



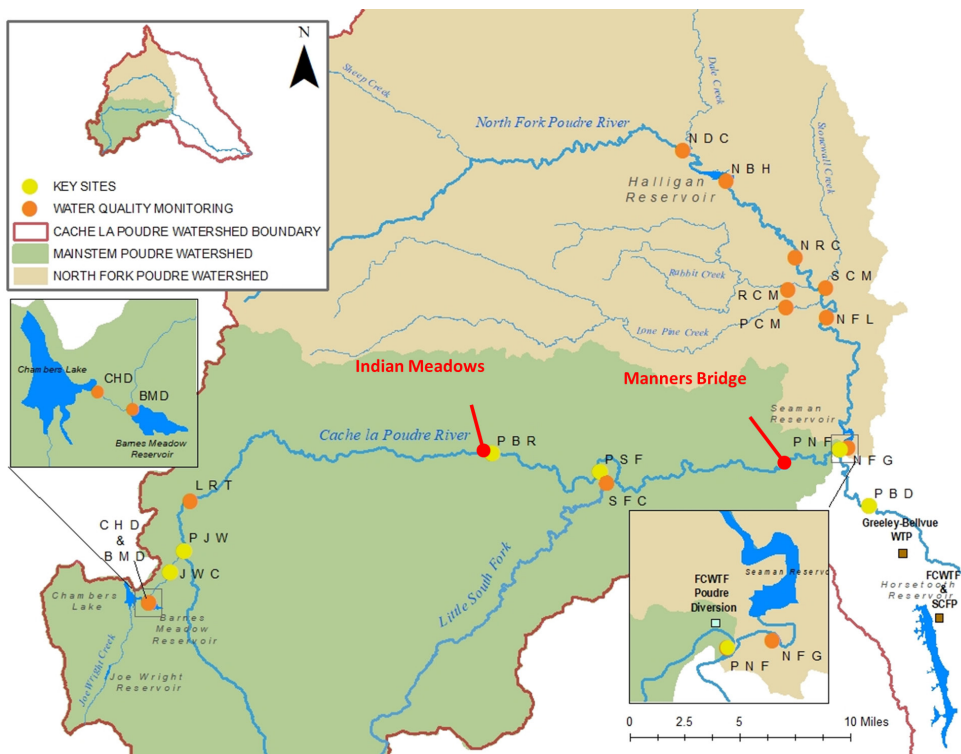
## Source Water Monitoring

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 Drinking Water Authority. The program helps these water providers meet present and future drinking water treatment goals.

Water quality monitoring of our raw (untreated), CLP River drinking water supply is conducted April through November. Monitoring sites are strategically located throughout the Upper CLP watershed and data provide valuable information about the health of our source watershed and quality of our raw water supply.

The Spring 2022 Water Quality Update provides a seasonal summary of watershed conditions in the Upper CLP watershed by highlighting weather, snowpack, and streamflow conditions over the spring season (March – May), as well as water quality information collected April and 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 collected from 2008 to 2012.



**Figure 1 – Upper CLP 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 spring season was 0.1°F cooler than the long-term average and ranked as the sixteenth coldest spring on record (out of 33 years). Monthly mean air temperature was below average in March and April, and above average in May (Table 1).

	Temperature			
	2022 (°F)	Average (°F)	Departure (°F)	2022 Rank
March	25.0	25.2	-0.3	15 <sup>th</sup> (H)
April	30.0	30.5	-0.5	11 <sup>th</sup> (C)
May	39.0	38.5	0.5	11 <sup>th</sup> (H)
Spring	31.3	31.4	-0.2	16 <sup>th</sup> (C)

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

*Note:* H = hottest and C = coldest

## Precipitation

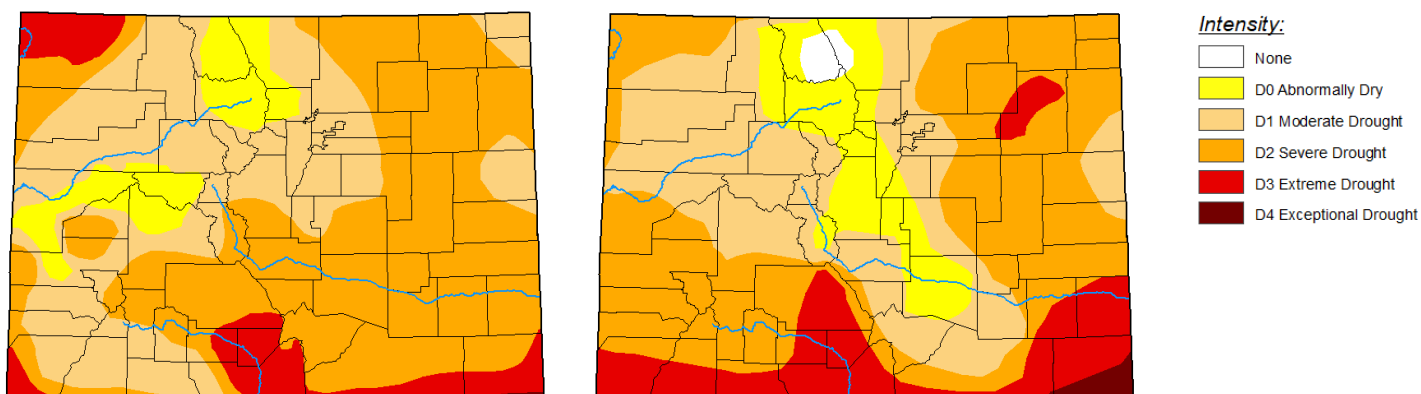
Precipitation measured at the Joe Wright SNOTEL over the 2022 spring season was above average and ranked as the eighth wettest spring on record (out of 44 years). Precipitation was below average in March and above average in April and May. March was the sixth driest on record and May was the fifth wettest on record (Table 2). Drought conditions improved near the headwaters of the Upper CLP watershed due to above average precipitation measured in April and May (Figure 2).

**Table 2** – Monthly accumulated precipitation totals measured at the Joe Wright SNOTEL over the 2022 spring 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
March	3.3	4.5	73%	6 <sup>th</sup> (D)
April	6.6	5.7	117%	10 <sup>th</sup> (W)
May	6.6	4.3	155%	5 <sup>th</sup> (W)
Spring	16.5	14.4	114%	8 <sup>th</sup> (W)

**Figure 2** – Drought conditions for the state of Colorado as monitored by the United States Drought Monitor on March 1, 2022 (left), and May 31, 2022 (right). Map source: droughtmonitor.unl.edu

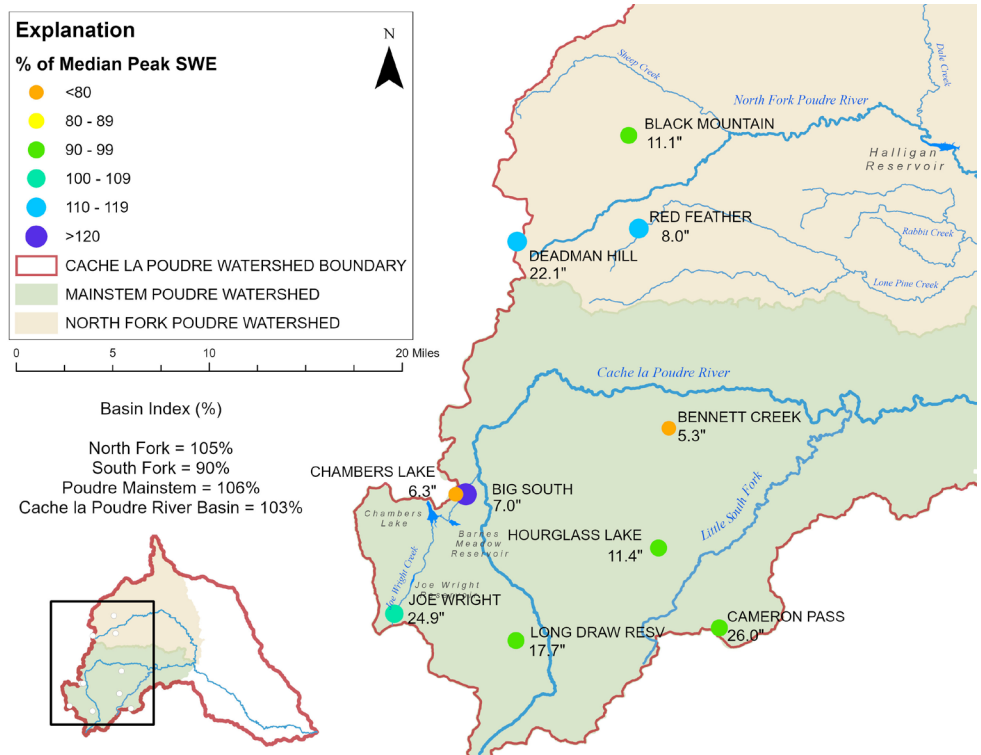




## Snowpack

Snow water equivalent (SWE), the amount of water held in the snowpack, at the Joe Wright SNOTEL station near Cameron Pass was below normal (median calculated over the 1991 – 2020 measurement period) for most of the snow accumulation season (October through May). Monthly maximum SWE was slightly below normal in October and November, above normal from December through February, and near normal from March through May. The maximum amount of water contained in the snowpack, referred to as peak SWE, was observed on May 10 and measured 24.9 inches – 104% of normal. Peak SWE across the entire Upper CLP watershed measured near normal. The Poudre Mainstem and North Fork CLP watersheds measured slightly above normal, while the South Fork CLP watershed measured slightly below normal (Figure 3).

**Figure 3 – Peak SWE measured at snowpack monitoring sites throughout the Upper CLP River watershed in 2022.**



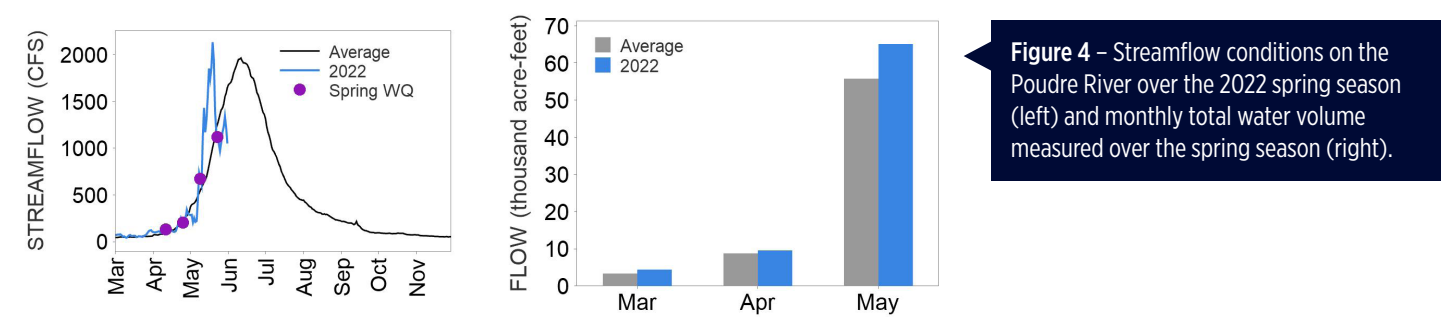
CLP River, May 23, 2022



Jordyn Geller, watershed technician for Fort Collins Utilities, collects water quality data from the Little South Fork.

## Streamflow Conditions

Streamflow at the CLP River near the Canyon Mouth (CLAFTCCO) stream gage measured 79,105 acre-feet of water over the spring season, which was 120% of the long-term average (calculated over the 1881 – 2021 measurement period). Snowmelt runoff began as expected in April. Streamflow increased slowly through April before rapidly increasing in early-May. Streamflow measured above average for the first two weeks of May before cooler weather slowed the pace of snowmelt for the remainder of the month. Streamflow measured above average in all spring months (Figure 4).



## 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.

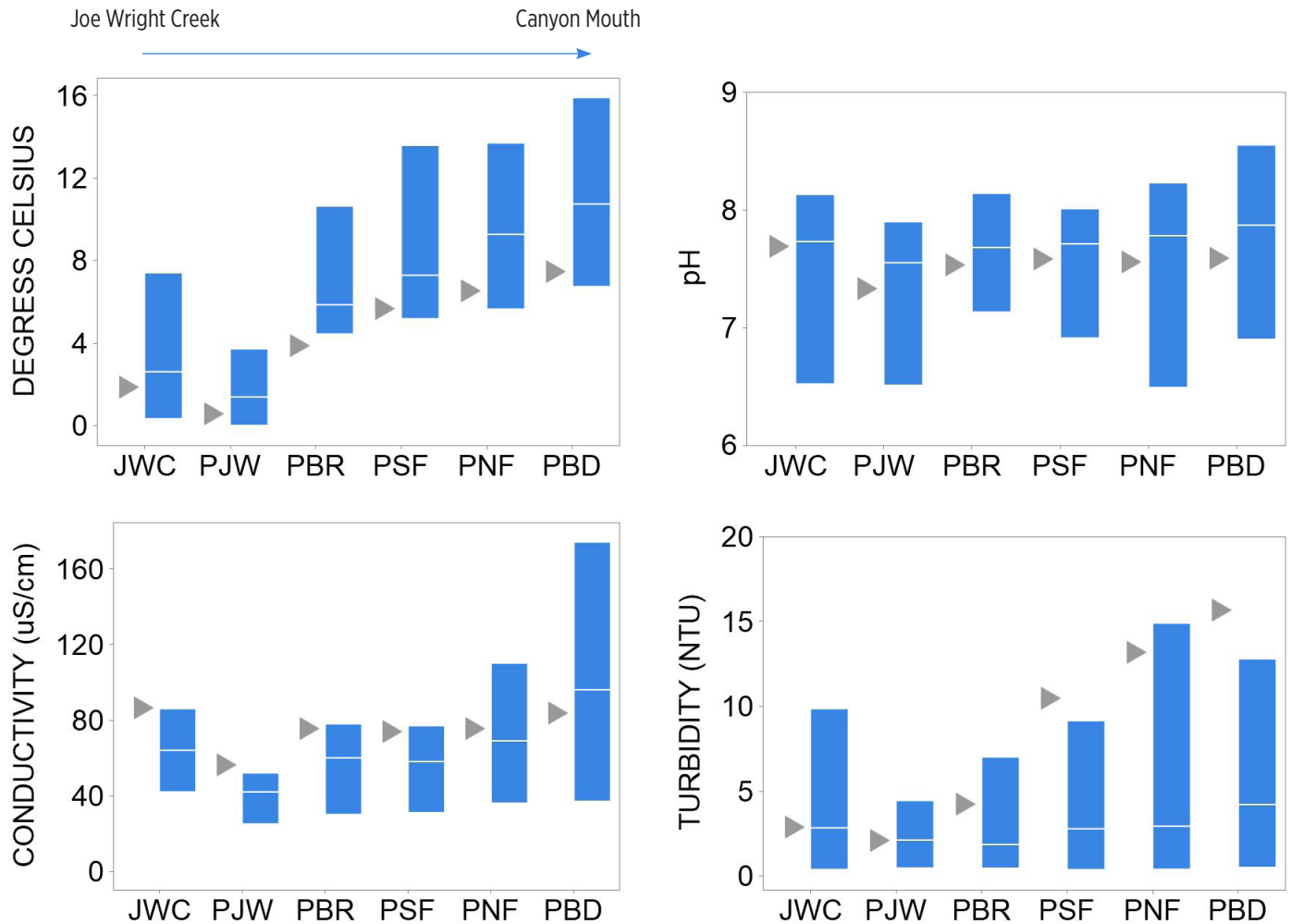
**Table 3 – Water quality indicators measured as part of the Upper Cache la Poudre Collaborative Water Quality Monitoring Program.**

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-methyisoborneol.
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 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 was cooler than baseline at all key monitoring sites. pH values were within the range of values observed over the baseline period of record and measured slightly lower than the baseline median at all key monitoring sites. Specific conductivity measured near or slightly above the baseline maximum from Joe Wright Creek (JWC) downstream to Mainstem below the South Fork (PSF). Specific conductivity was near the baseline median at both the City of Fort Collins and City of Greeley's intakes (PNF and PBD). Turbidity levels measured near the baseline median at higher elevation monitoring sites in 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 or above the baseline maximum (Figure 5).

Elevated specific conductivity and turbidity levels at these sites indicate higher amounts of sediment and solids (dissolved and suspended), introduced from the Cameron Peak Fire burn scar over the 2021 monsoon season, are impacting water quality during snowmelt runoff.



**Figure 5 –** Water quality indicator data collected at key monitoring sites over the 2022 spring monitoring season (April and May) compared to baseline spring 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. 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.

Post-fire impacts from the Cameron Peak Fire continue to affect water quality in the Poudre River during spring snowmelt. High intensity rain events during the 2021 monsoon season caused severe erosion of sediment, ash, and other debris from burned hillslopes into the Poudre River. This material was delivered downstream and accumulated on the banks and bottom of the Poudre River. As streamflow quickly increased from spring snowmelt, the stored material was resuspended in the water causing elevated turbidity levels (Figure 6). A substantial "flush" of sediment and ash occurred for several weeks in early-May turning the river dark brown. In response to the degraded water quality conditions in the Poudre River, water providers shutdown their Poudre River intakes and relied on alternate water sources to provide clean and safe drinking water.

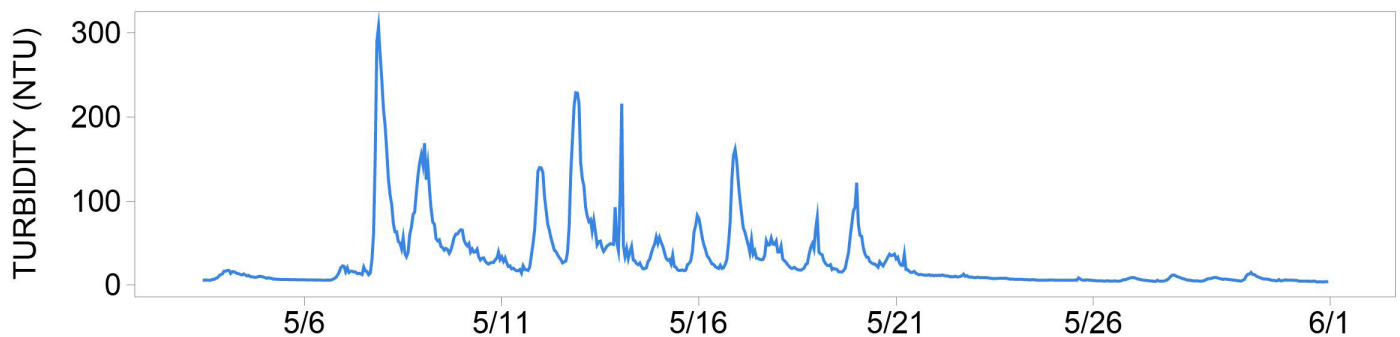


Figure 6 – Turbidity measured in the Poudre River at the Indian Meadows real-time water quality instrument during the month of May.



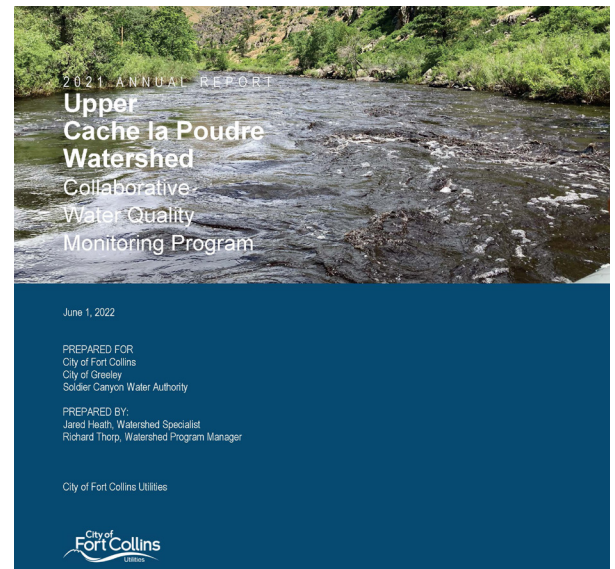
Ash and sediment, visible in the lower right corner of the image, resuspended in the water as streamflows increased, April 2022. Source: FireForest



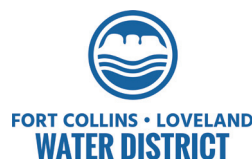
# 2021 Upper Cache la Poudre Watershed Water Quality Annual Report

The Upper Cache la Poudre Watershed Collaborative Monitoring Program recently released its 2021 Annual Report. The 2021 Annual Report summarizes climate and hydrology in the Upper CLP watershed over the 2021 calendar year and water quality data collected as part of the Upper CLP Collaborative Water Quality Monitoring Program.

Water quality reports can be found online at [fcgov.com/source-water-monitoring](https://fcgov.com/source-water-monitoring).



High turbidity in the Mainstem Poudre River near the City of Fort Collins raw water supply intake on May 9, 2022.



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