BUREAU OF RECLAMATION

# Calendar Year 2023 Report to the Pecos River Compact Commission

## Interior Region 7: Upper Colorado Basin

# Mission Statements

The U.S. Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated Island Communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

# Calendar Year 2023 Report to the Pecos River Compact Commission

## Interior Region 7: Upper Colorado Basin

*prepared by Bureau of Reclamation, Albuquerque Area Office, Albuquerque, New Mexico*

### For the Pecos River Compact Commission:

**New Mexico**
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**Frederic Tate**

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**Vacant**

Cover Photo: Pecos Bluntnose Shiner observed in September 2023 (V. Ritchie, Reclamation)

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# Acronyms

| | |
|---|---|
| AAO | Albuquerque Area Office |
| af | acre-feet |
| ASEI | Annual Security Equipment Inventory |
| ASI | Annual Site Inspection |
| Avalon | Avalon Dam and Lake |
| BIL or Infrastructure Law | Bipartisan Infrastructure Law |
| Brantley | Brantley Dam and Reservoir |
| BO | Biological Opinion |
| cfs | cubic feet per second |
| CID | Carlsbad Irrigation District |
| CPWA | Carlsbad Project Water Acquisition |
| CR | Comprehensive Review |
| DOI | U.S. Department of the Interior |
| ESA | Endangered Species Act |
| FCP | Fish Conservation Pool |
| FSDD | Fort Sumner Diversion Dam |
| FSID | Fort Sumner Irrigation District |
| FY | fiscal year |
| NAVD 88 | North American Vertical Datum of 1988 |
| NCAR | National Center for Atmospheric Research |
| NMISC | New Mexico Interstate Stream Commission |
| NMOSE | New Mexico Office of the State Engineer |
| NRCS | Natural Resources Conservation Service |
| O&M | Operation and Maintenance |
| P.L. | Public Law |
| PFR | Periodic Facility Review |
| PVACD | Pecos Valley Artesian Conservancy District |
| RAB | Roswell Artesian Basin |
| Reclamation | Bureau of Reclamation |
| RO&M | Review of Operation and Maintenance |
| S&T | Science and Technology |
| Santa Rosa | Santa Rosa Dam and Reservoir |
| SECURE | Science and Engineering to Comprehensively Understand and Responsibly Enhance Water Act |
| shiner | Pecos Bluntnose Shiner |
| SOP | Standing Operating Procedures |
| STAR | Security Tailored Assessment Report |
| Sumner | Sumner Dam and Lake |
| SWEP | Small-Scale Water Efficiency Projects |
| USACE | U.S. Army Corp of Engineers |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| VCP | Vaughan Conservation Pipeline |
| WaterSMART | Secure and Manage America's Resources for Tomorrow |
| WIIN | Water Infrastructure Improvements for the Nation |

# Introduction

The Bureau of Reclamation has numerous authorized Projects on the Pecos River. This report will limit discussion to the Carlsbad and Fort Sumner Projects. The Carlsbad Project was one of Reclamation's earliest projects, and Reclamation holds title to three of the four dams within the Project as well as jointly holding a water storage permit with the Carlsbad Irrigation District (CID). The Fort Sumner Diversion Dam (FSDD), constructed by private interests in the late 1800s, was reconstructed and rehabilitated by Reclamation in the early 1950s. Reclamation holds title to the dam and inspects it and certain other facilities within the Fort Sumner Irrigation District (FSID).

Reclamation's Albuquerque Area Office (AAO) has oversight responsibilities for these Projects. Figure 1 shows locations of major dams, partner irrigation districts, and important gages in the Pecos River Basin.

Reclamation's Annual Report to the Pecos River Commission contains all required reporting information on the Projects mentioned above. It also informs the Commission of proposed changes in programs, compliance requirements, management activities, and strategies that may affect operations, operating conditions, and/or the Compact, including Endangered Species Act (ESA) issues.

# Data

Prior to 2016, Reclamation used reservoir data – elevation, storage, weather, and pan evaporation – manually collected by CID. Reclamation no longer uses some of this manually collected and recorded data, and instead primarily relies on data collected and transmitted electronically. Use of data collected and transmitted electronically is standard operating procedure at most Federal reservoirs. All storage and flow data used in this report for the three Reclamation-owned reservoirs are from electronic instrumentation managed by the U.S. Geological Survey (USGS) and available at https://www.usbr.gov/uc/water/hydrodata/reservoir_data/site_map.html. Unless otherwise specified, reservoir elevations are the daily elevation recorded at midnight of the date listed, and daily storage values correspond to that end-of-day elevation. Reservoir elevations are reported in the North American Vertical Datum of 1988 (NAVD 88), except for Avalon Reservoir elevations which are reported in the Project Datum.

Reclamation continues to use weather and pan evaporation data collected and recorded by CID's dam tenders, typically at about 8:00 a.m. daily. Weather and evaporation data used by Reclamation is available upon request to AAO.

The stream gage data used within this report were downloaded from the USGS web page at: https://waterdata.usgs.gov/nm/nwis/current/?type=flow.


Figure 1: Map of the Pecos River Basin focused on Reclamation's projects

# Carlsbad Project

The Carlsbad Project includes four federal facilities on the Pecos River in New Mexico: Santa Rosa Dam (formerly Los Esteros), Sumner Dam (formerly Alamogordo), Brantley Dam, and Avalon Dam. Reclamation and the CID jointly hold the storage permit for the four reservoirs. There are three Carlsbad Project facilities owned by Reclamation and operated by CID that are used to divert water to storage and release water for beneficial use by CID: Sumner, Brantley, and Avalon Dams. The U.S. Army Corps of Engineers (USACE) owns and operates Santa Rosa Dam and Lake, which contains the majority of Carlsbad Project storage when the system is full. CID is in southeastern New Mexico near the City of Carlsbad. The Carlsbad Project authorizes irrigation on up to 25,055 acres from just below Avalon Dam to the Black River area. A brief description of the federal facilities follows:

- Santa Rosa Dam and Lake (hereafter Santa Rosa), the northernmost Project facility on the Pecos River, is a USACE-owned flood control facility. Construction of this facility was completed in 1980, and Santa Rosa stores a portion of the Carlsbad Project water. The entitlement storage, which is space set aside to meet the Project purpose of irrigation, for this facility was 100,535 acre-feet (af) in 2023.

- Sumner Dam and Lake Sumner (hereafter Sumner), a Reclamation-owned dam, was completed in 1938, and was the primary storage facility on the Pecos River for the Carlsbad Project until Santa Rosa was completed. The entitlement storage for Sumner was 32,099 af in 2023.

- Brantley Dam and Reservoir (hereafter Brantley) is a Reclamation-owned dam, completed in 1989 to replace McMillan Dam and Reservoir which was immediately upstream. This facility is about 225 river miles downstream from Sumner. The entitlement storage for this facility is 40,000 af.

- Avalon Dam and Lake (hereafter Avalon) is a Reclamation-owned dam, which Reclamation rebuilt in 1907 as part of the Carlsbad Project. The entitlement storage for this facility is 3,866 af.

## Operations

### Total Conservation Storage

Annually, Reclamation adjusts the conservation storage entitlements for the four Pecos River reservoirs in New Mexico (Santa Rosa, Sumner, Brantley, and Avalon) based on estimated sediment accumulation while keeping the total storage entitlement at 176,500 af. Table 1 shows the 2023 storage entitlements for these Reservoirs.

Table 1: 2023 Pecos River Reservoir Storage Entitlements

| Reservoir | Entitlement Storage (af) | Minimum Pool (af) | Total Estimated Sediment Accumulation (af) | Total Conservation Storage (af) | Conservation Elevation (feet) NAVD 88* |
|---|---|---|---|---|---|
| Santa Rosa | 100,535 | 0 | 1,317 | 101,852 | 4,749.89 |
| Sumner | 32,099 | 2,500 | 1,318 | 35,917 | 4,260.88 |
| Brantley | 40,000 | 2,000 | 766 | 42,766 | 3,256.35 |
| Avalon | 3,866 | 600 | 0 | 4,466 | 3,177.40 |
| Total | 176,500 | | 3,402 | 185,002 | |

*Note that Avalon elevation references Project Datum

Conservation storage in the Carlsbad Project reservoirs began the year at 37% of full on January 1, 2023. Santa Rosa, Sumner, Brantley, and Avalon Reservoirs were at approximately 16%, 45%, 84%, and 0%, respectively. On December 31, 2023, the total storage in the reservoirs was 29% of the conservation volume. Santa Rosa, Sumner, Brantley, and Avalon Reservoirs were at approximately 14%, 48%, 49%, and 40%, respectively.

## Santa Rosa Operations

Carlsbad Project storage and releases in and from Santa Rosa Reservoir, a USACE facility, were directed by Reclamation in coordination with CID and USACE. All inflow into Santa Rosa was stored for the Carlsbad Project. There were two releases from Santa Rosa in 2023 for Carlsbad Project operations. Santa Rosa operations are described in the USACE report to the Pecos River Compact Commission.

The Natural Resources Conservation Service's (NRCS) April 1, 2023, most probable streamflow forecast for March through July, predicted 69,000 af of inflow into Santa Rosa, or 168% of the 30-year median of 41,000 af. Observed March through July inflow to Santa Rosa was 84,023 af, 230% of median, as measured at the USGS Above Santa Rosa gage. USACE uses a mass balance equation to calculate reservoir inflow so their reported volume may be different than what is reported here.

## Sumner Operations

Reclamation directs the CID dam tender on storage and releases from Sumner Dam to maintain its water rights and for ESA compliance.[1]

All natural inflow to Sumner is stored for the Carlsbad Project when inflow is greater than the bypass needed for:

(1) FSID's direct flow diversion right,[2] and

(2) a downstream Biological Opinion (BO) target flow of 5 cubic feet per second (cfs) at the USGS Pecos River near Acme, as amended by the U.S. Fish and Wildlife Service (USFWS).

[1] See Water Operations and Water Supply Conservation ESA Compliance section of this document for additional information on Reclamation's ESA commitments and requirements.
[2] See Fort Sumner Project section of this report.

A flow of 5 cfs or greater at the USGS Pecos River near Acme gage indicates continuous river flow.

Reclamation stored 4,500 af of supplemental water[3] in Sumner during 2023. This included 750 af of water pumped into Brantley Reservoir and exchanged for 1,000 af of water stored in Sumner Reservoir, called the Fish Conservation Pool (FCP). Through an agreement with FSID, Reclamation stored 3,500 af of water that FSID forbore (Forbearance) from February 3 to 10 and 20 to 21, and from March 9 to April 2. The supplemental water was stored in the Carlsbad Project storage space, as stated in the 2009 Carlsbad Project Water Management Agreement (2009 Agreement) between Reclamation and CID and released to meet BO flow targets.

During the non-irrigation season from January 1 to February 2 and February 11 to 19, 1,036 af of bypass was released at an average rate of 12 cfs to meet BO target flows occurred. FSID forbore from February 3 to 10 and 156 af of FCP water weas released during that period. In 2023, Reclamation bypassed a total of 2,115 af for downstream BO target flows during the following periods: January 1 to February 2, February 11 to 19, April 10 to 30, and May 5 to 28.

Stored Carlsbad Project water in Santa Rosa and Sumner is released as a block at CID's direction and in consultation with Reclamation and the USACE. BO requirements restrict the duration of block releases from Sumner to a maximum of 15 contiguous days and a cumulative annual duration of 65 days with a minimum of 14 days between releases. Block releases, when possible, are scheduled to alleviate river intermittency. These block release restrictions are not enforced during flood operations. Reclamation's totals for Santa Rosa block releases may differ from the USACE totals as Reclamation uses USGS data and USACE uses their own mass balance data.

There were two block releases during the 2023 irrigation season from Santa Rosa and Sumner. The first block release started from Santa Rosa on June 21 and ended on June 29. The average release rate from Santa Rosa was 1,240 cfs. Total volume for the release from Santa Rosa was 22,138 af. The first block release from Sumner started on June 21 and ended on July 5. The average release from Sumner was 1,441 cfs. The total volume for the block release from Sumner was 42,859 af. Of that, 1,918 af was diverted by FSID leaving 40,928 af for delivery to Brantley for use by CID.

The second block release from Santa Rosa began on August 14 and ended on August 29. The average release was 1,263 cfs with a total release of 40,086 af. The second block release from Sumner started on August 16 and was curtailed on August 31. The average release from Sumner was 1,224 cfs. The total volume for the block release from Sumner was 38,842 af. FSID diverted 2,089 af of that, leaving 36,753 af for delivery to Brantley for use by CID.

Releases of Reclamation's supplemental water occurred intermittently throughout the year when bypass through Sumner to meet ESA flow targets was unavailable. To avoid river intermittency, the supplemental water was released at an average rate of 16 cfs. On December 31, 2023, 2,389 af of supplemental water remained in storage in Sumner and reverted to Carlsbad Project supply for future irrigation releases per the 2019 Depletions Agreement.

Sumner began 2023 with 16,293 af (4,250.48 ft) in storage. Total storage reached a maximum on June 8, 2023, at 28,065 af (4,257.36 ft). Sumner's minimum storage occurred on August 13 at 8,761

[3] See Supplemental Water section of this report.

af (4,243.64 ft). On December 31, 2023, Sumner had 16,978 af (4,250.96 ft) in storage. Figure 2 shows Sumner's total storage and release.

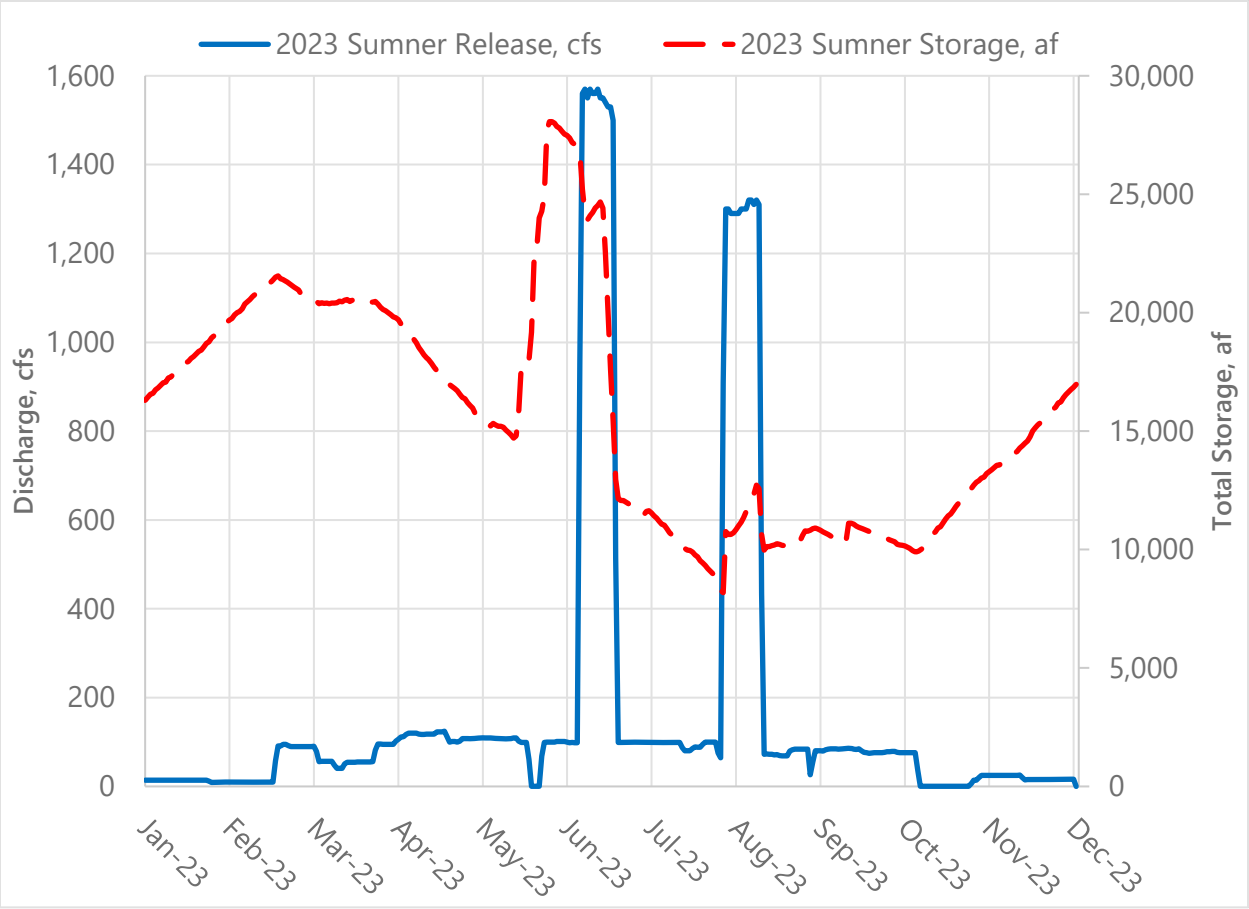


Figure 2: Sumner Dam Storage and Release

## Brantley Operations

All inflows to Brantley in 2023 were stored for the Carlsbad Project. Brantley was operated normally during irrigation season (March 1 through October 31). Normal operations release water to maintain a sufficient volume in Avalon to deliver water to CID for irrigation. Reclamation agreed to a continuous minimum release of 20 cfs[4] to mitigate for impacts of Brantley Dam to Major Johnson Springs, except as follows when releases may be terminated:

- To facilitate emergency repairs at Avalon's outlet structure,
- During periods when the water in storage in Brantley is reduced to the minimum pool of 2,000 af,
- During periods of spill from Avalon,

[4] This minimum release is documented in letters with the New Mexico Department of Game and Fish in 1982, and the Environmental Commitments of the Final Environmental Statement for the Brantley Project, New Mexico, and its final supplement filed with the Environmental Protection Agency in 1982.

- When prudent use of irrigation water would prevent such releases, or when water is not available.

The minimum release was shut off in November 2022 to limit inflow into Avalon which had been emptied for a sediment resurvey (see Avalon Operations section). Between March 3 and 21, 2023, CID released water from Brantley to refill Avalon. Small, brief releases were also made sporadically from November to March to maintain a small wetted area below the dam for fish and wildlife.

Brantley began the year with a total storage of 36,170 af (3,254.09 ft) and on December 31, 2023, had 21,109 af (3,247.58 ft) in storage. Minimum storage occurred on August 21 at 12,200 af (3,242.12 ft). Figure 3 depicts Brantley storage and release. The green line indicates maximum conservation storage for irrigation.

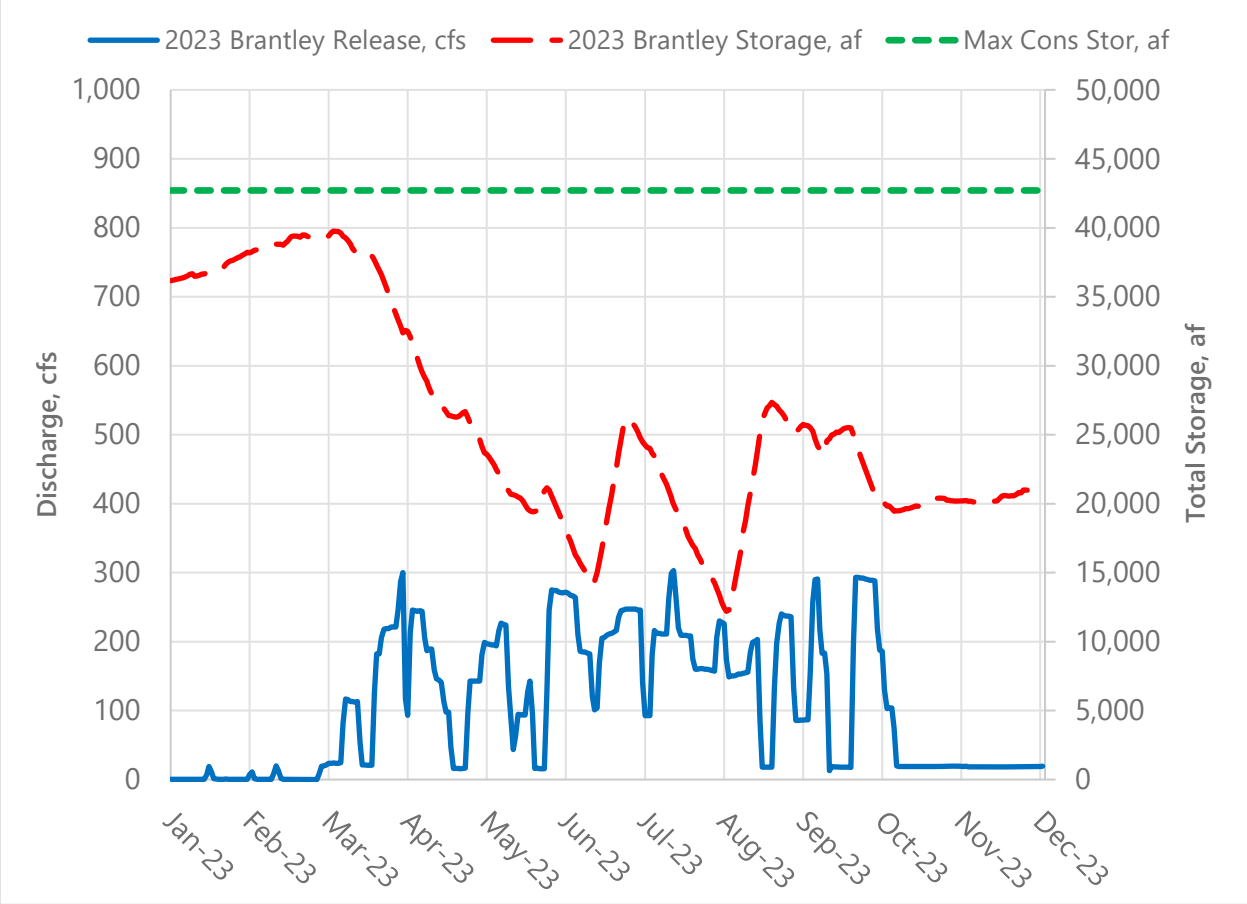


Figure 3: Brantley Dam Storage and Release

## Avalon Operations

Due to the small reservoir capacity and the location of Brantley Dam approximately 10 miles upstream, Avalon is used primarily as a diversion dam to meet irrigation demand for CID. Water released from Brantley is re-regulated at Avalon, which releases into the CID Main Canal.

A sediment survey was completed at Avalon Reservoir in 2023 using drone-based photogrammetry. It showed a loss of 30 af since the previous survey in 2006 and a cumulative storage loss of 2,516 af since the dam was reconstructed in 1907.

Avalon began 2023 at 0 af (3,159.29 ft; project datum), which was also the minimum for 2023. It ended the year with a storage of 1,833 af (3,174.17 ft). The maximum storage was on October 2 with storage of 2,117 af (3,174.56 ft).

Beginning on March 26, 71,969 af was released to the Carlsbad Main Canal. The maximum irrigation release into the canal was 305 cfs on October 18 and the last release in 2023 was on October 31. Figure 4 shows Avalon storage and release.

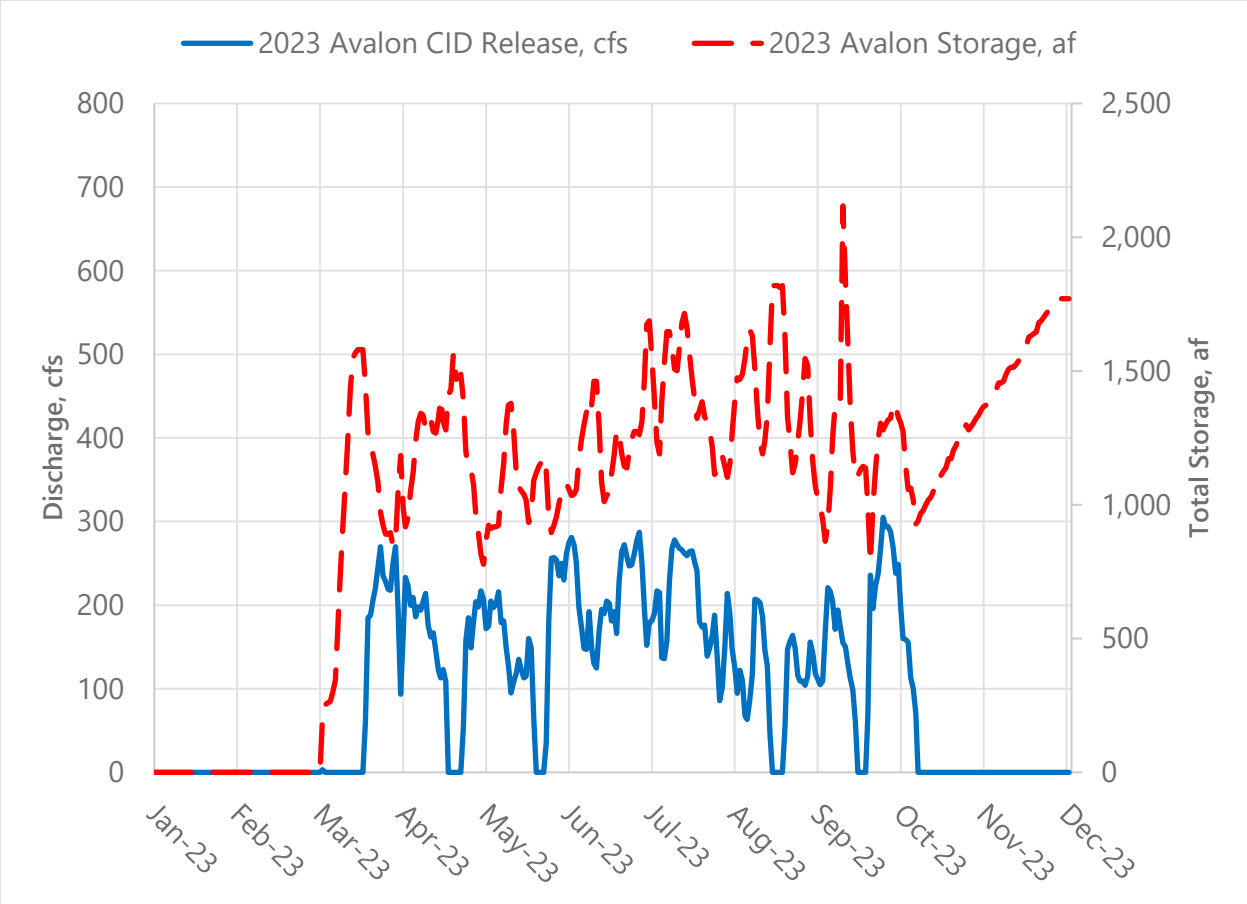


Figure 4: Avalon Dam Storage and Release

## Pecos River Settlement Implementation

The 2003 Pecos Settlement Agreement (Settlement) is a landmark agreement reached between New Mexico's principal Pecos River Basin water management and irrigation entities. Its primary objective is to ensure permanent compliance with the 1948 Pecos River Compact and the 1988 U.S. Supreme Court Amended Decree in Texas v. New Mexico. In addition, it aims to help resolve intrastate

disputes between Pecos Basin water-right owners, primarily over priority administration. The Settlement is the outcome of what was known as the Pecos Consensus Plan, conceived and refined by a broad spectrum of Pecos Basin stakeholders over a roughly two-year period. The parties to the agreement are the New Mexico Office of the State Engineer (NMOSE), New Mexico Interstate Stream Commission (NMISC), Reclamation, CID, and the Pecos Valley Artesian Conservancy District (PVACD). Objectives of the Settlement include:

- Permanent compliance with the Pecos River Compact and 1988 Amended Decree in Texas v. New Mexico,
- An increased and more stable water supply for CID,
- A reduced likelihood of a priority call by CID against junior groundwater pumpers, primarily PVACD (calls were made in 1976, 2013, and 2021),
- Decreased consumptive water use resulting in an improved hydrologic balance in the Pecos Basin.

The Settlement combines several different elements to achieve its objectives.

Water Rights Purchases: The Settlement required the NMISC to purchase and retire, or place in state water conservation programs, irrigation water rights to reduce depletions in the Pecos Basin and increase river flows. State purchases to date include approximately 4,500 acres in CID and 7,500 acres in the Roswell Artesian Basin (RAB). Under specific conditions, state-purchased CID water rights can be used for delivery to Texas, and state-purchased RAB water rights can be used in augmentation well fields to increase supplies for CID or for delivery to the state line.

Augmentation Well Fields: The Settlement also required the NMISC to construct two river augmentation well fields with a combined minimum capacity of 15,750 af per year. NMISC's primary well field, called Seven Rivers, is located adjacent to Brantley. A complementary well field is located near Lake Arthur. All NMISC augmentation wells have been, or are in the process of being, added as additional points of diversion for state-purchased RAB artesian water rights. The Settlement prescribes specific conditions under which augmentation pumping is required either for augmentation of CID's irrigation supply or Compact compliance.

NMISC delivered 423 af from the augmentation well fields for the 2023 irrigation season for CID. On March 1, 2023, Project supply was 59,304 af, which is below the target supply of 60,000 af for that date, therefore requiring augmentation pumping. By March 23, 2023, Project supply exceeded the 60,000 af target and pumping ceased. Project supply continued to exceed target supply for the remainder of the year so there was no additional pumping in 2023.

Delivery of Water to the State Line: Compact compliance before the Settlement was challenging due to the impoundment of Pecos River flows in Carlsbad Project reservoirs. Settlement algorithms determine an annual delivery of state-purchased CID water rights to Texas. These formulas depend in part on New Mexico's cumulative Compact credit.

Because of New Mexico's cumulative Compact credit exceeds 115,000 af as set in the Settlement, the Carlsbad Project did not deliver water to the New Mexico-Texas state line in 2023.

# Water Operations and Water Supply Conservation ESA Compliance

The USFWS issued a *Final Biological Opinion for the Carlsbad Project Water Operations and Water Supply Conservation, 2016-2026* (BO; Consultation Number 02WNNM00-2016-F-0506) in 2017. The non-jeopardy determination in the BO is based on the mandatory accomplishment of numerous commitments by Reclamation (12 Conservation Measures, four Reasonable and Prudent Measures, and four Terms and Conditions). The USFWS provided an Incidental Take Statement for the threatened Pecos Bluntnose Shiner (*Notropis simus pecosensis*, shiner) and Interior Least Tern (*Sterna antillarum athalassos*). The Interior Least Tern was removed from the Endangered Species List in 2021. It is no longer monitored at Brantley Reservoir and Reclamation will no longer provide updates in this report.

Term and Condition 1 of the BO stipulates that Reclamation should work with the USACE to allow storage of Reclamation's supplemental water at Santa Rosa Reservoir within 5 years of issuance of the BO. This additional storage could help reduce the effects of river intermittency on the shiner. If the goal of increased supplemental storage at Santa Rosa is reached within the proposed timeframe, the term of the BO, which provides coverage for Project-related water operations and conservation, would be extended for an additional 5 years through 2032.

Reclamation has made significant progress towards meeting this goal but requested a 2-year extension from the USFWS. In 2022, the USFWS agreed that Reclamation has made significant progress towards Term and Condition 1 and issued a 2-year extension to meet the goal, which would then extend ESA coverage under the BO to 15 years. In addition, the USFWS agreed that the 35 cfs target flow at the Taiban gage would no longer apply from November 1 through March 1 annually, as long as the river is kept continuous as shown by an Acme gage flow of 5 cfs or greater.

## Pecos Bluntnose Shiner

The BO defines two types of hydrologic conditions for a given year, Normal and Critically Dry. Each month from January to June, Reclamation assesses various hydrologic measures until a final determination of the hydrologic condition is made in June. Depending on the month, the hydrologic condition is determined by the percent of the Pecos basin in New Mexico classified as in Extreme or Exceptional Drought per the U.S. Drought Monitor, the proportion of the 30-year average of the NRCS' Santa Rosa Reservoir inflow forecast (note that the NRCS now compares the forecast to the median, but *average* is stated in the BO), or the percent of time in which bypass at Sumner is available during the early part of the irrigation season.

During Normal hydrologic conditions, the BO establishes a surrogate for quantifying incidental take of the shiner using the mean 3rd trimester density to determine if the incidental take attributable to the Carlsbad Project has been exceeded. Under Normal hydrologic conditions, if the 3rd trimester shiner density increases from the previous year's 3rd trimester density or stays at or above 12 fish per 100 $m^2$, then incidental take due to the Carlsbad Project is not exceeded. If under Normal hydrologic conditions, the 3rd trimester shiner density is decreasing and falls below a density of 12 fish per 100 $m^2$, then take is exceeded and further consultation with the USFWS is necessary to determine if the change in population density is due to the Project.

A designation of Critically Dry indicates that Reclamation may be unable to cover the deficit in the hydrologic system with its available supplemental water resources. In that case, the Taiban gage target flow of 35 cfs is no longer applied, and Reclamation instead focuses on maintaining 5 cfs at the Acme gage, which helps ensure that the Sumner to Brantley reach is continuous for supporting the shiner. Additionally, no take from the Carlsbad Project occurs under Critically Dry conditions provided that all water resources at Reclamation's disposal are used to minimize drying (see Supplemental Water section below).

The shiner is monitored annually to assess population status in the Pecos River and determine the incidental take attributable to Reclamation's Carlsbad Project. Reclamation funds USFWS for fish sampling from April to October and receives their trip reports. These data are compiled into an annual report on the status of the shiner. The following is a summary of monitoring data on the status of the shiner. [5]

In 2023, which was a Normal hydrologic year, 12 sites were monitored on six separate sampling trips. The Pecos River fish community was monitored in April, March, May/June, September, October, and November 2023. A total of 13,191 fish were collected from 22 different species. Fewer fish were collected in 2023 than in 2022. In 2023, the most abundant fish species was Red Shiner (*Cyprinella lutrensis*). The shiner was the second most abundant fish species in 2023, with a total of 2,142 collected and accounting for 15% of all fish collected.

During the 3rd trimester of 2023 (August–December), 1,416 shiner were collected from the Pecos River, comprising a mean percent of total that was 19.9 ± 2.1% of all species collected (Table 2). The 2023 mean shiner 3rd trimester density was 16.7 ± 3.3 fish per 100 $m^2$, higher than the 3rd trimester density in 2022 of 10.8 ± 3.0 fish per 100 $m^2$ and above the 12 fish per 100 $m^2$ take threshold established by the BO. Therefore take was not exceeded in 2023.

Table 2: Presence and Abundance of Pecos Bluntnose Shiner in Trimester 3 Only

| Calendar Year | Total Site Visits | Occupied Sites | Percent of Sites Occupied | Total # of Shiner | Total # of Fish (all species) | Shiner Percent of Total | Total Area Sampled ($m^2$) | Density (Shiner/ 100 $m^2$) |
|---|---|---|---|---|---|---|---|---|
| 2017 | 31 | 31 | 100 | 749 | 6,250 | 14.1 | 10,788.5 | 7.1 |
| 2018 | 33 | 33 | 100 | 2,419 | 10,499 | 22.0 | 7,659 | 33.3 |
| 2019 | 36 | 36 | 100 | 1,313 | 8,091 | 17.1 | 9,247.5 | 14.1 |
| 2020 | 35 | 35 | 100 | 1,052 | 13,667 | 8.7 | 9,415 | 15.3 |
| 2021 | 36 | 36 | 100 | 1,888 | 12,690 | 15.1 | 7,937.5 | 25.4 |
| 2022 | 35 | 33 | 94.3 | 770 | 12,487 | 7.8 | 7,491 | 10.8 |
| 2023 | 36 | 36 | 100 | 1,416 | 6,845 | 19.9 | 9,015 | 16.7 |

## Supplemental Water

As part of the BO conservation measures, Reclamation has established a supplemental water acquisition program to augment Pecos River flows between Sumner Dam and Brantley Dam. It is

[5] Davenport, S.R. 2024. 2023 Pecos River Basin Fisheries Update Summary Report. DRAFT report submitted to US Bureau of Reclamation, Albuquerque Area Office.

intended to avoid or minimize river intermittency and to acquire additional water for the Carlsbad Project to offset reductions in Project water supply caused by Reclamation's bypass and storage operations for ESA compliance, relative to historic operations.

In an October 5, 2022, letter, Reclamation asked USFWS to lift the Taiban target of 35 cfs from November to February. USFWS responded on October 26, 2022, and amended the BO as follows: *Under "non-Critically Dry" conditions, and given a continuous river, Reclamation may operate "without" the target flow of 1 m3/s (35 cfs) at the Taiban gage from November 1 to February 28. The Pecos River is considered continuous when the Acme gage is at minimum of 0.14 m3/s (5 cfs). This operational standard allows for a judicious use of limited water resources while maintaining a continuous river.*

### *Reclamation's Direct Flow Supplemental Water*

Reclamation's direct flow supplemental water supplies are used only to avoid river intermittency and are not used to meet river flow targets.

In 2023, Reclamation stored 3,500 af of Forbearance water through an agreement with FSID and 1,000 af of FCP water, for which Reclamation pumped 753 af from the Seven Rivers well field directly into Brantley, in Lake Sumner for supplemental use as negotiated through an agreement with NMISC and CID. These parties agreed that credit or debit would not be accounted for in 2022 while a new depletions accounting method is developed. See the Depletions and Offsets Accounting section below for more information.

In 2023, 557 af of FCP and 1,564 af of Forbearance water were released from Sumner Dam at the direction of Reclamation. On December 31, the remaining 443 af of FCP and 1,936 af of Forbearance water in Sumner, 2,379 af were returned to Carlsbad Project Storage.

Through agreements with NMISC, Reclamation acquired groundwater for augmenting flow to the Pecos River. In 2023, at Reclamation's direction, NMISC delivered 998 af of groundwater from the Vaughan Conservation Pipeline (VCP). The maximum output from the VCP in 2023 was 8.83 cfs while the average was 7.87 cfs. The VCP delivered water from February 25 to April 12 and August 1 to August 14, 2023.

In 2023, Reclamation operated its Seven Rivers wells for delivery to Brantley in exchange for FCP water stored in Sumner. The north and south well began pumping on March 30. The volume of 750 af needed for the exchange was delivered on June 27 and an additional 3 af were pumped incidentally. The average pumping rate was 8.46 af per day.

### *Reclamation's Offset Supplemental Water*

Reclamation leases water from willing water rights owners within the Pecos Basin for delivery to the Carlsbad Project in Brantley Reservoir to offset the depletions caused by ESA-related operations. Most of the water rights are owned by PVACD and were associated with lands near Hageman and Lake Arthur, NM. The land is fallowed, and the water is either left in the river or delivered to the river and used by CID for irrigation. In 2023, Reclamation leased 1,158 af of surface water rights that were previously pumped directly from the river (referred to as River Pumpers), of which 507 af was released to the river from the Hagerman Canal.

### *Depletions and Offsets Accounting*

Reclamation, NMISC, and CID entered into a 10-year Pecos River Depletions Accounting and Offsets Agreement on October 24, 2019 (2019 Depletions Agreement). The 2019 Depletions Agreement established terms and methodologies to account for reductions and increases in Carlsbad Project water supply due to modification of Reclamation's Sumner Dam operations and supplemental water released in support of ESA compliance. The 2019 Depletions Agreement replaces multiple, sequential prior agreements that date back to 2008.

Due to problems found in the Two-Stream Accounting Model, the parties agreed that no credit or debit would be calculated in 2022. In early 2024, the parties accepted a new model is and it will be used to calculate the 2023 depletions.

# Facility Review and Safety of Dams Programs

Reclamation reviews and examines the transferred Carlsbad Project facilities in accordance with federal and agency-specific guidance. For all dams classified as having either high or significant hazard potential, the review and examination program includes annual site inspections (ASIs); periodic facility reviews (PFRs) and comprehensive reviews (CRs) every eight years; and periodic examinations of normally inaccessible features, special examinations, and surveys.

Operation and Maintenance (O&M) recommendations for high and significant hazard dams are determined and categorized by Reclamation. Category 1 O&M recommendations are for the correction of severe deficiencies where immediate and responsive action is required to ensure structural safety and operational integrity of a facility. Category 2 O&M recommendations are for a wide range of important matters where action is needed to prevent or reduce further damage or preclude possible operational failure of the facility. Category 3 O&M recommendations are sound and beneficial suggestions to improve or enhance the O&M of the project or facility.

## Sumner Dam

Sumner Dam has one incomplete Category 1 O&M recommendation which is related to the rehabilitation of the three radial gates. Sumner Dam began 2023 with 13 incomplete Category 2 O&M recommendations. Three new Category 2 O&M recommendations were issued in 2023, two of these for Emergency Action Plan (EAP) updates and one for regular O&M procedures. An additional new Category 3 O&M recommendation related to the EAP was issued. Five Category 2 O&M recommendations were completed during 2023. At the end of 2023, one Category 1, 11 Category 2, and one Category 3 O&M recommendation remained incomplete.

Sumner Reservoir storage is currently restricted to a maximum of 35,917 af (4,259.0 ft) as an interim risk reduction measure per Safety of Dams recommendation 2019-SOD-A. This restriction limits loading on the radial gates until they are replaced. The National Environmental Policy Act (NEPA) and other environmental compliance for the radial gates replacement project started in late 2023. Construction is tentatively scheduled to begin in 2025.

The outstanding Category 1 O&M recommendation will be completed once the Sumner Dam radial gates are replaced. Of the remaining incomplete O&M recommendations, one will be complete once

the Sumner radial gates replacement project concludes. Three recommendations should be completed upon installation of a safety/security fence on the right abutment of the dam, which is awaiting funding. Another six recommendations should be completed via updates to the Standing Operating Procedures (SOP) once the radial gates replacement project is completed. Two recommendations will be complete once the service spillway survey and crack mapping is finished, tentatively scheduled for March 2025.

An updated sediment survey for Sumner Reservoir began in December of 2023 and should be completed in 2024.

No significant security issues for Sumner Dam were identified during the 2023 Annual Security Equipment Inventory (ASEI).

Table 3: Sumner Dam Facility Review and Exam Dates

| Review/Exam | Date of Last Review/Exam | Year of Next Scheduled Review/Exam |
|---|---|---|
| ASI | 2/21/2023 | 2024 |
| PFR | 2/15/2022 | 2030 |
| Dive Exam (Prep for CR) | 1/9/2018 | 2026 |
| CR | 2/6/2018 | 2026 |
| ASEI | 6/2/2023 | 2024 |
| Security Tailored Assessment Report (STAR) | 8/10/2020 | 2024 |
| Sediment Survey | 3/2013 | 2024 |
| Service Spillway Survey | N/A | 2024 |

## Brantley Dam

At the beginning of 2023, Brantley Dam had no incomplete Category 1 O&M recommendations, three incomplete Category 2 O&M recommendations, and no incomplete Category 3 O&M recommendations. One new Category 2 O&M recommendation was issued in 2023 and two Category 2 O&M recommendations were completed in 2023.

This left two incomplete Category 2 O&M recommendations at the end of 2023. One should be completed once the spillway inspection and crack mapping is completed, tentatively scheduled for 2025. The other recommendation will be complete once the updated sediment survey is completed, tentatively scheduled for late 2024 or early 2025.

There are sinkholes upstream and downstream on the left (southeast) side of Brantley Dam. The sinkholes are regularly monitored visually and documented via photographic surveys every eight years. The last sinkhole survey was conducted in August 2019. The sinkholes appear to be filling in naturally and are more difficult to find during each survey.

No significant security issues were identified for Brantley Dam during the 2023 ASEI.

Table 4: Brantley Dam Facility Reviews and Exams Dates

| Review/Exam | Date of Last Review/Exam | Year of Next Scheduled Review/Exam |
|---|---|---|
| ASI | 2/23/2023 | 2024 |
| PFR | 2/16/2022 | 2030 |
| Dive Exam (Prep for CR) | 2/20/2018 | 2026 |
| CR | 2/7/2018 | 2026 |
| ASEI | 6/14/2023 | 2025 |
| STAR | 8/10/2020 | 2024 |
| Sinkhole Survey | 09/2019 | 2025 (6 months before CR) |
| Embankment Survey | 12/2022 | 2030 |
| Service Spillway Survey | N/A | 2024 |

## Avalon Dam

At the beginning of 2023, Avalon Dam had no incomplete Category 1 O&M recommendations, fourteen incomplete Category 2 O&M recommendations, and no incomplete Category 3 O&M recommendations. Thirteen new Category 2 O&M recommendations were issued in 2023. Ten of these new recommendations were issued as a result of a site visit for regular O&M procedures. One new recommendation is to repair the roof of the dam tender's shed, another is for depression monitoring, and one is to update the Avalon Dam EAP. Two Category 2 O&M recommendations were completed in 2023. A total of 25 incomplete Category 2 O&M recommendations remained at the end of 2023.

Twelve incomplete Category 2 O&M recommendations pertain to the Avalon Dam outlet works and include SOP updates. The outlet works consist of two cylinder gates, a hoist platform, and a walkway, all in poor structural condition and in need of repair or replacement. Reclamation is working with CID to rehabilitate the river outlet works. CID's current plan is to convert the cylinder gates into morning glory spillways.

Another twelve incomplete Category 2 O&M recommendations are regular O&M scheduled to be completed by CID in 2024, including a recommendation for depression monitoring during ASI's and Ongoing Visual Inspection Checklists. The final incomplete recommendation will be completed once the 2022 sediment survey final area-capacity tables are received and transmitted.

No significant security issues for Avalon Dam were identified during the 2023 ASEI.

Table 5: Avalon Dam Facility Reviews and Exams Dates

| Review/Exam | Date of Last Review/Exam | Year of Next Scheduled Review/Exam |
|---|---|---|
| ASI | 2/23/2023 | 2024 |
| PFR | 2/17/2022 | 2030 |
| CR | 2/8/2018 | 2026 |
| ASEI | 6/14/2023 | 2024 |
| STAR | 8/10/2020 | 2024 |
| Sediment Survey | 3/2022 | 2030 |

# Fort Sumner Project

The Fort Sumner Project includes the FSDD, a Reclamation-owned dam, reconstructed by Reclamation in 1951. This facility is about 15 river miles downstream of Sumner Dam and diverts FSID's senior direct flow diversion water right into their canal. This facility replaced an earlier, privately-owned dam, and is operated and maintained by FSID. FSID includes 8,035 acres, of which 6,500 are classified as irrigable. The U.S. Army first irrigated some of these lands in 1863. Most of the area has been irrigated continuously since 1907.

Reclamation owns FSDD and the first few miles of the main canal. FSID operates and maintains these facilities through a contract with Reclamation. Reclamation does not pay any of the O&M costs of the facilities. FSID is contractually responsible to Reclamation for full repayment of the construction costs for the Fort Sumner Project. Full repayment on this contract was made in July 2023 and in 2023 Reclamation and FSID began discussing title transfer of Reclamation-owned FSID facilities (FSDD and the first few miles of the main canal).

FSID has a direct flow diversion right with a priority date of March 18, 1903. FSID's right to divert up to 100 cfs of the Pecos River's natural flow is senior to the Carlsbad Project's right to storage at Santa Rosa and Sumner. Therefore, Reclamation must not divert to storage at Sumner or Santa Rosa any water necessary to meet FSID's senior diversion water right of up to 100 cfs of natural flow. FSID's water right was determined prior to Reclamation's involvement with FSID and was never transferred to the United States. NMOSE calculates a two-week entitlement for FSID's direct diversion right using estimated natural inflow to Sumner and Santa Rosa over the previous two weeks.

## Operations

The irrigation season for FSID typically begins March 1 and ends October 31. FSID is also permitted to divert for two, eight-day periods during the winter. This winter entitlement has historically been diverted just prior to March 1.

During the 2023 irrigation season, 0 to 100 cfs was bypassed through Sumner Dam for FSID based on their OSE-calculated entitlement. FSID diverted 39,081 af into the FSID main canal as recorded by the USGS Fort Sumner Main Canal gage near Fort Sumner, NM (USGS gage number 08385000). FSID diverted flows less than 105 cfs arriving at their diversion and released Reclamation's supplemental water back to the river at the Sand Gate Diversion (USGS gage number 08385503). A total of 749 af were released back to the river at the Sand Gate. FSID's entitlement in 2023 was 43,757 af, not including the winter allotment.

## Facility Review of Operation and Maintenance

Reclamation reviews and examines the Fort Sumner Project facilities in accordance with federal and agency-specific guidance. The Review of Operation and Maintenance (RO&M) Program results in

categorized O&M recommendations for associated facilities. The categories are the same as those for high and significant hazard potential dams described earlier in this report.

There are three outstanding Category 2 O&M recommendations, such as vegetation control and concrete repairs, took longer to complete but are each approximately 80% complete and scheduled to be completed by FSID in 2024.

The last RO&M exam was completed on February 22, 2021, and the associated report was published in May 2021. No new recommendations were made as a result. The next RO&M exam is scheduled for FY 2027.

# WaterSMART Program

Congress recognized the increasing stresses on water supplies in the Western U.S. with the passage of the Science and Engineering to Comprehensively Understand and Responsibly Enhance (SECURE) Water Act in 2009 (P.L. 111-11). The law authorizes Federal water and science agencies to work together with state and local water managers to plan for threats to water supplies, as well as take action to secure water resources for the communities, economies, and ecosystems they support.

To implement the SECURE Water Act and ensure the Department of the Interior (DOI) is positioned to meet these challenges, the WaterSMART (Sustain and Manage America's Resources for Tomorrow) Program was established in February 2010. The Program's framework allows all DOI bureaus to work with States, Pueblos and Tribes, local governments, and non-governmental organizations to pursue a sustainable water supply for the Nation. This is accomplished by providing Federal leadership and assistance on the efficient use of water, integrating water and energy policies to support the maintainable use of all natural resources, and coordinating the water conservation activities of the DOI's many offices.

As DOI's main water management agency, Reclamation plays a key role in the WaterSMART Program. Reclamation's portion of the WaterSMART Program is focused on improving water conservation, recovering declining species, increasing ecological resiliency to the impacts of climate change, preventing water-related conflicts, and helping water resource managers make informed decisions about water conservation and use. Goals are achieved through administration of grants for scientific studies, technical assistance, and sharing scientific expertise. Reclamation will continue to work cooperatively with States, Pueblos and Tribes, and local entities as they plan for and implement actions to increase water supply through investments to modernize existing infrastructure and give attention to local water conflicts.

## Bipartisan Infrastructure Law

The Bipartisan Infrastructure Law (BIL or Infrastructure Law) provides a total of $8.3 billion under Title IX (Western Water Infrastructure) to the Bureau of Reclamation for authorized programs and activities to be appropriated in equal increments of $1.66 billion over five years. The Infrastructure Law provided emergency funding available for obligation until fully expended. Allocations of the annual $1.66 billion appropriations are laid out by programs and projects in annual spend plans and addendums. Additional information can be found at: https://www.usbr.gov/bil/.

Traditional WaterSMART Programs and newly authorized BIL efforts are funded and managed by Reclamation's Office of Policy and Administration. More information about these programs and funding opportunity announcements can be found at: https://www.usbr.gov/watersmart/. A WaterSMART Data Visualization Tool showing project locations can be found at: https://usbr.maps.arcgis.com/apps/MapJournal/index.html?appid=043fe91887ac4ddc92a4c0f427e38ab0.

Not all programs have funding opportunities each year, so there may not be currently active projects under all programs. Ongoing, newly funded, and recently completed projects within the jurisdiction of the AAO in the Pecos Basin are listed in Table 6 below.

Table 6: Active WaterSMART Projects in the Pecos Basin Managed by the AAO[6]

| Agreement No. | Program[7] | Completion Date | Recipient Name | Project Title | Federal Total Obligation Amount | Non-Federal Total Est Amount |
|---|---|---|---|---|---|---|
| R19AP00290 | ASG | 12/31/2023 | NM Institute of Mining and Technology | New Mexico Water Data Initiative and Regional Pilot Project for Improved Data Management and Decision Support Tool in the Lower Pecos Valley | $300,000 | $300,000 |
| R22AP00294 | ASG | 6/30/2024 | Southwest Research Institute | Application of a geochemical framework for water resource management in a semi-arid landscape: Trans Pecos Texas, USA | $200,000 | $119,998 |
| R23AC00264 | DROUGHT | 12/31/2024 | City of Roswell | City of Roswell, Drought Contingency Plan | $200,000 | $200,000 |
| R23AP00582 | WEEG | 3/1/2025 | Carlsbad Irrigation District | CID Main Canal Automation for Improving Water Delivery Efficiency | $1,300,000 | $1,300,082 |
| Total Funding | | | | | $2,000,000 | $1,920,080 |

# Basin Studies

Basin Studies are collaborative studies, cost-shared with non-Federal partners, to evaluate water supply and demand and help ensure reliable water supplies by identifying strategies to address imbalances in water supply and demand. Each study includes four key elements:

- State-of-the-art projections of future supply and demand by river basin,
- An analysis of how the basin's existing water and power operations and infrastructure will perform in the face of changing water realities,
- Development of strategies to meet current and future water demands,
- A trade-off analysis of strategies identified.

Basin Studies are critical to helping stakeholders address and plan for water supply and demand imbalances. Through these studies, Reclamation provides technical assistance and tool development, and brings together competing interests within river basins to help identify collaborative solutions. The studies are focused on areas with willing State and local partners who provide 50% of the study costs.

[6] As of January 22, 2024
[7] ASG = Applied Science Grants
DROUGHT = Contingency Planning, Resiliency Projects, or Emergency Response Actions
WEEG = Water and Energy Efficiency Grants

### Pecos River Basin Study – New Mexico

Reclamation and NMISC completed the *Pecos River Basin Study – New Mexico* in 2021, available at https://www.usbr.gov/watersmart/bsp/docs/finalreport/Pecos/PRNMB-final-9-20-2021.pdf. The study focused on potential impacts of climate change to agricultural water use in the Pecos Basin in New Mexico, including impacts to water storage and availability through the 21st century.

## Baseline Assessments and Pilots

Reclamation conducts Baseline Water Assessments to develop water supply and demand information, guidance, and tools needed to conduct planning activities across Reclamation's mission areas. Baseline Water Assessments support reservoir operations planning, appraisal and feasibility studies, basin studies, drought contingency planning, and environmental analyses.

## Reservoir Operations Pilots

Through the Reservoir Operations Pilot Initiative, Reclamation uses modeling and forecasting tools to identify ways to increase flexibility in reservoir operations to support optimal water management.

## Internal Applied Science Tools

Through the Internal Applied Science Tools program, Reclamation provides funding internally to Reclamation staff on a competitive basis for the development of improved modeling and forecasting tools, improved hydrologic information, GIS products, data management, and other decision support tools.

## 2021 SECURE Water Act Report

Updated projections of future conditions, and paleoclimate analyses to refine those projections, were developed by Reclamation and published on Reclamation's SECURE Water Act 2021 Report website: https://www.usbr.gov/climate/secure/.

Reclamation's 2021 West-Wide Climate and Hydrology Assessment and seven individual basin reports, including the Rio Grande Basin (https://www.usbr.gov/climate/secure/docs/2021secure/basinreports/RioGrandeBasinChapter.pdf), provide detailed information on climate change impacts and adaptation strategies to increase water supply reliability in the West. The 2021 SECURE Report Web Portal (https://experience.arcgis.com/experience/7461ca68b2da4620863ff27d65b8cf14/) provides a user-friendly, web-based format for delivery of information in the reports. The next report to Congress will be completed in 2026.

## Science & Technology Program and Other Research Projects

Reclamation's Science and Technology (S&T) Program is a Reclamation-wide, competitive, merit-based applied research and development program. The program focuses on innovative solutions for water and power challenges in the Western United States for Reclamation water and facility managers and the stakeholders they serve. The program has contributed many of the tools and capabilities Reclamation and Western water managers use today.

The AAO is an active participant in Reclamation's S&T Program, and initiates and participates in research to improve the services that Reclamation provides to its stakeholders. S&T Program projects related to the Pecos Basin that are ongoing or were completed in 2023 are listed below.

- FY 2020 Award – completed, *An Experimental Monsoon Forecast for Water Management* (AAO partnership with National Center for Atmospheric Research (NCAR), Boulder, CO); https://www.usbr.gov/research/projects/detail.cfm?id=20032. This project builds on a previous S&T Program project characterizing extreme events in New Mexico (https://www.usbr.gov/research/projects/detail.cfm?id=1782). It uses a process called "weather typing," along with statistical analyses, to begin to develop forecasts for summer monsoons in New Mexico, and in Arizona under a parallel project. This process was tested in 2021–2023 and has received "Facilitated Adoption" program funding from Reclamation's Research and Development Office for an additional three years of refinement and testing in both New Mexico and western Arizona.

Reclamation is funding the recalibration of hydrologic models used by the National Oceanic and Atmospheric Administration's West Gulf River Forecast Center, which is responsible for development of streamflow forecasts for the Rio Grande and Pecos basins. These hydrologic models support the development of Ensemble Streamflow Prediction forecasts, similar to those available in the Colorado River Basin, which will supplement the volumetric forecasts available from the NRCS.

Data collection was completed in 2023 on the Collison Floating Evaporation Pan (FEP) project through funding from the Reclamation's Upper Colorado Basin Regional Office. The project aims to improve estimates of reservoir evaporation through the development and calibration of an in situ floating evaporation pan. S&T Program-funded work at Cochiti Reservoir and Lake Powell was completed in 2021 and the report can be viewed at https://www.usbr.gov/research/projects/detail.cfm?id=8119. Evaporation monitoring continued at Lake Powell, Elephant Butte, and Caballo Reservoirs through summer 2023. The final datasets and report are expected in early 2024. Once received, Reclamation's Technical Service Center will independently review the datasets, including those generated by New Mexico State University.

In addition to the S&T Program, Reclamation's Research and Development Office initiated a series of projects in 2022 aimed at developing a Snow Water Supply Forecasting Program that takes advantage of new technologies. AAO is participating in development of this program through two funded projects:

- *A Testbed for Harnessing and Benchmarking Snow Data Observations and Watershed Modeling for Water Supply Prediction* (AAO partnership with NCAR) – ongoing. This is a modeling study to test

snow monitoring technologies using data from other Reclamation snow studies. This project has been extended to allow receipt and processing of several additional snow datasets to improve the overall benefit of this project to the Snow Program.

- *Assessing the Utility of New Satellites to Advance State of the Art Snow Forecasting Capabilities* (AAO partnership with the University of New Mexico, University of Washington, University of Wyoming, and USGS New Mexico Water Science Center) – ongoing. The initial intent was to test a new satellite technology for snow monitoring, but launch was delayed. The project instead focused on comparison of satellite stereo imagery and satellite altimetry measurements of snowpack to ground-based snowpack measurements. A report will be submitted in early 2024.