

Upper Cache la Poudre Watershed Collaborative Monitoring Program SUMMER 2023 WATER QUALITY UPDATE

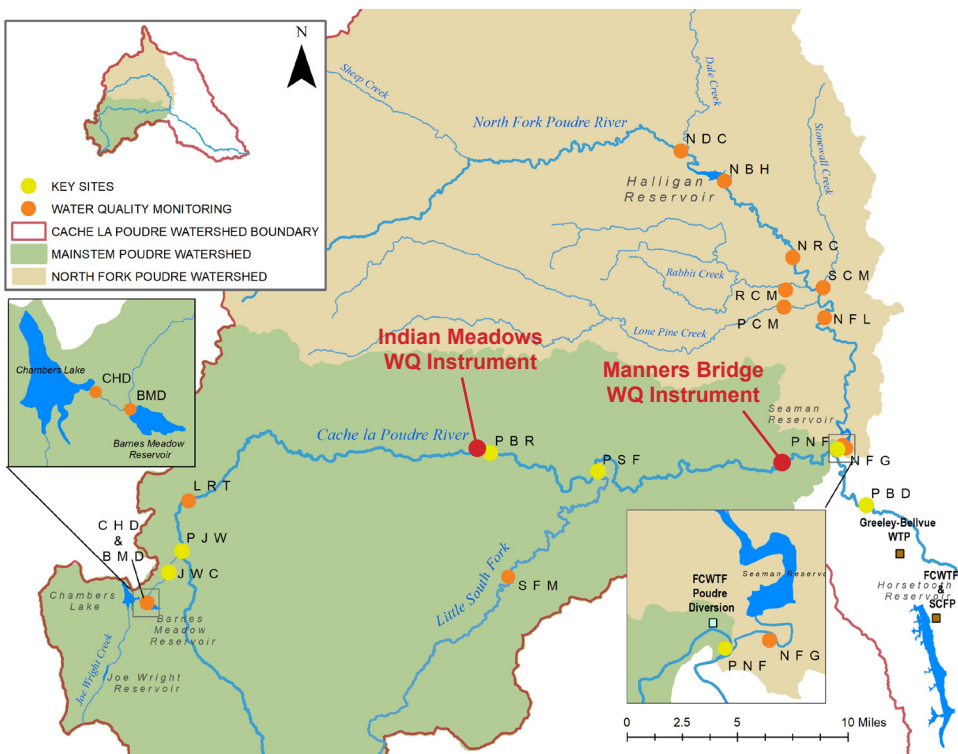
Source Water Monitoring

The Upper Cache la Poudre (CLP) Watershed Collaborative Water Quality Monitoring Program is a partnership between the cities of Fort Collins, Greeley, Thornton, and Soldier Canyon Water Treatment Authority. The goal of the program is to help these water providers meet present and future drinking water treatment goals.

Water quality monitoring of our raw, CLP River drinking water supply is conducted from April through November. Monitoring sites are strategically located throughout the Upper CLP watershed. Water quality data provide valuable information about the health of our source watershed and the quality of our raw water supply.

The Summer 2023 Water Quality Update provides a seasonal summary of watershed conditions in the Upper CLP watershed by highlighting weather, drought, streamflow, and water quality conditions over the summer season (June – August).

Water quality begins to stabilize following spring snowmelt runoff and routine monitoring is reduced to monthly sampling. Routine water quality monitoring results are reported for six key monitoring sites located throughout the CLP watershed. Monitoring sites capture water quality conditions above and below major tributaries and near water supply intake structures (Figure 1). Current water quality conditions are compared to baseline water quality conditions over the period of 2008 to 2012.



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Figure 1 – Upper Cache la Poudre Watershed Collaborative Monitoring Program water quality sampling sites and real-time water quality instrument locations.

JWC - Joe Wright Creek above the confluence with the Poudre River
PJW - Poudre River above the confluence with Joe Wright Creek
PBR - Poudre River below Rustic
PSF - Poudre River below the confluence with the Little South Fork
PNF - Poudre River above the confluence with the North Fork at the City of Fort Collins' Intake
PBD - Poudre River below the confluence with the North Fork at the Bellvue Diversion

Temperature

Air temperature measured at the Joe Wright Snowpack Telemetry (SNOTEL) station over the 2023 summer season was 1.1°F warmer than the long-term average and ranked as the 14th warmest summer on record (out of 34 years). The monthly mean air temperature was below average in June and above average in July and August. The month of July ranked as the ninth warmest on record and the month of August ranked as the fifth warmest on record (Table 1).

	Temperature			
	2023 (°F)	Average (°F)	Departure (°F)	2023 Rank
June	45.8	47.1	-1.3	12 th (C)
July	54.1	52.5	+1.6	9 th (H)
August	53.5	50.5	+3.0	5 th (H)
Summer	51.1	50.0	+1.1	14 th (H)

Table 1 – Monthly mean air temperatures measured at Joe Wright SNOTEL over the summer months of 2023 compared to the long-term average (1991 – 2020).

Note: H = hottest and C = coldest

Precipitation

Precipitation measured at the Joe Wright SNOTEL over the 2023 summer season was above average and ranked as the 12th wettest summer on record (out of 45 years). Precipitation was well above average in June and August and near average in July (Table 2). Due to the above-average precipitation over the summer season, drought conditions were nonexistent across the Upper CLP watershed (Figure 2).

Table 2 – Monthly accumulated precipitation totals measured at the Joe Wright SNOTEL over the 2023 summer season compared to the long-term average (1991 – 2020).

Note: W = wettest and D = driest

	Total Precipitation			
	2023 (inches)	Average (inches)	% of Average	2023 Rank
June	3.1	2.2	139%	11 th (W)
July	2.0	2.1	94%	21 st (D)
August	2.9	2.2	130%	12 th (W)
Summer	8.0	6.6	122%	12 th (W)

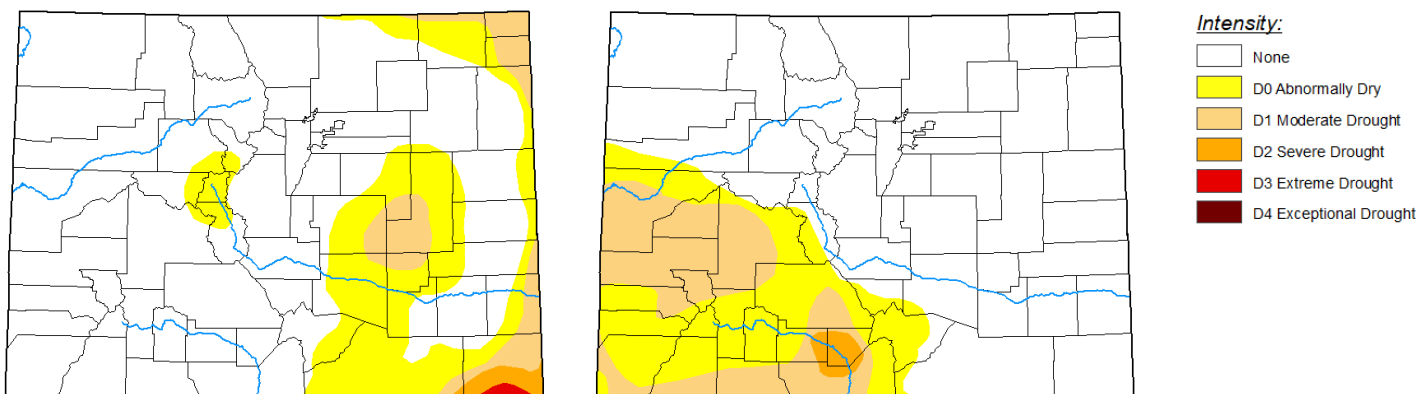


Figure 2 – Drought conditions for the state of Colorado as monitored by the United States Drought Monitor on May 30, 2023 (left) and August 29, 2023 (right). (Map source: <https://droughtmonitor.unl.edu/>)

Streamflow Conditions

Streamflow at the Cache la Poudre River near the Canyon Mouth (CLAFTCCO) stream gage measured 174,912 acre-feet of water over the summer season, which was 103% of the long-term average (calculated over the 1881 – 2022 measurement period). Peak streamflow was observed on June 17th and measured 2,520 cubic feet per second – 126% of average. The timing of the 2023 peak occurred six days later than the long-term average. Streamflow slowly receded following peak streamflow and by the end of the summer season was approaching baseflow (low flow) conditions. The total amount of water was slightly higher than average in all summer months (Figure 3).

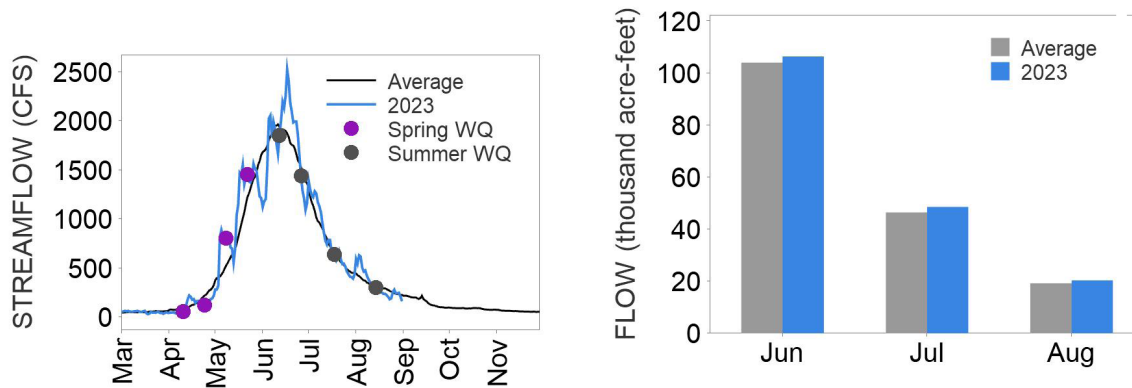


Figure 3 – Streamflow conditions on the Poudre River over the 2023 summer season (left) and monthly total water volume measured over the summer season (right).

Water Quality Indicators

The Upper CLP Collaborative Water Quality Monitoring Program uses several key water quality indicators, including pH, conductivity, temperature, and turbidity, which act as surrogates for other parameters (Table 3). These indicators provide a snapshot of water quality conditions and are useful for identifying trends or changes in water quality. Significant changes in these water quality indicators may provide an early warning of potential water pollution.

Table 3 – Water quality indicators measured as part of the Upper Cache la Poudre Collaborative Water Quality Monitoring Program.

Water Quality Indicator	Explanation
Temperature	Water temperature influences other water quality parameters and is a major driver of biological activity and algal growth in rivers, including certain phytoplankton species that produce the taste and odor compounds, geosmin and 2-methylisoborneol.
pH	pH is an important water quality parameter to monitor, because it influences the solubility and biological availability of chemical constituents, including nutrients and heavy metals. pH near 7 is considered neutral, with more acidic conditions occurring below 7 and more basic, or alkaline, conditions occurring above 7.
Specific Conductivity	Conductivity is an index of dissolved ionic solids in water. Conductivity is used as a general measure of water quality. Significant increases in conductivity can be used as an indicator of increased pollution.
Turbidity	Turbidity is monitored to track changes in water clarity. Clarity is influenced by the presence of algae and/or suspended solids introduced to surface waters through various land use activities, including runoff and erosion, urban stormwater runoff and drainage from agricultural lands. For water treatment, turbidity is an important indicator of the amount of suspended material that is available to harbor pollutants, such as heavy metals, bacteria, pathogens, nutrients and organic matter.

All water quality indicators at key sites along the CLP River were within the baseline range of values over the 2023 summer season (Figure 4). Water temperature was near normal in Joe Wright Creek (JWC) and in the CLP River above Joe Wright Creek (PJW) – normal is defined as the median value over the baseline period of record. Water temperature was slightly warmer than normal at all other key monitoring sites and increased from Joe Wright Creek (JWC) downstream to the City of Greeley’s diversion (PBD). pH levels were near normal at all key monitoring sites. Specific conductivity values were higher than normal at all key sites, except in Joe Wright Creek (JWC) where values were normal. Turbidity levels were near normal at all key monitoring sites and measured less than 5 nephelometric turbidity units (NTU).



Joe Wright Creek Canyon Mouth

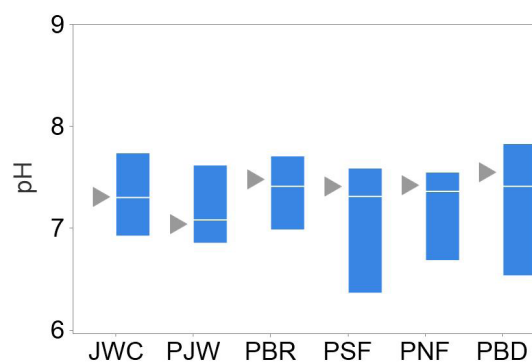
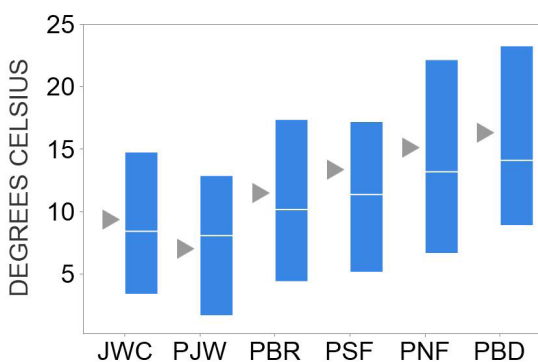
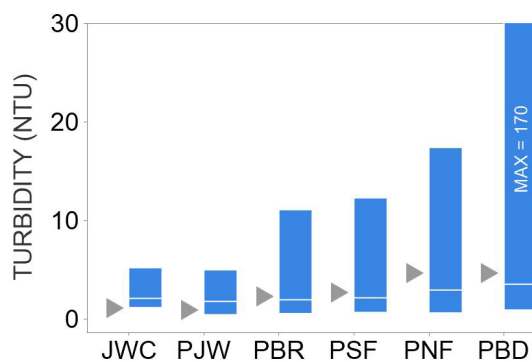
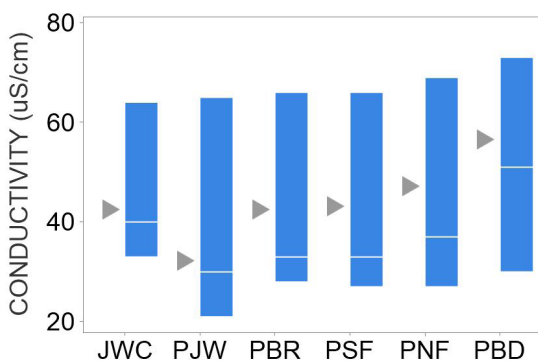
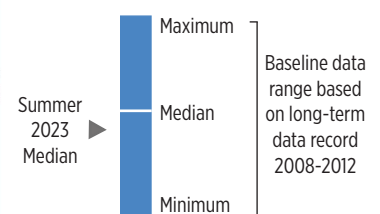


Figure 4–Water quality indicator data collected at key monitoring sites over the 2023 summer monitoring season compared to baseline fall water quality conditions.



Graphic Explanation



Post-Cameron Peak Wildfire Water Quality Impacts

Water quality monitoring instruments were installed at two locations upstream of the Poudre supply intake facility in early April. The Poudre at Indian Meadows site is located one mile downstream of the Town of Rustic and the Manners Bridge site is located approximately one mile upstream of the City's raw water intake (Figure 1). The Water Quality Alert System provides water treatment operations near real-time water quality data to quickly respond to changes in Poudre River water quality that result from runoff from the Cameron Peak burn area or other upstream events.

High-intensity precipitation events driven by the summer monsoon continued to cause several post-fire erosion, sedimentation, and flooding events on the Poudre River over the summer season (Figure 5). These events briefly impacted water quality and required water treatment plants to shut down their raw water intakes on the Poudre River.

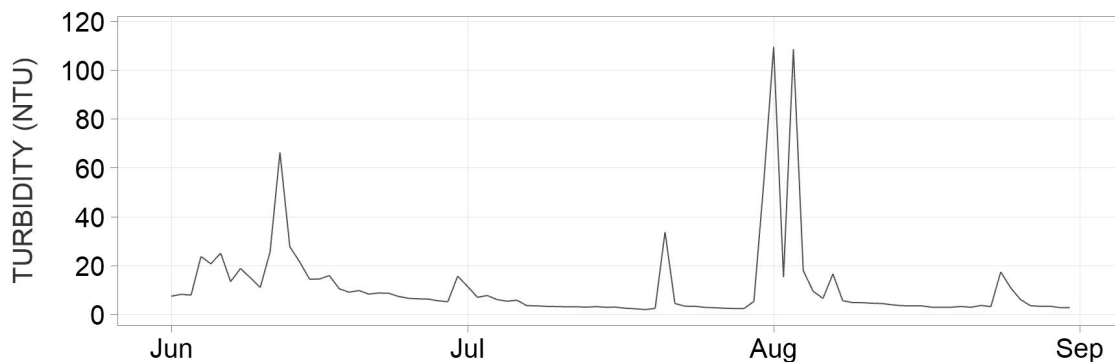
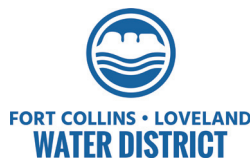


Figure 5 – Daily average turbidity measured in the Poudre River at the Manners Bridge Water Quality Alert System over the summer season. Daily average values were calculated from 15-minute data.



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