

# Arkansas River Basin



US Army Corps  
of Engineers®  
Albuquerque District

## 2022 Water Management and Civil Works Activities

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## 1. General

During Compact Year 2022 (1 November 2021 – 31 October 2022), activities of the U.S. Army Corps of Engineers (USACE), Albuquerque District, in the Arkansas River Basin consisted of water management, operations and maintenance, civil works, flood risk management, compliance with Section 404 of the Clean Water Act, and post wildfire flooding concerns.

## 2. Water Management Operations

In 2022, the Arkansas River Basin snowmelt forecast was well below normal throughout much of the basin. As of May 1<sup>st</sup>, the overall basin wide snowpack was reported as below average at 66% of median. The Upper Arkansas Basin reported 74% of median, the Cucharas and Huerfano basins reported 29% of median, the Apishapa Basin reported 66% of median, and the Purgatoire River Basin reported 37% of the median snowpack.

Table 1 compares the Natural Resources Conservation Service's (NRCS) forecast runoff to the actual measured runoff. The NRCS May 1<sup>st</sup> forecast predicted streamflow to be 77% of average for the Arkansas River above Pueblo Reservoir, and 39% of median for the Purgatoire River at Trinidad Reservoir. Actual observed snowmelt runoff (native) inflow to Pueblo Reservoir was 55% of the 30-year median used by NRCS, actual observed snowmelt and storm runoff inflow to Trinidad Reservoir was 17% of the 30-year median, and actual observed snowmelt runoff inflow to John Martin Reservoir was 36% of median.

**Table 1. May 1, 2022, NRCS/NWS Forecast and Actual Runoff**

Arkansas River Basin May 1 <sup>st</sup> Most Probable Snowmelt Runoff Forecast (50% Exceedance)				
Measurement Location	Snowmelt Runoff (x 1,000 Acre-Feet)		Percent of Median	
	May Forecast	Actual	May Forecast	Actual
Arkansas River above Pueblo (April – July)	250	177.5 <sup>1</sup>	77%	55%
Purgatoire River at Trinidad (April – July)	10	7 <sup>2</sup>	34%	24%
John Martin Dam and Reservoir (April – July)	82.4 <sup>3</sup>	60.75 <sup>2</sup>	65% <sup>3</sup>	48%

<sup>1</sup> Data Source: Colorado Division Water Resources

<sup>2</sup> Data Source: U.S. Army Corps of Engineers

<sup>3</sup> National Weather Service inflow forecast for Arkansas at Las Animas

### a. Trinidad Dam and Reservoir

For Compact Year 2022, the reservoir surface elevation started at 6,183 ft with storage of 20,247 acre-feet and ended at 6,181 ft with storage of 18,825 acre-feet, a net change of -2 ft in elevation and -1,420 acre-feet in storage. Storage peaked at 24,160 acre-feet (elevation of 6,188.33 ft) on 2 April 2022. The maximum daily inflow was 208 cubic feet per second (cfs) on 23 May 2022 and the maximum daily release was 1175.5 cfs on 04 August 2022. The total inflow for Trinidad Reservoir was 30,660 acre-feet and total outflow was 29,430 acre-feet. Figure 1 illustrates daily release, storage and computed inflow to Trinidad reservoir.

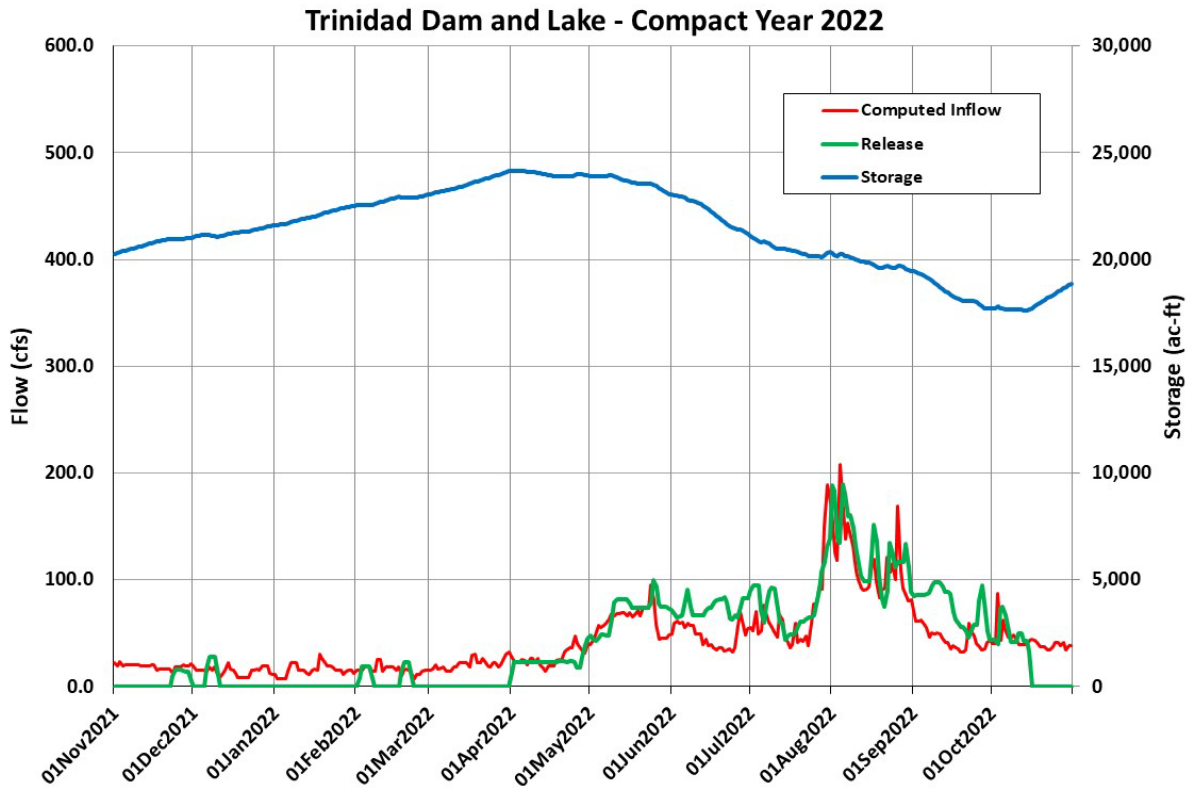
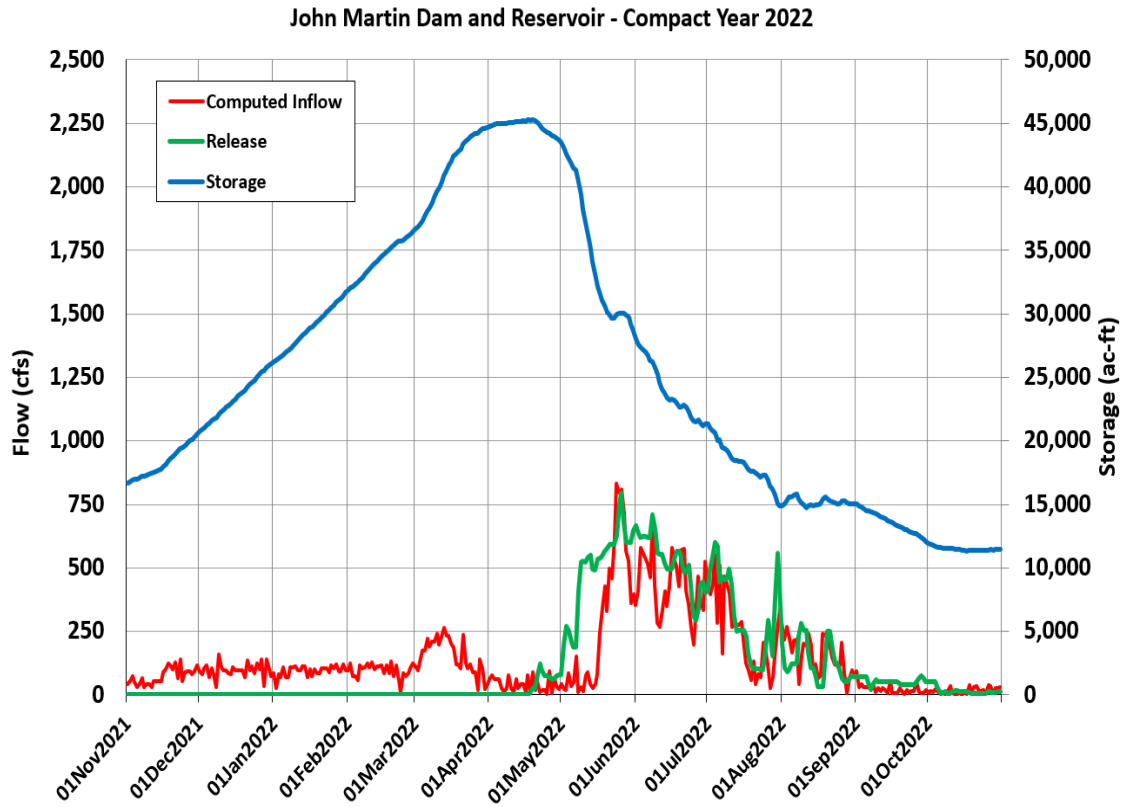


Figure 1: 2022 Trinidad Dam and Lake Water Operations

### b. John Martin Dam and Reservoir

For Compact Year 2022, the reservoir surface elevation started at 3,799.77 ft with storage of 16,658 acre-feet and ended at 3,797.29 ft with storage of 11,480 acre-feet, a net change of -2.48 ft in elevation and -5,178 acre-feet in storage. Storage peaked at 45,256 acre-feet (elevation of 3,810.02 ft) on 17 April 2022. The maximum daily inflow was 833 cfs on 24 May 2022 and the maximum daily release was 793 cfs on 26 May 2022. The total computed inflow for John Martin Reservoir was 103,740 acre-feet

and total release was 95,420 acre-feet. USACE did not operate for flood control at John Martin Dam and Reservoir in 2022. Figure 2 illustrates daily release, storage and computed inflow to John Martin Reservoir.



**Figure 2: 2022 John Martin Dam and Reservoir Water Operations**

**c. Water Quality**

USACE continued water quality monitoring program in Compact Year 2022. 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 3 & 4), staff collect surface measurements of turbidity, pH, and specific conductance, as well as 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.

In Compact Year 2020, 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 (Figures 3 & 4). These sites will collect data on water temperature, dissolved oxygen, turbidity, pH, and specific conductance at 15-minute intervals. Total suspended sediment and sampling

of anions and cations 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 2022 data was collected at all water quality sites.

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 Reservoir 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 Justin Reale.



**Figure 3: Water Quality monitoring stations at Trinidad Dam and Reservoir**

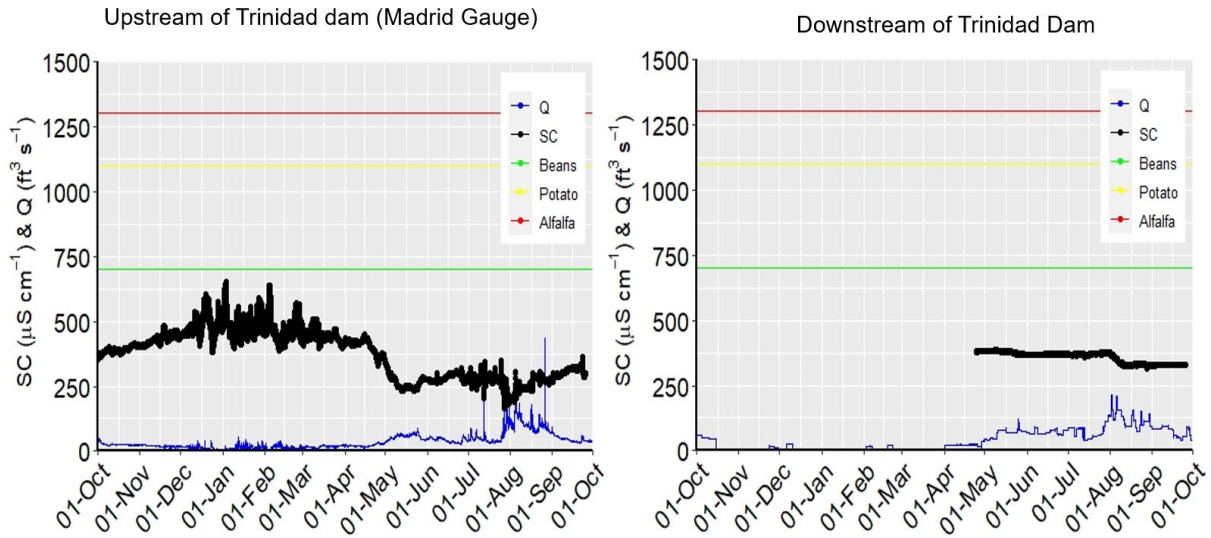


**Figure 4: Water Quality monitoring stations at John Martin Dam and Reservoir**

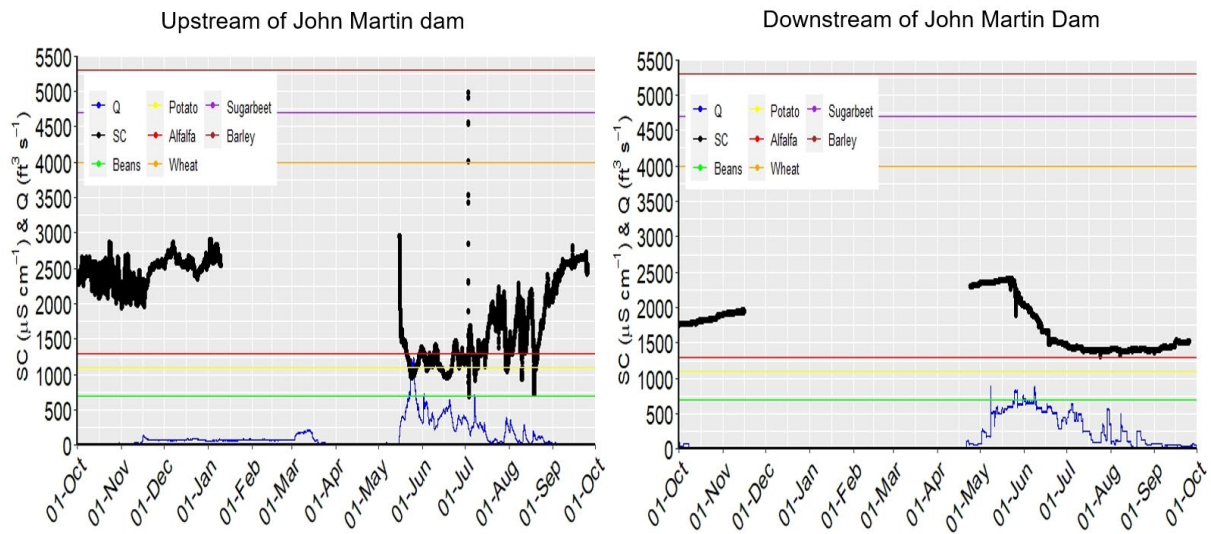
Figures 5 and 6 show specific conductance compared to river flows for water year 2022 above and below both Trinidad and John Martin Dams. The plots also include crop threshold values for a variety of crops. In water year 2022, the specific conductance at



Trinidad dam contains much less dissolved salt and minerals, because the majority of the flows come from snowmelt and rainfall. At John Martin, flows exhibit higher specific conductance due to dry conditions throughout the basin. The lack of data upstream of John Martin at the end of the year was due to harsh redox reactions that damaged two of the sensors. During wet years it is expected that the specific conductance would be lower than water year 2022.



**Figure 5: Water Quality monitoring data at Trinidad Dam**



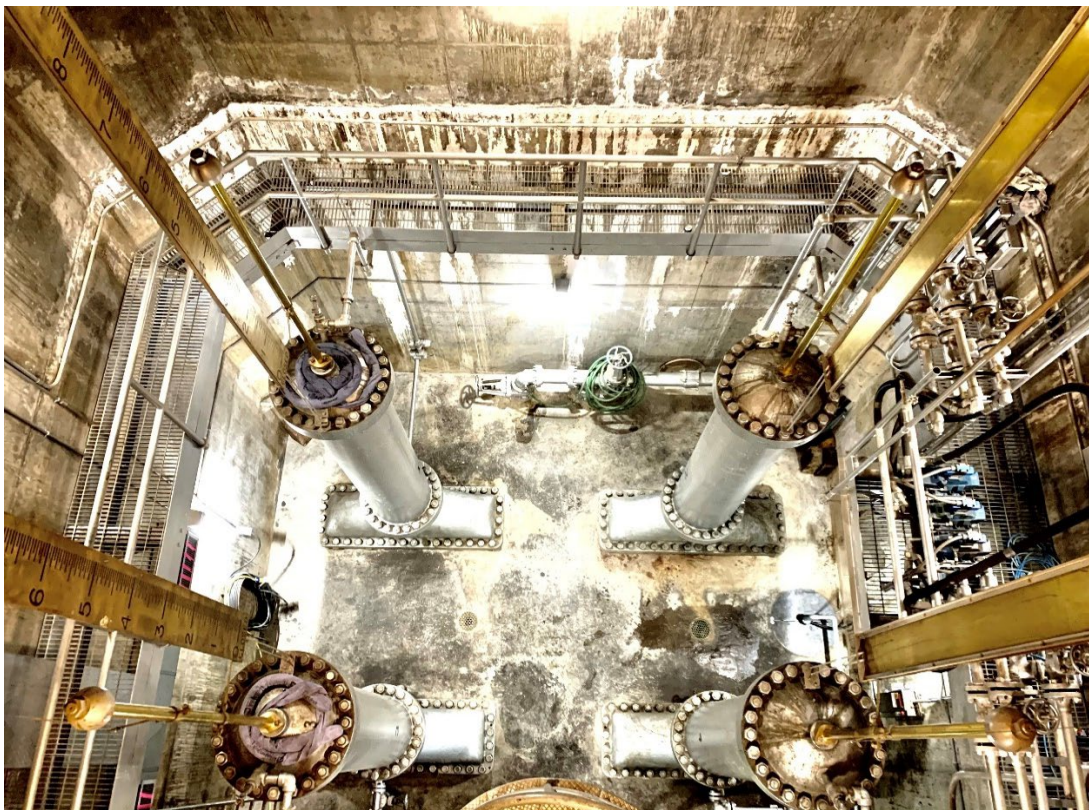
**Figure 6: Water Quality monitoring data at John Martin Dam and Reservoir**

### **3. Operations and Maintenance**

#### **a. Trinidad Dam and Reservoir**

During 2022, several projects were completed and/or awarded at Trinidad Dam and Reservoir as described below:

- a. A contract was awarded to replace the sump pump in the dam tower. The existing sump pump, while still functional, is original to the project and repair parts are no longer readily available. Installation of the new system, which also includes a high-water alarm, was completed in 2022
- b. A contract was awarded in 2021 to replace the packing glands on the two service and two emergency gates. The work was completed in 2022.
- c. Windows in the administrative building were replaced because of positive findings of asbestos.
- d. A heater for the dam tower was installed in September 2022.
- e. Periodic Inspection No.13 was performed on 29 June 2022.
- f. Stationing signs for the dam crest road were purchased and locations were marked in the field. Mounting of the signs is anticipated in 2023.



***Figure 7: New sump pumps at Trinidad Dam. New packing glands were also installed.***

## **b. John Martin Dam and Reservoir**

During 2022, operations and maintenance projects were completed at John Martin Dam and Reservoir as described below:

- a. Significant troubleshooting and repairs were made to the sump pumps on the north end of the grouting gallery. Additional repairs to the sump system were made in 2022 to prevent accumulation of water within the gallery when the pool elevation is high.
- b. Vibrating wire piezometers were installed at three key monoliths and directed both upstream and downstream of the dam. This effort involved drilling into the monoliths from the operating gallery and then barge drilling in the reservoir (Figure 8).
- c. Bulk samples were taken upstream of the dam in the proposed area of the confined disposal facility (CDF) to assist with the design of the dredging project.
- d. Bulkhead storage racks and cover structures were constructed.
- e. Fort Lyon Toe Drain Extension project was completed. This project involved constructing a seepage berm and installing new collector pipes on the landside of the levee.
- f. Common operations and maintenance (O&M) items were conducted according to prescribed schedules.



**Figure 8: Vibrating Wire Piezometers installed in the operating gallery of John Martin Dam.**

## **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 2022.

#### 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 2022.

#### 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 2022.

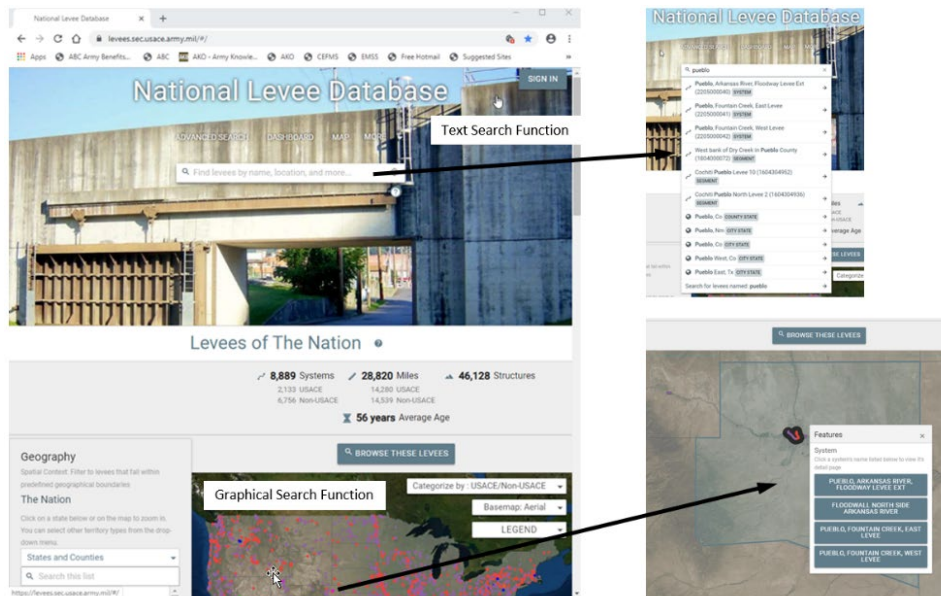
## **b. Investigations Program**

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 pre-construction 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 2022.

## **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 2022, no active projects in the ICW/RP were removed from the program based on inspection. Additionally, initial levee risk screenings have been performed and their risk characterizations HQ approved 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 National Levee Database (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 9: 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. There were several projects in Colorado including the development of a follow up hydrologic analysis for the Spring Fire in the community of La Veta, Colorado, as well as near completion of a Flood After Fire for the Regional Southwest that will be used by communities susceptible to wildfire risk in regions of the Southwest.

The La Veta Post Wildfire Community Action Plan is on track for completion in FY 23. The 2018 Spring Creek fire was the single largest disaster for Huerfano County (the County), and the third largest wildfire in Colorado history. The purpose of the project is to improve existing post-wildfire hydrology modeling, develop a community action plan, and develop a tabletop exercise.

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) reviewed a total of 71 activities in the Arkansas River Basin during Compact Year 2022, including 51 activities authorized under general (Regional or Nationwide) permits, 5 activities authorized under a Standard Individual Permit, and 15 activities that did not require a permit. 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 8<sup>th</sup> Street, Suite 350, Pueblo, Colorado 81003, email at [CESPA-RD-CO@usace.army.mil](mailto: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.

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.