Collaborative Upper Cache la Poudre Monitoring Program

SOURCE WATER MONITORING

The Upper Cache la Poudre (UCLP) Watershed Collaborative 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.

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

The Summer 2020 Water Quality Update provides a seasonal summary of watershed conditions in the Upper CLP Watershed by highlighting meteorological, hydrologic, and water quality conditions during the summer season, as defined by the months of June, July, and 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 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.

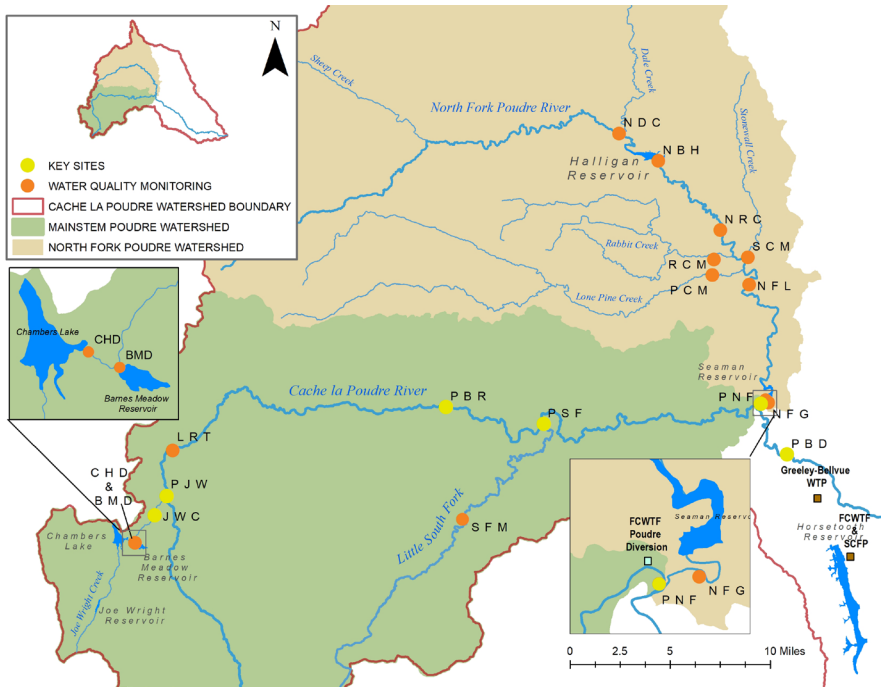

Figure 1 *- Upper Cache la Poudre Collaborative Monitoring Program sampling locations*

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 the Town of 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 over the 2020 summer season was 2.8°F warmer than the long-term average at the Joe Wright Snow Telemetry Station (SNOTEL) near Cameron Pass and ranked as the 2nd warmest summer on record (41 years). All summer months were warmer than average. June and July were slightly warmer than average and ranked as the 11th and 9th warmest on record (41 years). The month of August was much warmer than average and ranked as the warmest August on record ***(Table 1)***.

Table 1 *– Monthly mean summer air temperatures measured at Joe Wright SNOTEL compared to the 30-year long-term baseline average (1991 – 2019). Note: C = coldest and H = hottest*

Period of Record	Temperature			
	2020 (˚F)	Average (˚F)	Departure (˚F)	2020 Rank
June	49.0	47.0	2.0	11th (H)
July	54.0	52.4	1.6	7th (H)
August	55.0	50.3	4.7	1st (H)
Summer	52.7	49.9	2.8	2nd (H)

PRECIPITATION

Precipitation measured over the summer season was 63% of average and ranked as the 9th driest summer on record (41 years). Average precipitation was observed in the month of June. In contrast, precipitation measured in the months of July and August was less than half the average at 47% and 42% of average. The month of July ranked as the 5th driest on record and the month of August ranked as the 4th driest on record ***(Table 2).***

Table 2 *– Monthly accumulated precipitation totals measured at the Joe Wright SNOTEL over the 2020 summer season compared to the long-term average (1981 – 2010).*
Note: W = wettest and D = driest

Period of Record	Total Precipitation			
	2020 (inches)	Average (inches)	% average	2020 Rank
June	2.4	2.4	100%	17th (D)
July	1.1	2.3	47%	5th (D)
August	1.0	2.4	42%	4th (D)
Summer	4.5	7.1	63%	9th (D)

STREAMFLOW CONDITIONS

Streamflow at the Cache la Poudre River near the Canyon Mouth (CLAFTCCO) stream gage measured 111,374 acre-feet over the summer season which was well below the long-term average (65%). Streamflow peaked 10 days earlier than average in 2020 and measured 150% of average. The duration of snowmelt runoff was notably shorter in 2020 compared to average which resulted in below average streamflow conditions in all summer months. Streamflow in the month of June measured 78% of average at 83,488 acre-feet. In the month of July streamflow measured 21,231 acre-feet which was less than half of the average. Streamflow continued to drastically decline into August when flows measured 34% of average at 6,655 acre-feet. The month of August ranked as the 9th lowest streamflow on record (135 years).

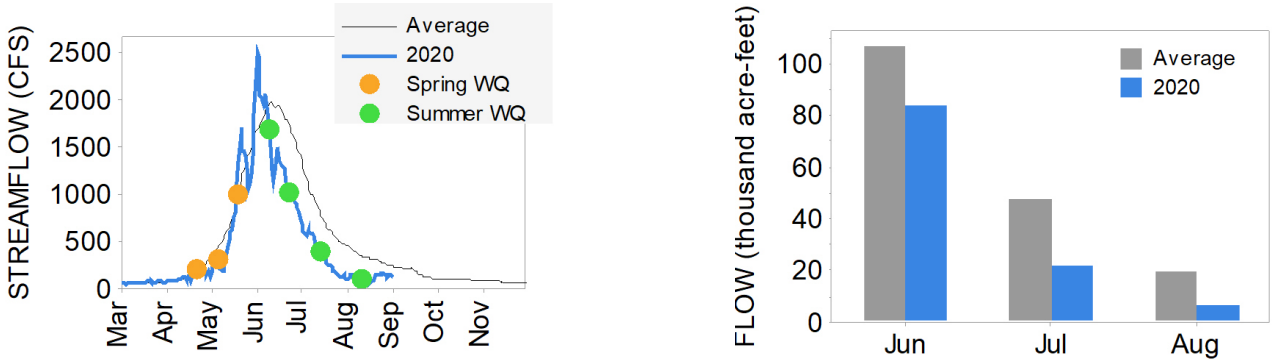

Figure 2 *– Streamflow conditions on the Poudre River over the 2020 summer season (left) and monthly total water volume measured over the summer season (right).*

WATER QUALITY INDICATORS

The Upper Cache la Poudre 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 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.

WATER QUALITY INDICATORS CONTINUED

Summer monitoring captures water quality conditions during the Poudre River's highest flow levels (peak streamflow) and when flow levels gradually decrease (the falling limb of the hydrograph) in the months following peak streamflow. During this time of the year water quality conditions stabilize and constituents 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.

Over the summer months of 2020, water quality indicators at all key sites along the Poudre River were within the baseline range of values ***(Figure 3)***. Water temperature was slightly warmer than normal at all key monitoring sites. pH levels were near normal at all sites except on the Mainstem CLP River at the City of Greeley's raw water intake (PBD) where levels were slightly higher than normal. Conductivity values were below normal on Joe Wright Creek (JWC) and above normal from the Mainstem CLP River above Joe Wright Creek (PJW) downstream to the Mainstem CLP River below the South Fork (PSF). Conductivity values were slightly above normal at the City of Fort Collins' and City of Greeley's raw water intakes (PNF and PBD). Turbidity levels were near the baseline minimum and very low at all key monitoring locations.

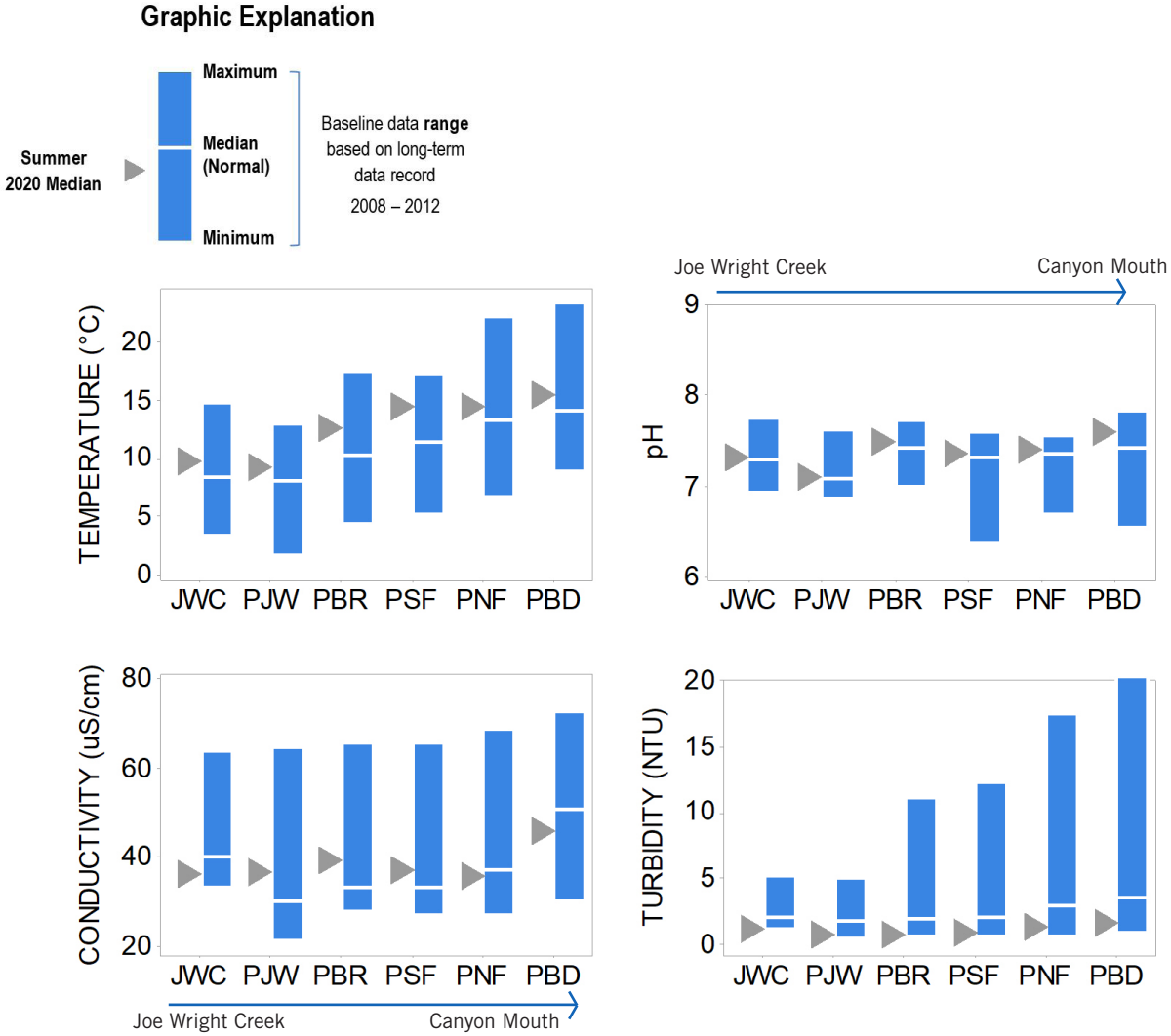

Figure 3 *– Water quality indicator data collected at key monitoring sites over the 2020 summer monitoring season (June, July and August) compared to baseline summer water quality conditions.*

TASTE AND ODOR COMPOUNDS

Geosmin and 2-Methylisoborneol (MIB) are naturally occurring organic compounds which introduce an earthy odor to water that can be detected by the most sensitive individuals at concentrations as low as 4 nanograms per liter (ng/L) or 4 parts per trillion (ppt). These compounds do not pose a public health risk but are of concern because their detectable presence can negatively affect customer confidence in the quality of drinking water. Geosmin and 2-MIB are monitored at PBR and PNF during routine UCLP monitoring events.

The taste and odor compound 2-MIB was reported slightly above the reporting limit on the Mainstem CLP River below Rustic (PBR) in July and August, but was not detected downstream on the Mainstem CLP River below Rustic (PBR). Geosmin was not detected (<1 ng/L) at either monitoring location over the summer season ***(Table 4)***.

Table 4 *– Poudre River geosmin and 2-MIB concentrations (ng/L or ppt) during the summer of 2019 on the Mainstem CLP River below Rustic (PBR) and CLP River above the North Fork (PNF). NS = not sampled*

Monitor Date	PBR		PNF	
	Geosmin (ng/L)	2-MIB (ng/L)	Geosmin (ng/L)	2-MIB (ng/L)
06/09/2020	ns	ns	<1	<2.5
07/13/2020	<1	**3.1**	<1	<2.5
08/10/2020	<1	**2.8**	<1	<2.5

CAMERON PEAK WILDFIRE

The Cameron Peak wildfire ignited on August 13th near Chambers Lake in the upper elevations of CLP watershed near Cameron Pass. As of September 8, the wildfire was only 4% contained and had burned over 100,000 acres of heavy timber stands. Several long-term water quality monitoring sites associated with UCLP Watershed Collaborative Monitoring Program are located either within or downstream of the wildfire impacted area ***(Figure 4)***. These sites will be used to monitor short- and long-term impacts from the Cameron Peak wildfire on the Poudre River water supply. Water quality alert systems located at two locations on the Poudre River upstream of water supply intakes will provide water treatment operations with real-time data and adequate warning time to quickly respond to changes in Poudre River water quality.

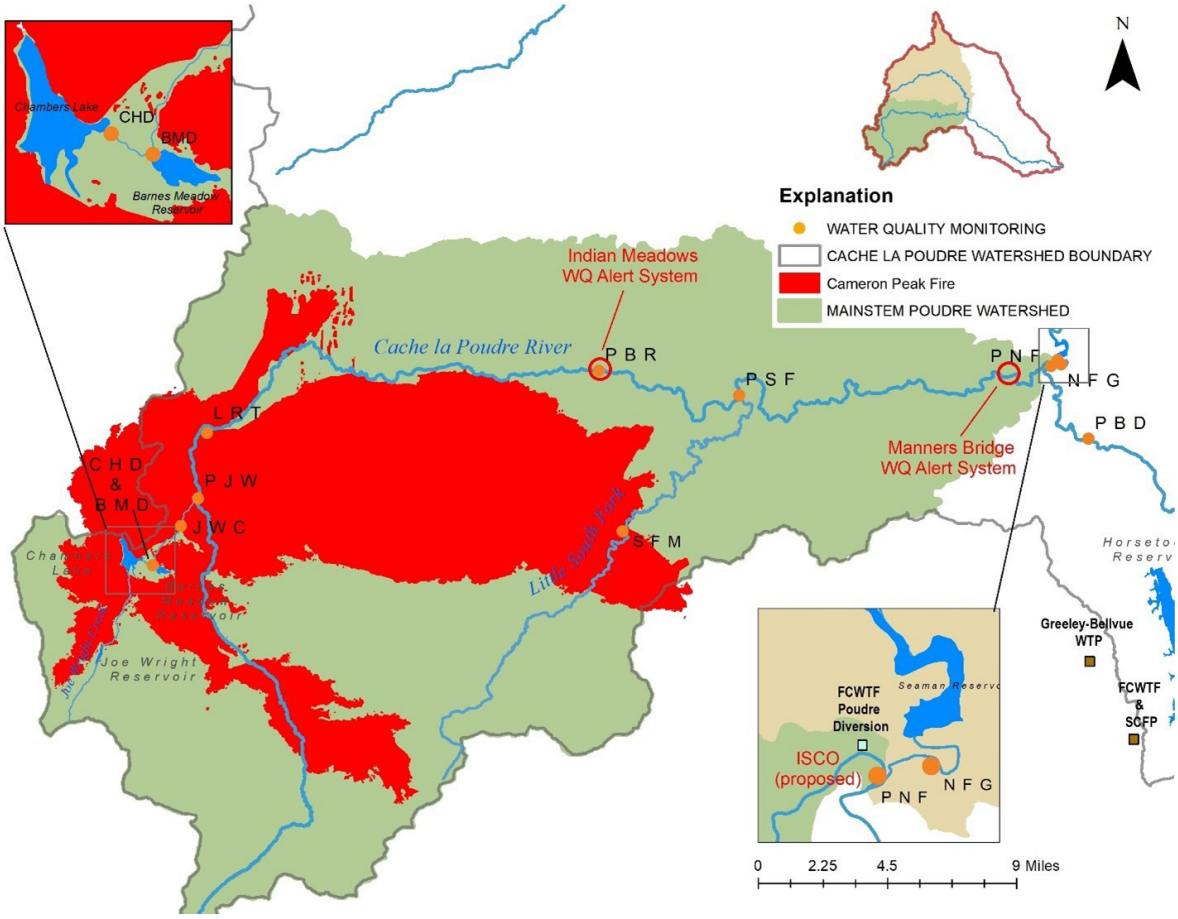

Figure 4 *– Cameron Peak Wildfire burn area boundary in the Upper Cache la Poudre watershed as of Sept. 8, 2020.*