

Upper Cache la Poudre Watershed Collaborative Monitoring Program

SPRING 2023 WATER QUALITY UPDATE

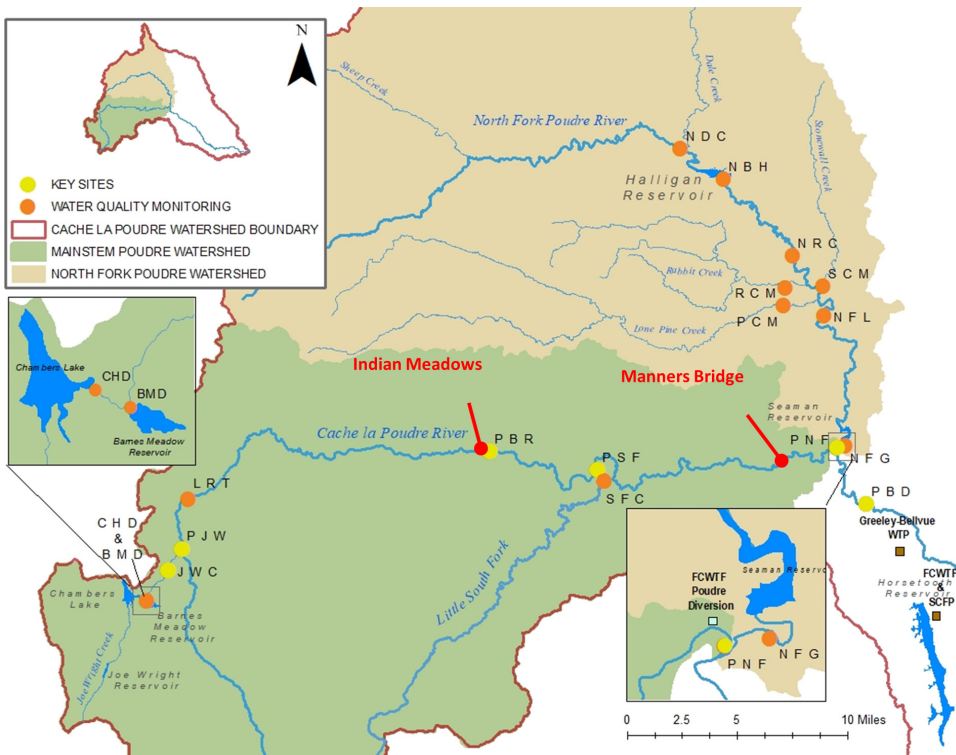
Source Water Monitoring

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 Spring 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 spring season (March – May).

Water quality during spring snowmelt runoff is highly variable. To better capture this seasonal variability, monitoring is conducted two times per month. Results are reported for six key monitoring sites located throughout the Upper 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 Collaborative Monitoring Program water quality sampling sites (key sites) and real-time water quality instrument locations (water quality monitoring).

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 spring season was 1.2°F cooler than the long-term average and ranked as the 10th coldest spring on record (out of 34 years). The monthly mean air temperature was well below average in March, near average in April, and above average in May. The month of March ranked as the coldest on record, while the month of May ranked as the 7th warmest on record (Table 1).

	Temperature			
	2023 (°F)	Average (°F)	Departure (°F)	2023 Rank
March	19.9	25.2	-5.3	1 st (C)
April	30.0	30.5	-0.5	11 th (C)
May	40.8	38.5	2.3	7 th (H)
Spring	30.2	31.4	-1.2	10 th (C)

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

Note: H = hottest and C = coldest

Precipitation

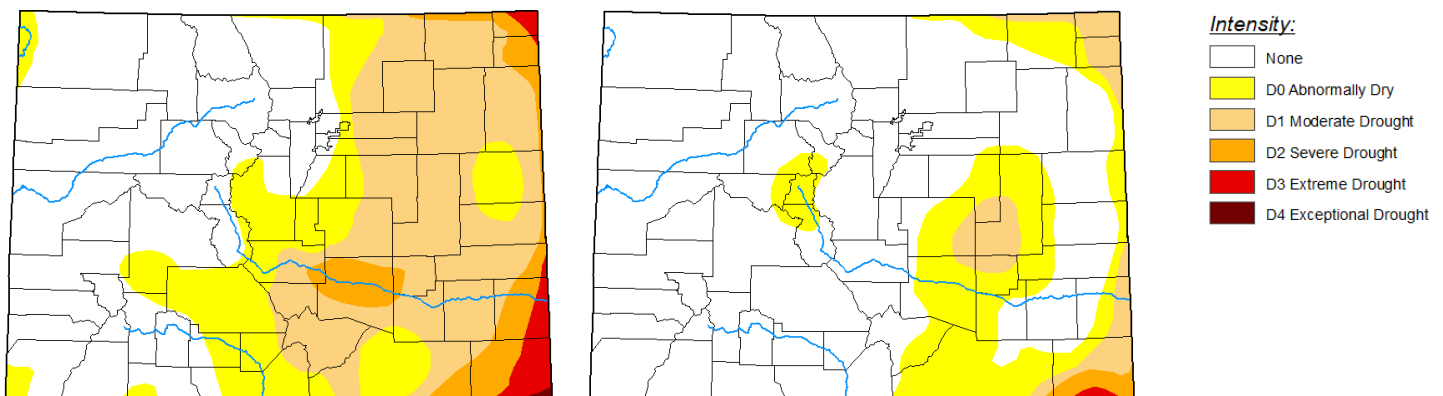
Precipitation measured at the Joe Wright SNOTEL over the 2023 spring season was below average and ranked as the 12th driest spring on record (out of 45 years). Precipitation was above average in March (122%) and below average in April (80%) and May (54%). The month of May ranked as the fifth driest on record (Table 2). Drought was not observed near the headwaters of the Upper CLP watershed over the spring 2023 season (Figure 2).

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

Note: W = wettest and D = driest

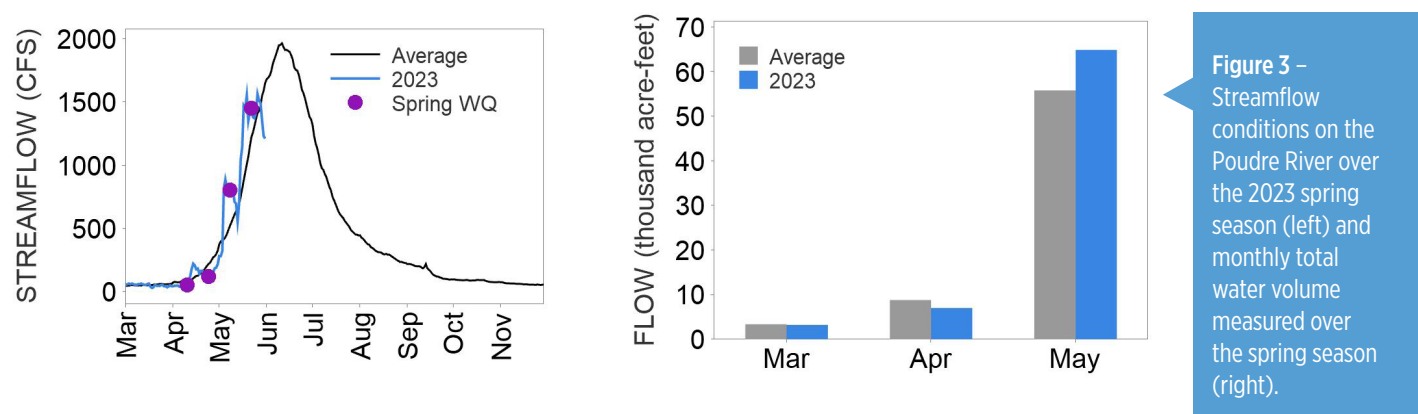
	Total Precipitation			
	2023 (inches)	Average (inches)	% of Average	2023 Rank
March	5.5	4.5	122%	11 th (W)
April	4.5	5.7	80%	17 th (D)
May	2.3	4.3	54%	5 th (D)
Spring	12.3	14.4	85%	12 th (D)

Figure 2 – Drought conditions for the state of Colorado as monitored by the United States Drought Monitor on Mar. 7, 2023 (left) and May 30, 2023 (right). Map source: droughtmonitor.unl.edu



Streamflow Conditions

Streamflow at the Cache la Poudre River near the Canyon Mouth (CLAFTCCO) stream gage measured 75,049 acre-feet of water over the spring season, which was 110% of the long-term average (calculated over the 1881 – 2022 measurement period). Snowmelt runoff began as expected in mid-April. Streamflow increased slowly through the end of April and began to rise more rapidly in May. Streamflow measured near average (96%) in March, below average (80%) in April, and above average (116%) in May (Figure 3).



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.

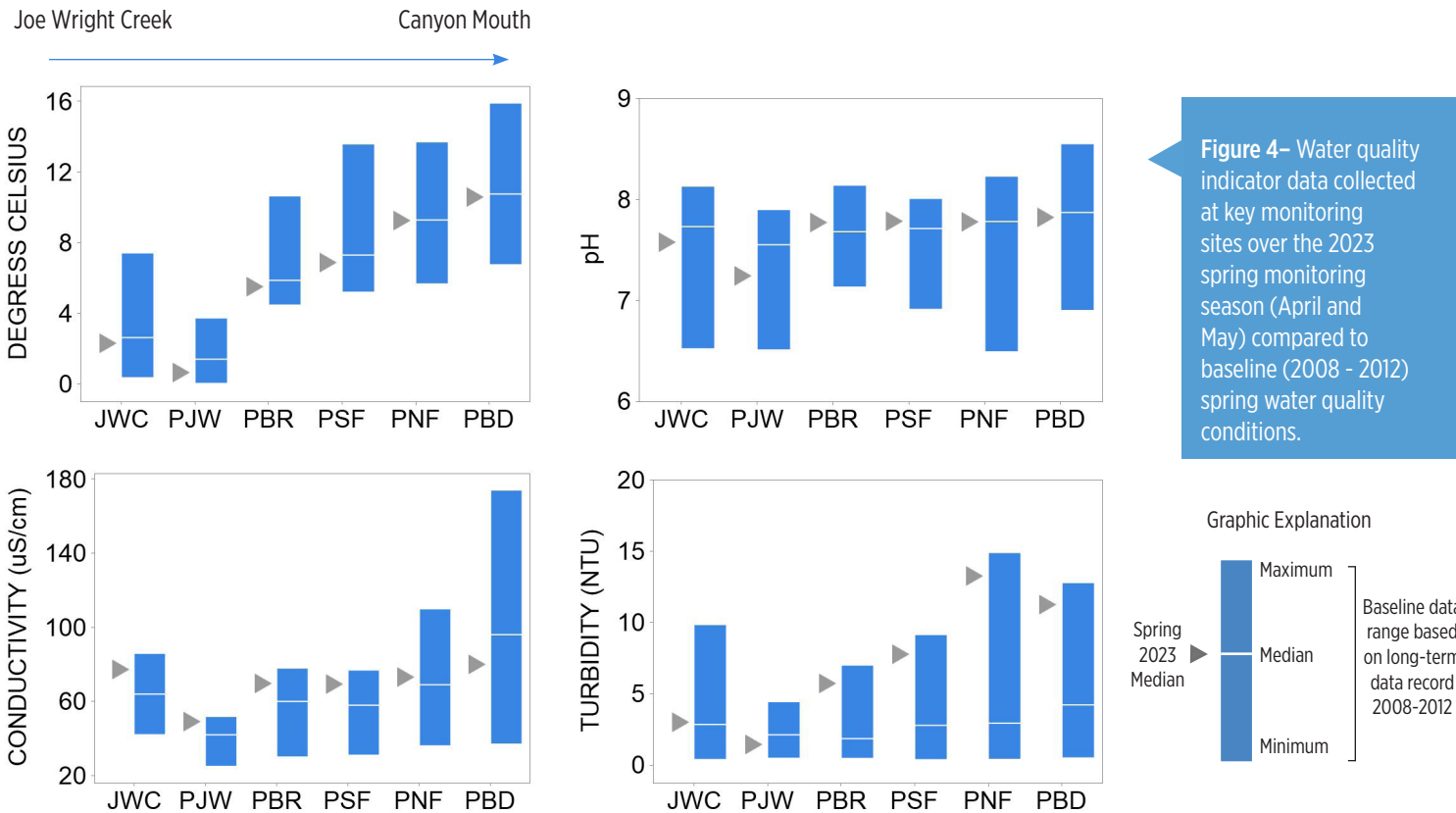
Water Quality Indicator	Explanation
Temperature	Water temperature influences other water quality parameters and is a major driver of biological activity and algal growth in rivers, including certain phytoplankton species that produce the taste and odor compounds, geosmin and 2-methylisoborneol.
pH	pH 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.

Spring water quality monitoring captures water quality conditions from the start of snowmelt runoff to near-peak streamflow in the CLP River. Water quality conditions vary with changes in elevation, contributing watershed area and potential watershed impacts.

Water temperature and pH were measured near baseline at all key monitoring sites. Specific conductivity, the ability of water to conduct electrical current, was measured near the baseline maximum from Joe Wright Creek (JWC) downstream to the Mainstem below the South Fork (PSF). Specific conductivity was near the baseline median at the City of Fort Collins intake (PNF) and below the baseline median at the City of Greeley's intake (PBD). Turbidity levels, how clear or cloudy water appears, were measured near the baseline median at higher elevation monitoring sites in Joe Wright Creek (JWC) and the Mainstem above Joe Wright Creek (PJW). A notable increase in turbidity was observed in the Poudre below Rustic (PBR) downstream to the City of Greeley's intake (PBD). Turbidity levels at these sites were near the baseline maximum but remained within the baseline range of values (Figure 5).

The elevated specific conductivity and turbidity levels at these sites imply that post-fire impacts from the Cameron Peak Wildfire continued to influence Poudre River water quality during snowmelt runoff; however, it appears that recent water quality impacts have lessened compared to previous years.

Jim Fahey, Watershed Technician with the City of Fort Collins, collects water samples from the Poudre River near the City's raw water intake location.



Snowpack

Snow water equivalent (SWE), the amount of water held in the snowpack, at the Joe Wright SNOTEL station near Cameron Pass was well above normal (median calculated over the 1991 – 2020 measurement period) for most of the snow accumulation season (October through May). The monthly maximum SWE was well below normal in October and November and above normal from December through May. The maximum amount of water contained in the snowpack, referred to as peak SWE, was observed on May 1st and measured 28.2 inches, or 118% of normal. Peak SWE across the entire Upper CLP watershed measured near normal to above normal. The Poudre Mainstem and North Fork CLP watersheds measured above normal (117% and 115%, respectively), while the South Fork CLP watershed measured slightly below normal (95%) (Figure 5).

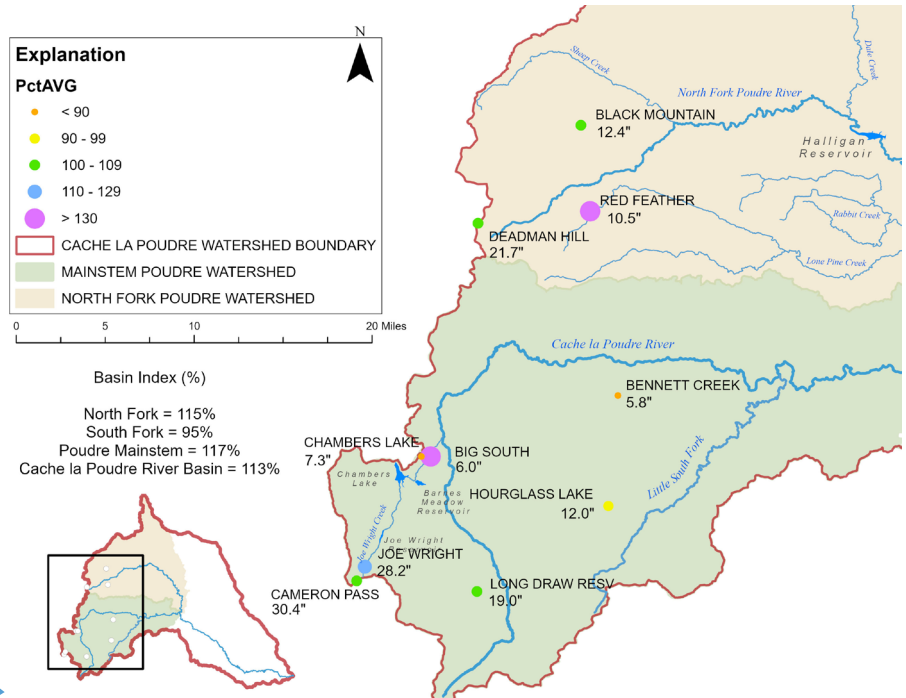
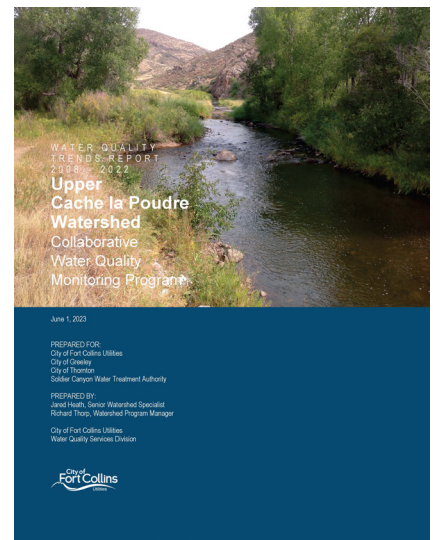


Figure 5 – Peak SWE measured at snowpack monitoring sites throughout the Upper Cache la Poudre River watershed in 2023.

2022 Upper Cache la Poudre Watershed Water Quality Trend Report

The Upper Cache la Poudre Watershed Collaborative Monitoring Program recently released its 2022 Water Quality Trends Report. The five-year water quality trend report analyzes the hydrology, climate, and water quality of the Upper CLP watershed over the last 15 years. Water quality data collected throughout the Upper CLP watershed were analyzed for short and long-term trends to determine if concentrations increased, decreased, or stayed the same over the five-year period of record from 2018 to 2022 and the long-term period of record from 2008 to 2022, respectively. The report documents 1) watershed impacts and issues of concern; 2) significant trends in climate, hydrology, and water quality in the Upper CLP watershed; 3) potential sources of pollution and/or watershed disturbances influencing water quality trends; and 4) a summary of significant findings and implications to water treatment.

Water quality reports can be found online at fcgov.com/source-water-monitoring/.



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