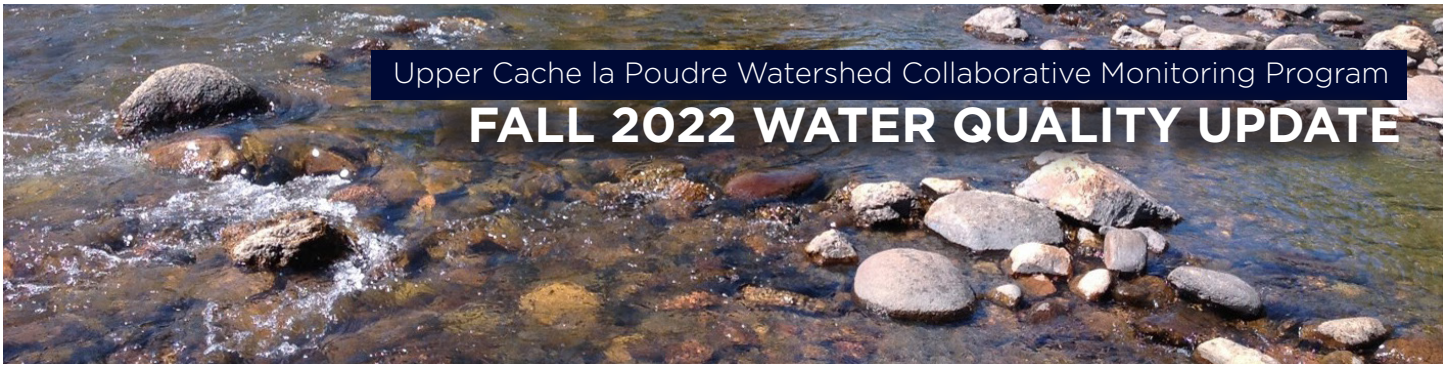


Upper Cache la Poudre Watershed Collaborative Monitoring Program

FALL 2022 WATER QUALITY UPDATE

Source Water Monitoring

The Upper Cache la Poudre (CLP) Watershed Collaborative Water Quality Monitoring Program was established in 2008 between the City of Fort Collins, the City of Greeley, and Soldier Canyon Water Authority, to help meet present and future drinking water treatment goals. The City of Thornton was added as a full partner in 2022.

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 quality of our raw water supply.

The Fall 2022 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 fall season (September – November).

Routine water quality monitoring results are reported for six key monitoring sites located throughout the Upper Cache la Poudre watershed, which capture water quality conditions above and below major tributaries and near water supply intake structures (Figure 1). Present water quality conditions are compared to baseline water quality data, collected over the period of 2008 to 2012.

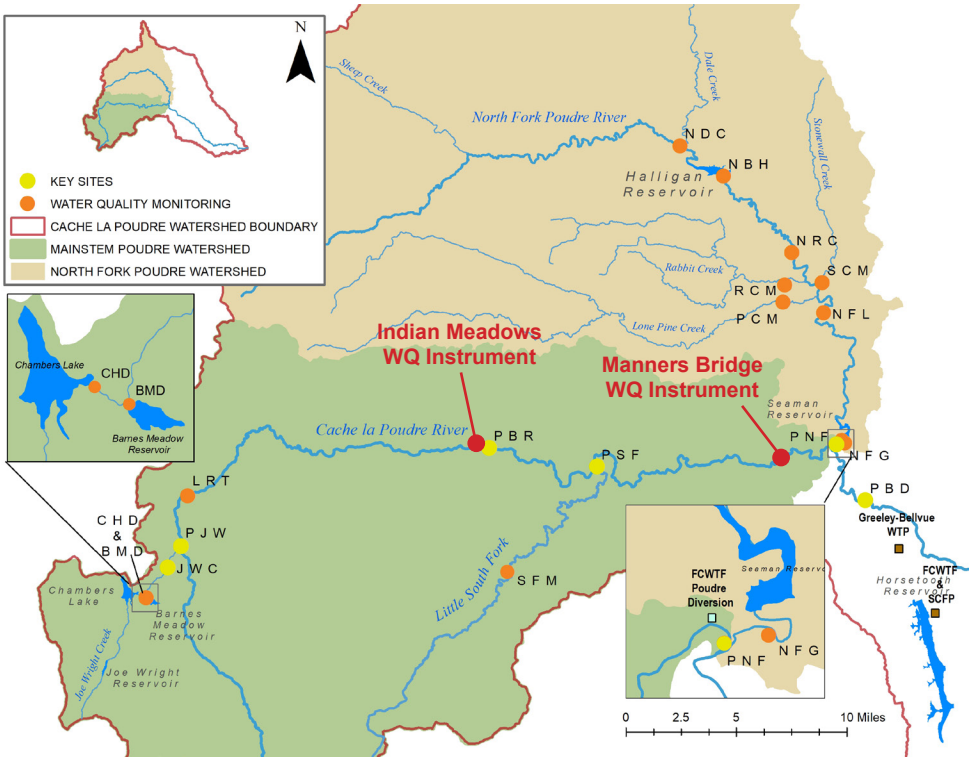


Figure 1 – Upper Cache la Poudre Watershed Collaborative Monitoring Program water quality sampling sites and real-time water quality instrument locations.

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 2022 fall season was 0.5°F warmer than the long-term average and ranked as the 17th warmest fall on record (out of 33 years). Monthly mean air temperature was well above average in September, near average in October, and below average in November. The month of September ranked as the second warmest on record, while the month of November ranked as the eighth coldest on record (Table 1).

	Temperature			
	2022 (°F)	Average (°F)	Departure (°F)	2022 Rank
September	49.0	44.7	+4.3	2nd (H)
October	35.0	34.7	+0.3	16th (H)
November	22.0	24.8	-2.8	8th (C)
Fall	35.3	34.9	+0.5	17th (H)

Table 1 – Monthly mean air temperatures measured at Joe Wright SNOTEL over the fall months of 2022 compared to the long-term average (1991 – 2020).

Note: H = hottest and C = coldest

Precipitation

Precipitation measured at the Joe Wright SNOTEL over the 2022 fall season was below average and ranked as the 11th driest fall on record (out of 44 years). Precipitation was below average in all months. The month of October was particularly dry and ranked as the seventh driest on record. Precipitation measured only 51% of average in October (Table 2). Drought conditions returned to the Upper CLP watershed over the fall season due to well above average temperatures in September and below average precipitation measured from September – November. Drought conditions intensified from no drought at the start of the fall season to abnormally to moderately dry conditions throughout much of the CLP watershed by the end of the fall season (Figure 2).

Table 2 – Monthly accumulated precipitation totals measured at the Joe Wright SNOTEL over the 2022 fall season compared to the long-term average (1991 – 2020).

Note: W = wettest and D = driest

	Total Precipitation			
	2022 (inches)	Average (inches)	% of Average	2022 Rank
September	2.5	2.8	90%	20th (W)
October	2.0	3.9	51%	7th (D)
November	4.0	4.2	96%	20th (D)
Fall	8.5	10.8	78%	11th (D)

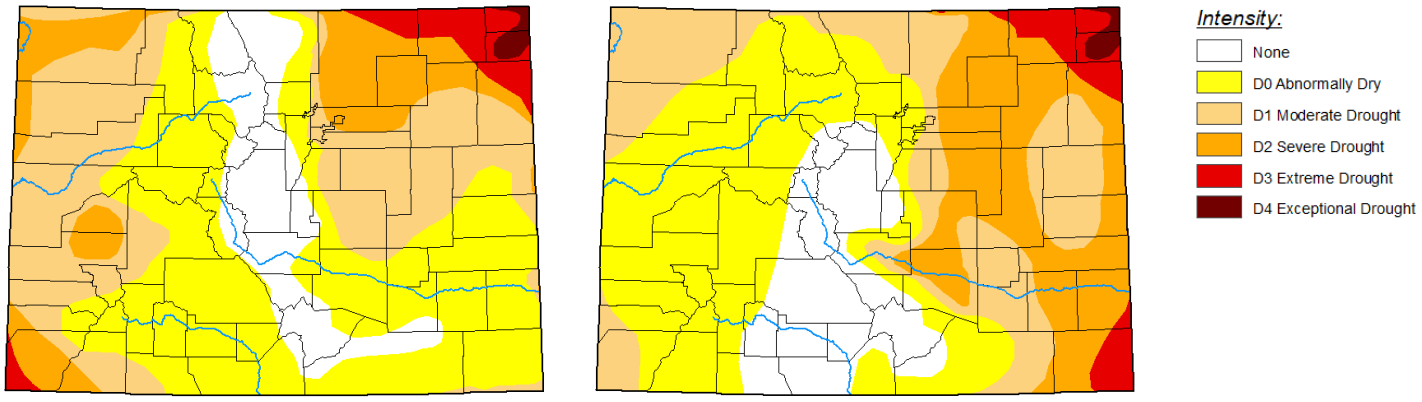


Figure 2 – Drought conditions for the state of Colorado as monitored by the United States Drought Monitor on August 30, 2022 (left) and November 29, 2022 (right). (Map source: droughtmonitor.unl.edu/)

Streamflow Conditions

Streamflow at the Cache la Poudre River near the Canyon Mouth (CLAFTCCO) stream gage measured 11,887 acre-feet of water over the fall season, which was 65% of the long-term average (calculated over the 1881 – 2021 measurement period). The total amount of water measured well below average in all fall months, most notably in September when streamflow measured only 61% of average (Figure 3).

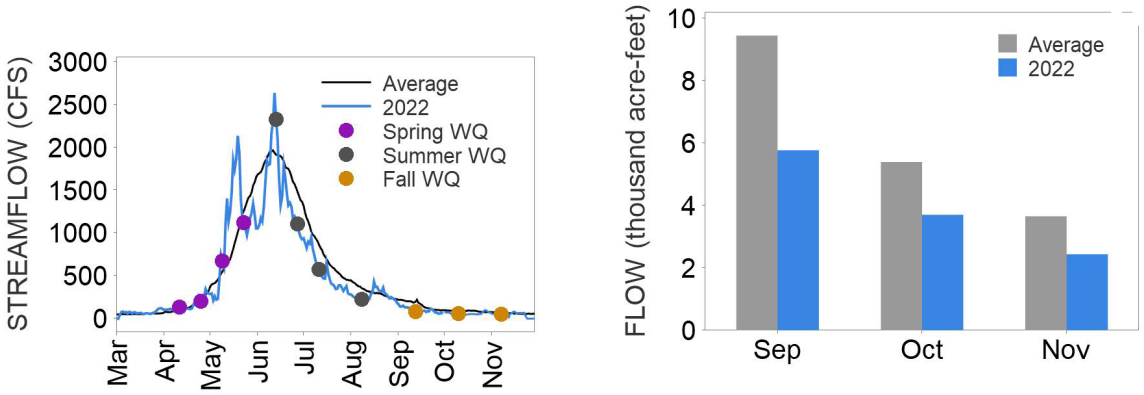


Figure 3 – Streamflow conditions on the Poudre River over the 2022 fall season (left) and monthly total water volume measured over the fall season (right) compared to the long-term average.

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 CLP 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-methlyisoborneol.
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.

Fall monitoring captures water quality as streamflow on the Poudre River transitions to baseflow (or low flow) conditions. During this time of the year water quality is generally stable throughout the watershed. Water releases from high elevation water storage reservoirs and storm events may cause changes in streamflow and water quality through September and early October, although these events are temporary. Substantial water releases in the Upper CLP watershed typically cease (depending on demand) in October, and storm events this time of year are more uncommon, as precipitation in the Upper CLP shifts from rain to snow. Most water quality constituents begin to concentrate under baseflow conditions and water temperature decreases, especially in the higher elevations of the watershed.

Over the fall months of 2022, nearly all water quality indicators at key sites along the CLP River were within the baseline range of values (Figure 4). Water temperature was near or slightly above normal at all key monitoring sites – normal is defined as the median value over the baseline period of record. The pH was slightly below normal at higher elevation monitoring sites on Joe Wright Creek (JWC) and the Poudre River above Joe Wright Creek (PJW). The pH measured slightly above normal from the Poudre below Rustic (PBR) downstream to the City of Greeley's raw water intake (PBD). Specific conductivity was higher than normal at all key sites. Values measured within the baseline range of values at all sites, except in the Poudre above Joe Wright Creek (PJW) where specific conductivity measured higher than the baseline maximum. Turbidity measured within the baseline range of values at all monitoring sites, except in the Poudre below the South Fork (PSF) where turbidity measured higher than the baseline maximum at this monitoring site. Turbidity values at all sites were still low (<2 NTU) indicating normal water quality for this time of the year.

Jordyn Geller, Watershed Technician with the City of Fort Collins, collects water samples from the Little South Fork Cache la Poudre River (SFM).

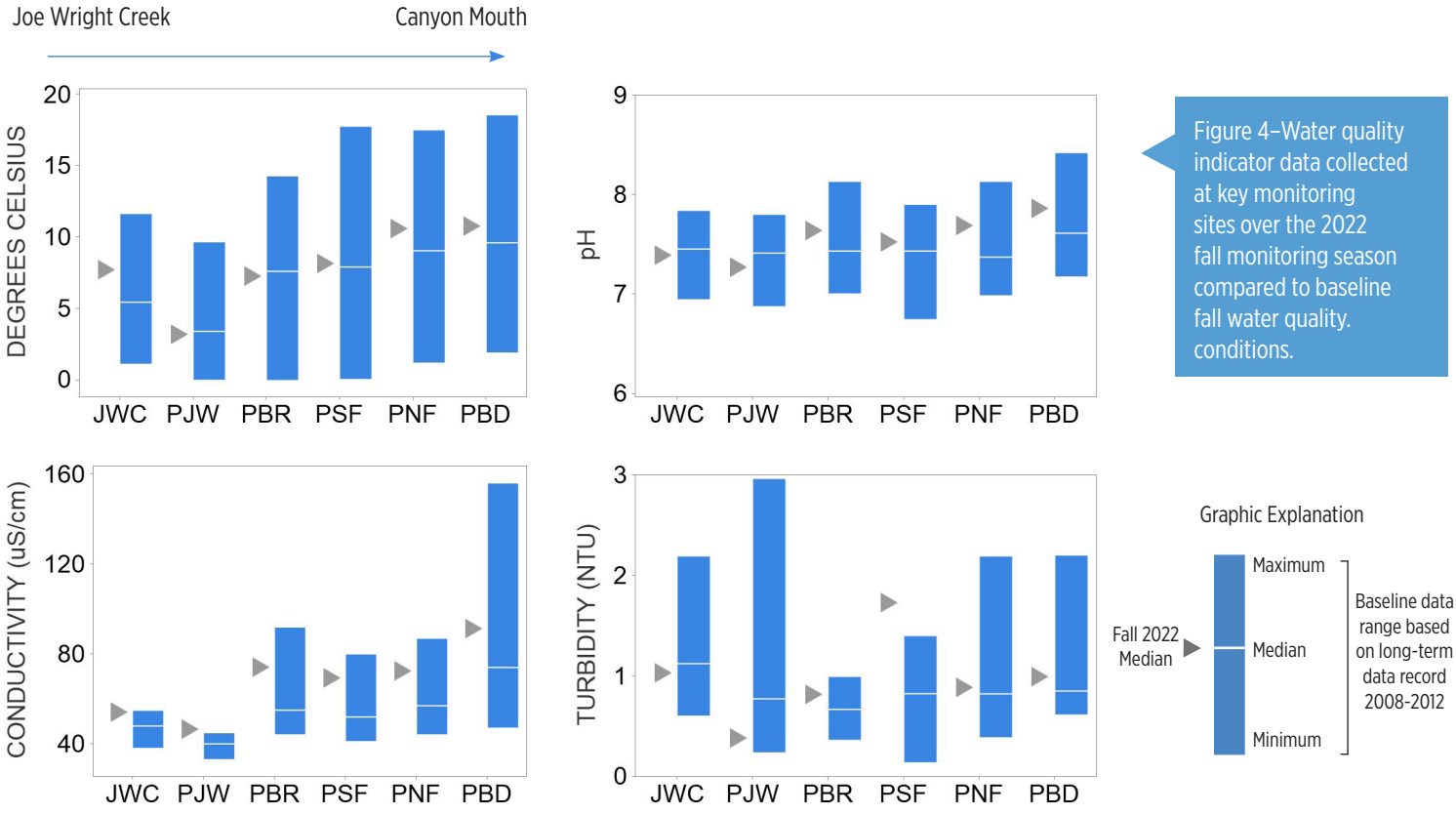


Figure 4–Water quality indicator data collected at key monitoring sites over the 2022 fall monitoring season compared to baseline fall water quality. conditions.

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). This monitoring 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.

The summer monsoon began to wane in August. Post-fire impacts from the Cameron Peak Wildfire, such as flooding, debris flows, and erosion, were not observed over the fall season and did not appear to impact Poudre River water quality as can be seen in daily average turbidity measurements from the Indian Meadows and Manners Bridge Water Quality Alert Systems (Figure 5).

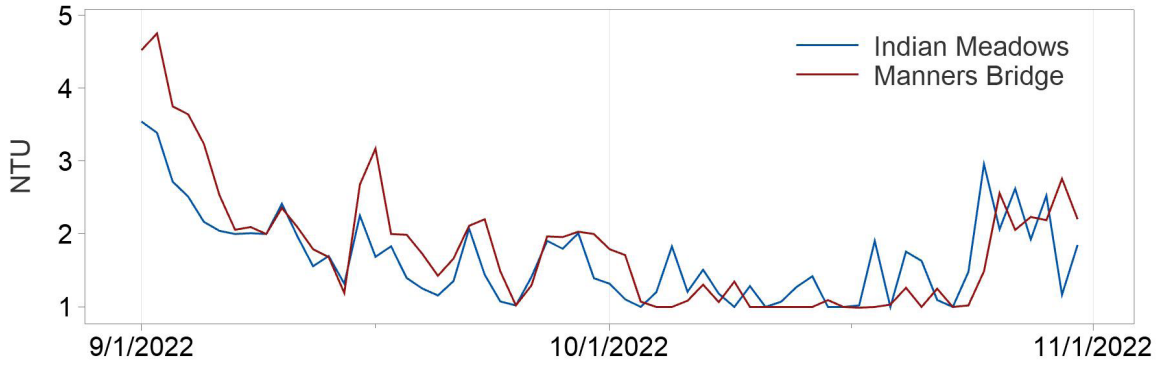
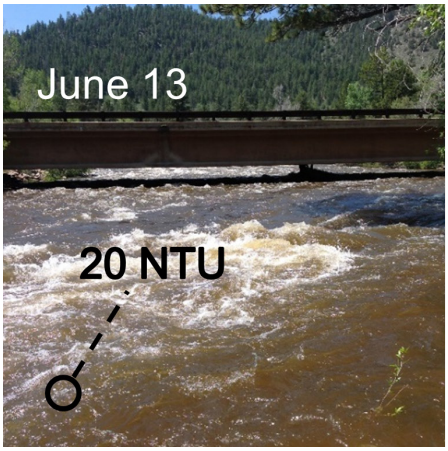
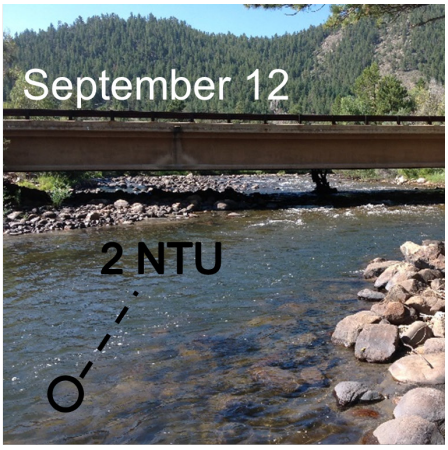


Figure 5 – Daily average turbidity measured in the Poudre River at the Indian Meadows and Manners Bridge Water Quality Alert Systems over the fall season. Daily average values were calculated from data collected at 15-minute intervals. November data are not displayed because the instruments had already been removed from the river for the season.





A photo comparison of the Poudre River near the Indian Meadows Water Quality Alert System highlights the difference in turbidity during snowmelt runoff in June and baseflows in September.

Learn More

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