,724	58,488	42,399	24,092	13,083	5,124	238
						OTOWI B	RIDGE TO SAN	MARCIAL						
McCLURE	TOTAL	220	397	945	1,370	1,880	2,490	2,030	1,200	835	587	544	575	541
	PRE-COMP	(220)	(397)	(751)	(751)	(751)	(839)	(751)	(558)	(230)	0	0	0	0
	TRANS-MTN	0	0	0	0	0	0	0	0	0	0	0	0	0
NICHOLS	TOTAL	442	333	388	395	402	300	449	501	342	320	356	337	319
	PRE-COMP	(364)	(255)	(310)	(310)	(310)	(222)	(310)	(310)	(114)	(74)	(67)	(79)	(27)
	TRANS-MTN	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)
сосніті	TOTAL	46,764	47,175	46,351	46,848	46,657	48,175	46,222	45,593	45,168	45,024	44,693	45,201	44,595
	TRANS-MTN	(46,180)	(46,132)	(46,355)	(46,070)	(45,854)	(45,438)	(44,857)	(44,311)	(44,158)	(43,850)	(43,583)	(43,865)	(43,801)
	ACC. SED	(630)	(636)	(646)	(662)	(679)	(789)	(859)	(893)	(919)	(936)	(940)	(946)	(954)
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. ¹	0	0	0	0	0	0	0	0	0	0	0	0	0
ACOMITA	TOTAL ²													
SEAMA	TOTAL ³	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL R	IO GRANDE	(46)	407	(456)	742	1,267	3,599	1,846	1,144	846	993	925	1,145	595
							NEW MEXICO							
TOTAL RIO G	RANDE	12,318	15,033	18,637	35,716	76,102	113,652	92,570	59,632	43,245	25,085	14,008	6,269	833

¹ accumulated sediment (312 acre-feet) omitted from the accounting while Jemez Reservoir is dry by decision of the Engineer Advisers, March 4, 2005
² storage omitted from accounting by action of the Commission on March 23, 2000
³ No data available.

TABLE 12.EVAPORATION LOSS ON RIO GRANDE WATER STORED
IN RESERVOIRS ABOVE OTOWI AND TOTAL
RIO GRANDE STORAGE AT EL VADO AND ABIQUIU.

TABLE 12.	EL VADO	R.G. COMPACT	LOSSES ON	LOSSES ON	LOSSES ON	
Evap abv Otowi	AND	DEBT WATER	R.G. COMPACT	RIO GRANDE	RIO GRANDE	OTOWI
	ABIQUIU	STORED IN	DEBT WATER	STORED IN	STORED IN	EVAPORATION
MONTH	RIO GRANDE	EL VADO	STORED IN	EL VADO	ABIQUIU	ADJUSTMENT
	STORAGE		EL VADO			
	(1)	(2)	(3)	(4)	(5)	(6) = (4) + (5)
JANUARY	14625	0	0	0	1	1
FEBRUARY	19094	0	0	0	4	4
MARCH	34974	0	0	59	1	60
APRIL	74836	0	0	290	3	293
MAY	110056	0	0	433	90	523
JUNE	90745	0	0	554	132	686
JULY	58509	0	0	454	18	472
AUGUST	42422	0	0	133	-2	131
SEPTEMBER	24120	0	0	79	-5	73
OCTOBER	13109	0	0	42	-5	37
NOVEMBER	5152	0	0	171	-1	170
DECEMBER	266	0	0	307	0	307
ANNUAL		0	0	2522	233	2755

(UNIT = ACRE-FEET)

(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.

2016 Evaporation Loss On Rio Grande Compact Water Stored in Elephant Butte Reservoir (Unit = Acre-Feet) Except Col. (8)

	Total Rio	Total Net	Colorado's	Colorado's	New Mexico's	New	Total Credit	Total Rio	Total Water	CO Credit	NM Credit
	Grande	Evap on	Rio Grande	Credit Water	Rio Grande	Mexico's	Water	Grande	Relinquished	Water	Water
	Stored in	Rio Grande	Compact	Evaporation	Compact	Credit Water	Evaporation	Usable	(Ac-Ft)	Relinquished	Relinquished
	Elephant	Stored in	Credit	Adjustment	Credit Water	Evaporation	Adjustment	Water		(Ac-Ft)	(Ac-Ft)
Month	Butte	Elephant	Water	(Ac-Ft)	Stored in	Adjustment	(Ac-Ft)	Stored in			
	(Ac-Ft)	Butte	Stored in		Elephant	(Ac-Ft)		Elephant			
		(Ac-Ft)	Elephant		Butte			Butte			
			Butte		(Ac-Ft)			(Kaf)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
BOY Credit	(2016)		6600		400						
January	361137	2392	6556	44	397	3	46	354	0	0	0
February	401906	4222	6487	69	393	4	73	395	0	0	0
March	407188	8376	6354	133	385	8	142	400	0	0	0
April	334873	6757	6226	128	377	8	136	328	0	0	0
May	310490	8852	6048	178	367	11	188	304	0	0	0
June	289032	10603	5826	222	353	13	235	283	0	0	0
July	180560	8204	5562	265	337	16	281	175	0	0	0
August	123364	2455	5451	111	330	7	117	118	0	0	0
September	123306	3319	5304	147	321	9	156	118	0	0	0
October	128708	3237	5171	133	313	8	141	123	0	0	0
November	160745	1223	5131	39	311	2	42	155	0	0	0
December	202454	1001	5106	25	309	2	27	197	0	0	0
Annual		60643		1494		91	1584		0	0	0

(New Mexico Accounting Method-2)

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

Addendum Engineer Advisers Report Texas Engineer Adviser April 05, 2017

The Engineer Advisers to the Rio Grande Compact Commission (Commission) were unable to reach agreement on the Accounting of water deliveries for 2016. 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. At the 2016 Rio Grande Compact Commission meeting, Colorado noted they will no longer follow Method 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 (Method 3), even though the calculation of Credit Water evaporation is a summation of monthly evaporation amounts. Under this method, whenever Usable Water amounts go negative and Credit Water was released, those amounts were repaid immediately as inflows occur. 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. As understood by the Texas Engineer Adviser, Method 2 holds the credit water constant throughout the year. If there is insufficient Usable Water in Elephant Butte to cover all the evaporation losses on the Credit Water, Usable Water has gone negative. Method 2 then assumes the negative dip into the Credit Water can never be repaid. The Texas Engineer Adviser was unable to find any instance where this method had been approved by the Commission.

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

The Commission direct that accrued Credit Water be held constant during the year.

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.

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 used by the Commission was to tabulate evaporation of credit water on a monthly basis, Reclamation proceeded with this historical practice and allocated the monthly tabulated evaporation of Credit Water to Usable Water.

COMPACT ACCOUNTING 2016 - METHOD 1

The Texas Engineer Adviser has reviewed the streamflow and reservoir storage records and other pertinent data for calendar year 2016. 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 2016, and balances as of January 1, 2017 are as follows:

(a) Deliveries by Colorado at the State line:

Balance as of January 1, 2016	6,700 acre-feet
Scheduled delivery	283,700 acre-feet
Actual delivery at Lobatos plus 10,000 acre-feet	285,900 acre-feet
Reduction of credit water on account of evaporation	1,500 acre-feet
Accrued credit January 1, 2017	7,400 acre-feet
(b) Deliveries by New Mexico at Elephant Butte Dam:	
Balance as of January 1, 2016	10,000 acre-feet
Scheduled delivery	433,000 acre-feet
Actual delivery	412,400 acre-feet
Reduction of credit on account of evaporation	2,200 acre-feet
Accrued debit January 1, 2017	12,800 acre-feet
(c) Project Storage and Releases:	
Accrued departure (credit) as of January 1, 2016	1,865,800 acre-feet
Actual release of Usable Water	546,400 acre-feet
Normal release for year	790,000 acre-feet
Accrued departure (credit) as of January 1, 2017	2,015,800 acre-feet
Under release capped at 150,000	

Method 1: Reduce Credit Water for Evaporation Monthly during the 2016 Calendar Year - Developed by Texas and Reclamation RIO GRANDE COMPACT - DELIVERIES BY COLORADO AT STATE LINE

YEAR 2016 - Method 1

				CON	EJOS IN	DEX SUP	PLY						RIO G	RANDE	INDEX SL	JPPLY				DELIV	ERIES	-
		MEASUR	ED FLOW			ADJUST	MENTS		SUP	PLY			A	JUSTMEN	ITS		SUP	PLY				
MONTH	CONEJOS AT MOGOTE	LOS PINOS NEAR ORTIZ	SAN ANTONIO AT ORTIZ	ΤΟΤΑL	STORAGE AT END OF MONTH ^d	CHANGE IN STORAGE ^e	OTHER ADJUSTMENTS	NET ADJUSTMENTS	SUPPLY IN MONTH	ACCUMULATED TOTAL	RECORDED FLOW NEAR DEL NORTE	STORAGE AT END OF MONTH	CHANGE IN STORAGE	TRANSMOUNTIAN DIVERSIONS ^b	OTHER ADJUSTMENTS ^a	NET ADJUSTMENTS	SUPPLY IN MONTH	ACCUMULATED TOTAL	CONEJOS RIVER AT MOUTH NEAR LASAUCES	RIO GRANDE LESS CONEJOS RIVER	RIO GRANDE AT LOBATOS	ACCUMULATED TOTAL AT LOBATOS
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
					10.1					0.0		0.2						0.0				0.0
JAN	3.0			3.0	9.9	-0.2		-0.2	2.8	2.8	11	0.2	0.0			0.0	11.0	11.0	3.8	12.2	16.0	16.0
FEB	3.9			3.9	10.0	0.1		0.1	4.0	6.8	14.6	0.2	0.0			0.0	14.6	25.6	4.6	16.7	21.3	37.3
MAR	6.3			6.3	10.9	0.9		0.9	7.2	14.0	24.1	0.2	0.0			0.0	24.1	49.7	8.9	29.1	38.0	75.3
APR	15.1	11.6	3.2	29.9	10.9	0.0		0.0	29.9	43.9	61.2	0.2	0.0			0.0	61.2	110.9	8.9	13.9	22.8	98.1
MAY	53.8	29.5	3.9	87.2	11.4	0.5	0.1	0.6	87.8	131.7	185.8	0.2	0.0			0.0	296.7	21.8	23.3	45.1	143.2	
JUN	71.0	14.0	0.3	85.3	25.7	14.3	0.2	14.5	99.8	231.5	209.8	0.2	0.0			0.0	209.8	506.5	27.8	42.8	70.6	213.8
JUL	18.9	2.2	0.1	21.2	19.7	-6.0	0.2	-5.8	15.4	246.9	48.4	0.2	0.0	-2.9	0.2	-2.7	45.7	552.2	4.3	15.1	19.4	233.2
AUG	10.9	1.8	0.2	12.9	17.8	-1.9	0.0	-1.9	11.0	257.9	33.7	0.2	0.0			0.0	33.7	585.9	0.2	3.9	4.1	237.3
SEPT	10.7	1.2	0.0	11.9	14.9	-2.9	0.0	-2.9	9.0	266.9	26.9	0.2	0.0			0.0	26.9	612.8	0.3	2.2	2.5	239.8
OCT	6.4	1.1	0.1	7.6	13.5	-1.4	0.0	-1.4	6.2	273.1	24.9	0.2	0.0			0.0	24.9	637.7	0.0	3.7	3.7	243.5
NOV	4.5			4.5	12.0	-1.5	0.0	-1.5	3.0	276.1	15.1	0.2	0.0			0.0	15.1	652.8	3.4	10.4	13.8	257.3
DEC	4.1			4.1	11.5	-0.5	0.0	-0.5	3.6	279.7	12.0	0.2	0.0			0.0	12.0	664.8	3.9	14.7	18.6	275.9
YEAR	208.6	61.4	7.8	277.8		1.4	0.5	1.9	279.7		667.5		0.0	-2.9	0.2	-2.7	664.8		87.9	188.0	275.9	
Remarks:	Cols. 6 and	d 13 do not	include trar	nsmountain v	water.											SI	JMMARY O	F DEBITS /	AND CREDI	TS		1
^a Evapora	tion loss po	st-compact	reservoirs;	report of the	e Engineer	Adviser for	Colorado.								I- · ·		EM			DEBIT	CREDIT	BALANCE
^b 3,154 ad	-ft minus 24	43 ac-ft pre	-compact; re	eport of the I	Engineer A	dviser for C	olorado.							C1	Balance at	Beginning (of Year	Discon				Cr. 6.7
Reduction	on of Credit	for Evapora	ation calcula	ated on a mo	onthly basis	5. 	<i>,</i>							C2	Scheduled	Delivery fro	m Conejos	River do		95.2 199.5		Dr. 88.5
Note: 31	9 acre-feet	of relinquis	hment cred	it accrued in	Platoro in	2016. Stora	ige of reling	uished cred	it to date ha	s totaled 2,	068 acre-te	et;		C4	Actual Deli	verv at Loba	atos nlus 10		eet	100.0	285.9	Cr 8 9
^e See Enc	lineer Advis	er report in	regards to	change of st	orage									C5	Reduction	of Debits o/	c Evaporatio	on	001		200.0	01. 0.0
			. g to											C6	Reduction	of Credits o	/c Evaporati	on ^c		1.5		Cr. 7.4
														C7								
														C8	Balance at	End of Yea	r					Cr. 7.4

_ Date: ____

Quantities in thousands of acre feet to nearest hundred

APPROVED: Engineer Adviser for Colorado_____

Date:

Method 1: Reduce Credit Water for Evaporation Monthly during the 2016 Calendar Year - Developed by Texas and Reclamation RIO GRANDE COMPACT - DELIVERIES BY NEW MEXICO AT ELEPHANT BUTTE

YEAR 2016 - Method 1

Quantities in thousands of acre feet to nearest hundred

				ОТО	WI INDEX SU	JPPLY						ELEPHANT E	BUTTE EFFEC	TIVE SUPPLY	,
				ADJUS	TMENTS			INDEX	SUPPLY		STORAGE I	N ELEPHANT		Effectiv	e Supply
		RESERVO	DIRS: LOBATOS	ΤΟ ΟΤΟΨΙ							BUTTE RI	ESERVOIR			
MONTH	Recorded Flow at Otowi Bridge	Storage End of Month ^{a, b,e}	Change in Storage	Reservoir Evaporation	Other Adjustments	Trans-mountain Diversions	Net Adjustments	During Month	Accumulated Total	Total Water Stored in New Mexico Above San Marcial at End of Month ^{a, b}	End of Month ^a	Change Gain (+) Loss (-)	Recorded Flow Below Elephant Butte Dam	During Month	Accumulated Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		12.4								12.3°	322.5				
JAN	41.8	14.6	2.2	0.0		-2.5	-0.3	41.5	41.5	15.0	361.1	38.6	0.0	38.6	38.6
FEB	49.6	19.1	4.5	0.0		-2.8	1.7	51.3	92.8	18.6	401.9	40.8	0.1	40.9	79.5
MAR	68.1	35.0	15.9	0.1		-3.0	13.0	81.1	173.9	35.7	407.2	5.3	32.4	37.7	117.2
APR	67.3	74.8	39.8	0.3		-3.6	36.5	5 103.8	277.7	76.1	334.9	-72.3	100.2	27.9	145.1
MAY	139.5	107.6	32.8	0.5		-3.5	29.8	169.3	447.0	111.2	310.5	-24.4	83.5	59.1	204.2
JUN	152.2	81.1	-26.5	0.6	i	-4.4	-30.3	3 121.9	568.9	83.0	298.2	-12.3	104.1	91.8	296.0
JUL	74.0	48.9	-32.2	0.4		-12.5	-44.3	3 29.7	598.6	50.1	189.5	-108.7	117.2	8.5	304.5
AUG	55.6	32.9	-16.0	0.1		-7.7	-23.6	32.0	630.6	33.7	132.2	-57.3	76.1	18.8	323.3
SEPT	43.2	14.6	-18.3	0.1		-6.1	-24.3	18.9	649.5	15.6	132.0	-0.2	9.5	9.3	332.6
ОСТ	30.1	13.1	-1.5	0.0		-8.9	-10.4	19.7	669.2	14.1	128.7	-3.3	9.3	6.0	338.6
NOV	42.1	5.2	-7.9	0.2		-2.8	-10.5	5 31.6	700.8	6.3	160.7	32.0	0.0	32.0	370.6
DEC	48.6	0.2	-5.0	0.3		-3.1	-7.8	40.8	741.6	0.8	202.5	41.8	0.0	41.8	412.4
YEAR	812.1		-12.2	2.6		-60.9	-70.5	5 741.6				-120.0	532.4	412.4	
Remarks:	d 12 do not include	transmountain wat	or							SUMMARY	OF DEBITS AN	D CREDITS			
h Note: In 2016	22.490 core feet a	f relinguishment or	on.	o rolinguichmont or	reemente were et	and in ELVada	NM1	Balance at Begi	II nning of Year	EM			DEBII	CREDI1	BALANCE Cr 10.0
Reservoir, and 75	55 acre-feet were st	ored in McClure Re	eservoir. Storage of	f relinquished credit	t to date has totale	d 288,281 acre-	NM2	Scheduled Deliv	ery at Elephant E	Butte			433.0		Dr. 423.0
feet; balance rem	aining is 92,219 ac	re-feet.					NM3	Actual Elephant	Butte Effective S	upply				412.4	Dr. 10.6
c Value corrected	for 2015 where pre	e-Compact storage	in Santa Fe Reser	voirs was added to	total rather than su	ubtracted.	NM4	Reduction of De	bits o/c Evaporat	ion					
d Reduction of C	redit for Evaporation	n calculated on a m	onthly basis.				NM5	Reduction of Cr	edits o/c Evapora	tion and Spill ^a			2.2		Dr. 12.8
e Storage in May	and June includes	water stored for FI	Vado modified ope	vration			NM6								
							NM8	Balance at End	of Year						Dr. 12.8
APPROVED: Engineer Advise	er for Colorado	Di	ate:	Engi	neer Adviser for	New Mexico	Date	e:	Engine	er Adviser for Te	(as	Date:		1	<u>.</u>

Method 1: Reduce Credit Water for Evaporation Monthly during the 2016 Calendar Year - Developed by Texas and Reclamation

RIO GRANDE COMPACT - RELEASE AND SPILL FROM PROJECT STORAGE

YEAR 2016 - Method 1

Quantities in thousands of acre feet to nearest hundred

		USABLE	WATER IN S	STORAGE		CREDIT V	VATER IN S	TORAGE					RIO GR	ANDE BEL	OW CABALI	O DAM		
														SPIL	L FROM STOP	RAGE	USABLE	RELEASE
MONTH	Total Project Storage Capacity Available at End of Month ^a	Elephant Butte Reservoir	Caballo Reservoir	Total at End of Month	Unfilled Capacity of Project Storage at End of Month	Colorado Credit Water ^C	New Mexico Credit Water ^C	Total at End of Month	Flood Water in Storage in Caballo Reservoir at End of Month	Total Water in Project Storage at End of Month	Measured Flow at Caballo Gaging Station	Intervening Diversions to Canals	Total Release and Spill	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	307.4 ^b	27.7	335.1 ^b	1,664.5	5.5 ^b	9.6 ^b	15.1 ^b		350.2								0.0
JAN	1,999.6	344.5	29.2	373.7	1,625.9	6.7	9.9	16.6		390.3	0.0	0.0	0.0				0.0	0.0
FEB	1,999.6	385.5	30.8	416.3	1,583.3	6.6	9.8	16.4		432.7	0.0	0.0	0.0				0.0	0.0
MAR	1,999.6	391.2	39.8	431.0	1,568.6	6.4	9.6	16.0		447.0	19.7	0.1	19.8				19.8	19.8
APR	1,974.6	319.2	63.1	382.3	1,592.3	6.3	9.4	15.7		398.0	72.7	0.1	72.8				72.8	92.6
MAY	1,974.6	295.2	73.5	368.7	1,605.9	6.1	9.2	15.3		384.0	65.9	0.1	66.0				66.0	158.6
JUN	1,974.6	283.5	50.8	334.3	1,640.3	5.9	8.8	14.7		349.0	127.5	0.1	127.6				127.6	286.2
JUL	1,974.6	175.4	28.7	204.1	1,770.5	5.7	8.4	14.1		218.2	140.2	0.1	140.3				140.3	426.5
AUG	1,974.6	118.4	21.6	140.0	1,834.6	5.5	8.3	13.8		153.8	87.4	0.1	87.5				87.5	514.0
SEPT	1,974.6	118.5	4.4	122.9	1,851.7	5.4	8.1	13.5		136.4	31.7	0.1	31.8				31.8	545.8
ОСТ	1,999.6	115.5	16.2	131.7	1,867.9	5.3	7.9	13.2		144.9	0.2	0.1	0.3				0.3	546.1
NOV	1,999.6	147.7	19.1	166.8	1,832.8	5.2	7.8	13.0		179.8	0.1	0.1	0.2				0.2	546.3
DEC	1,999.6	189.5	21.0	210.5	1,789.1	5.2	7.8	13.0		223.5	0.1	0.0	0.1				0.1	546.4
YEAR											545.5	0.9	546.4	0.0	0.0	0.0	546.4	
Remarks: Col	s. 2, 6 and 11 ref	lect implementa	tion of revised ar	ea-capacity tab	les from Elephar	t Butte and Caba	allo Reservoirs,	effective Jan 1,	2009			ACCF	RUED DEPAR	TURE FROM I	NORMAL REL	EASE		
										B4			EM			DEBIT	CREDIT	BALANCE
^a Project Sto	orage Capacity	is 1,974,600 a	cre-feet (April te	o September)	and 1,999,600	acre-feet (Octo	ober to March)	as adopted		P1 P2	Actual Release	arture at Beginn	ing of Year			546.4		Cr 1319 /
by the Rio	Grande Compa	act Commissio	n on March 31,	2009 with floo	d control stora	ge reservation	at Elephant	ch		P3	Normal Relea	se for Year					790.0	Cr. 2109.4
Dulle Nest		acie-leet lion		September an	a 20,000 acre-i		er unougin Ma	UII.		P4	Under Releas	e in Excess of	150.0			93.6		Cr. 2015.8
^b Based on	Balance at Begi	inning of Year	(C1 and NM1).							P5								
G Colouleted	on a manthly b	ooio								P6								0 0045 0
	on a monthly b	asis.								P7	Accrued Depa	arture at End of			LL Did not oc			Cr. 2015.8
										I		T IIV		TIE HOAL SPI				

Date:

APPROVED:

Engineer Adviser for Colorado_____

Date:

_ Engineer Adviser for New Mexico ____

_____ Engineer Adviser for Texas ____

_____ Date: ____

Method 2: Reduce Credit Water for Evaporation at the End of the 2016 Calendar Year - Developed by Colorado and New Mexico RIO GRANDE COMPACT - DELIVERIES BY COLORADO AT STATE LINE

YEAR 2016 - Method 2

				CON	IEJOS IN	DEX SUP	PLY						RIO G	RANDE	INDEX SU	IPPLY				DELIV	ERIES	
		MEASUR	ED FLOW			ADJUS1	MENTS		SUPF	ΡLY			AD	JUSTMEN	ITS		SUPI	ΡLY				
MONTH	CONEJOS AT MOGOTE	LOS PINOS NEAR ORTIZ	SAN ANTONIO AT ORTIZ	TOTAL	STORAGE AT END OF MONTH ^d	CHANGE IN STORAGE ^e	OTHER ADJUSTMENTS	NET ADJUSTMENTS	SUPPLY IN MONTH	ACCUMULATED TOTAL	RECORDED FLOW NEAR DEL NORTE	STORAGE AT END OF MONTH	CHANGE IN STORAGE	TRANSMOUNTIAN DIVERSIONS ^b	OTHER ADJUSTMENTS ^a	NET ADJUSTMENTS	SUPPLY IN MONTH	ACCUMULATED TOTAL	CONEJOS RIVER AT MOUTH NEAR LASAUCES	RIO GRANDE LESS CONEJOS RIVER	RIO GRANDE AT LOBATOS	ACCUMULATED TOTAL AT LOBATOS
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
					10.1					0.0		0.2						0.0				0.0
JAN	3.0			3.0	9.9	-0.2		-0.2	2.8	2.8	11	0.2	0.0			0.0	11.0	11.0	3.8	12.2	16.0	16.0
FEB	3.9			3.9	10.0	0.1		0.1	4.0	6.8	14.6	0.2	0.0			0.0	14.6	25.6	4.6	16.7	21.3	37.3
MAR	6.3			6.3	10.9	0.9		0.9	7.2	14.0	24.1	0.2	0.0			0.0	24.1	49.7	8.9	29.1	38.0	75.3
APR	15.1	11.6	3.2	29.9	10.9	0.0		0.0	29.9	43.9	61.2	0.2	0.0			0.0	61.2	110.9	8.9	13.9	22.8	98.
MAY	' 53.8 29.5 3.9 87.2 11.4 0.5 0.1 0.6 87.8 131.7 185.8 0.2 0.0 0.0 185.8 296.7 21										21.8	23.3	45.1	143.2								
JUN	71.0	14.0	0.3	85.3	25.7	14.3	0.2	14.5	99.8	231.5	209.8	0.2	0.0			0.0	209.8	506.5	27.8	42.8	70.6	213.8
JUL	18.9	2.2	0.1	21.2	19.7	-6.0	0.2	-5.8	15.4	246.9	48.4	0.2	0.0	-2.9	0.2	-2.7	45.7	552.2	4.3	15.1	19.4	233.2
AUG	10.9	1.8	0.2	12.9	17.8	-1.9	0.0	-1.9	11.0	257.9	33.7	0.2	0.0			0.0	33.7	585.9	0.2	3.9	4.1	237.3
SEPT	10.7	1.2	0.0	11.9	14.9	-2.9	0	-2.9	9.0	266.9	26.9	0.2	0.0			0.0	26.9	612.8	0.3	2.2	2.5	239.8
OCT	6.4	1.1	0.1	7.6	13.5	-1.4	0.0	-1.4	6.2	273.1	24.9	0.2	0.0			0.0	24.9	637.7	0.0	3.7	3.7	243.
NOV	4.5			4.5	12.0	-1.5	0.0	-1.5	3.0	276.1	15.1	0.2	0.0			0.0	15.1	652.8	3.4	10.4	13.8	257.3
DEC	4.1			4.1	11.5	-0.5	0.0	-0.5	3.6	279.7	12.0	0.2	0.0			0.0	12.0	664.8	3.9	14.7	18.6	275.9
YEAR	208.6	61.4	7.8	277.8		1.4	0.5	1.9	279.7		667.5		0.0	-2.9	0.2	-2.7	664.8		87.9	188.0	275.9	
Remarks:	Cols. 6 and	d 13 do not	include trar	Ismountain	water.											SI		F DEBITS A	AND CREDI	TS		
^a Evapora	ition loss pos	st-compact	reservoirs;	report of the	e Engineer	Adviser for	Colorado.							C.1	Balance at	Reginning (IM of Year				CREDIT	Cr 6.6
^c Evapora	tion of credit	t water acc	ounted as d	escribed in	Article VI of	the Rio Gr	olorado. ande Comp	act						C2	Scheduled	Deliverv fro	m Coneios I	River		95.2		Dr. 88.6
d Note: 3	19 acre-feet	of relinquis	shment cred	it accrued i	n Platoro Re	eservoir dur	ing 2016. St	torage of re	linquished cr	redit to date	e has totaled	d 2,068 acr	e-feet;	C3	Scheduled	Delivery fro	m Rio Grano	de		188.5		Dr. 277.1
balance r	emaining is 9	932 acre-fe	et.	abanaa of a	torogo									C4	Actual Deliv	very at Loba	atos plus 10,	000 Acre F	eet		285.9	Cr. 8.8
l- ⊇ee ⊏uố	JILIEEL AUVIS	er report in	regards to (mange of s	lorage.									C5	Reduction of	of Debits o/	c Evaporatio	n				
														C6	Reduction of	of Credits o	c Evaporatio	on ^c		1.5		Cr. 7.3
														C7								
														C8	Balance at	End of Yea	r					Cr. 7.3

Date:

Quantities in thousands of acre feet to nearest hundred

APPROVED: Engineer Adviser for Colorado_____

Date:

Method 2: Reduce Credit Water for Evaporation at the End of the 2016 Calendar Year - Developed by Colorado and New Mexico

RIO GRANDE COMPACT - DELIVERIES BY NEW MEXICO AT ELEPHANT BUTTE

YEAR 2016 - Method 2

Quantities in thousands of acre feet to nearest hundred

				<u>0</u> TC	WI INDEX SU	IPPLY						ELEPHANT E	BUTTE EFFEC	TIVE SUPPLY	/
				ADJUS	TMENTS			INDEX	SUPPLY		STORAGE I	N ELEPHANT		Effectiv	e Supply
		RESERVO	DIRS: LOBATOS	ΓΟ ΟΤΟΨΙ							BUTTE RI	ESERVOIR			
MONTH	Recorded Flow at Otowi Bridge	Storage End of Month ^{a, b}	Change in Storage	Reservoir Evaporation	Other Adjustments	Trans-mountain Diversions	Net Adjustments	During Month	Accumulated Total	Total Water Stored in New Mexico Above San Marcial at End of Month ^{a, b}	End of Month ^a	Change Gain (+) Loss (-)	Recorded Flow Below Elephant Butte Dam ^d	During Month	Accumulated Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		12.4								12.3	322.5				
JAN	41.8	14.6	2.2	0.0)	-2.5	-0.3	41.5	41.5	15.0	361.1	38.6	0.0	38.6	38.6
FEB	49.6	19.1	4.5	0.0)	-2.8	1.7	51.3	92.8	18.6	401.9	40.8	0.1	40.9	79.5
MAR	68.1	35.0	15.9	0.1	1	-3.0	13.0	81.1	173.9	35.7	407.2	5.3	32.4	37.7	117.2
APR	67.4	74.8	39.8	0.3	3	-3.6	36.5	103.9	277.8	76.1	334.9	-72.3	100.2	27.9	145.1
MAY	139.5	110.1	35.3	0.5	5	-3.5	32.3	171.8	449.6	113.7	310.5	-24.4	83.5	59.1	204.2
JUN	142.5	90.7	-19.4	0.7	7	-4.4	-23.1	119.4	569.0	92.6	289.0	-21.5	104.1	82.6	286.8
JUL	74.0	58.5	-32.2	0.5	5	-12.5	-44.2	29.8	598.8	59.6	180.6	-108.4	117.2	8.8	295.6
AUG	55.6	42.4	-16.1	0.1	1	-7.7	-23.7	31.9	630.7	43.2	. 123.4	-57.2	76.1	18.9	314.5
SEPT	43.2	24.1	-18.3	0.1	1	-6.1	-24.3	18.9	649.6	25.1	123.3	-0.1	9.5	9.4	323.9
ОСТ	39.6	13.1	-11.0	0.0)	-8.9	-19.9	19.7	669.3	14.0	128.7	5.4	9.3	14.7	, 338.6
NOV	41.9	5.2	-7.9	0.2	2	-2.8	-10.5	31.4	700.7	6.3	160.7	32.0	0.0	32.0	370.6
DEC	48.6	0.3	-4.9	0.3	3	-3.1	-7.7	40.9	741.6	0.8	202.5	41.8	0.0	41.8	412.4
YEAR	811.8		-12.1	2.8	3	-60.9	-70.2	741.6				-120.0	532.4	412.4	
Remarks:	12 do not includo t		r							SUMMAR'	Y OF DEBITS AN	D CREDITS			
^b Note: In 2016,	23,489 acre-feet of	relinquishment cr	edit under previous	relinquishment ag	preements were sto	red in El Vado	NM1	Balance at Begi	IT nning of Year	EM			DEBIT	CREDIT	BALANCE
feet; balance rem	aining is 92,219 ac	re-feet.	servoir. Storage of i	elinquisned credit	to date has totaled	288,281 acre-	NM2	Scheduled Deliv	very at Elephant B	utte			433.0		Dr. 432.6
c Value correcte d Gage record re	d for 2015 where pr flects improved pre-	e-Compact storage cision during 2016.	in Santa Fe reserv A low bias in gaged	oirs was added to I flow during certa	total rather than su in months due to al	btracted. gae growth was	NM3	Actual Elephant	Butte Effective St	upply				412.4	Dr. 20.2
identified and add	dressed for 2016. The vide a more accurate	his has occurred fo ate gage record in th	r an undetermined a	amount of time. Ne	ew Mexico will conti	nue to coordinate	NM4	Reduction of De	bits o/c Evaporati	on Vien and Chill ^e					Dr. 00.0
e Evaporation of	credit water accoun	ited as described in	Article VI of the Rid	o Grande Compac	t.		NM5 NM6	Reduction of Cr	edits 0/c Evaporal	lion and Spill			0.1		Dr. 20.3
Note: Numbers i	n red reflect a New	Mexico operation tl	nat would have occu	urred in 2016 if Re	clamation had oper	ated El Vado	NM7								
Reservoir under	viethod 2.						NM8	Balance at End	of Year						Dr. 20.3
APPROVED: Engineer Advise	r for Colorado	Da	ate:	Eng	ineer Adviser for I	New Mexico	Date);	Engine	er Adviser for Te	xas	Date:			

Method 2: Reduce Credit Water for Evaporation at the End of the 2016 Calendar Year - Developed by Colorado and New Mexico

RIO GRANDE COMPACT - RELEASE AND SPILL FROM PROJECT STORAGE

YEAR 2016 - Method 2

Quantities in thousands of acre feet to nearest hundred

		USABLE	WATER IN S	TORAGE		CREDIT V	VATER IN S	TORAGE					RIO GR	ANDE BEL	OW CABALL	O DAM		
														SPIL	L FROM STOR	AGE	USABLE	RELEASE
MONTH	^a Total Project Storage Capacity Available at End of Month	Elephant Butte Reservoir	Caballo Reservoir	Total at End of Month	Unfilled Capacity of Project Storage at End of Month	^C Colorado Credit Water	^C New Mexico Credit Water	Total at End of Month	Flood Water in Storage in Caballo Reservoir at End of Month	Total Water in Project Storage at End of Month	Measured Flow at Caballo Gaging Station	Intervening Diversions to Canals	Total Release and Spill	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	315.8	27.7	343.5	1,656.1	6.6 ^b	0.4 ^b	7.0		350.5								0.0
JAN	1,999.6	354.1	29.2	383.3	1,616.3	6.6	0.4	7.0		390.3	0.0	0.0	0.0				0.0	0.0
FEB	1,999.6	394.9	30.8	425.7	1,573.9	6.6	0.4	7.0		432.7	0.0	0.0	0.0				0.0	0.0
MAR	1,999.6	400.2	39.8	440.0	1,559.6	6.6	0.4	7.0		447.0	19.7	0.1	19.8				19.8	19.8
APR	1,974.6	327.9	63.1	391.0	1,583.6	6.6	0.4	7.0		398.0	72.7	0.1	72.8				72.8	92.6
MAY	1,974.6	303.5	73.5	377.0	1,597.6	6.6	0.4	7.0		384.0	65.9	0.1	66.0				66.0	158.6
JUN	1,974.6	282.0	50.8	332.8	1,641.8	6.6	0.4	7.0		339.8	127.5	0.1	127.6				127.6	286.2
JUL	1,974.6	173.6	28.7	202.3	1,772.3	6.6	0.4	7.0		209.3	140.2	0.1	140.3				140.3	426.5
AUG	1,974.6	116.4	21.6	138.0	1,836.6	6.6	0.4	7.0		145.0	87.4	0.1	87.5				87.5	514.0
SEPT	1,974.6	116.3	4.4	120.7	1,853.9	6.6	0.4	7.0		127.7	31.7	0.1	31.8				31.8	545.8
ОСТ	1,999.6	121.7	16.2	137.9	1,861.7	6.6	0.4	7.0		144.9	0.2	0.1	0.3				0.3	546.1
NOV	1,999.6	153.7	19.1	172.8	1,826.8	6.6	0.4	7.0		179.8	0.1	0.1	0.2				0.2	546.3
DEC	1,999.6	195.5	21.0	216.5	1,783.1	6.6	0.4	7.0		223.5	0.1	0.0	0.1				0.1	546.4
YEAR											545.5	0.9	546.4	0.0	0.0	0.0	546.4	
Remarks: Co	ls. 2, 6 and 11 ref	lect implementa	ation of revised are	a-capacity tab	les from Elephar	nt Butte and Cab	allo Reservoirs,	effective Jan 1, 2	2009			ACCF	RUED DEPAR	TURE FROM I	NORMAL RELE	EASE		
a Project Sto	rage Capacity is	,974,600 acre-i	feet (April to Septe	ember) and 1,9	99,600 acre-fee	t (October to Mar	ch) as adopted	,				ITE	M · · · · · · · · · · · · · · · · · · ·			DEBIT	CREDIT	BALANCE
by the Rio	Grande Compact	Commission on	March 31, 2009 w	ith flood contro	ol storage reserv	ation at Elephan	t March			P1	Accrued Depa	rture at Beginn	ing of Year			 546.4		Cr.
b Based on F	Balance at Beginn	ing of Year (C1	and NM1).			October through				P2 P3	Normal Releas	se for Year					790.0	Cr.
^c Credit wate	r held constant du	uring the year in	accordance with	Article VI and r	per direction of C	Compact Commis	ssion in March 2	006. Evaporatio	n for credit	P4								Cr.
water is acco	unted at end of ca	alendar year in t	the proportion that	the Credit Wa	ter bore to the to	tal amount of wa	ter in Elephant E	Butte Reservoir o	luring the year.	P5								
If loan had be	en approved, Cre	edit Water would	d have been decre	ased by the ar	nount of the neg	ative usable wate	er.			P6								
2012.2013.2	$2014.\ 2015\ and$	epancies during 2016 could no	y ∠o ∩, data was n ot be computed.	or approved to	n ∠011; conseqt	ienuy, the accrue	eu ueparture at tr			P7	Accrued Depa	rture at End of	Year		LL Did not occ			Cr.
	. ,											1 11		RETIGAL SPI				
APPROVED:																		

Engineer Adviser for Colorado______ Date: ______ Engineer Adviser for New Mexico ______ Date: _____ Engineer Adviser for Texas ______ Date: _______ Date: ______ Date: ______ Date: ______ Date: _______ Date: ______ Date: _______ Date: _______ Date: ______ Date: _______ Date: ______ Date: _______ Date: _______ Date: ______ Date: _______ Date: ______ Date:

		Borne by		Borne by	
Item	Total Cost	United States	Colorado	New Mexico	Texas
GAGING STATIONS					
In Colorado	\$75,345		\$75,345		
In New Mexico, above Caballo					
Reservoir	\$75,062	\$41,142		\$33,920	
In New Mexico, Caballo Reservoir and below	\$39,662	\$15,882		\$3,256	\$20,524
Subtotal	\$190,069	\$57,024	\$75,345	\$37,176	\$20,524
ADMINISTRATION					
U.S.G.S. Technical Services	\$19,414	\$5,884	\$4,510	\$4,510	\$4,510
Other expenses ¹	\$3,000		\$1,000	\$1,000	\$1,000
Subtotal	\$22,414	\$5,884	\$5,510	\$5,510	\$5,510
GRAND TOTAL	\$212,483	\$62,908	\$80,855	\$42,686	\$26,034
EQUAL SHARES			\$49,858	\$49,858	\$49,858

BUDGET FOR FISCAL YEAR ENDING JUNE 30, 2016 (FY-2016)

¹Includes cost of court reporter and publication of Annual Report.

BUDGET FOR FISCAL YEAR ENDING JUNE 30, 2018 (FY-2018)

		Borne by		Borne by	
Item	Total Cost	United States	Colorado	New Mexico	Texas
GAGING STATIONS					
In Colorado	\$76,635		\$76,635		
In New Mexico, above Caballo					
Reservoir	\$77,313	\$42,375		\$34,938	
In New Mexico, Caballo					
Reservoir and below	\$31,547	\$7,600		\$3,354	\$20,593
Subtotal	\$185,495	\$49,975	\$76,635	\$38,292	\$20,593
ADMINISTRATION					
U.S.G.S. Technical Services	\$19,996	\$6,058	\$4,646	\$4,646	\$4,646
Other expenses ¹	\$3,000		\$1,000	\$1,000	\$1,000
Subtotal	\$22,996	\$6,058	\$5,646	\$5,646	\$5,646
GRAND TOTAL	\$208,491	\$56,033	\$82,281	\$43,938	\$26,239
EQUAL SHARES			\$50,819	\$50,819	\$50,819

¹Includes cost of court reporter and publication of Annual Report.

Agreement No: 17CRNM000000012 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 1st day of July, 2017 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:

\$6,058
\$4,646
\$4,646
\$4,646

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, 2018, 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, 2018, 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 2018 and July 2018. 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 USC50b.

UNITED STATES GEOLOGICAL SURVEY

athan Bumgarner 3/17/2017 Director, New Mexico Water Science Center

RIO GRANDE COMPACT COMMISSION

Commissioner for Colorado

Date

Commissioner for New Mexico

Commissioner for Texas

Date

Representative of the United States

Statement of Work for 17CRNM00000012

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

- 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.
- Prepare and submit provisional water accounting reports on the deliveries of the Rio Grande water.
- 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.

RESOLUTION

RIO GRANDE COMPACT COMMISSION

Honoring Nabil G. Shafike

WHEREAS, *Nabil G. Shafike, PhD, worked for 17 years as an employee of the State of New Mexico on Rio Grande Compact issues including seven years as the Assistant to the New Mexico Engineer Adviser to the Rio Grande Compact Commission;*

WHEREAS, during that time Dr. Shafike faithfully and exceptionally represented New Mexico and multiple New Mexico Rio Grande Compact Commissioners as a staff member of the New Mexico Interstate Stream Commission;

WHEREAS, during his tenure, the Commissioners of the states of New Mexico, Texas, and Colorado, and the federal Chair to the Rio Grande Compact Commission did develop great admiration and respect for Dr. Shafike;

AND WHEREAS, in particular, Dr. Shafike showed tremendous dedication and support to the Rio Grande Compact Commission in his efforts to produce accurate and precise records and computations of flows and deliveries;

NOW THEREFORE, BE IT RESOLVED that the Rio Grande Compact Commission assembled in its 78th annual meeting held in Santa Fe, New Mexico, acknowledges the devoted service of Dr. Nabil G. Shafike to the people of the Rio Grande basin, and the Rio Grande Compact Commission, and this Commission extends to Dr. Shafike its best wishes for a prosperous and enjoyable future;

BE IT FURTHER RESOLVED, that the New Mexico Engineer Adviser to the Rio Grande Compact Commission is hereby directed to furnish copies of this unanimously adopted resolution to Dr. Nabil G. Shafike, and to cause said resolution to be included in the Minutes of the 78th annual meeting of the Rio Grande Compact Commission.

In witness whereof, we do hereby cause our signatures to be affixed hereon this 5th day of April 2017, *A.D.*, in Santa Fe, New Mexico.

TOM BLAINE, P.E. Commissioner for New Mexico

DICK WOLFE, P.E. Commissioner for Colorado

PATRICK R. GORDON Commissioner for Texas

HAL SIMPSON, P.E. *Federal Chairman*

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 Re	eservoir	Mill Creek Reservoir
Rito Hondo Reservoir	Big Meadows Re	eservoir	Fuchs Reservoir
Hermit Lakes Reservoir No. 3	Alberta Park Res	ervoir	Platoro Reservoir
Troutvale No. 2 Reservoir	Shaw Lake Enla	gement	Trujillo Meadows Reservoir
The office of the State Engineer of Colorad Rio Grande near Del Norte, Colo. Conejos River below Platoro Reservoir.	do provided records Colo.	of discharge for t Los Pinos River Conejos River ne	the following: near Ortiz, Colo. ear Lasauses, Colo.
Conejos River near Mogote, Colo. San Antonio River at Ortiz, Colo.		Rio Grande near	Lobatos, Colo.
The U.S. Bureau of Reclamation, Albuque Azotea Tunnel at Outlet, near Chama, N. Willow Creek above Heron Res., near Lo Storage in El Vado Reservoir near Tierra Storage in Heron Reservoir near Los Ojo	rque, N. Mex., prov Mex. os Ojos, N. Mex. Amarilla, N. Mex. os, N. Mex.	vided the following Willow Creek be	g records: Now Heron Dam, N. Mex.
The U.S. Geological Survey, in cooperation the following records: Storage in Nambe Falls Reservoir near N Rio Nambe below Nambe Falls Dam, near	n with the U.S. Bur lambe, N. Mex. ar Nambe, N. Mex.	eau of Reclamatic	on, Albuquerque, N. Mex, provided
The U.S. Geological Survey supplied the re- the New Mexico Interstate Stream Commis- Rio Chama below El Vado Dam, N. Mex- Rio Grande at Otowi Bridge, near San Ild Storage in Nichols and McClure Reservo	ecord for Rio Grand ssion, also provideo c. Santa Fo defonso, N. Mex pir near Santa Fe, N	le below Elephant l the following: e River near Santa . Mex.	t Butte Dam, and in cooperation with ι Fe, N. Mex.
The U.S. Geological Survey, in cooperation following records:	n with the Corps of	Engineers, Albuq	juerque, N. Mex., also provided the
Rio Chama below Abiquiu Dam, N. Mex Galisteo Creek below Galisteo Dam, N. I	a. Rio Gra Mex. Jemez F	nde below Cochiti River below Jemez	i Dam, N. Mex. 2 Canyon Dam, N. Mex.
The Corps of Engineers, Albuquerque, N. 1 Abiquiu Reservoir. Galisteo Reserv	Mex., provided the oir. Jemez C	following records Canyon Reservoir.	of storage: Cochiti Lake.
The U.S. Bureau of Reclamation, El Paso, Storage in Elephant Butte Reservoir at El Storage in Caballo Reservoir near Arrey, Rio Grande below Caballo Dam, N. Mex Bonito ditch below Caballo Dam, N. Mex	Texas, provided the lephant Butte, N. M N. Mex. x.	e following record Iex.	ls:

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.

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. -- 127 years (1890-2016), 887 ft³/s (642,800 acre-ft per year).

Extremes. -- 1889-2016: Maximum discharge, 18,000 ft³/s Oct. 5, 1911 (gage height, 6.80 ft), from rating curve extended

above 12,900 ft³/s; minimum daily, 74 ft³/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

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	5,560	200	140	179	11,030
February	7,375	360	185	254	14,630
March	12,140	430	350	392	24,080
April	30,860	1,460	360	1,030	61,210
May	93,670	4,620	1,140	3,020	185,800
June	105,790	5,720	1,590	3,530	209,800
July	24,400	1,730	380	787	48,400
August	17,004	997	420	549	33,730
September	13,542	625	335	451	26,860
October	12,564	488	294	405	24,920
November	7,612	342	170	254	15,100
December	6,025	230	160	194	11,950
Calendar year 2016	336,540	5,720	140	920	667,500

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. -- 64 years (1890-2016), 91 ft³/s (65,770 acre-ft per year).

Extremes. -- 1952-2016: Maximum discharge, 1,160 ft²/s Nov. 1, 1957; maximum gage height, 4.29 ft June 15, 1958; no

flow Oct. 16-20, 1955.

Remarks. -- No estimated daily discharges. Records good. No diversions above station. Flow completely

regulated by Platoro Reservoir (capacity, 59,570 acre-ft).

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	451	32	10	14	895
February	319	11.0	11	11	633
March	321	11.0	10	10	637
April	1,702	90	10	57	3,380
May	7,287	446	57	235	14,450
June	9,086	544	106	303	18,020
July	5,315	293	105	171	10,540
August	2,166	139	31	70	4,300
September	2,523	141	27	84	5,000
October	1,418	84	24	46	2,810
November	974	36	24	32	1,930
December	599	36	13	19	1,190
Calendar year 2016	32,161	544	10	88	63,780

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. -- 106 years (1904, 1912-2016), 317 ft3/s (229,600 acre-ft per year).

Extremes. -- 1903-1905, 1911-2016: Maximum discharge, 9,000 ft3/s Oct. 5, 1911 (gage height, 8.50 ft), from rating curve

extended above 3,100 ft³/s; minimum daily determined, 10 ft³/s July 18, 1904, also occurred Aug. 19,2002.

<u>Remarks.</u> -- 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

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	1,492	70	36	48	2,960
February	1,948	94	36	67	3,860
March	3,178	125	71	103	6,300
April	7,605	452	72	254	15,080
May	27,100	1,460	280	874	53,750
June	35,800	1,950	500	1,190	71,010
July	9,503	636	175	307	18,850
August	5,518	272	138	178	10,940
September	5,403	295	107	180	10,720
October	3,244	147	74	105	6,430
November	2,274	91	60	76	4,510
December	2,086	74	60	67	4,140
Calendar year 2016	105,150	1,950	36	287	208,550

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. -- 76 years (1941-2016), 24 ft³/s (17,260 acre-ft per year).

Extremes. -- 1920, 1925-2016: Maximum discharge, 1,750 ft³/s Apr. 15, 1937 (gage height, 5.38 ft), from rating curve

extended above 1,100 ft³/s; no flow at times.

Remarks. -- Records good except for the period of Aug. 17 to Sept. 26, flows above 140 ft3/s and below 2.0 ft3/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

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	56.6	2.5	1.0	1.8	112
February	99.9	6.8	1.4	3.4	198
March	349	16	7.0	11	692
April	1,629	141	8.4	54	3,230
May	1,962	127	20	63	3,890
June	178	19	0.5	6	353
July	30.2	9.8	0.00	1.0	60
August	80	14	0.00	3	158
September	19.3	1.7	0.10	0.6	38
October	45.8	2.1	0.77	1.5	91
November	52.2	2.9	0.90	1.7	104
December	73.1	3.3	1.0	2.4	145
Calendar year 2016	4,575	141	0.00	12	9,070

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. -- 98 years (1915-1920, 1925-2016), 115 ft³/s (83,570 acre-ft per year).

Extremes. -- 1915-1920, 1925-2016: Maximum discharge, 3,160 ft³/s May 12, 1941 (gage height, 5.77 ft, site and datum then

in use), from rating curve extended above 1,600 ft^3/s ; minimum observed, 1.7 ft^3/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

-	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	498	18	14	16	988
February	661	39	13	23	1,310
March	1,461	73	36	47	2,900
April	5,859	345	40	195	11,620
May	14,887	708	214	480	29,530
June	7,083	497	63	236	14,050
July	1,102	105	19	36	2,190
August	884	65	20	28	1,750
September	632	37	15	21	1,250
October	532	34	14	17	1,060
November	472	25	12	16	936
December	489	18	13	16	970
Calendar year 2016	34,560	708	12.0	94	68,550

Conejos River near Lasauses, Colo

Location. -- Water-stage recorder, lat 37°18'01", long 105°44'47", inSW 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. -- 95 years (1922-2016), 169 ft³/s (122,400 acre-ft per year).

Extremes. -- 1921-2016: Maximum discharge, 3,890 ft³/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.

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	1,890	75	47	61	3,750
February	2,313	122	48	80	4,590
March	4,460	174	115	144	8,850
April	4,503	304	74	150	8,930
May	11,005	669	112.0	355	21,830
June	14,042	896	137	468	27,850
July	2,156	305	2.4	70	4,280
August	109	33	0.00	4	215
September	163	26	0.00	5	324
October	0.00	0.00	0.00	0.00	0.00
November	1,740	84	0.60	58	3,450
December	1,957	82	52	63	3,880
Calendar year 2016	44,338	896	0.00	121	87,950

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).

<u>Average discharge</u>. -- 31 years (1900-1930), 846 ft³/s (612,900 acre-ft per year); 86 years (1931-2016) 426 ft³/s (308,400) acre-ft per year).

Extremes. -- 1899-2016: Maximum discharge observed, 13,200 ft³/s June 8, 1905 (gage height, 9.1 ft); from rating curve extended above 8,000 ft³/s; no flow at times in 1950-51, 1956.

<u>Remarks</u>. -- 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

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	8,050	300	210	260	15,970
February	10,746	523	235	371	21,310
March	19,136	690	524	617	37,960
April	11,508	603	198	384	22,830
May	22,740	1,170	371	734	45,110
June	35,600	1,550	578	1,190	70,620
July	9,749	994	79	314	19,340
August	2,062	187	29	66	4,090
September	1,275	71	25	42	2,530
October	1,888	85	35	61	3,740
November	6,942	415	56	231	13,770
December	9,383	435	135	303	18,610
Calendar year 2016	139,080	1,550	25	380	275,880

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 downsteam.

Drainage area. -- 112 sq mi.

Average discharge. -- 7 years (1963-1969), 11.5 ft³/s (8,330 acre-ft per year) prior to completion of Azotea tunnel; 47 years (1970-2016) 132 ft3/s (95,730 acre-ft per year) subsequent to completion of Azotea tunnel.

Extremes. -- 1962-2016: Maximum discharge, 1,610 ft3/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.

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	56.0	6.05	0.00	1.81	111.0
February	1,100	145	0.00	38	2,181
March	3,935	191	69	127	7,805
April	7,035	370	69	234	13,950
May	13,159	722	126	424	26,100
June	16,308	860	176	544	32,350
July	1,943	277	1.51	63	3,854
August	2,002	308	2.52	65	3970
September	722	116	1.01	24	1433
October	129	36	0.00	4	255
November	0.00	0.00	0.00	0.00	0
December	0.00	0.00	0.00	0.00	0
Calendar year 2016	46,388	860	0.00	127	92,010

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 (1963-1973,1986), 1.17 ft³/s (848 acre-ft per year).

Extremes. -- 1963-2011: Maximum discharge, 3,960 ft3/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 2016					

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. -- 46 years (1971-2016), 130 ft³/s (93,860 acre-ft per year).

Extremes. -- 1971-2016: Maximum daily discharge, 2,780 ft³/s Dec. 18, 19, 1982; no flow at times each year.

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

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	0.00	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00	0.00
March	2,093	100	0.00	68	2,093
April	3,006	103	100	100	3,006
May	143	100	0.00	5	143
June	3,155	203	0.00	105	3,155
July	2,207	140	44	71	2,207
August	8,872	501	45	286	8,872
September	13,166	505	101	439	13,166
October	3,127	101	100.0	101	3,127
November	3,118	215	99	104	3,118
December	8,437	305	0.00	272	8,437
Calendar year 2016	47,324	505	0.00	129	93,870

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, 1921-1923), 448 ft3/s (324,600 acre-ft per year), prior to completion of El Vado Dam;

35 years (1936-1970), 373 ft³/s (270,200 acre-feet per year), prior to release of transmountain water; 45 years (1971-2016)

 $451 \text{ ft}^3/\text{s}$ (327,000 acre-feet per year).

Extremes. -- 1914-1916, 1920-1924, 1936-2016; Maximum discharge observed, 9,000 ft3/s May 22, 1920 (gage height, 12 ft); no flow Mar. 25, 26, 31, 1955.

<u>Remarks</u>. -- Records good except estimated daily discharges, which are fair. 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

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	3,271	136	96	106	6,490
February	2,641	103	79	91	5,240
March	2,340	80	73	76	4,640
April	2,764	154	76	92	5,480
May	30,190	3,480	69	974	59,870
June	17,370	1,480	100	579	34,460
July	20,081	953	102	648	39,830
August	20,772	974	144	670	41,200
September	16,691	806	492	556	33,110
October	6,827	489	189	220	13,540
November	5,900	209	193	197	11,700
December	4,754	199	92	153	9,430
Calendar year 2016	133,600	3,480	69	365	264,990

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 (1962-1970), 384 ft³/s (278,200 acre-ft per year), prior to release of transmountain water; 44 years (1971-2016), 497 ft3/s (360,300 acre-feet per year).

Extremes. -- 1961-2016; Maximum discharge, 2,990 ft³/s July 1, 1965 (gage height, 6.69 ft); minimum, about 0.5 ft3/s Mar. 17, 1966, Jan. 28, 1972.

Remarks. -- Records good except for estimated daily discharges, which are fair. 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 woorly	dicaharaa	in auhia	foot nor	coond
wonuny	and yearry	anscharge,	III CUDIC	reet per	second

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	2,233	74	69	72	4,430
February	3,956	371	71	136	7,850
March	2,447	116	70	79	4,850
April	5,467	220	114	182	10,840
May	24,450	1,750	163	789	48,500
June	31,140	1,750	236	1,040	61,770
July	25,990	1,100	315	838	51,560
August	17,960	1,030	354	579	35,630
September	14,721	596	266	491	29,200
October	7,103	289	153	229	14,090
November	7,140	251	207	238	14,160
December	6,386	247	105	206	12,670
Calendar year 2016	149,000	1,750	69	407	295,550

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. -- -- 38 years (1979-2016), 13 ft3/s (9,250 acre-feet per year).

Extremes. -- 1979-2016; Maximum discharge, 312 ft3/s June 9, 1979 at site 1,100 ft downstream; no flow December 31, 1993.

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

Monthly and yearly discharge, in cubic feet per second

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	135.2	4.5	4.2	4.4	268
February	333	19	5.8	12	660
March	370	16	5.1	12	733
April	534	26	10	18	1,060
May	856	37	17	28	1,700
June	739	38	11	25	1,470
July	666	31	3.4	22	1,320
August	154	30	3.4	5	306
September	322	15	4.0	11	640
October	242.8	9.9	3.3	7.8	482
November	33.0	3.4	0.91	1.1	65
December	29.6	1.0	0.92	0.96	59
Calendar year 2016	4,415	38	0.91	12	8,760

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. -- 117 years (1896-1905, 1910-2016), 1,480 ft³/s (1,070,000 acre-feet per year).

Extremes. -- 1895-1905, 1910-2016; Maximum discharge, 24,400 ft³/s May 23, 1920 (gage height, 14.1 ft); minimum daily, 195 ft³/s Aug. 4, 1977.

<u>Remarks</u>. -- Records fair except for estimated daily discharges, which are poor. 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.

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	21,066	745	655	680	41,780
February	25,000	1,250	635	862	49,590
March	34,340	1,210	994	1,110	68,120
April	33,960	1,570	818	1,130	67,350
May	70,330	3,690	1,130	2,270	139,500
June	76,720	4,170	1,260	2,560	152,200
July	37,310	1,370	967	1,200	74,000
August	28,040	1,260	701	904	55,610
September	21,771	872	474	726	43,180
October	15,155	544	409	489	30,060
November	21,224	956	496	707	42,100
December	24,525	995	637	791	48,650
Calendar year 2016	409,440	4,170	409	1,119	812,140

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. -- 104 years (1913-2016), 7.8 ft3/s (5,700 acre-feet per year).

Extremes. -- 1913-2016; Maximum discharge, 1,500 ft3/s Aug. 14, 1921 (gage height, 5.17 ft); from rating curve extended

above 150 ft³/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.

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	27.6	1.4	0.00	0.9	55
February	62.6	2.7	1.4	2.2	124
March	33.7	2.5	0.99	1.1	67
April	55.3	2.3	1.3	1.8	110
May	191	12	2.3	6	379
June	427	16	14	14	847
July	452	16	8.8	15	896
August	257	10	3.7	8	509
September	178.9	9.4	1.5	6.0	355
October	57.1	2.0	1.6	1.8	113
November	32.2	3.6	0.07	1.1	64
December	55.7	1.8	1.7	1.8	110
Calendar year 2016	1,830	16	0.00	5	3,630

Monthly and yearly discharge, in cubic feet per second

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. -- 46 years (1971-2016), 1,268 ft³/s (919,000 acre-feet per year).

Extremes. -- 1971-2016; Maximum discharge, 10,300 ft³/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 ft³/s; minimum discharge 0.51 ft³/s Aug. 3-5, 1977, Aug. 27-28, 1978.

<u>Remarks</u>. -- 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.

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	19,103	688	549	616	37,890
February	24,420	1,190	568	842	48,440
March	30,220	1,180	828	975	59,950
April	27,700	1,320	650	923	54,940
May	60,840	3,410	1,060	1,963	120,700
June	78,710	4,020	1,080	2,624	156,100
July	32,350	1,100	933	1,043	64,160
August	23,283	990	635	751	46,180
September	16,058	613	415	535	31,850
October	10,589	382	329	342	21,000
November	17,664	821	341	589	35,040
December	23,712	858	613	765	47,030
Calendar year 2016	364,650	4,020	329	996	723,300

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. -- --46 years (1971-2016), 5.1 ft3/s (3,667 acre-feet per year).

Extremes. -- 1970-2016; Maximum discharge, 3,460 ft3/s Aug. 24, 1997 (gage height, 5.57 ft); no flow many days each year.

<u>Remarks</u>. -- Records poor. Flow regulated by Galisteo Reservoir 0.4 mi upstream. Capacity of outlet, 5,000 ft³/s when reservoir is full. Diversions for irrigation of about 50 acres above reservoir.

Monthly and yearly discharge, in cubic feet per second

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	0.00	0.00	0.00	0.00	0.00
February	0.69	0.10	0.00	0.02	1.4
March	0.31	0.05	0.00	0.01	0.6
April	0.00	0.00	0.00	0.00	0.00
May	0.00	0.00	0.00	0.00	0.00
June	0.00	0.00	0.00	0.00	0.00
July	0.00	0.00	0.00	0.00	0.00
August	635	284	0.00	20	1,260
September	45	19	0.00	1.5	88
October	0.00	0.00	0.00	0.00	0.00
November	32	29	0.00	1.1	64
December	0.00	0.00	0.00	0.00	0.00
Calendar year 2016	713	284	0.00	0.00	1,410

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. -- 7 years (2010-2016), 32 ft3/s (22,960 acre-feet per year).

Extremes. -- 2010-2016; Maximum discharge, 1,420 cfs Jul. 27, 2013, gage height 4.82; no flow many days each year.

Remarks. -- Records fair, except for estimated daily dischaerges, which are poor. Flow regulated by Jemez Canyon Dam

since October 1953. Diversions for irrigation of about 3,000 acres above station.

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	622.1	31.6	14.7	20.1	1,230
February	954.9	61.4	10.0	32.9	1,890
March	2,902	188	45.6	93.6	5,760
April	3,341	203	30.9	111	6,630
May	2,687	161	12.6	86.7	5,330
June	53.4	18.0	0.00	1.78	106
July	83.0	61.2	0.00	2.68	165
August	159	48.5	0.00	5.15	316
September	9.35	3.49	0.00	0.31	18.5
October	3.13	0.82	0.00	0.10	6.21
November	361	165	0.00	12.0	717
December	454	30.2	2.43	14.6	900
Calendar year 2016	11,630	203	0.00	32	23,070

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. -- 102 years (1915-2016), 968 ft3/s (701,500 acre-feet per year).

Extremes. -- 1915-2016; Maximum daily discharge, 8,220 ft³/s May 22, 1942; no flow at times prior to 1929, Mar. 2-4, 1979.

Remarks. -- Records good except for estimated daily discharges and daily discharges from July 1 to August 18, which are poor.

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

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	0.00	0.00	0.00	0.00	0.00
February	39	26	0.00	1	77
March	16,320	1,890	0.10	526	32,370
April	50,530	1,980	1,090	1,680	100,200
May	42,100	1,740	614	1,360	83,520
June	52,490	2,170	678	1,750	104,100
July	59,070	2,200	1,720	1,900	117,200
August	38,370	1,980	0.00	1,240	76,100
September	4,800	1,200	0.00	160	9,510
October	4,700	712	0.00	152	9,320
November	11.6	3.2	0.17	0.4	23
December	3.4	0.17	0.05	0.11	6.7
Calendar year 2016	268,430	2,200	0.00	733	532,400

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 Dam of 1929. October 13, 1938 to December 31, 1945, at datum 5.0 ft higher. <u>Drainage area</u>. -- 30,700 sq mi, approximately (includes 2,940 sq mi in closed basin in San Luis Valley, Colo.).

Average discharge. -- 79 years (1938-2016), 894 ft3/s (647,900 acre-feet per year).

Extremes. -- 1938-2016; Maximum daily discharge, 7,650 ft3/s May 20, 1942; minimum daily, 0.0 ft3/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.

	Second-	Maximum	Minimum		Runoff in
Month	foot-days	daily	daily	Mean	acre-feet
January	12.09	0.50	0.31	0.39	24
February	17.81	0.72	0.51	0.61	35
March	9,950	1,994	0.73	321	19,740
April	36,620	1,697	908	1,220	72,650
May	33,200	1,647	697	1,070	65,850
June	64,280	2,450	1,812	2,140	127,500
July	70,680	2,522	1,989	2,280	140,200
August	44,060	1,889	1,026	1,420	87,390
September	16,004	992	101	533	31,740
October	92	68	0.75	3	182
November	69	44	0.83	2	137
December	29	0.99	0.91	0.95	58
Calendar year 2016	275,010	2,522	0.31	751	545,500

Bonito Ditch below Caballo Dam, N. Mex.

<u>Records available</u>. -- 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. <u>Remarks</u>. -- 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	0.0
March	118.3
April	119.8
May	138.0
June	129.8
July	80.19
August	81.53
September	74.72
October	85.2
November	86.1
December	4.8
Calendar year 2016	918.3

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

Squaw Lake. – Staff gage in sec. 12, T. 39 N., R. 4 W., on tributary to Squaw Creek. Completed in 1938; capacity, 162 acre-ft by 1953 survey. Water is used for irrigation below gaging station on Rio Grande near Del Norte.

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

Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	-
Contents	162	162	162	162	162	162	162	162	162	162	162	162	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

<u>Rito Hondo Reservoir</u>. – Staff gage in sec. 22, T. 42 N., R. 3 W., on Rito Hondo (Deep Creek) tributary to Clear Creek. Completed in 1957; capacity, 561 acre-ft. Originally filled during May and June 1958 with transmountain water; storage

is not in debit status. Water is used for fish culture.

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

Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	-
Contents	561	561	561	561	561	561	561	561	561	561	561	561	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

Hermit Lakes Reservoir No.3. – In sec. 25, T. 41 N., R. 4 W., on South Clear Creek. Completed prior to 1960; capacity, 192 acre-ft. Capacity table based on elevation above bottom of outlet. Water is used for fish culture. Includes 169 acre-feet of transmountain water by exchange in 1984 and 23 acre-ft of transmountain water by exchange in 1985.

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

Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	-
Contents	192	192	192	192	192	192	192	192	192	192	192	192	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

<u>Troutvale No. 2 Reservoir</u>. – Staff gage in E1/2 sec. 10, T. 41 N., R. 3 W., on South Clear Creek. Completed in 1940; capacity, 435 acre-ft. Condition of spillway limited storage to 168 acre-ft after May 1942. Repairs to spillway in 1947 increased capacity to 257 acre-ft. Water is used for fish culture with only occasional sale for irrigation. Storage omitted from accounting by action of Commission on Feb. 15, 1962.

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

Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	-
Contents	213	213	213	213	213	213	213	213	213	213	213	213	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

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

<u>Jumper Creek Reservoir</u>. – In sec. 5, T. 39 N., R. 2 W., on Jumper Creek, tributary to Trout Creek. Completed in 1951; capacity, 38 acre-ft. Capacity table based on elevation above bottom of outlet. Storage omitted from accounting by action of Commission on Feb. 15, 1962.

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

Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-
Contents	38	38	38	38	38	38	38	38	38	38	38	38	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

<u>Big Meadows Reservoir</u>. – In NW1/4 sec. 17, T. 38 N., R. 2 E., on South Fork about 0.9 mi upstream from Hope Creek. Completed in 1967; capacity, 2,437 acre-ft. Capacity table based on elevation above outlet. Water is used for fish culture. Includes 140 acre-ft of transmountain water, by exchange, in 1967; 838 acre-ft, by exchange, in 1968; 347 acreft, by exchange, in 1969; and 1,112 acre-ft, by exchange, in 1983, for a total of 2,437 acre-ft.

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

Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	-
Contents	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

<u>Alberta Park Reservoir</u>. – In sec. 34, T. 38 N., R. 2 E., on Pass Creek. Completed in 1953; capacity, 598 acre-ft. Capacity table based on elevation above bottom of outlet. Storage prior to June 30, 1983 included 244 acre-ft of transmountain water imported in 1963. By a 1983 resolution of the Rio Grande Compact Commission, the reservoir was drained for repairs in July 1983; recovery was completed in 1984. The reservoir also contains 100 acre-ft of transmountain water stored by exchange in 1983 and 254 acre-ft of transmountain water stored in 1984.

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

Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	-
Contents	598	598	598	598	598	598	598	598	598	598	598	598	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

<u>Shaw Lake Enlargement</u>. – sec. 5, T. 38 N., R. 2 E., on tributary to Lake Creek. Capacity, 638 acre-ft by 1916 decree; enlarged in 1955 to 681 acre-ft. Only the storage in excess of 638 acre-ft is subject to terms of Rio Grande Compact. Includes 42 acre-ft of transmountain water imported in 1965.

Month-end gage height, in feet, and contents, in acre-feet Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	-	-	-	-	-	-	-	-	-	-	-	-	-
Contents	42	42	42	42	42	42	42	42	42	42	42	42	-
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

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

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

<u>Fuchs Reservoir</u>. – 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 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Gage height	14.4	15.8	17.2	17.2	17.2	17.2	17.2	16.3	15.2	10.9	10.9	13.6	-
Contents	176	206	237	237	237	237	237	218	194	109	109	159	-
Change	+31	+30	+31	0	0	0	0	-19	-24	-85	0	+50	+14

<u>Platoro Reservoir.</u> – 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.

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Month_end	elevation	1n	teet	and	contents	1n	acre_teet
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Date	Elevation	Contents	Change in contents
December 31, 2015	9,970.12	13,238	-
January 31, 2016	9,969.63	13,006	-232
February 29	9,969.90	13,133	+127
March 31	9,971.75	14,027	+894
April 30	9,971.86	14,078	+51
May 31	9,972.82	14,552	+474
June 30	9,997.03	28,822	+14,270
July 31	9,988.00	22,948	-5,874
August 31	9,984.87	21,063	-1,885
September 30	9,979.76	18,160	-2,903
October 31	9,977.08	16,723	-1,437
November 30	9,975.02	15,656	-1,067
December 31, 2016	9,974.47	15,374	-282
Calendar year 2016	-	-	+2136

<u>Trujillo Meadows Reservoir.</u> – 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 2016

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	24.4	24.1	23.9	23.9	23.9	23.9	23.9	23.9	-
Contents	869	869	869	869	856	836	823	823	823	823	823	823	-
Change	0	0	0	0	-13	-20	-13	0	0	0	0	0	-46

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

<u>Heron Reservoir.</u> – 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, 2015	7,098.53	68,555	-
January 31, 2016	7,098.80	69,010	+455
February 29	7,100.32	71,620	+2,610
March 31	7,102.12	74,822	+3,202
April 30	7,106.29	82,751	+7,929
May 31	7,118.18	110,005	+27,254
June 30	7,127.77	137,251	+27,246
July 31	7,127.09	135,168	-2,083
August 31	7,122.14	120,694	-14,474
September 30	7,112.05	95,070	-25,624
October 31	7,109.02	88,385	-6,685
November 30	7,105.91	81,996	-6,389
December 31, 2016	7,096.83	65,748	-16,248
Calendar year 2016	-	-	-2,807

<u>El Vado Reservoir.</u> – 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

			Change in	Transmountain
Date	Gage Height	Contents	contents	water
December 31, 2015	6,829.32	36,503	-	24,405
January 31, 2016	6,827.97	34,922	-1,581	20,891
February 29	6,828.82	35,913	+991	16,819
March 31	6,839.03	48,930	+13,017	14,381
April 30	6,864.12	90,716	+41,786	15,880
May 31	6,870.39	103,716	+13,000	14,228
June 30	6,867.71	98,001	-5,715	16,936
July 31	6,851.24	67,473	-30,528	18,694
August 31	6,840.00	50,276	-17,197	17,407
September 30	6,839.07	48,985	-1,291	34,335
October 31	6,836.11	45,001	-3,984	31,869
November 30	6,834.00	42,266	-2,735	37,094
December 31, 2016	6,841.38	52,230	+9,964	52,098
Calendar year 2016	-	-	+15,727	-

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

<u>Abiquiu Reservoir.</u> -- 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.

			Change in	Transmountain
Date	Elevation	Contents	contents	water
December 31, 2015	6,204.88	130,533	-	129,972
January 31, 2016	6,205.39	132,225	+1,692	131,335
February 29	6,205.45	132,425	+200	132,130
March 31	6,205.75	133,422	+997	132,701
April 30	6,205.38	132,191	-1,231	131,895
May 31	6,209.75	147,079	+14,888	128,550
June 30	6,203.08	124,619	-22,460	124,110
July 31	6,199.32	112,544	-12,075	111,888
August 31	6,202.34	122,210	+9,666	121,689
September 30	6,202.93	124,130	+1,920	123,592
October 31	6,202.40	122,405	-1,725	121,862
November 30	6,201.71	120,171	-2,234	119,627
December 31, 2016	6,201.15	118,367	-1,804	117,722
Calendar year 2016	-	-	-12,166	-

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

<u>Nambe Falls Reservoir.</u> – 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, 2015	6,822.16	1,493	-
January 31, 2016	6,824.61	1,621	+128
February 29	6,825.79	1,684	+63
March 31	6,826.70	1,734	+50
April 30	6,826.73	1,736	+2
May 31	6,826.75	1,737	+1
June 30	6,826.74	1,737	0
July 31	6,809.74	938	-799
August 31	6,818.33	1,305	+367
September 30	6,815.80	1,188	-117
October 31	6,813.09	1,072	-116
November 30	6,819.06	1,340	+268
December 31, 2016	6,823.75	1,575	+235
Calendar year 2016	-	-	+82
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 accomodate up to a total of 1,061 acre-feet of pre-Compact storage in McClure and Nichols Reservoirs combined.

			Change	Pre-Compact	Transmountain
Date	Gage height	Contents	in contents	water	water
December 31, 2015	7,830.58	220	-	220	0
January 31, 2016	-	397	+177	397	0
February 29	7,848.28	945	+548	751	0
March 31	7,857.50	1,370	+425	751	0
April 30	7,866.38	1,880	+510	751	0
May 31	7,875.49	2,490	+610	839	0
June 30	7,868.72	2,030	-460	751	0
July 31	7,854.03	1,200	-830	558	0
August 31	7,845.47	835	-365	230	0
September 30	7,838.05	587	-248	0	0
October 31	7,836.54	544	-43	0	0
November 30	7,837.66	575	+31	0	0
December 31, 2016	7,836.42	541	-34	0	0
Calendar year 2016	-		+321		

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

<u>Nichols Reservoir.</u> – Water-stage recorder, lat 35°41'24", long l05°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.

			Change	Pre-Compact	Transmountain
Date	Gage height	Contents	in contents	water	water
December 31, 2015	7,478.83	442	-	364	78
January 31, 2016	7,473.30	333	-109	255	78
February 29	7,476.01	388	+55	310	78
March 31	7,476.32	395	+7	310	78
April 30	7,476.60	402	+7	310	78
May 31	7,471.54	300	-102	222	78
June 30	7,478.69	449	+149	310	78
July 31	7,480.80	501	+52	310	78
August 31	7,473.75	342	-159	114	78
September 30	7,472.60	320	-22	74	78
October 31	7,474.50	356	+36	67	78
November 30	7,473.48	337	-19	79	78
December 31, 2016	7,472.54	319	-18	27	78
Calendar year 2016	-		-123		

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

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

Cochiti Lake. – Water-stage recorder with satellite telemetry, lat 35°37'01", long 106°18'58", in NW1/4SW1/4 sec. 16, T. 16 N., R. 6 E., in Pueblo de Cochiti Grant, on Rio Grande. Completed in 1975; capacity 491,259 acre-ft at elevation 5,450.0 ft (crest of service spillway); zero storage at elevation 5,255.0 from 1998 survey. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by the U.S. Army Corps of Engineers). A 50,000 acre-foot permanent pool was authorized by Public Law 88-293, 88th Congress, March 26, 1964. Reservoir is operated by Corps of Engineers for flood control, sediment storage, and recreation. Storage began Nov. 12, 1973.

			Change in	Transmountain
Date	Elevation	Contents	contents	water
December 31, 2015	5,343.51	46,764	-	46,180
January 31, 2016	5,343.85	47,175	+411	46,132
February 29	5,343.16	46,351	-824	46,355
March 31	5,343.58	46,848	+497	46,070
April 30	5,343.42	46,657	-191	45,854
May 31	5,344.65	48,175	+1,518	45,438
June 30	5,343.05	46,222	-1,953	44,857
July 31	5,342.50	45,593	-629	44,311
August 31	5,342.12	45,168	-425	44,158
September 30	5,341.99	45,024	-144	43,850
October 31	5,341.69	44,693	-331	43,583
November 30	5,342.15	45,201	+508	43,865
December 31, 2016	5,341.60	44,595	-606	43,801
Calendar year 2016	-	-	-2,169	-

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

<u>Galisteo Reservoir.</u> – 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.

Month-end contents, in acre-feet

Calendar Year 2016

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Cal. Yr.
Contents	0	0	0	0	0	0	0	0	0	0	0	0	0
Change	0	0	0	0	0	0	0	0	0	0	0	0	0

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.

			Change in	Transmountain
Date	Elevation	Contents	contents	water
December 31, 2015	5,155.00	0	-	0
January 31, 2016	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	5,155.00	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, 2016	5,155.00	0	0	0
Calendar year 2016	-	-	0	-

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

<u>Acomita Reservoir.</u> – 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 2016

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

<u>Seama Reservoir.</u> – 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 2016.

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

<u>Elephant Butte Reservoir.</u> – 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.

			Change in	Transmountain
Date	Gage Height	Contents	contents	water
December 31, 2015	4,325.28	322,516	-	0
January 31, 2016	4,328.99	361,137	+38,621	0
February 29	4,332.68	401,906	+40,769	0
March 31	4,333.14	407,188	+5,282	0
April 30	4,326.49	334,873	-72,315	0
May 31	4,324.08	310,490	-24,383	0
June 30	4,322.83	298,204	-12,286	0
July 31	4,310.01	189,470	-108,734	0
August 31	4,301.23	132,194	-57,276	0
September 30	4,301.20	132,016	-178	0
October 31	4,300.64	128,708	-3,308	0
November 30	4,305.80	160,745	+32,037	0
December 31, 2016	4,311.79	202,454	+41,709	0
Calendar year 2016	-	-	-120,062	-

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

<u>Caballo Reservoir.</u> – 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, 2015	4,139.55	27,687	-
January 31, 2016	4,140.11	29,162	+1,475
February 29	4,140.72	30,831	+1,669
March 31	4,143.63	39,779	+8,948
April 30	4,149.48	63,120	+23,341
May 31	4,151.60	73,537	+10,417
June 30	4,146.65	50,843	-22,694
July 31	4,139.92	28,656	-22,187
August 31	4,137.02	21,550	-7,106
September 30	4,127.04	4,390	-17,160
October 31	4,134.43	16,154	+11,764
November 30	4,135.89	19,088	+2,934
December 31, 2016	4,136.79	21,035	+1,947
Calendar year 2016	-	-	-6,652

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, 2015	350,203	-
January 31, 2016	390,299	+40,096
February 29	432,737	+42,438
March 31	446,967	+14,230
April 30	397,993	-48,974
May 31	384,027	-13,966
June 30	349,047	-34,980
July 31	218,126	-130,921
August 31	153,744	-64,382
September 30	136,406	-17,338
October 31	144,862	+8,456
November 30	179,833	+34,971
December 31, 2016	223,489	+43,656
Calendar year 2016		-126,714

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.
- <u>Williams Creek Squaw Pass ditch</u>.-- 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.
- <u>Treasure Pass diversion ditch</u>.-- 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, 2016

	Pine River-		Williams			Treasure	
	Weminuche	Weminuche	Creek-			Pass	
	Pass	Pass	Squaw Pass	Tabor	Don La Font	diversion	Azotea
Month	ditch	ditch	ditch	ditch	ditches	ditch	tunnel
January	0	0	0	0	0	0	109
February	0	0	0	0	0	0	1,917
March	0	0	0	0	0	0	6,489
April	0	0	0	0	0	0	13,687
May	50	357	0	146	3	21	27,940
June	555	1,578	211	526	275	288	35,427
July	0	0	54	170	64	3	3,535
August	0	0	26	78	5	4	3,681
September	0	0	27	45	0	1	1,271
October	0	0	8	28	0	1	253
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
Calendar year	605	1,935	326	993	347	318	94,309

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.

<u>Alamosa Airport</u>.--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 2016

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.	Annual
Alamosa	Evap.	-	-	-	-	-	-	-	-	-	-	-	-	-
Airport	Precip.	0.58	0.40	0.52	1.75	1.12	0.51	0.31	2.16	0.28	0.02	0.44	1.08	9.17
Platoro Dam	Evap. Precip.	-	-	-	-	2.54	8.02 2.40	8.50 2.12	4.43 4.73	2.59 1.64	2.50 1.32	-	-	-
Heron	Evap.	-	-	-	4.56	6.52	9.59	10.20	5.66	5.52	5.91	-	-	-
Dam	Precip.	1.24	0.66	0.01	2.09	1.02	0.32	1.17	3.83	1.07	0.25	1.35	2.37	15.38
El Vado	Evap.	-	-	-	5.14	6.85	9.46	9.95	5.89	5.59	4.71	-	-	-
Dam	Precip.	0.84	0.47	0.03	2.36	1.38	0.46	0.9	4.03	1.08	0.13	1.29	2.15	15.12
Abiquiu	Evap.	2.47	3.72	6.13	6.89	8.99	11.33	13.15	8.53	7.35	6.56	3.65	2.22	80.99
Dam	Precip.	0.50	0.34	0.00	1.50	0.71	0.79	1.08	5.24	0.64	0.15	1.23	1.15	13.33
Nambe	Evap.	-	-	-	6.78	9.39	11.19	12.86	7.16	7.00	5.69	-	-	-
Canyon Dan	r Precip.	0.64	0.39	0.02	1.91	0.42	1.09	0.59	2.95	1.33	0.35	1.56	0.67	11.92
Cochiti	Evap.	2.79	4.29	5.95	6.10	8.30	11.23	12.30	7.32	6.67	5.78	3.60	2.83	77.16
Dam	Precip.	0.32	0.45	0.00	1.70	0.48	0.12	1.20	3.47	0.36	0.34	1.46	0.52	10.42
Jemez	Evap.	3.10	4.58	7.66	9.53	12.62	14.33	13.68	11.84	9.66	6.02	4.25	3.14	100.41
Canyon Dan	r Precip.	0.25	0.06	0.00	0.69	0.03	0.69	0.53	2.05	0.41	0.36	0.87	0.37	6.31
Elephant	Evap.	4.04	6.54	12.23	11.93	16.72	18.21	18.23	11.68	11.95	10.80	5.29	4.06	131.68
Butte Dam	Precip.	0.10	0.00	0.00	0.78	0.99	0.02	0.89	3.43	1.33	0.88	1.42	1.08	10.92
Caballo	Evap.	3.96	6.77	11.39	11.84	14.72	16.51	16.75	12.51	10.01	9.75	4.96	4.01	123.18
Dam	Precip.	0.41	0.00	0.00	0.81	0.49	0.08	0.72	3.33	1.52	0.06	1.19	1.33	9.94
State	Evap.	3.34	5.89	8.55	9.80	11.76	12.59	13.38	10.04	7.76	6.93	4.60	3.39	98.03
University	Precip.	0.27	0.01	0.00	0.46	1.32	0.91	0.77	1.60	1.98	0.04	0.41	0.71	8.48

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	M. C. Hinderlider
For the State of New Mexico	Thomas M. McClure
For the State of Texas	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.

(I) "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;
- (I) 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.

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

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

Rio Grande at Lobatos less Rio Grande at Del Norte (3) Conejos at Mouths (4) 650 182 700 204 229 750 800 257 850 292 900 335 950 380 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:

DISCHARGE OF RIO GRANDE AT OTOWI BRIDGE AND AT SAN MARCIAL EXCLUSIVE OF JULY, AUGUST AND SEPTEMBER Quantities in thousands of acre feet

(6)

Otowi Index Supply (5)	San Marcial Index Supply
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.)

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.

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

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.

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

RESOLUTION

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	2,490
3,000	∠,ວອວ

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.

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.

(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 <u>/2</u>, <u>/3</u>, <u>/4</u>, <u>/6</u>

(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.
- <u>/2</u> 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.
- <u>/6</u> Adopted March 31, 2009; made effective January 1, 2010.

(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.
- <u>/8</u> Amended June 2, 1959.

(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 <u>/8</u>, <u>/9</u>, <u>/10</u>

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 <u>/1</u>, <u>/2</u>, <u>/3</u>

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.

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

<u>/9</u> Amended March 31, 2009.

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

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

<u>/2</u> Amended March 31, 2009.

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

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.

