

Arkansas River Basin



US Army Corps
of Engineers®
Albuquerque District

2021 Water Management and Civil Works Activities

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Contents

1. General	1
2. Water Management Operations	1
a. Trinidad Dam and Reservoir.....	2
b. John Martin Dam and Reservoir	2
c. Water Quality	3
3. Operations and Maintenance	5
a. Trinidad Dam and Reservoir.....	5
b. John Martin Dam and Reservoir	6
4. Civil Works	7
a. Continuing Authorities Program.....	7
b. Investigations Program.....	8
5. Flood Risk Management Program.....	8
6. Regulatory Program	10
7. Emergency Management Coordination.....	10

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1. General

During Compact Year 2021 (1 November 2020 – 31 October 2021), 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 2021, the Arkansas River Basin snowmelt forecast was well below normal throughout much of the basin. As of May 1st, the overall basin wide snowpack was reported as below average at 76% of median. The Upper Arkansas Basin reported 78% of median, the Cucharas and Huerfano basins reported 78% of median, the Apishapa Basin reported 98% of median, and the Purgatoire River Basin reported 82% of the median snowpack.

Table 1 compares the Natural Resources Conservation Service's (NRCS) forecast runoff to the actual measured runoff. The NRCS May 1st forecast predicted streamflow to be 69% of average for the Arkansas River above Pueblo Reservoir, and 68% of average for the Purgatoire River at Trinidad Reservoir. Actual observed snowmelt runoff (native) inflow to Pueblo Reservoir was 49% of the 30-year average used by NRCS, actual observed snowmelt and storm runoff inflow to Trinidad Reservoir was 125% of the 30-year average, and actual observed snowmelt runoff inflow to John Martin Reservoir was 51% of average.

Table 1. May 1, 2021, NRCS/NWS Forecast and Actual Runoff

Arkansas River Basin May 1 st Most Probable Snowmelt Runoff Forecast (50% Exceedance)				
Measurement Location	Snowmelt Runoff (x 1,000 Acre-Feet)		Percent of Average	
	May Forecast	Actual	May Forecast	Actual
Arkansas River above Pueblo (April – July)	250	176.8 ¹	69%	49%
Purgatoire River at Trinidad (March – July)	25	46.3 ²	68%	125%
John Martin Dam and Reservoir (April – July)	89 ³	87.0 ²	52% ³	51%

¹ Data Source: Colorado Division Water Resources

² Data Source: U.S. Army Corps of Engineers

³ National Weather Service inflow forecast for John Martin Dam and Reservoir

a. Trinidad Dam and Reservoir

For Compact Year 2021, the reservoir surface elevation started at 6,176 ft with storage of 15,549 acre-feet and ended at 6,183 ft with storage of 20,226 acre-feet, a net change of +7 ft in elevation and +4,677 acre-feet in storage. Storage peaked at 31,264 acre-feet (elevation of 6,197.03 ft) on 6 June 2021. The maximum daily inflow was 2,553.5 cubic feet per second (cfs) on 23 May 2021 and the maximum daily release was 1175.5 cfs on 25 May 2021. The total inflow for Trinidad Reservoir was 58,007 acre-feet and total outflow was 50,582 acre-feet. During the 22-23 May 2021 rainstorm event, dam releases were reduced to prevent downstream flooding. Figure 1 illustrates daily release, storage and computed inflow to Trinidad reservoir.

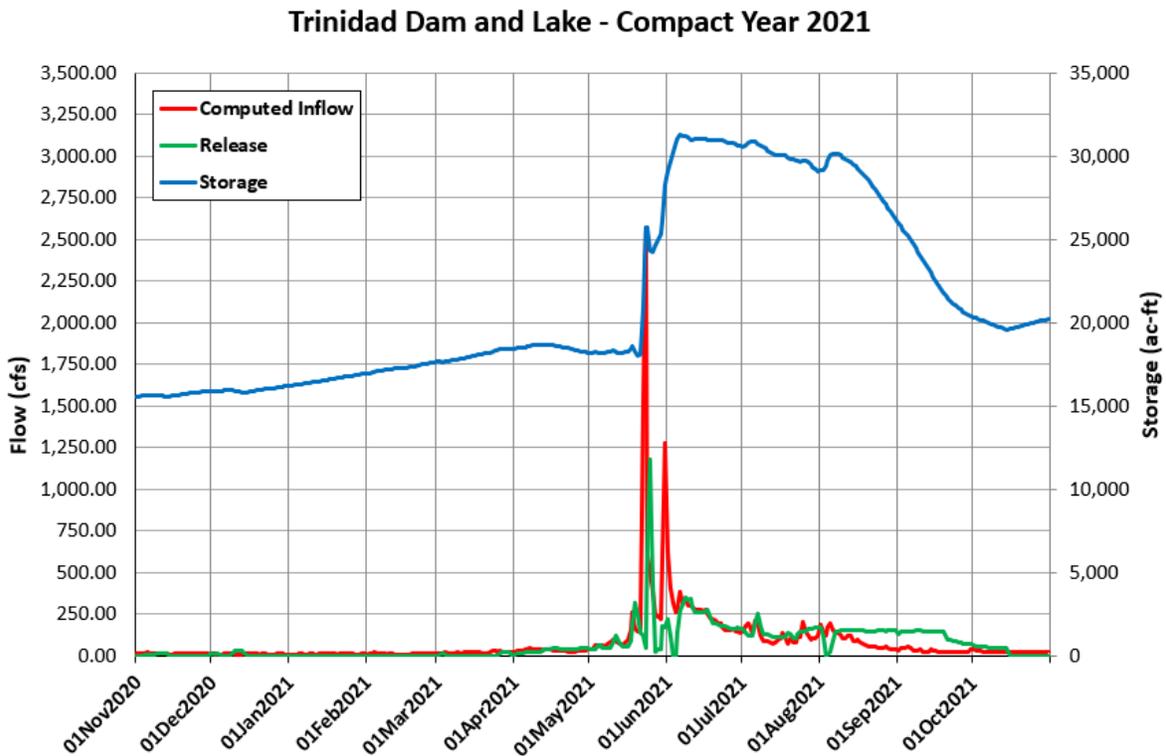


Figure 1: 2021 Trinidad Dam and Reservoir Water Operations

b. John Martin Dam and Reservoir

For Compact Year 2021, the reservoir surface elevation started at 3,806.43 ft with storage of 33,919 acre-feet and ended at 3,799.76 ft with storage of 16,590 acre-feet, a net change of -6.67 ft in elevation and -17,329 acre-feet in storage. Storage peaked at 70,260 acre-feet (elevation of 3,816.55 ft) on 4 June 2021. The maximum daily inflow was 2,067 cfs on 30 May 2021 and the maximum daily release was 1,061 cfs on 6 July 2021. The total computed inflow for John Martin Reservoir was 143,170 acre-feet and total release was 145,410 acre-feet. USACE did not operate for flood control at John

Martin Dam and Reservoir in 2021. Figure 2 illustrates daily release, storage and computed inflow to John Martin Reservoir.

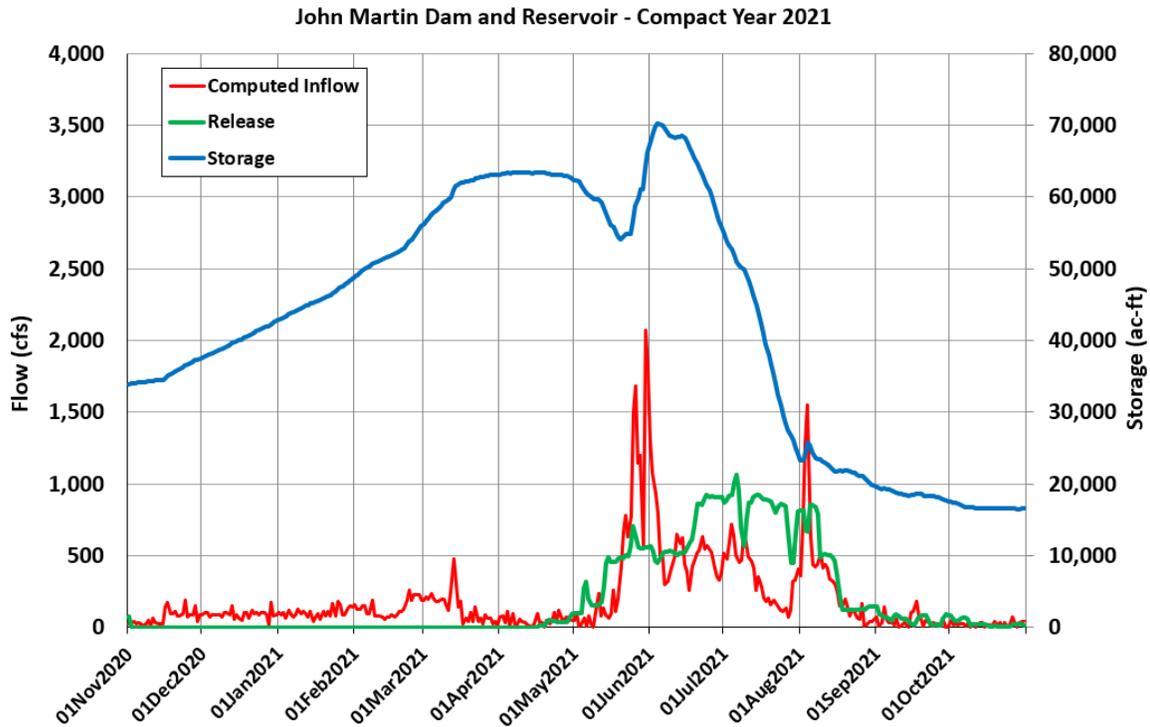


Figure 2: 2021 John Martin Dam and Reservoir Water Operations

c. Water Quality

USACE continued water quality monitoring program in Compact Year 2021. 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 2021 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.

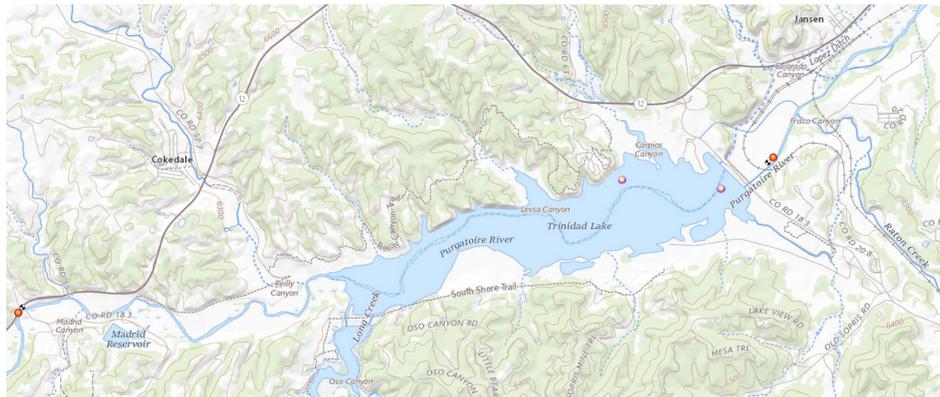


Figure 3: Water Quality monitoring stations at Trinidad Dam and Reservoir



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 2021 above and below both Trinidad and John Martin Dams. The plots also include crop threshold values for a variety of crops. In water year 2021, 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. Most probably during wet years, specific conductance would be lower than water year 2021.

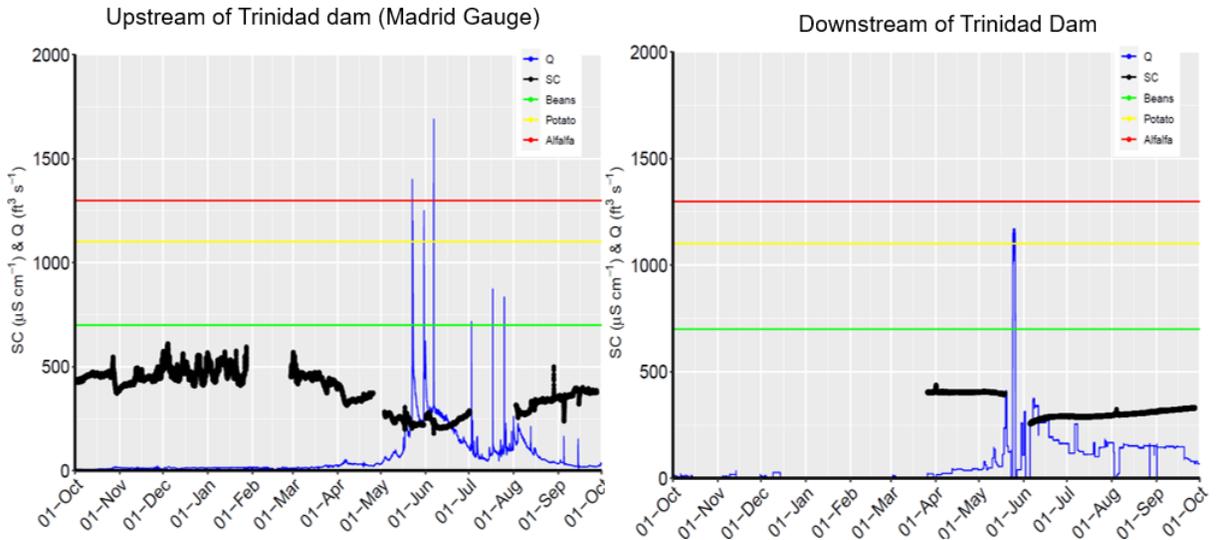


Figure 5: Water Quality monitoring data at Trinidad Dam

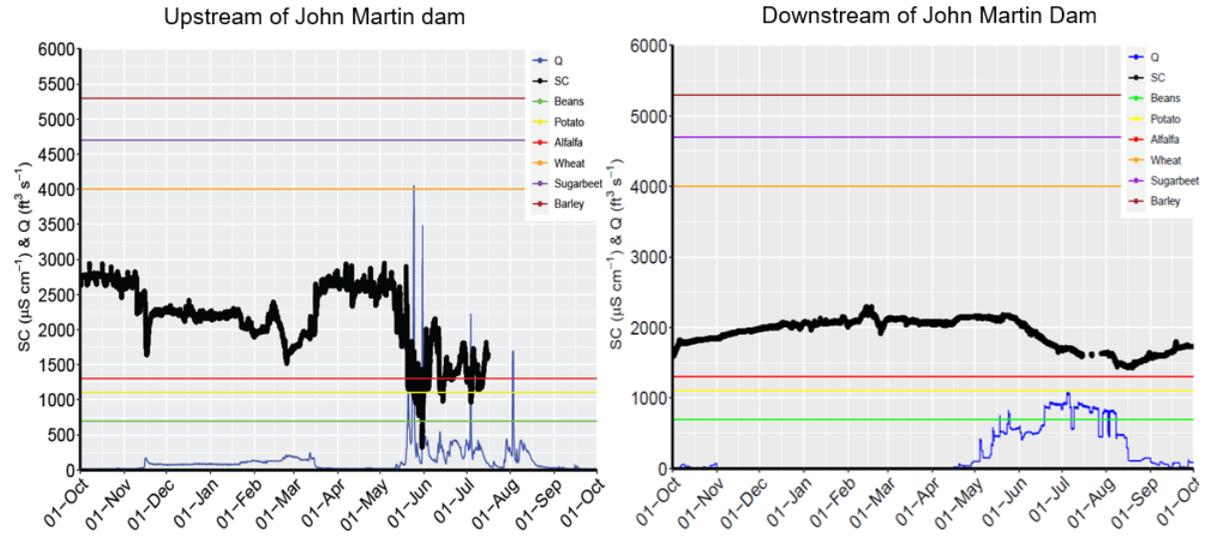


Figure 6: Water Quality monitoring data at John Martin Dam and Reservoir

3. Operations and Maintenance

a. Trinidad Dam and Reservoir

During 2021, several projects were completed and/or awarded at Trinidad Dam and Reservoir as described below:

- a. A new emergency backup generator was installed at the administrative office.
- b. A new heavy equipment shed was constructed in the maintenance yard (Figure 7). The structure also houses the new emergency generator.
- c. Wireless flood sensors were installed upstream of the dam and at Rule Creek to provide early warning detection for significant water events from a

previously ungauged part of the watershed. This is part of a system capability testing program and future development is planned.

- d. 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, is planned for early 2022.
- e. A contract was awarded to replace the packing glands on the two service and two emergency gates. The work is scheduled for early 2022 before irrigation season begins.



Figure 7: New heavy equipment shed and emergency generator storage at Trinidad Dam

b. John Martin Dam and Reservoir

During 2021, 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 (Figure 8). Additional repairs to the sump system will be made in 2022 to prevent accumulation of water within the gallery when the pool elevation is high.
- b. Pressure gauges were installed on key foundation drains throughout the grouting gallery to gather data on uplift pressures beneath the concrete dam. The data is being used to evaluate the need to install replacement piezometer sensors at key monoliths both upstream and downstream of the dam.
- c. Wireless flood sensors were installed directly downstream of the dam and at Rule Creek to provide early warning detection for significant water events and verify downstream flow measurements (Figure 9). This is part of a system capability testing program and future development is planned.
- d. Core samples were taken of upstream sediment deposits, and evaluations were conducted in advance of a dredging project to allow for proper placement of

emergency bulkheads required to inspect the outlet conduits.

- e. Common operations and maintenance (O&M) items were conducted according to prescribed schedules.



Figure 8: John Martin employee working to replace sump pump gasket.



Figure 9: John Martin employee installing flood sensor downstream of the 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 2021.

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 2021.

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, and be no more than \$10 million in total cost. In fiscal year 2021 (federal), the USACE received “new start” funding, 100% federally funded, to determine if the Spring Creek Section 206 has a federal interest. The Spring Creek Section 206 has determined to have a federal interest in September of 2021. The determination that the project has a federal interest allows the USACE and Sponsor to enter into a feasibility cost share agreement (50/50%). Once the feasibility cost share agreement is signed by both parties, the feasibility study will start. The feasibility study will take 3 years to complete. If the results of the feasibility study determines that there is an alternative that is the best buy and in the public interest, then the project will move into the implementation phase project 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 2021.

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 2021.

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 2021, 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.

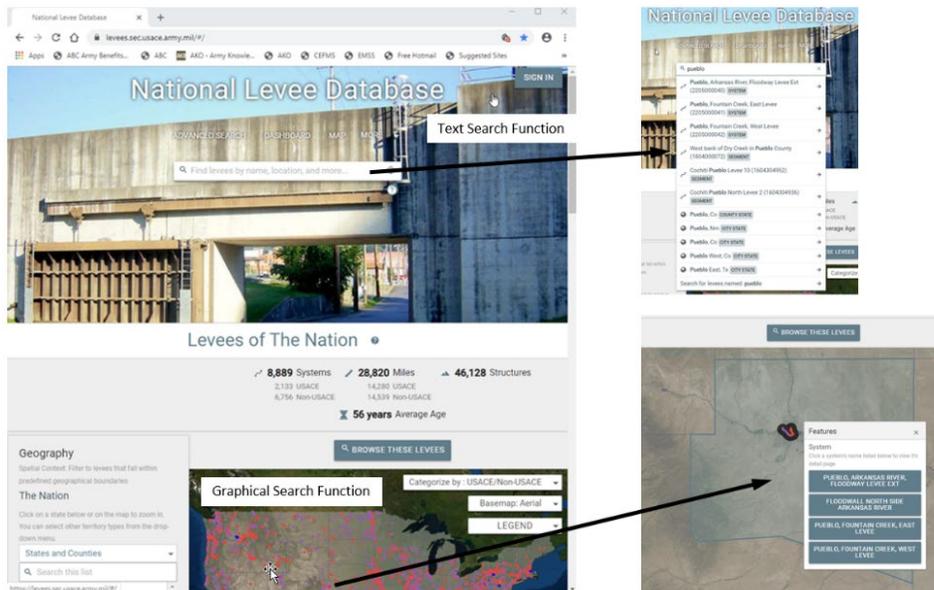


Figure 10: National Levee Database Search Functions

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 as well as the Colorado Department of Homeland Security. FEMA Region 8 is also part of the State team. There were several FY21 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 an After Wildfire Interactive Training Course that will be used by communities susceptible to wildfire risk in Colorado.

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 94 activities in the Arkansas River Basin during Compact Year 2021, including 43 activities authorized under general (Regional or Nationwide) permits and 1 activity authorized under a Standard Individual 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. 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 home 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, Readiness and Contingency Operations Office, 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.