Upper Cache la Poudre Watershed Collaborative Monitoring Program

FALL 2024 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, and Thornton, Soldier Canyon Water Treatment Authority, and Northern Water Conservancy District. The goal of the program is to help these water providers meet present and future drinking water treatment goals.

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

The Fall 2024 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 CLP watershed, which capture water quality conditions above and below major tributaries and near water supply intake structures (Figure 1). Fall 2024 water quality data are compared to baseline water quality data, collected between 2008 to 2012.

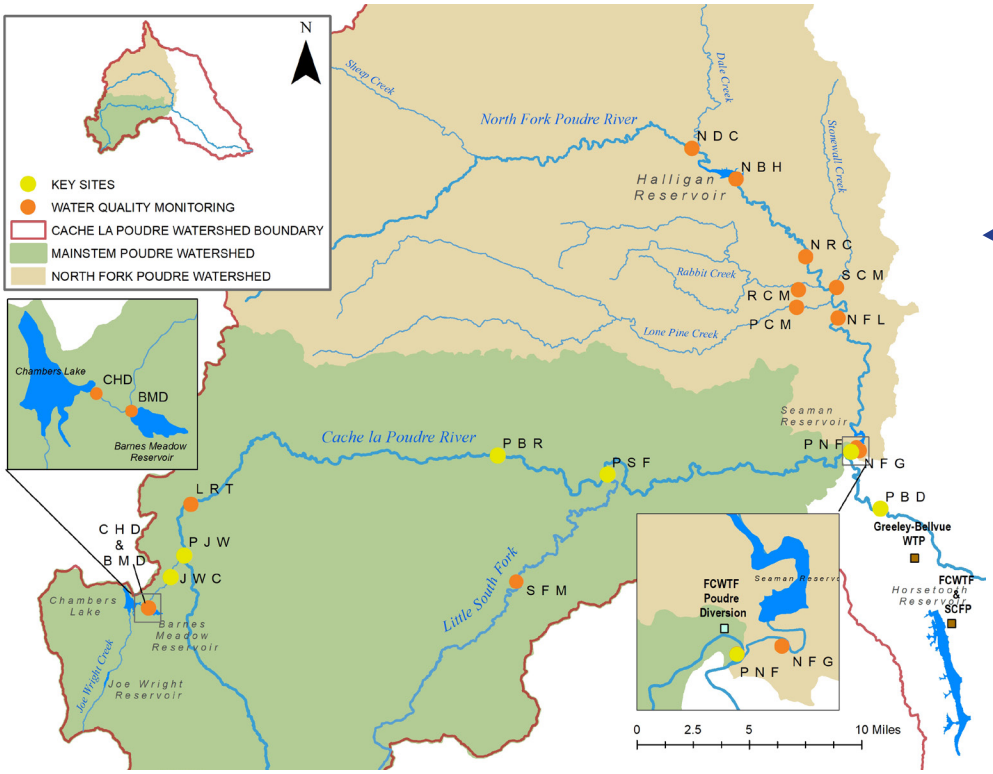

Figure 1 – Upper Cache la Poudre Collaborative Monitoring Program water quality sampling sites and real-time water quality instrument locations.

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 2024 fall season was 1.9°F warmer than the long-term average and ranked as the 11th warmest fall on record (out of 35 years). Monthly mean air temperature was above average in September, well above average in October, and below average in November. The month of October was 6.2°F warmer than the long-term average and ranked as the warmest on record (Table 1).

	Temperature			
	2024 (°F)	Average (°F)	Departure (°F)	2024 Rank
September	47.2	44.7	+2.5	9th (H)
October	40.9	34.7	+6.2	1st (H)
November	22.1	24.8	-2.7	10th (C)
Fall	36.7	34.9	+1.9	11th (H)

Table 1 – Monthly mean air temperatures measured at the Joe Wright SNOTEL over the fall months of 2024 compared to the long-term average (1991 – 2020).

Note: H = hottest and C = coldest

Precipitation

Precipitation measured at the Joe Wright SNOTEL over the 2024 fall season was slightly below average, ranking as the 20th driest fall on record (out of 45 years). Precipitation was well below average in the months of September and October, measuring only 50% and 54% of average, respectively (Table 2). Wet conditions returned in the month of November when precipitation measured 144% of average. Drought conditions were prevalent throughout the Upper CLP watershed during the fall season due to above average temperatures and below average precipitation. Despite wetter and cooler conditions in November, drought conditions intensified throughout the watershed, from abnormally dry conditions at the start of the fall season, to severe drought conditions by the end of the fall season (Figure 2). The North Fork CLP and Mainstem CLP below its confluence with the North Fork experienced extreme drought conditions by the end of November.

Table 2 – Monthly accumulated precipitation totals measured at the Joe Wright SNOTEL over the 2024 fall season compared to the long-term average (1991 – 2020)

Note: W = wettest and D = driest

	Total Precipitation			
	2024 (inches)	Average (inches)	% of Average	2024 Rank
September	1.4	2.8	50%	10th (D)
October	2.1	3.9	54%	9th (D)
November	6.0	4.2	144%	10th (W)
Fall	9.5	10.8	88%	20th (D)

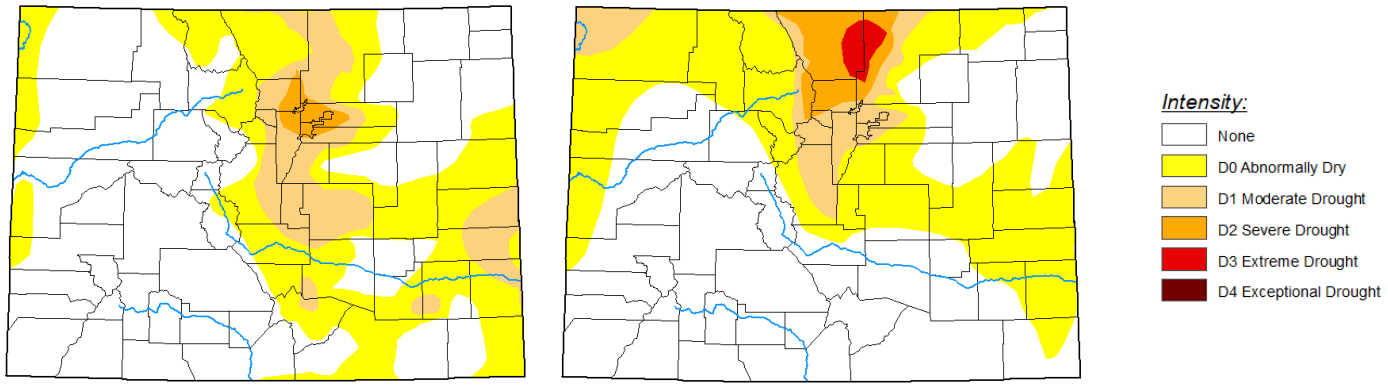

Figure 2 – Drought conditions for the state of Colorado as monitored by the United States Drought Monitor on September 3rd, 2024 (left) and November 26, 2024 (right). (Map source: https://droughtmonitor.unl.edu/)

Streamflow Conditions

Streamflow at the Cache la Poudre River near the Canyon Mouth (CLAFTCCO) stream gage measured 8,367 acre-feet of water over the fall season, which was 46% of the long-term average (calculated over the 1881 – 2023 measurement period). The 2024 fall season's water yield was ranked as the 10th lowest on record out of 142 years. The total amount of water measured notably below normal in all fall months, with none exceeding 50% of the average (Figure 3). These low flows are likely due to a combination of the quick return to baseflow during the late summer months, intensified drought conditions across the watershed, changes in high elevation water storage, and high demand. Stream gages below each high elevation reservoir (LAPLODCO, JWCCHACO, CLANSECO) confirm that Long Draw Reservoir releases ceased mid-September, Chambers Reservoir releases ramped down at the end of September with periodic releases throughout October, and Milton-Seaman Reservoir ramped down releases in July and remained constant through the fall months. The demand for treated water was high due to drought conditions resulting in increased raw water diverted from the Poudre River at Fort Collins and Greeley's intakes located upstream of the Canyon Mouth gage.

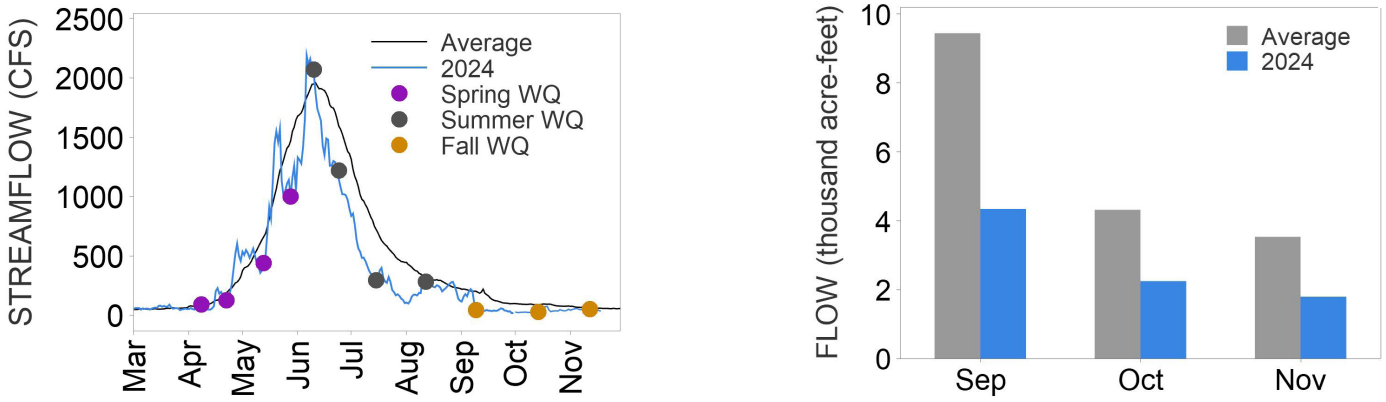

Figure 3 – Streamflow conditions on the Poudre River over the 2024 fall season (left) and monthly total water volume measured over the fall season (right) compared to the long-term average (1885 – 2023).

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-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.

Streamflow on the Poudre River during fall transitions to baseflow (or low flow) conditions. During this time, water quality is generally stable throughout the watershed. However, 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 in October, depending on demand. Storm events this time of year are less common, as precipitation in the Upper CLP shifts from rain to snow. Typically, most water quality constituents concentrate under fall baseflow conditions and water temperature decreases, especially in the higher elevations of the watershed.

Nearly all water quality indicators at key sites along the CLP River were within the baseline range of values over the 2024 fall season (Figure 4). Water temperature was warmer than normal (defined as the median value) at all key monitoring sites over the baseline period of record. pH levels were notably higher than normal at nearly all monitoring sites. Exceptions included the Mainstem Poudre River above Joe Wright Creek (PJW) and below the City of Greeley's diversion (PBD) where the pH was near baseline. Specific conductivity was elevated at all monitoring sites downstream of the Mainstem Poudre River below Rustic (PBR). Turbidity was near baseline at Mainstem Poudre River below Rustic (PBR) and below the City of Greeley's diversion (PBD) but was below normal at all other monitoring sites.

The Upper CLP watershed experienced prolonged drought conditions during the 2024 fall season. Releases from high elevation reservoirs ramped down in the beginning of the fall season and few substantial releases were made during October. The combination of the drought conditions, subsequently high demand, and fewer substantial reservoir releases likely induced the observed extreme low flows, contributing to higher water temperatures across the watershed. Additionally, during extended low-flow periods, groundwater carrying higher concentrations of dissolved minerals can enter the water column without notable dilution from surface waters. Low-flow conditions experienced in the watershed likely exacerbated the effects of groundwater recharge, contributing to the elevated specific conductivity. Variability in turbidity is typically small during the fall season and was <3 NTU at nearly all key monitoring sites. Turbidity likely trended low in the 2024 fall season due the lack of variability in streamflow and extended dry conditions throughout the watershed. Additionally, in-stream algal activity was observed at nearly all key monitoring sites during fall 2024. The combination of drought and low-flow conditions may have extended algal activity into the late fall, possibly contributing to the elevated pH observed across all study sites.

Lucas Lane, Water Quality Technician with the City of Greeley, collecting water quality samples from the Mainstem Poudre River above Joe Wright Creek (PJW).

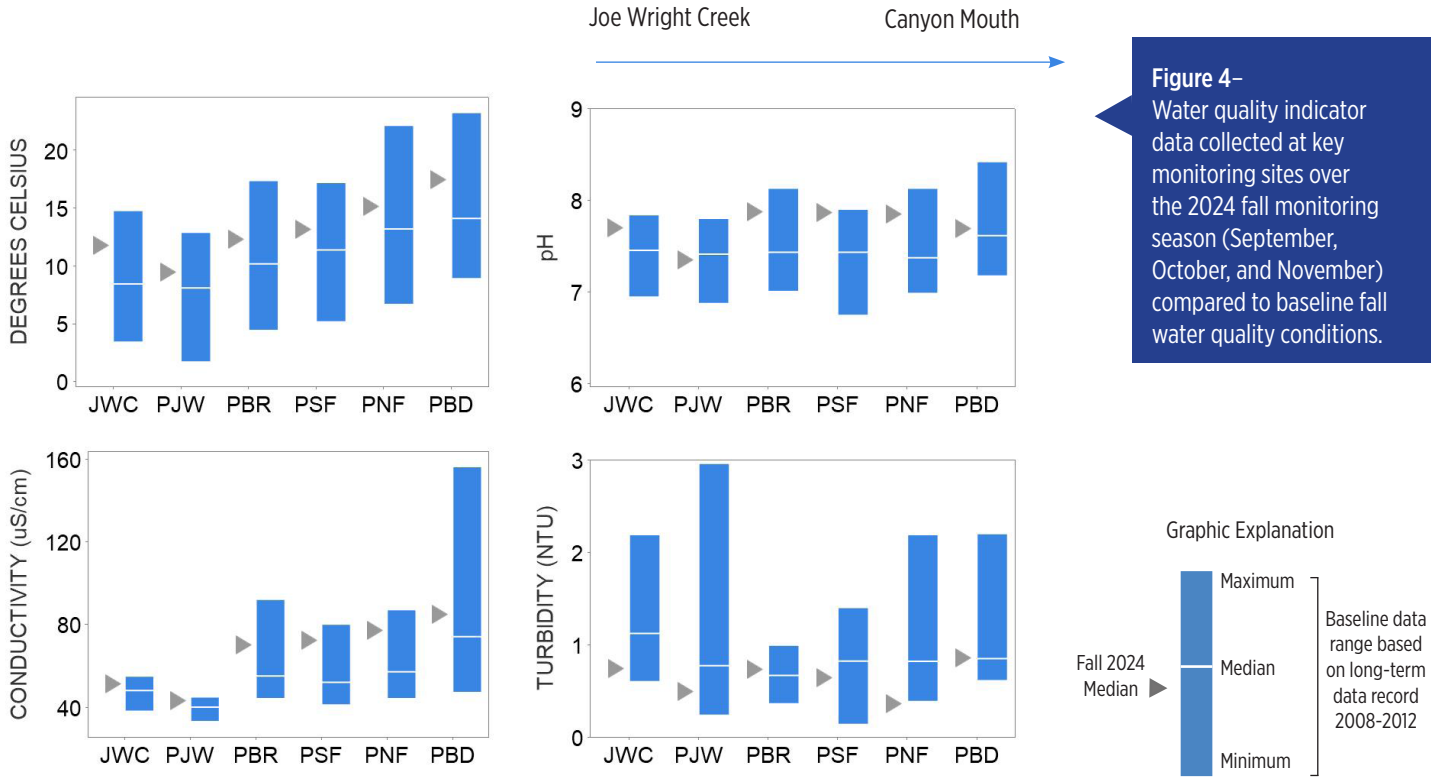

Figure 4– Water quality indicator data collected at key monitoring sites over the 2024 fall monitoring season (September, October, and November) compared to baseline fall water quality conditions.

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