

**REPORT OF THE ENGINEER ADVISERS
TO THE RIO GRANDE COMPACT COMMISSION
FOR CALENDAR YEAR 2020**

April 8, 2021

Because of the on-going, global COVID-19 pandemic the Engineer Advisers to the Rio Grande Compact Commission met via video conference on February 2, 2021 and between March 1 and March 5, 2021 to:

- Receive reports;
- Prepare the 2020 Rio Grande Compact (Compact) water accounting;
- Discuss continuing and new issues in preparation for the 2021 annual meeting of the Rio Grande Compact Commission (Commission); and
- 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), the U.S. Fish and Wildlife Service (Service), and the City of Santa Fe (Santa Fe) at the meetings. The agencies each presented information about their specific water-related activities in the basin during calendar year 2020.

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 2020 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 the 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 2020 Compact Delivery accounting sheets for Colorado and New Mexico and

the Release and Spill from Project Storage accounting sheet. For 2020, as in previous years, each of the Engineer Advisers developed accounting methods described in the addenda to this report. At its 2020 meeting, the Commission did not approve any of the proposed accounting methods. The Engineer Advisers continued to use the accounting methods they individually prepared to carry forward Compact accounting for the 2020 calendar year. As described in the New Mexico Engineer Adviser's addenda in previous years, the use of accounting methods 1 and 2 had an impact on the timing of Article VII storage restrictions and upstream storage operations. In 2020, however, Article VII timing went into effect on June 19, 2020 for both accounting methods.

For calendar year 2020, New Mexico carried an Accrued Debit of 38,800 acre-feet, in accordance with the New Mexico Engineer Adviser's accounting methodology. Article VI of the Rio Grande Compact states in part that, "*Within the physical limitations of storage capacity of such reservoirs, New Mexico shall retain water in storage at all times to the extent of its accrued debit.*" For information on Article VI operations in 2020, please see the minutes of the November 2020 Rio Grande Compact Commission meeting and the addenda developed by each state attached to this report.

In 2021, Article VII restrictions will likely continue to prohibit New Mexico from storing native Rio Grande water other than relinquishment credit, therefore no debit water will be retained.

During the course of their review of the 2020 water accounting data, the Engineer Advisers discovered an error in the Release and Spill from Project Storage accounting sheet. The error first appeared on the 2012 accounting sheet (developed during the 2013 meeting of the Engineer Advisers) and continued through to the 2019 accounting sheets. For calendar years 2012 through 2019, Column 2 on the Release and Spill from Project Storage sheets incorrectly specified 1,974,600 acre-feet (May through September) and 1,999,600 acre-feet (September through March) as the Total Project Storage Capacity Available at End of Month. These numbers were the storage capacities of Elephant Butte Reservoir alone and did not include the Caballo Reservoir storage capacity. The corrected values, based on the area-capacity tables for Elephant Butte and Caballo reservoirs that took effect on January 1, 2020, are: 2,185,400 acre-feet (April 1 to September 30) and 2,210,400 acre-feet (October 1 to March 31). Column 2 on

the Release and Spill from Project Storage accounting sheet also impacts Column 6, Unfilled Capacity of Project Storage at End of Month. It should be noted that this error had no impact on any state's end of year credits or debits, water operations or determination of the timing of a spill. The Engineer Advisers have corrected the Release and Spill from Project Storage accounting sheet for 2020 going forward and recommend that the Secretary to the Commission correct the Release and Spill from Project Storage accounting sheets for years 2012 through 2019, when and if they are ultimately approved.

RIO GRANDE BASIN CONDITIONS

Snowpack and snow-water equivalent (SWE) amounts were near to well-below average for the winter of 2019-2020. Some snow courses in the northern portion of the basin in Colorado peaked at very close to average, while those farther south lagged significantly behind. However, even those areas with near average SWE in the winter experienced significant precipitation loss due to the windy spring conditions, and the very low soil moisture prevented much of the remaining water from reaching the rivers and streams. As a result, snowmelt runoff levels in 2020 were substantially below the long-term average for most areas across the basin in Colorado and in New Mexico.

Due to the low-runoff flows, Platoro Reservoir only reached a high of approximately 39 percent of capacity during early June of 2020. Usable Water in Rio Grande Project (Project) Storage was above the Article VII trigger of 400,000 acre-feet until June 19 when it fell below the 400,000-acre-foot threshold, imposing Article VII storage restrictions on post-compact reservoirs. Usable Water remained below 400,000 acre-feet throughout the rest of the year.

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 writing of the Engineer Advisers' report, including information obtained from the reports of the federal agencies and municipalities at the 2021 Engineer Advisers meetings or otherwise

reported. The terms “reported” and “indicated” herein reflect information provided by various entities without analysis by the Engineer Advisers.

Middle Rio Grande Endangered Species Collaborative Program

The Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) was authorized by the Omnibus Appropriations Act of 2009 (P.L. 111-8). The Collaborative Program continues to seek innovative and collaborative ways to support Endangered Species Act (ESA) compliance for listed species while protecting water uses in the Middle Rio Grande. Reclamation reported that their federal appropriations in federal fiscal year (FY) 2020 were \$3.84 million for Collaborative Program activities, including funding and contracting for continuation of endangered species monitoring and program management efforts. This is not expected to increase in FY 2021.

The Corps received a 51 percent cut to their Collaborative Program budget in FY 2020, with total appropriations of \$1,178,000. In FY 2021, the budget for Corps funding for the Collaborative Program was cut to zero. Since 2010, the Corps has provided planning assistance for numerous activities within the MRG, but much of this will remain unfunded for the near future. These activities include long-term avian monitoring, sediment data collection for the Rio Puerco, San Acacia and San Marcial areas, as well as LiDAR remote sensing and collaborative aerial imagery analyses.

The Collaborative Program nonfederal signatories have provided a cost-share contribution of over 25 percent cash and in-kind services, with most of the cost share coming from the State of New Mexico. The Collaborative Program has begun to institute a new organizational structure including the Science and Adaptive Management Committee (SAMC) and Fiscal Planning Committee with a focus on scientific projects that address management decision making for water and species. The new website for the MRGESCP is webapps.usgs.gov/MRGESCP.

Update on WildEarth Guardian’s Litigation over the 2003 Biological Opinion

In 2019, at the request of the Engineer Advisers, the Commission directed the Legal Committee to review the Federal District Court ruling in the *WildEarth Guardians v. U.S. Army*

Corps of Engineers (case no. 1:14-cv-00666-RB-SCY) and to provide legal opinions on the implications and impacts, if any, to the Commission and the Compact. The Legal Committee reported at the November 12, 2020 Commission annual meeting that this case, in its current status, would not impact the Commission or the Compact.

Upper Rio Grande Water Operations Model

The Upper Rio Grande Water Operations Model (URGWOM) is a computational model developed through an interagency effort led by the Corps, Reclamation, and the New Mexico Interstate Stream Commission (NMISC). The effort includes regular meetings to discuss modeling outputs for daily water operations and accounting procedures. During 2020, URGWOM activities included:

- Developing an updated basin-wide annual operating plan (AOP) in collaboration with Reclamation and NMISC;
- Updating the database to include data from years 2015 to 2019 for the MRG and the Lower Rio Grande (LRG);
- Updating the Physical Model Documentation for the URGWOM public website;
- Compiling groundwater seepage reports and data for the MRG and the LRG for use in the future expansion of water quality modeling;
- Continuing enhancements to RiverWare for use in support of model development and continued refinements; and
- Implementing and calibrating the new aquifer objects to model deep aquifer head elevation and the groundwater movement between the shallow aquifer and the deep aquifer for the MRG and the LRG.

Key objectives for 2021 include:

- Preparing basin-wide AOPs for 2021;
- Incorporating the new deep aquifer objects into the official model and updating the official documentation. Expanding and updating the policy rules to incorporate construction changes at El Vado Dam;
- Incorporating RiverWare into Corps Water Management System (CWMS) for real-time operational linking and monitoring;

- Adding upgrades to RiverWare to continue model enhancements to refine the calibration and create additional opportunities for uses of URGWOM;
- Continuing the partnership to monitor water quality and collect data with the USGS; and
- Collaborating with Reclamation for an expansive online URGWOM training platform.

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 to account and report on related depletions in the MRG. It coordinates with the New Mexico Office of the State Engineer (NMOSE) to determine if a permit is needed and to ensure the depletions are offset by the projects' sponsors. The NMISC reported that it continues to coordinate with the Corps on several habitat restoration projects to ensure that those depletions are offset. The NMISC also coordinates with Reclamation in using the State's Strategic Water Reserve for ESA-related water management, including offsetting depletions associated with habitat restoration and river augmentation activities. Below-average snowmelt runoff in 2020 resulted in no depletion offset requirements for habitat restoration projects.

Elephant Butte Delta Channel Project

The below-average snowmelt runoff and a weak monsoon season resulted in the Elephant Butte Delta Channel (Delta Channel) successfully conveying all flows during 2020. Extremely low reservoir levels in the fall and early winter of 2020 exposed the second sediment plug that was observed in 2019. This sediment plug could not be excavated in 2019 because it was within the active pool of the reservoir. During October, November, and December of 2020, the NMISC construction contractor excavated the now exposed second sediment plug and performed other regular maintenance to the Delta Channel in the area below the Narrows, including constructing approximately two additional river miles of channel downstream from the plug area. Since 2003, New Mexico has spent nearly \$20 million to construct and maintain the Delta Channel and continues to partner with Reclamation, who provides engineering support and environmental compliance for the project.

Relinquishment Update

The total amount of Accrued Credit relinquished by Colorado since 2013 is 3,000 acre-feet. Colorado stored 488 acre-feet of relinquishment credit water in 2020. Between 2013 and 2020, Colorado stored a total of 2,556 acre-feet of relinquishment credit water in Platoro Reservoir, which leaves a balance of 444 acre-feet in Colorado's relinquishment account.

The total amount of Accrued Credit relinquished by New Mexico since 2003 is 380,500 acre-feet. No relinquishment credit water was stored in New Mexico reservoirs during the 2020 calendar year. Relinquishment-credit water storage to date totals 288,728 acre-feet, leaving a balance of 91,772 acre-feet available to be stored in future years when Article VII storage restrictions are in effect.

Article VII storage restrictions will likely be in effect for the 2021 snowmelt runoff season. However, given New Mexico's Accrued Debit status, the Rio Grande Compact Commissioner for New Mexico may direct that no available relinquishment credit water be stored during the 2021 snowmelt runoff season, unless there is a substantial improvement to New Mexico's Water Supply Forecast prior to runoff.

Gaging Station Review

The Colorado Division of Water Resources (CDWR) reported on activities at Colorado's Compact gages. The Colorado USGS reviewed gaging station records for the seven Colorado Compact gages and approved all of those records for 2020. The CDWR made an average of 29 measurements at each of these seven compact gaging stations, with the ratings of those measurements varying from excellent to poor. The records for most of these stations were rated as 'good' except for the periods of estimation, which were rated as 'poor.'

A steel cross-sectional area was constructed at the South Channel near La Sauses gage during the summer to improve the accuracy of low-flow measurements. A new radar sensor was installed at the Conejos near Mogote gage in April 2020.

For the Rio Grande near Otowi streamflow gage (#08313000), the USGS reported that in calendar year 2020 they developed a new stage discharge rating (#41) which was implemented on June 2, 2020 and used for the remainder of 2020. The USGS made a total of 15 measurements at the Otowi gage in 2020, with 12 rated good, 1 rated fair, and 2 rated poor. For

2020, the USGS continued to utilize redundant primary sensors (non-contact radar and wire weight) as well as redundant secondary reference gages (bubbler and staff gage) for gage height readings. The USGS also indicated that the Rio Grande above Buckman gage (#08313150), installed by the USGS upstream of the City of Santa Fe's Buckman Direct Diversion Project in 2017, continues to help verify the Otowi gage record.

The USGS reported that during the 2020 calendar year, 20 measurements were collected at the Rio Grande below Elephant Butte streamflow gage (#08361000). Of the 20 measurements, 11 were rated good, 5 were rated fair, and 4 were rated poor. Aquatic vegetation growth on the streambed at the USGS gaging station section continues to cause 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 by utilizing an alternate section which is not impacted by vegetation growth during certain months. The gage records for 2016 through 2020 reflect improved precision, and the NMISC will continue to coordinate with the USGS to provide more accurate gage records in the future.

At the 2021 pre-Engineer Advisers' meeting, Reclamation stated that they have completed the construction of the new gage on the opposite side of the river from the existing gage at the Rio Grande below Caballo Reservoir. Reclamation stated that they have decided to operate the existing gage until it is no longer functional, and then switch the equipment to the new gage.

The USGS also reported that they reviewed and approved the 2020 streamflow gage below Caballo (#08362500) flow records developed by Reclamation, and that all necessary documentation was provided. The USGS reported that the record accuracy looked good, in large part due to the high number of measurements made at the gage (63 in total). In 2020, Reclamation and the USGS utilized five Acoustic Doppler Current Profiler (ADCP) measurements to calibrate the Acoustic Doppler Velocity Meter (ADVM). They are continuing to develop a rating for ADCP measurements and for data quality. The USGS stated that once the quality control issues have been resolved, measurement quantity could be reduced by fully utilizing the ADVM installed at the site. The USGS also reported that they ran levels in cooperation with Reclamation in 2020 to verify datum at the site.

During 2020, the NMISC continued its survey of water-level elevations in Elephant Butte and Caballo reservoirs. NMISC's surveyor performed surveys alongside Reclamation staff in June and December 2020. Both the June and December 2020 results from NMISC's survey indicated that Reclamation's reservoir stage elevations were within the agreed upon threshold criteria. Reclamation performed routine stage elevation surveys throughout 2020 and made adjustments to the stage-discharge recorder (SDR) a total of six times during the year.

In 2020, Reclamation continued to measure Elephant Butte elevation via the SDR and a bubbler. The bubbler, which is maintained in conjunction with the USGS, shows more scatter but in general more accurately reflects observed elevation when the reservoir is low. In August 2020, the SDR was damaged by a lightning strike, and it was replaced by the USGS. Reclamation continues to closely monitor data, but feels that, while physical improvements may help, continued vigilance is most important because the reservoir elevation may vary so much in a single season. Reclamation continues to provide email updates to the Engineer Advisers describing any discrepancies between lake elevation surveys and the SDR, and corrective actions taken. NMISC and Reclamation will continue to perform side-by-side surveys at select times during 2021 to ensure the accuracy of the reservoir elevation data.

Mass Balance Review

The NMISC conducted a mass balance analysis for the Rio Grande between the Elephant Butte and Caballo gages for calendar year 2020. The mass balance analysis indicated that the reach gained water in nine out of twelve months with a total calculated annual gain of 2,573 acre-feet. A significant portion of the gain occurred during the June-through-October period although there was no significant monsoon precipitation.

Gaging Station Costs

In recent years, the Engineer Advisers and Compact Commissioners have expressed concern over the large difference in costs between what Reclamation charges to operate the gage below Caballo Reservoir as compared to what the Colorado Division of Water Resources (CDWR) and USGS charge on average for other Compact gages. The three Compact states split

the costs of their operations in support of the Compact equally, including operation and maintenance of the Compact gaging stations.

For FY 2022, Reclamation decreased their charged amount for the gage below Caballo Reservoir. However, the cost charged by Reclamation is still approximately 36 percent more than the average cost charged per gage by CDWR and the USGS. The Engineer Advisers remain concerned with Reclamation's high cost for the operation of this gage and with the large fluctuations in the charged costs year to year.

Additionally, the USGS Colorado Water Science Center has greatly increased their charges related to the review of the seven Colorado Compact gage records. This cost has almost doubled in the last two years, going from \$8,870 for FY 2020 to \$17,240 in FY 2022. This review cost is significantly higher than the review cost charged by the USGS New Mexico Water Science Center. The Engineer Advisers are concerned about this drastic rise in costs from the USGS Colorado Water Science Center and will request justification for the increase.

Review of Compact Accounting Data

The document, titled "Schedule for Review and Approval of the Rio Grande Compact Accounting Records for the Previous Year," authorized at the 2016 RGCC meeting, outlines a process and schedule for development, evaluation, and approval of required RGCC accounting records. For calendar year 2020, city, state, and federal agencies followed the schedule. The process will be reviewed and revised as necessary to meet Compact business needs.

YEAR 2020 OPERATIONS

Closed Basin Project

The total production of the Closed Basin Project in calendar year 2020 was 9,911 acre-feet. This total includes water that was exchanged for Colorado Parks and Wildlife water to be delivered to the Blanca Wildlife Habitat Area, the Alamosa National Wildlife Refuge and to the San Luis Lakes State Wildlife Area. The amount creditable to the Rio Grande for Compact purposes from direct delivery and exchange was 6,498 acre-feet. The remainder of the water

produced was delivered to various federal lands along the project to be used as mitigation for the project footprint. All of the water delivered to the Rio Grande in 2020 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 four wells in 2020, rehabilitated twelve other wells, and installed seven new pumps. Wells will continue to be replaced as budgetary constraints allow in an effort to help maintain project production. The Closed Basin Operating Committee continues to monitor groundwater levels and groundwater production and to adjust project operations pursuant to the enabling legislation.

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 were approved by the Colorado Division 3 (Rio Grande Basin) Water Court in 2019 and will go into full effect on March 15, 2021. As an integral part of these rules, the State Engineer of Colorado has also completed the development of Phase 6 of the Rio Grande Decision Support System Model. This model captures the interaction between surface and groundwater and shows the effect that wells have on senior surface water rights. These new rules require that, beginning on March 15, 2021, owners of non-exempt wells mitigate the injurious depletions that their wells cause to senior surface water rights diverters, and they also require that the well owners ensure the sustainability of the groundwater aquifers. There are currently seven groundwater user subdistricts and multiple individual augmentation plans that have been developed as a way for the well owners to comply with the new rules.

Aamodt Settlement and Pojoaque Basin Regional Water System

The Aamodt Water Rights Settlement Agreement (Settlement Agreement) was developed through multi-party negotiations, which began in 2000 between the Pueblos of Nambé, Pojoaque, Tesuque and San Ildefonso, the State of New Mexico, the United States of America (U.S.), Santa Fe, Santa Fe County, and representatives of non-Pueblo water users, to settle the Pueblos' water right claims in the Pojoaque Basin. The Settlement Agreement provides for the

funding and construction of the Pojoaque Basin Regional Water System to supply treated water to Pueblo and non-Pueblo parties. As expressly stated in the Settlement Agreement, “Nothing in this agreement shall be construed to limit the authority of the State Engineer to...ensure compliance with the Rio Grande Compact,” (Section 6.6.1.6). The Engineer Advisers will continue to evaluate the project as it moves forward including evaluating potential impacts to the Otowi Index Supply.

The final Pojoaque Basin Regional Water System Environmental Impact Statement was published in the Federal Register in January 2018 and the Record of Decision was signed on September 11, 2019. Original cost estimates were well above the amount authorized for the project, but the settlement parties signed an agreement that renegotiated cost shares and cost savings measures for the project on September 17, 2019. In 2020, additional Cost Sharing, System Integration and Contributed Funds Agreements were signed by Santa Fe County and Reclamation. Construction began on the intake area of the Regional Water System in June 2020 and is expected to be completed in April 2021. The remainder of Phase 1 construction is expected to be completed by 2028. No diversions, river sampling, or water quality analysis of Rio Grande water occurred in 2020.

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 San Juan Chama Project (SJCP) water, for endangered species needs and compliance with the 2016 Biological Opinion (BO). In 2020, Reclamation reported a total of 29,267 acre-feet of supplemental water was released for endangered species purposes. Of that volume, 22,267 acre-feet was SJCP water Reclamation leased from 2019 and 2020 contractor allocations. The release of supplemental water began on April 6 and continued through October 24. Reclamation also released 7,000 acre-feet of water leased from Albuquerque Bernalillo County Water Utility Authority’s (ABCWUA) SJCP water stored in Abiquiu Reservoir from September 9 through October 4. Of these 7,000 acre-feet, MRGCD and NMISC contributed funds for 2,500 acre-feet and 1,000 acre-feet, respectively.

Reclamation ended 2020 with a total of 1,276 acre-feet of SJCP water in storage: 408 acre-feet of 2020 leased SJCP water in Abiquiu Reservoir and 868 acre-feet of water in Heron Reservoir, all acquired via short term leases or other water contracts.

In addition to the water released by Reclamation, 512.3 acre-feet of SJCP water leased by Audubon New Mexico and 293.61 acre-feet of pre-1907 native water rights owned or leased by Reclamation were released as needed between May 6 and September 14 in 2020.

At one time, Reclamation maintained portable pumps at four strategic locations along the Low Flow Conveyance Channel (LFCC) to maintain river connectivity to the Elephant Butte Reservoir pool. Reclamation only equipped the south boundary site in 2020, which was in operation from May 1 through July 13, and again in early August through August 26. The Neil Cupp site is now operated by MRGCD and was pumping water to the river in the spring of 2020.

MRGCD pumped 1,350 acre-feet from the Neil Cupp site in 2020. Supplemental flow provided at the south boundary site was 5,188 acre-feet. With MRGCD's pumping at Neil Cupp, a total volume of 6,538 acre-feet were pumped from the LFCC to the river in 2020.

Six Middle Rio Grande Pueblos Prior and Paramount Operations

BIA requested that Reclamation store 20,095 acre-feet of Rio Grande water in El Vado Reservoir for the Coalition of Six Middle Rio Grande Basin Pueblos' (Pueblos) Prior and Paramount (P&P) operations in 2020. The entire amount was stored outside of the time that Article VII Compact restrictions were in place. A total 17,771 acre-feet was released for irrigation with 1,573 acre-feet returned to MRGCD in June, August, and September. A total of 751 acre-feet was lost to evaporation. No P&P releases took place after September 30. The remaining 91 acre-feet was transferred to the MRGCD storage account in the URGWOM. It was then released to Elephant Butte by the MRGCD less 4 acre-feet of evaporation loss.

Based on the March 2021, most-probable snowmelt runoff forecast, the BIA reported that Reclamation will have a preliminary storage target of approximately 28,000 acre-feet for their P&P operation in 2021. Additional forecasts in April and May could change this storage target.

The BIA was able to make limited funding available to the Pueblos to perform work upgrading their irrigation systems. Due to the COVID-19 pandemic, very little work was performed on Pueblo lands in 2020. The BIA also provides funds to the MRGCD to perform

maintenance work on the systems which serve Pueblo lands. This work was also hampered due to the pandemic restrictions.

The BIA reported that discussions concerning the carryover storage of P&P water in El Vado are occurring infrequently, and no request to allow carryover storage is anticipated in the near future.

The Engineer Advisers remain concerned about the procedures for quantifying storage, release, and delivery of water for the P&P lands of the 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. The BIA is interested in incorporating a separate URGWOM account for the native Rio Grande flows at Otowi to improve P&P operations.

2020 Rio Chama Water Supply Conditions

Snowpack conditions in the Rio Chama Basin were well-below average during the winter of 2019-2020. The March through July native inflow to El Vado Reservoir was 89,629 acre-feet, or approximately 36 percent of average.

Beginning in early summer, flows on the Rio Chama were insufficient to meet the direct-flow irrigation needs of the Rio Chama Acequia Association (RCAA). RCAA represents 16 acequias on the Rio Chama between Abiquiu Reservoir and the confluence with the Rio Grande that have direct surface flow diversion rights. With insufficient native flows to meet their needs and the absence of sufficient leased San Juan Chama Project Water, the NMOSE curtailed RCAA diversions to the available natural flow of the river from summer through fall of 2020.

Reclamation's Identification of San Acacia Reach Options

Reclamation reported on a new planning and coordination effort in the middle Rio Grande called the Identification of San Acacia Reach Options (ISARO). In 2020, Reclamation hosted internal and external workshops to evaluate actions that improve delivery of water to Elephant Butte Reservoir, reduce costs associated with system operation and maintenance, and maintain and enhance ecosystem health. The external workshop included the NMISC, MRGCD,

Service, Bosque del Apache National Wildlife Refuge (BDANWR) and Armendaris Ranch. The geographic extent of the planning is from the Highway 380 bridge downstream to the Narrows of Elephant Butte Reservoir.

Reclamation expects that outcomes from these workshops will continue to be refined during 2021 and that the effort will include projects that were previously included in Reclamation's Lower Reach Plan.

The New Mexico Engineer Adviser remains concerned about depletions in the San Acacia reach. Reclamation has committed to work with NMISC to establish a methodology to quantify depletions and to offset any increased depletions. The Engineer Advisers support the intent of the ISARO but want to ensure that the projects improve deliveries of water to Elephant Butte Reservoir and that Reclamation maintains the conveyance capacity of the river channel as authorized by the Middle Rio Grande project.

Rio Grande Project Operations

Reclamation's initial allocation for calendar year 2020 for El Paso County Water Improvement District No. 1 (EP No. 1) and Elephant Butte Irrigation District (EBID), was delayed until March because the 2018 and 2019 allocations were not finalized. The allocation balance from the previous year was needed to determine the current year's allocation. In early 2020, Reclamation, EBID and EP No. 1 reviewed and adjusted the accounting for both 2018 and 2019.

Mexico was provided an initial allocation in January 2020. Based on the provisions of the 1906 Convention for extraordinary drought, the allocations to Mexico were updated monthly, with a final in-season allocation in April 2020 of 50,362 acre-feet, which is 84 percent of a full allocation. Mexico's allocation is calculated from the anticipated release of Usable Water. Once allocated, the U.S. cannot reduce the allocation even if the anticipated release or actual release is significantly less than originally planned.

In May, EP No. 1 determined it would not order all its 2020 allocated water, causing the actual Caballo Reservoir release to be significantly less than the water available for release. Therefore, the final allocation to Mexico was 43,968 acre-feet (73% of a full allocation). The

over delivery of water to Mexico is charged to the U.S. districts. Since the over delivery of water was due to operations by EP No. 1, the full amount of the over delivery was charged to EP No. 1.

Reclamation reported a final 2020 release from Caballo Reservoir during the irrigation season of 592,869 acre-feet for all three Project water users: EP No. 1, EBID, and Mexico. A total of 525,864 acre-feet of water were delivered to the Project water users. The 2020 deliveries are considered to be provisional until an agreement is reached between the districts and Reclamation.

The final in-season allocation was 622,869 acre-feet, including Mexico's allocation of 43,968 acre-feet. Reclamation reported that end-of-year allocations at the diversion headings to EBID were 197,694 acre-feet and 381,207 acre-feet to EP No. 1. The calculated charges were 268,582 acre-feet to EP No. 1 and 198,314 acre-feet to EBID. EP No. 1 was also charged with 6,762 acre-feet for the over delivery to Mexico. The allocation balances for EBID and EP No. 1 were -620 acre-feet and 97,625 acre-feet, respectively.

During 2020, Reclamation's report indicates flows into Hudspeth County Conservation and Reclamation District No. 1 (HCCRD) during March through September were 45,792 acre-feet of tailwater. The calendar year total flow data for HCCRD was 55,620 acre-feet. Additionally, 1,138 acre-feet was delivered through the Bonita Lateral during calendar year 2020.

The USGS reported that the total annual flow volume at the gage below Elephant Butte dam was 612,938 acre-feet. Elephant Butte Reservoir storage peaked at 611,125 acre-feet on March 2, 2020, and storage at Caballo Reservoir peaked at 80,437 acre-feet on March 23. Releases from Caballo Reservoir for irrigation deliveries began on March 13 and ended on September 25, 2020. EP No. 1 and Mexico began the season with coordinated orders and diversions. EP No. 1 ended all diversions on September 25, 2020. EBID delayed their initial order, and their diversions began on April 13 and ended on August 28, with Mexico ending on September 7.

In January 2020, there was 578,707 acre-feet of Usable Water in Project Storage (Elephant Butte and Caballo reservoirs combined) and 155,864 acre-feet on December 31. According to Method 1 utilized by the URGWOM, Usable Water reached a high of 653,515 acre-feet and low of 109,011 acre-feet on March 12 and September 25, respectively.

Combined end-of-year storage at Elephant Butte and Caballo reservoirs was 156,702 acre-feet, which is about 7 percent of their total conservation capacity. Due to implementation of new area-capacity tables on January 1, 2020, Caballo Reservoir lost about 425 acre-feet of capacity between the 2017 and 2007 sediment surveys and has lost 22,227 acre-feet since 1938.

On December 1, 2020, Usable Water in Elephant Butte and Caballo reservoirs was 128,927 acre-feet. Therefore, Reclamation determined that the initial 2021 allocation was 0 acre-feet. On February 1, 2021, the calculated Usable Water (using the estimated 2021 Compact credit in Elephant Butte Reservoir) was 182,057 acre-feet. With this increase in storage, Reclamation allocated 2,458 acre-feet to Mexico. EBID and EP No. 1 have requested no official allocations until April 2021.

Based on the January 2021 snowmelt runoff forecast for the Rio Grande at San Marcial of 186,000 acre-feet (36 percent of average), the current La Niña conditions for El Niño Southern Oscillation activity, and current hydrologic conditions, Reclamation anticipates a near-record low allocation for 2021 and expects a shortened irrigation season beginning around June 1 and lasting for six to eight weeks.

The New Mexico Engineer Adviser expressed concern about continued use of the 2008 Operating Agreement for the Project. These concerns include changes in Reclamation's reported annual allocation and delivery values since 2008. Additionally, the New Mexico Engineer Adviser expressed concern over operational and administrative changes that have been made under 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 Rio Grande Basin projects. The USGS completed a four-year WaterSMART Focus Area Study in 2019 to assess water use and availability from the headwaters in southern Colorado to Fort Quitman, Texas, and

continues to finalize the associated reports. The study investigated water use based on the eight-digit hydrologic unit code (HUC-8), evapotranspiration, snow and watershed processes, groundwater, and surface water. The data were analyzed and made easily accessible for use by stakeholders. The study was conducted by personnel from the USGS Colorado, New Mexico, Utah, and Texas Water Science Centers and the USGS Earth Resources Observation and Science Center. All reports for the study are expected to be completed by mid-2021, and data and reports are available on the Upper Rio Grande Basin Focus Area Study website.

The USGS, in cooperation with Reclamation, has developed a 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, known as RGTIHM. The model is operational, and an interim report was published in May of 2018. A Techniques and Methods Report on the MODFLOW One-Water Hydrologic Flow Model used for RGTIHM was released in 2020, and updates to model parameters were incorporated in 2020. Final recalibration and a Scientific Investigations Report are planned for 2021. Through the Mesilla Basin Monitoring Program, which is supported by several cooperators, the USGS continues to maintain an observation well network and hydrologic cross sections in the Mesilla valley, and to monitor salinity in shallow groundwater in the Mesilla Valley. The Engineer Advisers also received a report on review procedures for non-USGS streamflow records in New Mexico and Colorado.

Corps Rio Grande Civil Works Projects

The Corps reported on the status of Civil Works projects under the Water Resources Development Act (WRDA) of 2020, which provided reauthorization for the Rio Grande Environmental Management Program in Colorado, New Mexico, and Texas. Authorization for this program was extended through federal FY 2029. Current projects undergoing either a feasibility study, higher-level planning, or construction include: Abiquiu Dam legislation, Bernalillo to Belen Levee Project, and Sandia to Isleta ecosystem restoration.

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. Reclamation has engaged in public outreach efforts since 2009.

The number of watercraft inspections in New Mexico has increased from 9,346 in 2013 to 42,929 in 2020. Of these, 42 percent of the inspections and 28 percent of the decontaminations were conducted at Elephant Butte Reservoir. In 2020, Reclamation collected 48 water samples from seven of its New Mexico reservoirs (Navajo, Heron, El Vado, Elephant Butte, Caballo, Sumner, and Brantley). These samples were analyzed by microscopy and molecular methods, providing early detection, and can be used to trigger immediate containment action. In 2020, there were no detections of invasive mussels or their markers by Reclamation's Ecological Research Laboratory, operating in Denver, Colorado. Continued vigilance is important, as conditions more suitable to aquatic invasive species establishment may occur in the future.

Rio Grande Silvery Minnow

The Service and Reclamation reported on the 2020 monitoring results for the Rio Grande silvery minnow using the October Catch per Unit Effort (CPUE) data typically used to report long-term trends in relative abundance.

The 2020 October CPUE survey for the MRG estimated a silvery minnow density of 0.23 silvery minnow/100 square meter (m²), a decrease from 3.41 in 2019. The Service has acknowledged previous efforts in 2018 by water managers to ensure survival of the species, and they have determined that the low 2018 CPUE will not be counted against the proposed action in the BO. The Service recognized that the low density in 2018 was a result of climatic conditions and not of the BO partner agencies' actions. While the Service recognizes that climatic conditions are also a factor in 2020 CPUE, they have not received the 2020 Annual Biological Opinion report and are still evaluating whether the 2020 density counts against the proposed action.

The Service reported that 310,634 silvery minnows were augmented to the Middle Rio Grande in 2020, more than triple the 83,635 released in 2019. Fish were provided by the City of

Albuquerque's BioPark, the Service's Southwestern Native Aquatic Resources and Recovery Center located in Dexter, New Mexico, and the NMISC's Los Lunas Silvery Minnow Refugium. The Service, with assistance from the BO partners, conducted rescue activities in the San Acacia and Isleta reaches for 2020, rescuing and relocating 3,914 silvery minnows to flowing portions of the river.

Other 2020 activities include fish passage design criteria for the San Acacia and Isleta Diversion Dam, as well as the ISARO planning process. This process is part of the Lower Reach Plan, which includes the river realignment pilot and other projects near BDANWR. Further progress is noted on River Integrated Operations (RIO), the adaptive management framework for testing and refining the Service's hydrobiological objectives.

Temporary Modification of Operations at El Vado Reservoir

In 2019, at the request of the Engineer Advisers, the Commission directed the Legal Committee to review the request for future deviations at El Vado Reservoir for endangered species to determine if it can be accomplished in a manner that does not violate Article VII of the Compact.

The Legal Committee reported at the November 12, 2020 Commission annual meeting that it had studied the issues related to the deviations at El Vado but did not reach consensus on any recommended actions that should be taken regarding whether a future request for deviations at El Vado for endangered species would affect the Compact. It is not anticipated that an El Vado modification will be requested for the snowmelt runoff period in 2021.

El Vado Dam Repairs

Reclamation reported that substantial degradation of the steel lining system and service spillway have occurred at El Vado Dam. Corrective action studies have determined that construction and repair work need to be conducted at the dam. The planned El Vado Safety of Dams Project will occur in two phases: 1) embankment seepage reduction, which will involve installation of a synthetic liner system across the entire face plate of the existing dam, and 2) spillway repair and refurbishment. Reclamation anticipates that a contract for the Embankment seepage reduction phase of the project will be awarded in August 2021 with contractor

mobilization occurring in March 2022. The El Vado spillway repair and refurbishment 60-percent design phase was completed in August 2020, and a contract is expected to be awarded by May of 2023.

During both phases of construction, there will be restrictions on storage of water in El Vado Reservoir, and Reclamation continues to work with the Corps to provide an alternate location for native water storage at Abiquiu Reservoir during El Vado Dam and spillway construction activities. Reclamation and the Corps are evaluating changes needed to the Corps' Water Control Manual for Abiquiu and incorporating those changes into URGWOM, however, Reclamation reported that no new accounting procedures will be needed. The New Mexico Engineer Adviser indicates that, in addition to changes to the Water Control Manual, it will be necessary for Reclamation to seek and obtain favorable advice and consent from the Rio Grande Compact Commission, as well as obtain emergency authorization through the New Mexico Office of the State Engineer for native water storage in Abiquiu Reservoir during the El Vado dam construction work.

Middle Rio Grande Project Channel Maintenance

Reclamation's report indicates it is pursuing work at 17 active priority sites along the MRG Project reach where bank erosion or reduced channel capacity could cause levee failure. Of the active priority sites, five require an annual review of channel capacity and possible maintenance due to sediment accumulation. Reclamation reported that maintenance work at the River Mile 202.2 project area near Sandia Pueblo (Sandia Priority Site), began in early 2020 but that progress has been impeded due to the COVID-19 pandemic. This project includes major side-channel construction intended to provide increased channel capacity, resulting in less lateral migration, as well as habitat improvements for listed species.

Reclamation reported that the BDANWR Pilot Realignment Project was substantially completed in September 2020. Work on the project continued with repositioning the excavation spoils in the previous channel area. Reclamation reported that due to the low snowmelt runoff, the realigned channel has not seen high enough flows to further advance the river slope adjustment from the new downstream connection. The New Mexico Engineer Adviser notes that

the current channel is undefined through a significant portion of the project, resulting in extensive open water that likely has a negative impact to Compact deliveries.

Vegetation Management at Elephant Butte and Caballo Reservoirs

Reclamation reported that it performed vegetation maintenance at Caballo Reservoir during 2020, but that it did not use State of New Mexico funds because of the state's concerns with mowing locations. Reclamation reported that maintenance at Caballo Reservoir included approximately 891 acres of phreatophytic vegetation clearing by utilizing mowers and mulchers, in addition to approximately 700 acres that were maintained to be free of woody phreatophytes by means of longer-term inundation during the irrigation season.

Since 2017, the Engineer Advisers have requested Reclamation complete a draft plan for further vegetation control and discuss the plan with the Service. Reclamation has not provided the Engineer Advisers with a report or plan on this request. The Engineer Advisers remain concerned about the lack of vegetation management activities by Reclamation at Elephant Butte Reservoir. The State of New Mexico is reluctant to continue the Vegetation Management Agreement if Elephant Butte Reservoir is not included in the effort.

Southwestern Willow Flycatcher and Yellow-billed Cuckoo

Reclamation and others continued to conduct surveys and nest monitoring for the southwestern willow flycatcher (flycatcher) and western yellow-billed cuckoo (cuckoo) during the summer along the Rio Grande. Unfortunately, survey efforts were impacted by restrictions due to the COVID-19 pandemic that resulted in fewer surveys being completed in 2020. Because of this, the Service has acknowledged that while decreases in territories are apparent in the 2020 results, this may not represent the actual species condition within the MRG.

For 2020, 265 flycatcher territories were documented from Albuquerque to the Texas state line, down from 440 in 2019. Most flycatchers were present in the San Marcial and Elephant Butte Reservoir area, as is typically the case.

Reclamation has historically conducted surveys for the cuckoo from Belen to El Paso, Texas. In 2020, Reclamation conducted surveys only from Highway 380 (San Antonio, NM) to Elephant Butte Reservoir. Within this area, an estimated 66 cuckoo territories were observed.

A final revised proposal of critical habitat for the cuckoo will be available in April 2021. The 2017 petition to delist the cuckoo was denied in 2020 and the bird retains its threatened status under ESA. The proposed critical habitat includes a 10-mile-long segment of the Ohkay Owingeh Pueblo near Alcalde, New Mexico; a 6-mile-long segment near San Ildefonso Pueblo upstream to La Mesilla; and a continuous 170-mile-long segment from Elephant Butte Reservoir (at River Mile 54) to Cochiti Dam.

The tamarisk leaf beetle is currently present in most of the Rio Grande area, and defoliation of saltcedar in occupied territories may result in impacts to nesting success. Reclamation, in coordination with others, are evaluating areas to create suitable habitat in the lower section of the San Acacia Reach, especially in areas that experienced wildfires in recent years.

Additional Listing Information Provided by the Service

In 2016, the Service found that listing the Rio Grande chub and the Rio Grande sucker may be warranted. A Conservation Agreement was signed in September 2018 between the Service and the states of New Mexico, Colorado and Texas, the Jicarilla Apache Nation, the Pueblo of Santa Ana, several counties in Colorado, the U.S. Forest Service, Bureau of Land Management, and the National Park Service to reduce the threats to these fishes. In 2020, the Service has stated that they will assign a project manager for the chub and sucker in 2022, will complete a Species Status Assessment in 2023, and will conduct a 12-month review in 2024.

The Service conducts photographic monitoring of the New Mexico meadow jumping mouse (jumping mouse) at BDANWR. In 2020, there were seven unique photo detections compared to ten photo detections in 2019. The Service states that the BDANWR experienced extreme drought conditions during the 2020 growing season but was able to maintain habitat through well pumping and coordination with the MRGCD.

International Boundary and Water Commission Activities

The IBWC provided a report of its activities along the Rio Grande in New Mexico and Texas during 2020 and their projected activities for 2021. The items discussed included their levee rehabilitation work and Federal Emergency Management Agency (FEMA) status. The

Vado East Levee Rehabilitation Project documents were submitted to FEMA in 2018, and the Vado West Levee construction is scheduled to be completed in April 2020. The Sunland Park West Levee construction was awarded in September 2019, and the construction is scheduled to be completed in June 2021. The designs for East Levee sections are about 90 percent complete and construction will be awarded in 2021 and 2022. The IBWC also provided a list of the FEMA status for 12 levee projects which have been either submitted to FEMA, are pending design, in design, or pending construction.

Brief updates were also provided for the IBWC's ongoing channel maintenance projects. Construction projects include the American Canal Upper Reach which was completed in 2020, and the American Canal Lower Reach which is under redesign to be completed in 2022. Construction and mitigation work were completed for the Thurman arroyo sediment basins in January 2020.

IBWC presented updates to the status of the Canalization River Management Plan (RMP). The RMP covers floodplain management, endangered species management, and channel maintenance. The 2009 Record of Decision (ROD) for the IBWC expired in 2019 with release of the Final Report on the 10-year implementation. Therefore, the ROD commitments have been incorporated into the RMP. An Environmental Assessment was initiated in 2018 and delivered for public comment in 2019. Target update for the revised RMP will be late 2021.

The 2019 selected alternative will continue implementation of the RMP, designate up to 65 miles through the U.S. IBWC's right of way for the New Mexico Rio Grande Trail and Texas city and county trails, perform additional sediment removal in the channel, engage stakeholder participation, and establish partnerships to create up to 500 acres of habitat areas outside of IBWC jurisdiction.

In the 2009 ROD, the IBWC committed to implement 30 habitat restoration projects under the River Habitat Restoration Program. Currently, IBWC has implemented 22 habitat restoration sites, totaling over 500 acres. Under the River Habitat Restoration Program, IBWC treated over 500 acres of saltcedar, planted about 102,000 trees and 12,000 shrubs, and installed groundwater-monitoring wells. IBWC anticipates completing an Environmental Assessment for aquatic habitat restoration in the spring of 2020 and designs in summer of 2020.

Status updates were also provided for the Environmental Water Transaction Program which is also included under the 2009 ROD for the Canalization Project. Between 2014 and 2017 under the Environmental Water Transaction Program, IBWC acquired additional water rights for over 47 acres from EBID, irrigated 5 restoration sites, and conducted 31 irrigation events. In 2020, IBWC awarded a contract to conduct an appraisal of EBID surface water rights to acquire additional water rights to meet their commitments to meet the 2009 ROD obligations. They are currently working with several federal agencies to develop an interagency agreement allowing them to conduct review appraisals pursuant to federal appraisal regulations.

Under the 2017 Biological Opinion, IBWC is required to move vegetation from islands being removed that have known endangered species nesting or have suitable habitat. In 2018 and 2019, IBWC contractors successfully transplanted willows from islands in Sunland Park, Canutillo, Vinton, and Hatch to nearby restoration sites. In 2020, about 15,000 additional willows were transplanted at the Vado West mitigation site.

IBWC estimated that 450,000 to 490,000 cubic yards of silt is deposited into the Rio Grande Canalization Project reach annually. This results in sediment plugs, island formations, raised riverbeds, increased flooding risks, and inhibited irrigation return flows. The Canalization reach is defined as 105 river miles from Percha Dam to El Paso. Prior to 1990, IBWC removed 250,000 to 300,000 cubic yards of sediment per year. During 2019, IBWC removed over 422,000 cubic yards. In 2020, they were able to hire outside contractors to remove about 1,188,000 cubic yards. Plans for 2021 are to remove an additional 400,000 cubic yards of sediment.

In 2019, the IBWC began development of a new hydraulic model for three separate reaches between Percha Dam and American Dam. The modeling system will include both 1-dimensional, steady-state and 2-dimensional, unsteady-state HEC-RAS hydraulic models. The project will be 90 percent completed in April 2021, with a final completion date of June 18, 2021.

The IBWC provided an update on the border wall fences in the Compact reach showing the locations and different types of designs being used. Some locations are adjacent to the river. The wall is not considered to be impacting any of the IBWC operations, and all of the projects

have been put on hold by the current administration to assess the need and impacts of the projects.

The IBWC reported deliveries for the Convention of 1906 to Mexico in 2020, which were 84 percent of a full allocation. The initial allocation for 2021 to Mexico is only 2,458 acre-feet based on the 200,177 acre-feet of Usable Water in storage.

ADDITIONAL NON-FEDERAL AGENCY UPDATES

In addition to the federal agency reports summarized above, on February 2, 2021, Santa Fe presented a summary of their water planning activities with an emphasis on potential impacts to SJCP water accounting. Specifically, Santa Fe presented a proposed SJCP return flow pipeline and two options enabled by the pipeline that would allow Santa Fe to fully utilize their allocation of SJCP water. Both options involve diversion and return flow operations of SJCP below Otowi gage. An initial review suggests that neither option will affect Compact accounting. However, a more detailed analysis will be done by the Engineer Advisers once the final proposal and permit are received from the New Mexico State Engineer.

ENGINEER ADVISER RECOMMENDATIONS

Reclamation has recently conducted surveys to develop new area-capacity tables for Elephant Butte Reservoir. These tables account for the sediment buildup within the reservoir and the related loss of storage. They also are used to determine the current total storage volume of the reservoir. The Rio Grande Compact Rules and Regulations describe the now-outdated total storage volume in the reservoir. The Engineer Advisers recommend that the Commissioners direct the Legal Committee, in conjunction with the Engineer Advisers, to incorporate the new tables developed by Reclamation for Elephant Butte Reservoir into the Compact Rules and Regulations.

BUDGET

The Engineer Advisers reviewed the cost of operation for the year ending June 30, 2020 and the budget for the FY ending June 30, 2022.

The Engineer Advisers found that the expenses for gaging stations and administration of the Compact for the year ending June 30, 2020 were \$203,868. The U.S. federal government bore \$52,733 of this total, with the balance of \$151,135 to be borne equally by the three states.

The Engineer Advisers found that the proposed budget for the FY ending June 30, 2022 indicates that a total of \$223,929 will be spent for gaging and administration, with a proposed contribution by the U.S. federal government of \$71,840.



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