

Arkansas River Basin



US Army Corps
of Engineers®
Albuquerque District

2023 Water Management and Civil Works Activities

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1. General

During Compact Year 2023 (1 November 2022 – 31 October 2023), activities of the U.S. Army Corps of Engineers (USACE), Albuquerque District, in the Arkansas River Basin consisted of water management, operations and maintenance of USACE projects, civil works, flood risk management, compliance with Section 404 of the Clean Water Act, and continued concerns about post wildfire flooding.

2. Water Management Operations

The overall Arkansas River Basin snowpack was reported to be below normal at 84% of median when the May 1st Colorado Water Supply Outlook Report was released. The respective forecast runoff volumes for the 50% Exceedance Probability for the Upper Arkansas Headwaters and the Lower Arkansas Headwaters were respectively 104% of median and 57% of median. The combined 50% Exceedance Probability forecast runoff volume for the Cucharas and Huerfano Basins was 64% of median, and the 50% Exceedance Probability forecast runoff volume for the Purgatoire Basin was 65% of median.

Table 1 compares the most probable 50% exceedance forecast runoff volumes to the actual measured runoff for the April through July period at Pueblo Dam, Trinidad Dam, and John Martin Dam. For Pueblo Dam and Trinidad Dam, the Natural Resources Conservation Service's (NRCS) May 1st forecast volumes and 30-year median are presented. For John Martin Dam, the forecast volume and 30-year normal are obtained from the National Weather Services (NWS) Arkansas River Basin Forecast Center using their forecast for the Arkansas River at Las Animas, Colorado gage. For this location, NWS's historical and forecast volumes are calculated based on regulated or observed flow at the gage.

Table 1. May 1 NRCS/NWS April-July Forecast and Actual Runoff

Arkansas River Basin May 1 st Most Probable Snowmelt Runoff Forecast (April 1 – July 31 50% Exceedance)				
Measurement Location	Snowmelt Runoff (x 1,000 Acre-Feet)		Percent of Median/Normal	
	May Forecast	Actual	May Forecast	Actual
Arkansas River above Pueblo	310	307	95%	94%
Purgatoire River at Trinidad	18.7	27.1	64%	93%
John Martin Dam and Reservoir	109	147.5	87%	117%

NRCS predicted the inflow volume to be 95% of the 30-year median inflow volume of 325,000 acre-feet for the Arkansas River above Pueblo Reservoir, and 64% of the 30-year median inflow volume of 29,000 acre-feet for the Purgatoire River at Trinidad Reservoir. Actual observed native Arkansas River snowmelt runoff into Pueblo Dam with no Fryingpan-Arkansas Project contributions was 94% of NRCS's 30-year median. Actual observed snowmelt and storm runoff inflow to Trinidad Reservoir was 93% of NRCS's 30-year median.

For John Martin Dam and Reservoir, using the combined Arkansas River at Las Animas and Purgatoire River at Las Animas as the forecast flow, NWS predicted the inflow volume to be 87% of the 30-year normal inflow volume of 126,000 acre-feet. The actual observed inflow volume to John Martin Reservoir was 117% of the NWS normal. Actual operations at USACE's dams are discussed in more detail in the following sections of this report.

a. Trinidad Dam and Reservoir

For Compact Year 2023, the reservoir surface elevation started at 6,181.00 ft with storage of 18,923 acre-feet and ended at 6,178.85 ft with storage of 17,477 acre-feet, a net change of -2.15 ft in elevation and -1,446 acre-feet in storage. Storage peaked at 25,007 acre-feet (elevation of 6,189.44 ft) on 22 June 2023. Minimum storage during Compact Year 2023 occurred on 12 October 2023 when the pool reached 16,894 acre-feet (elevation 6,177.96 ft). The maximum daily inflow was 256 cubic feet per second (cfs) on 06 June 2023 and the maximum daily release was 268 cfs on 23 May 2023. The total inflow for Trinidad Reservoir was 39,695 acre-feet and total outflow was 37,911 acre-feet. USACE did not operate for flood control at Trinidad Dam and Lake in 2023. Figure 1 illustrates daily release, storage, and computed inflow to Trinidad reservoir.

Trinidad Dam and Lake - Compact Year 2023

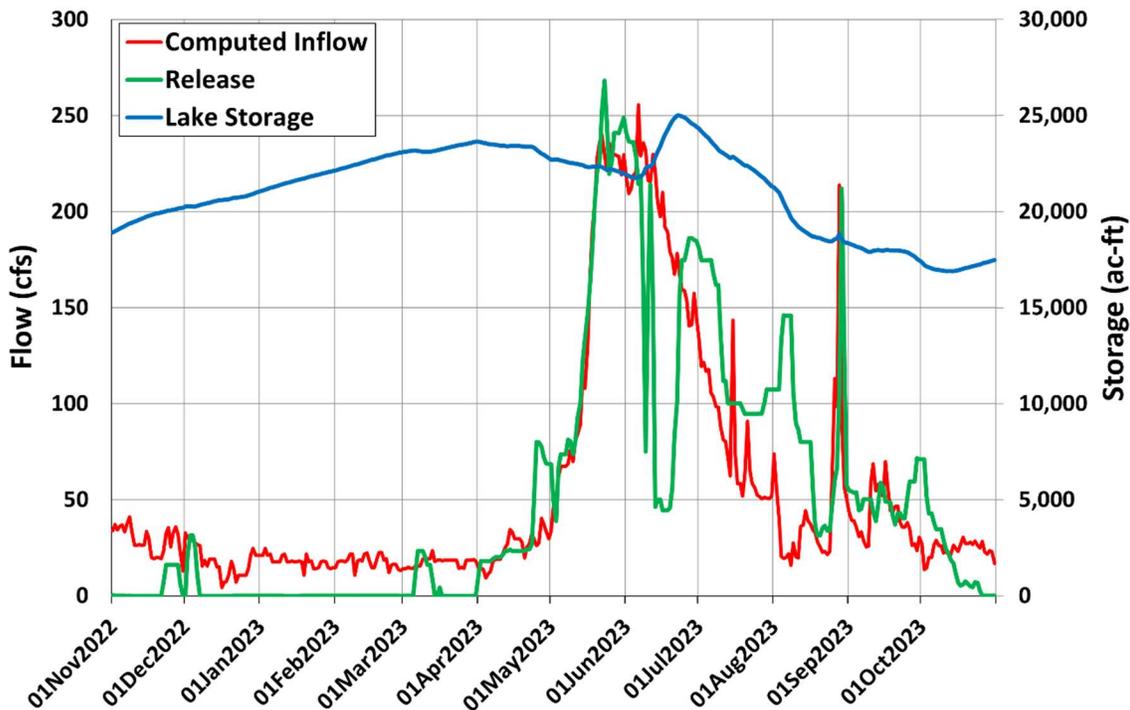


Figure 1: 2023 Trinidad Dam and Lake Water Operations

b. John Martin Dam and Reservoir

For Compact Year 2023, the John Martin Reservoir began the year at the lowest storage for the compact year at elevation 3,797.32 ft with a storage of 11,537 acre-feet and ended the compact year at elevation 3,802.42 ft with a storage of 23,003 acre-feet, a net change of 5.10 ft in elevation and 11,466 acre-feet in storage. Storage peaked at 103,481 acre-feet (elevation of 3,823.27 ft) on 23 July 2023. The maximum daily inflow was 2,878 cfs on 22 July 2023 and the maximum daily release was 1,230 cfs on 05 August 2023. The total computed inflow for John Martin Reservoir was 199,471 acre-feet and total release was 171,601 acre-feet. USACE did not operate for flood control at John Martin Dam and Reservoir in 2023. Figure 2 illustrates daily release, storage, and computed inflow to John Martin Reservoir.

John Martin Dam and Reservoir - Compact Year 2023

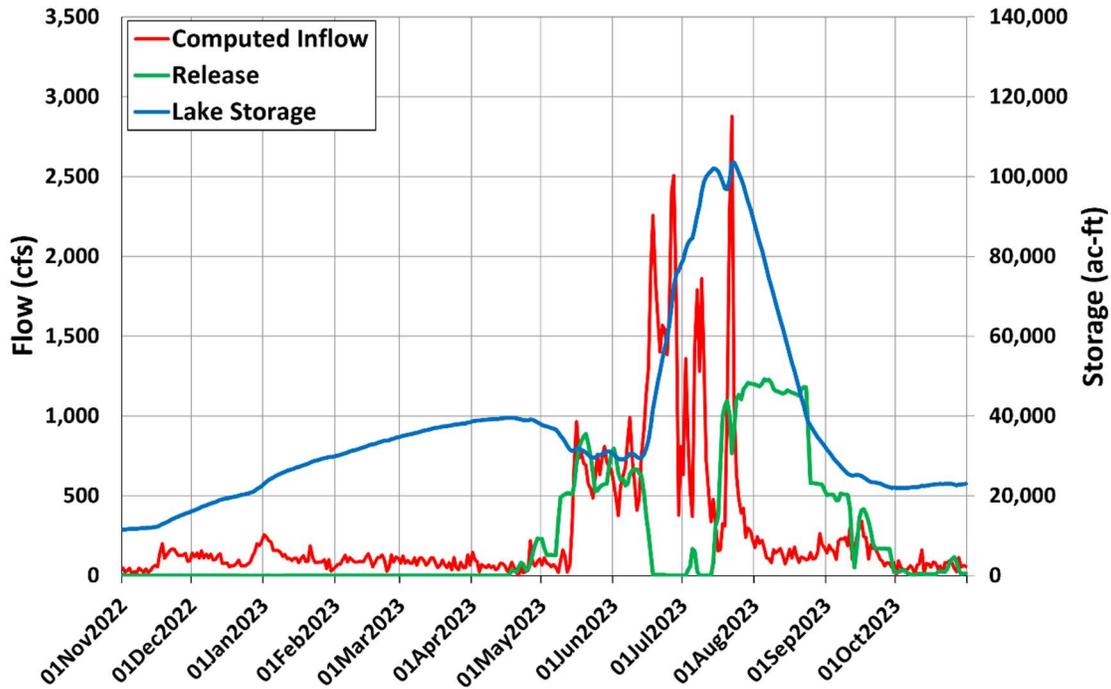


Figure 2: 2023 John Martin Dam and Reservoir Water Operations

c. May – June High Flows on Fountain Creek and the Arkansas River Mainstem

On May 11, strong storm cells occurring along Fountain Creek from Colorado Springs to the confluence with Arkansas River generated multiple storm peaks in Fountain Creek, with some as great as 5,000 cfs. When the resulting attenuated storm peaks from Fountain Creek merged with flows on the Arkansas River, reported flow at the Avondale gage peaked at about 5,090 cfs on May 12, followed by a greater peak of about 5,800 cfs on May 13. Both peaks were below the 6,000 cfs channel capacity at Avondale.

From May 13 through June 12, the Arkansas River Basin continued to receive sporadic rains. Runoff off from these rains combined with a relatively steady release from Pueblo Dam resulted in flows of between 2,200 cfs and 3,200 cfs at the Avondale gage. During this period, releases from Pueblo Dam drew the reservoir down from elevation 4,873.6 ft (216,633 acre-feet) on May 12 to elevation 4,871.2 ft (207,163 acre-feet) on June 2. The reservoir elevation remained well below the elevation 4,880.38 ft (245,373 acre-feet) top of the seasonal conservation pool during the entire period of high river flows.

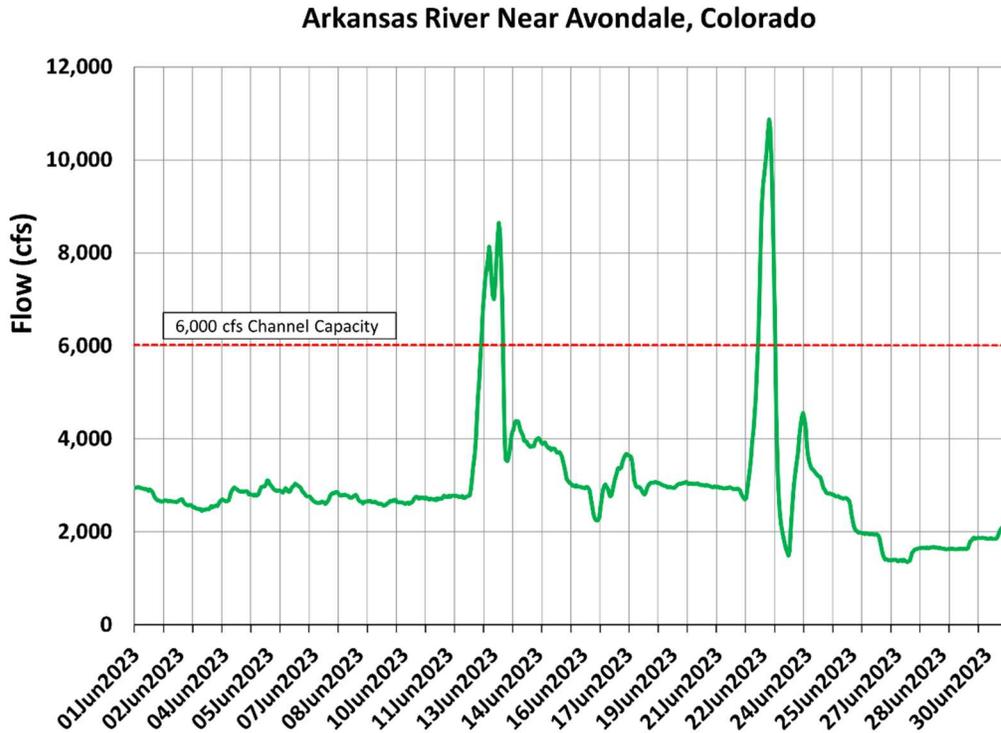


Figure 3: June 2023 Arkansas River flows near Avondale, CO

Beginning on June 11, a stronger storm system developed in the Arkansas Basin and the Fountain Creek watershed experienced heavy rain events on June 12. As much as 5 inches of cumulative precipitation fell in the vicinity of Colorado Springs between June 11 and June 13, while the City of Pueblo received a cumulative total of around 1 inch of precipitation. Runoff from these storms resulted in short duration flow peaks ranging from 6,000 cfs to 12,000 cfs along Fountain Creek. In response to these high peaks on Fountain Creek, Pueblo Dam releases to the Arkansas River were lowered to about 1,420 cfs for two hours on the afternoon of June 12, and then down to about 85 cfs from around midnight on June 12 until about 4 pm on June 13. As the Fountain Creek storm runoff passed through the Avondale gage, flow exceeded the 6,000 cfs channel capacity for about 18 hours between 4 am and 10 pm on June 13. Recorded flows at the Avondale gage peaked at about 8,730 cfs during the evening of June 13 before dropping back to a baseflow of around 3,500 cfs. Since reservoir storage in Pueblo Dam was well below the top of the seasonal conservation pool during this period, releases were directed by the State of Colorado. June 2023 rivers flow at the Arkansas River near Avondale, CO gage is shown in Figure 3.

For the next nine days, flows at the Avondale gage were between about 2,200 cfs and 4,400 cfs as smaller storms occurred and Pueblo Dam releases were regulated as needed. Then on June 22, strong storm cells returned to the Fountain Creek watershed and a 24,500 cfs storm peak was recorded at the Pinon gage. Pueblo Dam releases were reduced from about 2,200 cfs to about 60 cfs from 10 am on June 22 to 11 am on June 23. As the Fountain Creek storm peaks passed through the Avondale gage, recorded flows peaked at nearly 11,000 cfs. Flows exceeded the 6,000 cfs channel capacity for about 14 hours from 4 pm on June 22 to about 7 am on June 23. As in earlier high flow events at Avondale, Pueblo Dam reservoir storage remained well below the top of the seasonal conservation pool during this period, and releases were directed by the State of Colorado.

These high flow events recorded at the Avondale gage and downstream of the gage to John Martin Reservoir did not cause any significant flooding along the Arkansas River.

d. Water Quality

USACE continued the water quality monitoring program in the Arkansas Basin during Compact Year 2023. Project staff have been collecting monthly water quality data from USACE reservoirs since 2012, which is forwarded to environmental staff in USACE's Albuquerque District Office for review and entry into the water quality database. At the locations shown below within Trinidad Reservoir and John Martin Reservoir (Figures 4 & 5), staff collect surface measurements of turbidity, pH, specific conductance, and Secchi depth. Data on temperature and dissolved oxygen are collected through vertical profiles through the water column, and zebra and quagga mussel monitoring typically occurs from June through October.

The Albuquerque District entered into cooperative agreements to install riverine water quality stations upstream and downstream of Trinidad Reservoir and John Martin Reservoir at the locations indicated by red dots in Figures 3 and 4 during Compact Year 2020. These sites will collect data on water temperature, dissolved oxygen, turbidity, pH, and specific conductance at 15-minute intervals. Sampling for total suspended sediment will be completed monthly at these riverine stations. Monitoring at most of these riverine stations began in July and August of 2020, and this project is currently funded to provide riverine monitoring through 2025. During compact year 2023 data was collected at all water quality sites, however there were issues with specific conductivity at upstream Trinidad (Madrid Gauge), as the port which holds the sensor malfunctioned as discussed below.

The primary goals of this expanded water quality monitoring program are to identify seasonal and other trends in streamflow and reservoir water quality, and to help assess the impacts of Trinidad Lake and John Martin Reservoir on the Purgatoire and Arkansas Rivers. The program will also generate and disseminate reviewed real-time and high-

frequency water quality data and determine the suitability of using turbidity and streamflow records to calculate high-frequency suspended sediment concentrations and loads upstream and downstream of the reservoirs. The data collected through this program will be reviewed and compiled into a database that will be available through the Albuquerque District Water Management Section. Data requests can be sent to Christopher McGibbon.

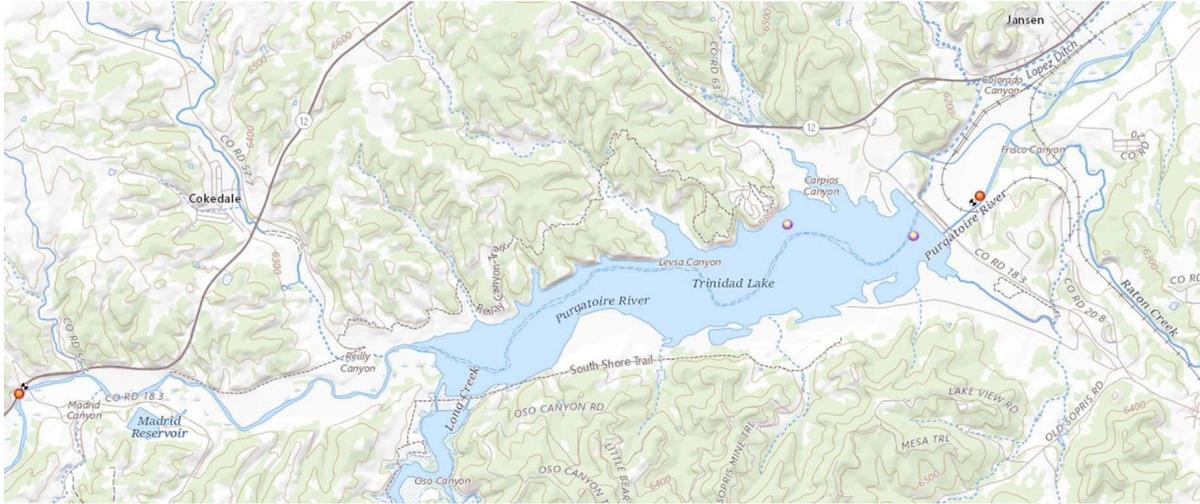


Figure 4: Water Quality monitoring stations at Trinidad Dam and Lake



Figure 5: Water Quality monitoring stations at John Martin Dam and Reservoir

Figures 6 and 7 show specific conductance compared to river flows for water year 2023 at locations above and below both Trinidad Lake and John Martin Reservoir. The plots also include a variety of crop threshold values. In water year 2023, the specific conductance at Trinidad dam contains less dissolved salt and minerals, as the majority of flows come from snowmelt and rainfall. The data gap from mid-May onward is related

to a faulty sensor port. This led to intermittent inaccurate data, which wasn't noticed upon initial inspection during calibration. Due issues accessing the Aquarius server, the data was not uploaded in the regular timeframe which did not become apparent until the end of year. John Martin data exhibits higher specific conductance due to dry conditions throughout the basin. During wet years it is expected that the specific conductance would be lower than measured during water year 2023.

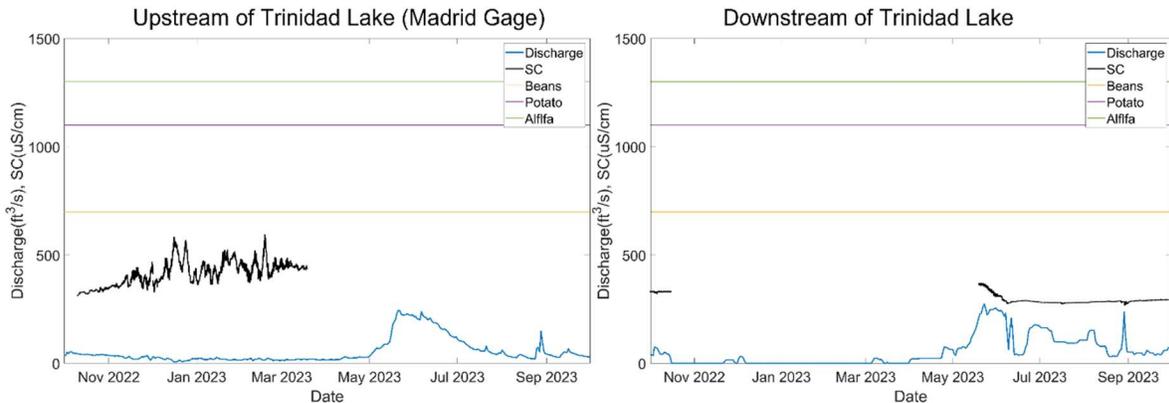


Figure 6: Water Quality monitoring data at Trinidad Dam and Lake

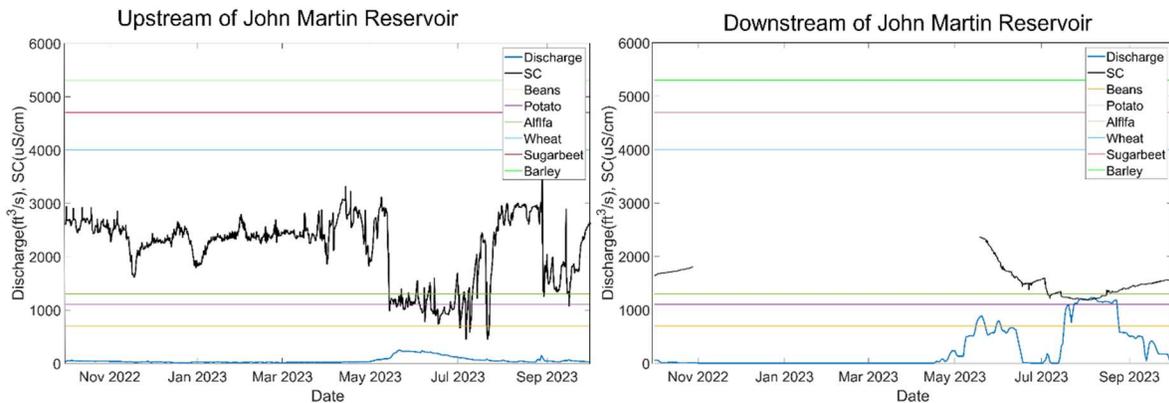


Figure 7: Water Quality monitoring data at John Martin Dam and Reservoir

3. Operations and Maintenance

a. Trinidad Dam and Lake

Several projects were completed and contracts for future work were awarded at Trinidad Dam and Lake during 2023 as described below:

- a. The Project Delivery Team was established for the Bipartisan Infrastructure Project, Upstream Dam Slope Riprap. Partial funds were received in 2023 with additional funds anticipated to be received in FY24. Award of the contract is expected to occur in early 2024.

- b. Stationing signs along the dam crest road were installed.
- c. A surge protector was installed for the gate chamber tower elevator.
- d. Repairs to the platform bridge leading to the gate chamber tower were completed (Figure 8).
- e. Arc flash inspections were conducted throughout the entire project.



Figure 8: Repairing the platform bridge at Trinidad Dam.

b. John Martin Dam and Reservoir

John Martin Dam and Reservoir celebrated its 75th Anniversary on 21 October 2023. Over 1,000 visitors were in attendance onsite where food vendors, fishing derbies, disc golf tournaments, corn hole tournaments, dam tours and fireworks were available to the community. The celebration acknowledged the cooperative efforts of the many stakeholders and partners, including ARCA, that have worked with and supported the John Martin Project over the last 75 years. These efforts have been vital in helping

USACE with execution of the project's mission objectives, including Flood Risk Management, Irrigation, Recreation and Environmental Stewardship.

During 2023, several operations and maintenance projects were completed and contracts for future work were awarded at John Martin Dam and Reservoir as described below:

- a. John Martin Dredge, Stops, and Seals Repair Contract was awarded 18 April 2023. The construction of the confined disposal facility (CDF) site is complete and dredge operations are underway. Dive operations are scheduled to commence at the end of November 2023, with an estimated completion date of 30 March 2024.
- b. Crane Repair Contract for the yard and dam cranes was awarded in September of 2022, and work on this project is proceeding.
- c. John Martin Spillway Bridge Deck Repair Contract was awarded in July 2023, and work was completed 17 October 23.
- d. Contract for the John Martin Sump Pump Replacements for both the north and south sump pumps was awarded in August 2023. Work is scheduled to begin in December 2023.
- e. John Martin staff scraped, sanded, and painted all bonnets over the gate stems and constructed and installed corrosion barriers over the piping along the galley walls within the dam.



Figure 9: Dredging within John Martin Reservoir

4. Civil Works

a. Continuing Authorities Program

The Continuing Authorities Program (CAP) is a group of nine legislative authorities under which the Secretary of the Army, acting through the Chief of Engineers, is authorized to plan, design, and implement certain types of water resources projects without additional project-specific congressional authorization. USACE had one active CAP projects in the Arkansas River Basin in 2023.

Section 205

Section 205 of the 1948 Flood Control Act, as amended, provides authority to USACE to plan and construct small flood damage reduction projects that have not been specifically authorized by Congress. USACE had no active Section 205 projects in the Arkansas River Basin in 2023.

Section 206 Ecosystem Restoration

Section 206 of Water Resources Development Act (WRDA) 1996 provides authority to USACE for aquatic ecosystem restoration projects in areas unrelated to existing USACE water projects. Section 206 projects must improve the environmental quality of the environment, be in the public interest, demonstrate cost effectiveness.

Spring Creek Section 206 Ecosystem Restoration Project

In cooperation with the Sponsor, the City of Colorado Springs, the proposed project will restore a wetland and bird sanctuary formerly managed by the Audubon Society. The project site is located along Spring Creek in Colorado Springs. Stream channel incision and morphological changes resulted in the degraded wetland. Structural and non-structural means will be used to restore the wetland habitat and improve stream channel function and stability. The project was determined to have a federal interest in September of 2021 and the USACE and Colorado Springs entered into a feasibility cost share agreement (50/50%) and began the feasibility study in July 2022. The feasibility study is expected to take 2-3 years to complete. If the results of the feasibility study determines that there is an efficient and effective alternative in the public interest, then the project will move into the implementation and construction phase that will have a 65% federal and 35% non-federal cost share.

Section 14

Section 14 of the 1946 Flood Control Act, as amended, provides authority for USACE to plan and construct emergency stream bank protection projects to protect endangered highways, highway bridge approaches, public facilities such as water and sewer lines, churches, public and private nonprofit schools and hospitals, and other nonprofit public facilities. There are no active Section 14 projects in the Arkansas River Basin in 2023.

Section 1135

Section 1135 of the Water Resource Development Act of 1986, as amended, provides authority to USACE to modify structures and operations of water resources projects constructed by the Corps for the purpose of improving the quality of the environment. Restoration projects can also occur at locations where an existing Corps project contributed to the degradation of the environment. There were no active Section 1135 projects in the Arkansas River Basin in 2023.

b. Investigations Program

The USACE Investigations Program includes specifically authorized studies for comprehensive solutions to large complex problems relating to flooding, ecosystem restoration, loss of land and property, floodplain management, and watershed planning and analysis. The Investigations program consists of two phases: the feasibility study phase, and the pre-construction engineering and design (PED) phase. The feasibility study is used to investigate the Federal interest, engineering feasibility, economic justification and environmental acceptability of a recommended water resources project, and results in a feasibility report. The feasibility report is the document on which congressional authorization for PED and Construction is based. During the preconstruction engineering and design phase, development of the first construction contract bidding package can be completed while waiting for congressional construction authorization. If the project is authorized for construction by Congress, USACE and the project sponsor can move forward with the remaining detailed design and construction. USACE had no active Investigations or Construction projects in the Arkansas River Basin in 2023.

5. Flood Risk Management Program

USACE established the National Flood Risk Management Program (FRMP) in May 2006 to integrate and synchronize USACE activities, both internally and with counterpart activities of the Department of Homeland Security, Federal Emergency Management Agency (FEMA), other Federal agencies, state organizations, and regional and local partners and stakeholders. The USACE Levee Safety Program was authorized in WRDA 2007 and established by the National Levee Safety Act of 2007. The Inspection of Completed Works/Rehabilitation Program (ICW/RP) is the USACE program that provides for the inspection and rehabilitation of Federal and non-Federal flood risk management projects within the ICW/RP (PL8499).

For 2023, no active projects in the ICW/RP were removed from the program based on inspection. In 2023, four formal inspections of levee systems were performed within the watershed. Those inspections were Templeton Gap North and South, and Pueblo East and West levees. Formal inspections are currently under review and will be signed and approved within the National Levee Database (NLD) when completed. Templeton Gap

levees will have a second-round risk assessments perform when the formal inspection is completed. Initial levee risk screenings have been performed and their risk characterizations are approved USACE headquarter for all, except one, USACE constructed levees in the Arkansas watershed. Levee system risk characterizations have been published to the National Levee Database. The one exception is the Pueblo Arkansas River Levee Extension, which ties into Pueblo Arkansas River Levee which is currently finalizing rehabilitation of the levee. Initial risk screening will be completed after rehabilitation is finalized.

The NLD is used to track both USACE and Non-USACE levee system inventory and other flood risk management features (Figure 10). The NLD is viewable to the public through the following internet link; <https://levees.sec.usace.army.mil/#/>. The database contains pertinent information (length, height, crest width, etc.) concerning levee systems as well as flooding risk information for the systems. The database viewer uses both an interactive text search and graphical search functions to locate levee systems of interest.

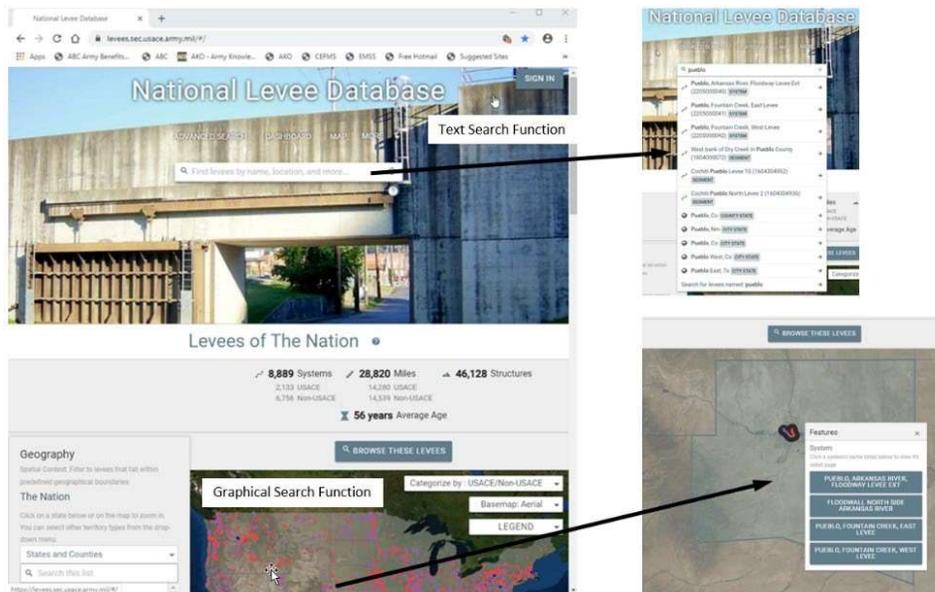


Figure 10: National Levee Database search functions

An additional component of FRMP is the Silver Jackets Program, which is part of the National Flood Risk Management Program. The Silver Jackets Program proposes establishing an interagency team in each state with a representative from FEMA, USACE, the State National Flood Insurance Program Coordination Office, and the State Hazard Mitigation Office as standing members and lead facilitators. The lead FRMP Manager for the formation of the Silver Jackets Program in Colorado and the Arkansas River Basin resides in the USACE Omaha District, and the Albuquerque District performs a support role.

The Colorado Silver Jackets team was officially created in 2013. The team consists of four USACE Districts that include the Sacramento, Albuquerque, Kansas City, and Omaha Districts, with the lead Silver Jackets coordinator sitting in the Omaha District. The State of Colorado is represented by the Colorado Water Conservation Board, the Colorado Division of Water Resources, Dam Safety Program, and the Colorado Department of Transportation. FEMA Region 8 is also part of the State Silver Jackets team.

Two previous activities were concluded in the Arkansas River basin under the Colorado Silver Jackets program. These were related to the 2018 Spring Creek fire which was the single largest disaster for Huerfano County and the third largest wildfire in Colorado history. The purpose of the projects was to improve existing post-wildfire hydrology modeling, develop a community action plan, and develop a tabletop exercise. The development of the improvements to the hydrologic analysis for the Spring Fire in the community of La Veta, Colorado was completed and given to the local agencies and others to use in mitigation and future planning efforts. The La Veta Post Wildfire Community Action Plan Tabletop exercise was conducted in February/March 2023 and was attended by local officials, emergency agencies, and others involved with these types of exercises.

The Flood After Fire Training for the Regional Southwest Wildfire is a half-day interactive workshop that walks through modules for mitigation, preparation and training, response, and recovery. The training brings together emergency managers, stakeholders, community members, and federal/state/local governments, to simulate the resource personnel that interact during emergencies. Each module allows the group to practice interpreting and responding to scenarios to reduce flood risk by protecting lives, property, and infrastructure. The training is complete in PowerPoint presentation versions and is being advertised to gain community interest, it is also being integrated into a video format by the USACE Risk Management Center (RMC) for ease of use.

6. Regulatory Program

USACE has regulatory authority under Section 404 of the Clean Water Act for the discharge of dredged or fill material into waters of the United States. The Albuquerque District, Southern Colorado Office (SCO) has finalized a total of 71 regulatory actions in the Arkansas River Basin during Compact Year 2023, including the verification of 66 general permits, resolved 7 unauthorized and 3 non-compliance activities, modified 2 Standard Individual Permits, determined that 9 activities did not require a permit, and conducted 19 compliance evaluations. General permits are activity-specific permits that are used to authorize projects that result in minimal adverse impacts on the aquatic environment. Standard Individual Permits are required for activities having more than minimal adverse impacts and/or for activities that do not meet the terms and conditions of a general permit.

Persons or agencies who are planning to conduct work in any waterway in the basin are advised to contact SCO at 201 W 8th Street, Suite 350, Pueblo, Colorado 81003, email at CESPA-RD-CO@usace.army.mil, or telephone 719-744-9119. Information, including all public notices, is also available on the USACE Albuquerque District web page at: <https://www.spa.usace.army.mil/Missions/Regulatory-Program-and-Permits/>.

7. Emergency Management Coordination

Public Law 84-99 provides USACE with the authority to assist state and local governments before, during, and after flood events. In the Arkansas River Basin, USACE works with the State of Colorado Division of Homeland Security and Emergency Management and the National Weather Service, in Pueblo Colorado to prepare for flood fight activities in years with significant snowpack and spring snowmelt runoff. Omaha District is the lead for FEMA Missions that may develop within Colorado and coordinates support with Albuquerque District Emergency Management.

Assistance can be obtained by contacting the Albuquerque District, U.S. Army Corps of Engineers, Emergency Management Branch, 4101 Jefferson Plaza NE, Albuquerque, New Mexico 87109, or telephone 505-342-3686 during our normal business hours between 7 am and 4 pm, weekdays.