

# Upper Cache la Poudre Watershed Collaborative Monitoring Program SUMMER 2022 WATER QUALITY UPDATE

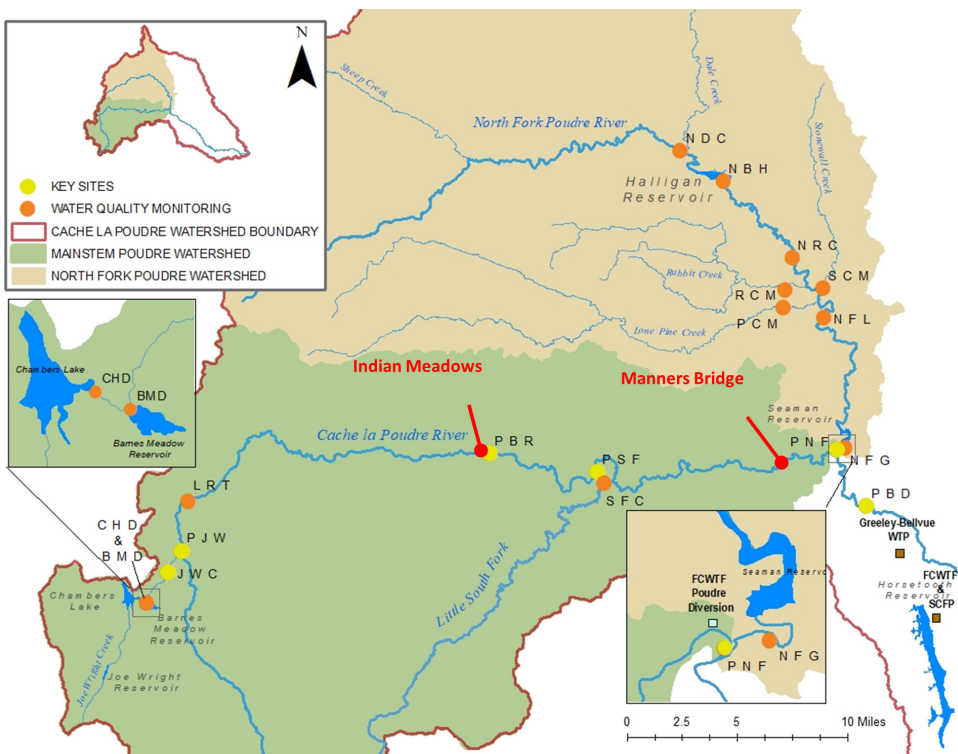
## Source Water Monitoring

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 Summer 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 summer season (June – August).

Water quality begins to stabilize following peak 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 Upper Cache la Poudre watershed, which capture water quality conditions above and below major tributaries and near raw 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  
 PJB - 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 summer season was 2.0°F warmer than the long-term average and ranked as the ninth warmest summer on record (out of 33 years). Monthly mean air temperature was above average in all summer months and the month of July ranked as the second warmest July on record (Table 1).

	Temperature			
	2022 (°F)	Average (°F)	Departure (°F)	2022 Rank
June	49.0	47.1	+1.9	12 <sup>th</sup> (H)
July	55.0	52.5	+2.5	2 <sup>nd</sup> (H)
August	52.0	50.5	+1.5	8 <sup>th</sup> (H)
Summer	52.0	50.0	+2.0	9 <sup>th</sup> (H)

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

*Note:* H = hottest and C = coldest

## Precipitation

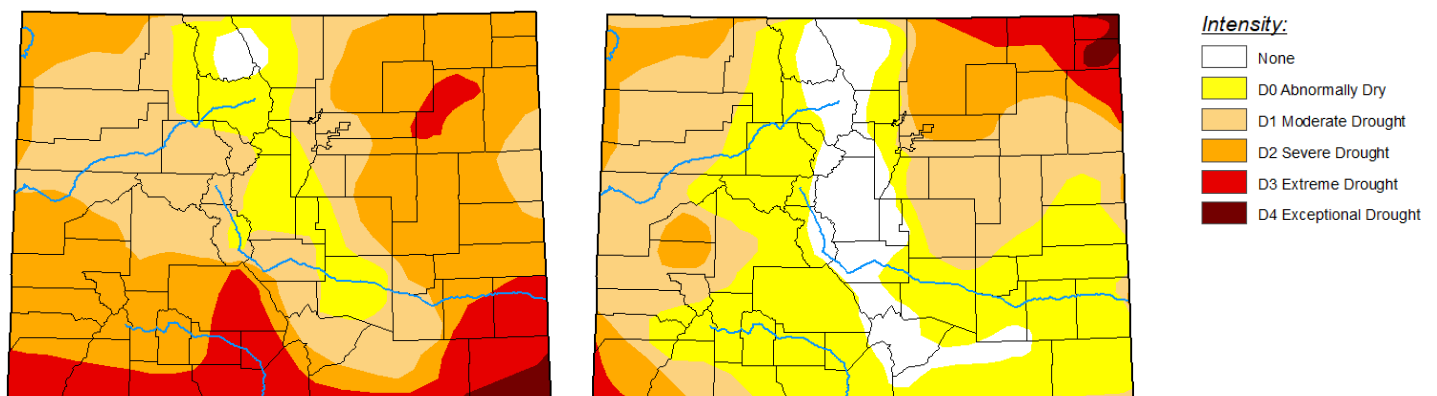
Precipitation measured at the Joe Wright SNOTEL over the 2022 summer season was near average and ranked as the 19th driest summer on record (out of 44 years). Precipitation was below average in June, near average in July, and slightly above average in August (Table 2). Drought conditions continued to improve throughout much of Upper CLP watershed due to near average precipitation measured in July and August. The intensity of drought conditions improved from abnormally and moderately dry conditions to mostly non-existent drought conditions (Figure 2).

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

*Note:* W = wettest and D = driest

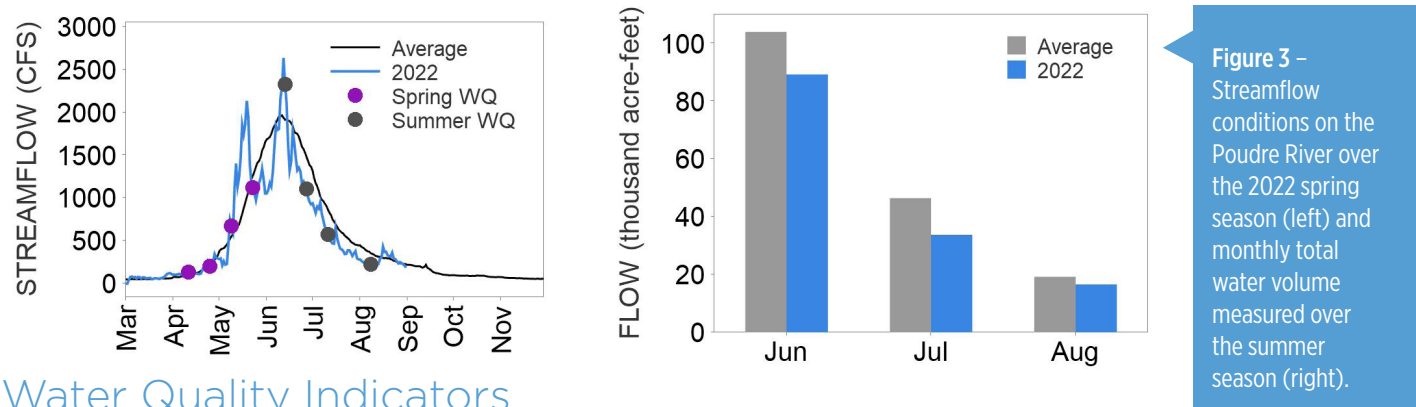
	Total Precipitation			
	2022 (inches)	Average (inches)	% of Average	2022 Rank
June	1.7	2.2	76%	20 <sup>th</sup> (D)
July	2.1	2.1	99%	21 <sup>st</sup> (D)
August	2.4	2.2	108%	18 <sup>th</sup> (W)
Summer	6.2	6.6	94%	19 <sup>th</sup> (D)

**Figure 2** – Drought conditions for the state of Colorado as monitored by the United States Drought Monitor on May 31, 2022 (left) and Aug. 30, 2022 (right). Map source: [droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)



# Streamflow Conditions

Streamflow at the Cache la Poudre River near the Canyon Mouth stream gage measured 139,319 acre-feet of water over the summer season, which was 82% of the long-term average (calculated over the 1881 – 2021 measurement period). Peak streamflow was observed June 12 and measured 2,630 cubic-feet per second – 132% of average. The timing of the 2022 peak was one day later than the long-term average peak streamflow date. Streamflow quickly receded following peak streamflow and by the end of the summer season was approaching baseflow (low flow) conditions. The total amount of water measured below average in all summer months, most notably in June and July (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.



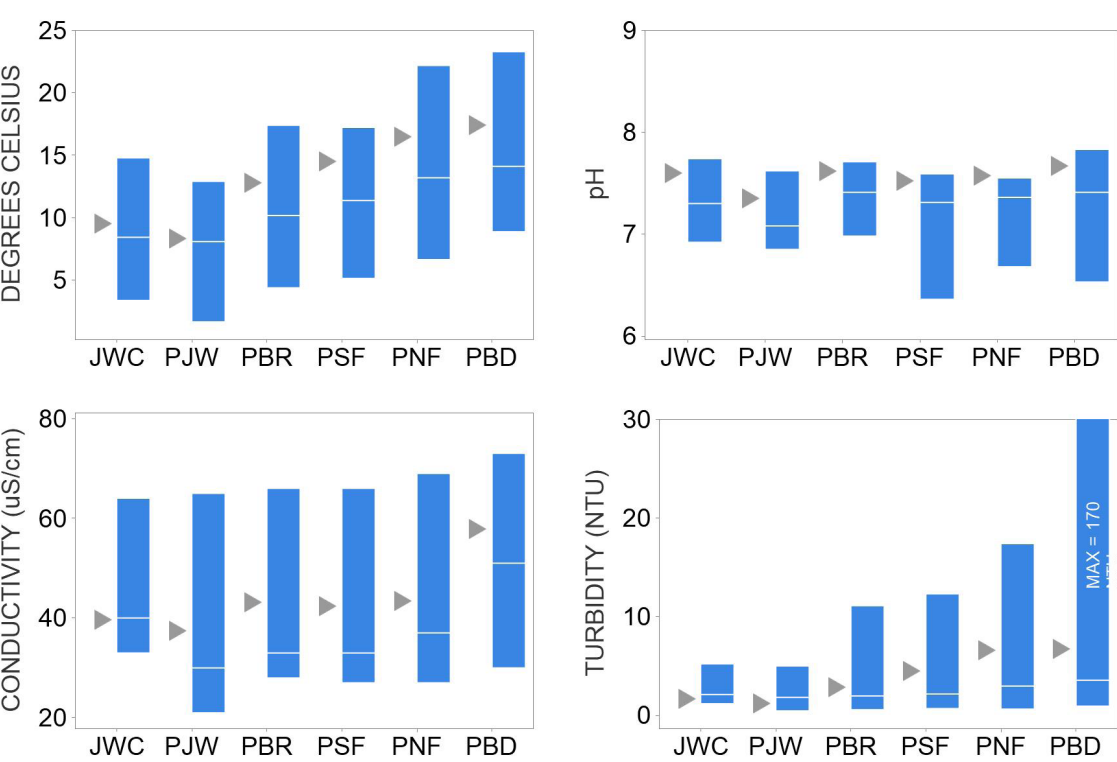
Summer monitoring captures water quality conditions during the Poudre River’s highest flow levels (peak streamflow) and when flow levels gradually decrease in the months following peak streamflow. Water quality conditions generally stabilize during this time of year. Water quality indicators that were once diluted by high streamflow begin to concentrate as streamflow recedes. In general, water temperature and specific conductivity increase, while turbidity and pH levels decrease. The summer season also marks the beginning of the summer monsoon, which can lead to increased frequency and intensity of rain events. An active monsoon season, in combination with a post-fire landscape, can lead to flash flooding, debris flows, and severe impacts to water quality.

Nearly all water quality indicators at key sites along the CLP River were within the baseline range of values over the 2022 summer season (Figure 4). Water temperature was 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 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 more alkaline than normal and consistent across monitoring locations. pH in the CLP at the City of Fort Collins’ diversion (PNF) was slightly higher than any value observed over the baseline. Specific conductivity values were higher than normal at all key sites, except in Joe Wright Creek (JWC) where values were normal. Specific conductivity levels were consistent across monitoring locations; however, higher values were measured near the City of Greeley’s diversion (PBD). The higher values at this monitoring location are likely associated with contributions from the North Fork CLP River (NFG), which joins the Mainstem CLP River between the cities of Fort Collins’ and Greeley’s diversions (PNF and PBD, respectively). Turbidity levels were near normal from Joe Wright Creek (JWC) downstream to the CLP River below Rustic (PBR) and slightly higher than normal from the CLP River below the South Fork (PSF) downstream to the City of Greeley’s diversion (PBD).

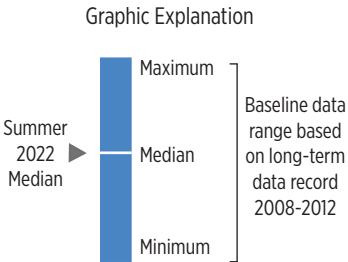


Sydney Phillips-Grace, a Water Quality Technician with the City of Greeley, gathering data with a water quality meter from the North Fork below Seaman Reservoir (NFG).

Joe Wright Creek Canyon Mouth



**Figure 4–** Water quality indicator data collected at key monitoring sites over the 2022 summer monitoring season (June, July, and August) compared to baseline (2008 - 2012) summer 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). 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. The Manners Bridge Water Quality Alert System measured several storm events. Many of these events impacted water quality and required water treatment plants to shut down their raw water intakes on the Poudre River for an extended period.

The response in post-storm event turbidity was variable depending on the location, magnitude, and extent of rainfall across the Cameron Peak burn scar. The figure below (Figure 5) displays daily average turbidity (calculated from 15-minute readings) in the Poudre River with maximum turbidity levels ranging from less than 100 nephelometric turbidity units (NTU) to 400 NTU (Figure 5). Some storm events resulted in instantaneous turbidity levels near 1,000 NTU. In comparison, pre-storm turbidity levels during the summer season were around 5 NTU. The duration of high turbidity events was short-lived in 2022. On average, water quality impacts lasted for less than 24 hours following many of the storm events.

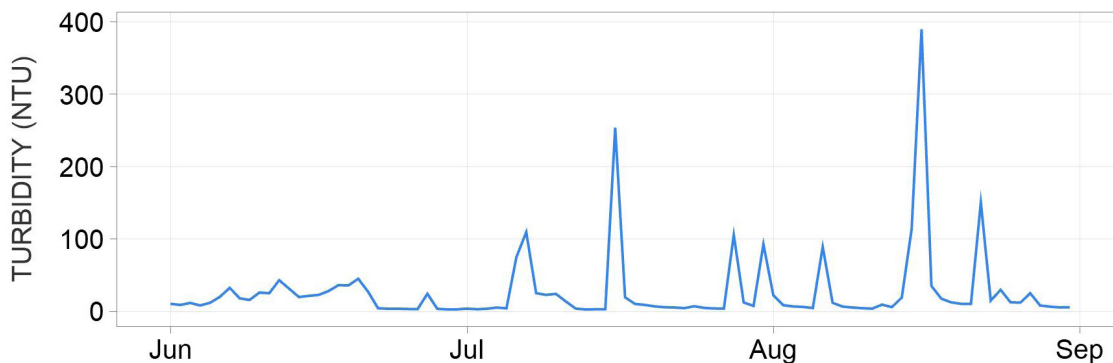
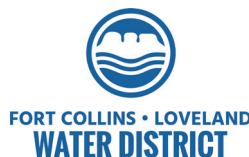


Figure 5 – Turbidity measured in the Poudre River at the Manners Bridge real-time water quality instrument during the month of May.



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