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. Water quality data provide valuable information about the health of our source watershed and raw water supply.

The Spring 2017 Water Quality Update provides a seasonal summary of watershed conditions in the Upper CLP Watershed by highlighting snowpack and streamflow conditions, as well as water quality information collected over the months of April, May and June.

Water quality during snowmelt runoff is highly variable and to better capture this seasonal variability, monitoring is conducted two times per month from April through June. 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)***.

More information is available at *fcgov.com/source-water-monitoring*.

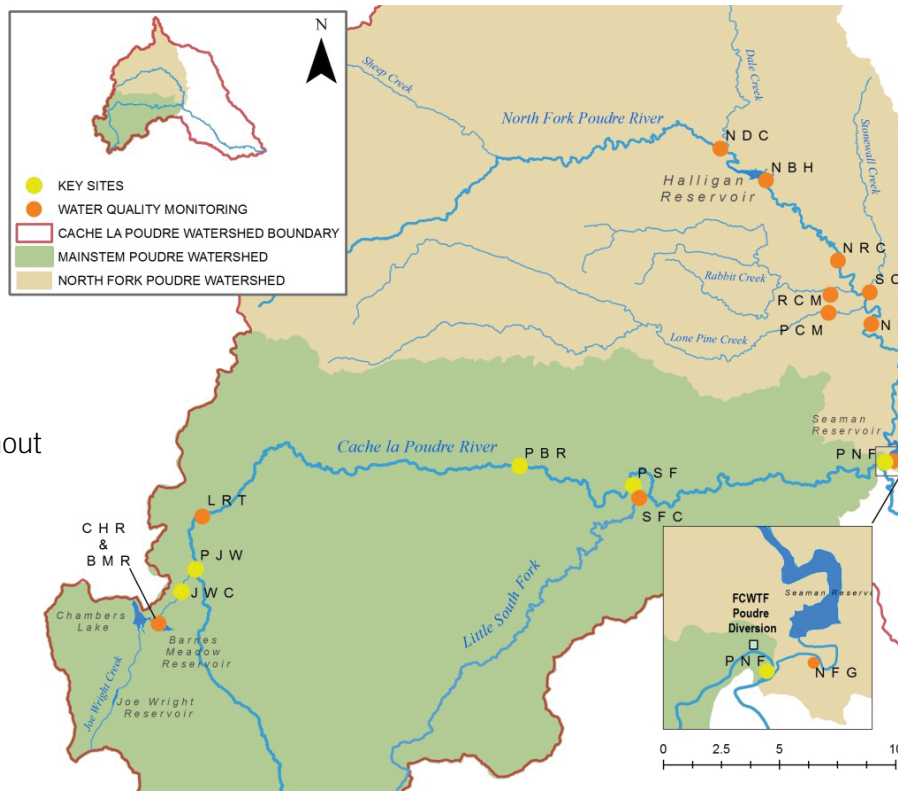


Figure 1 *- Upper Cache la Poudre Collaborative Monitoring Program sampling locations*

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

SNOWPACK AND STREAMFLOW CONDITIONS

Snow water equivalent (SWE), the amount of water held in the snowpack, measured at Joe Wright snow telemetry station near Cameron Pass was below the long-term median during the start of the snow accumulation season. In normal years the snowpack begins to develop in October and steadily accumulate through April. Dry and warm conditions that began in the summer of 2016 persisted through the months of October and early November with the snow accumulation season beginning nearly six weeks later than normal.

Steady storms beginning in mid-November through December brought the snowpack back to near normal conditions. A strong storm during the first week of January increased the amount of water in the snowpack from 7.6 inches to 12.8 inches leaving the snowpack well above normal **(*Figure 2a*)**. The water content in the snowpack remained above normal through February, but the rate of accumulation during these months was slower than normal resulting in near normal conditions by early March. Variably dry and wet conditions beginning in March resulted in periods of snowmelt and snow accumulation cycles before the water content peaked in May.

The maximum amount of water contained in the snowpack, referred to as peak SWE, at Joe Wright SNOTEL was measured on May 4 at 19.5 inches – 83 percent of the historical median **(*Figure 2a*)**. Based on the 30 year period of record, peak SWE at Joe Wright SNOTEL normally occurs on April 29. Peak SWE varied throughout the Upper CLP watershed **(*Figure 3*)**. The North Fork and Mainstem Poudre were near the historic median, while the Little South Fork watershed measured below the historic median. Peak SWE for the Upper CLP basin was measured at 103 percent of the median for the 2017 water year.

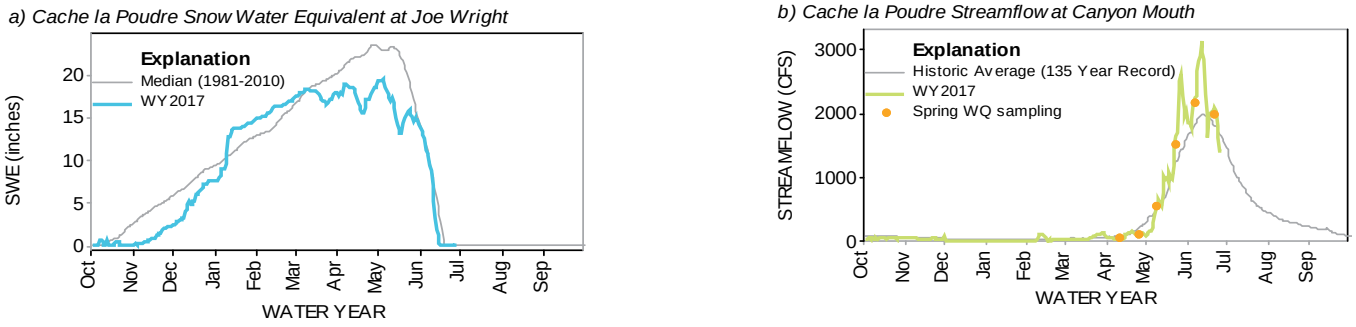


Figure 2 *– Snowpack (a) and streamflow (b) conditions in the Poudre River watershed over the 2017 water year.*

SNOWPACK AND STREAMFLOW CONDITIONS

Snowmelt runoff began in early May, which was slightly later than normal. Streamflow, as measured at the Canyon Mouth, followed closely to the historic average.

A late winter storm in May delivered significant snow to the mid and lower elevations of the North Fork and Mainstem watersheds. This storm was followed by warmer weather and a rain-on-snow event which accelerated snowmelt causing a rapid rise and initial peak in streamflow. Streamflow increased from about 1,000 cubic feet per second (cfs) to 2,500 cfs in seven days. Streamflow receded following this event, but quickly increased from snowmelt occurring higher in the watershed.

Peak streamflow (daily average) was observed on June 11 at 3,140 cfs – 157 percent of the average peak streamflow. The snowpack at Joe Wright SNOTEL was completely melted by June 16 and by the June 20 monitoring event, streamflow had receded to normal streamflow levels **(*Figure 2b*)**.

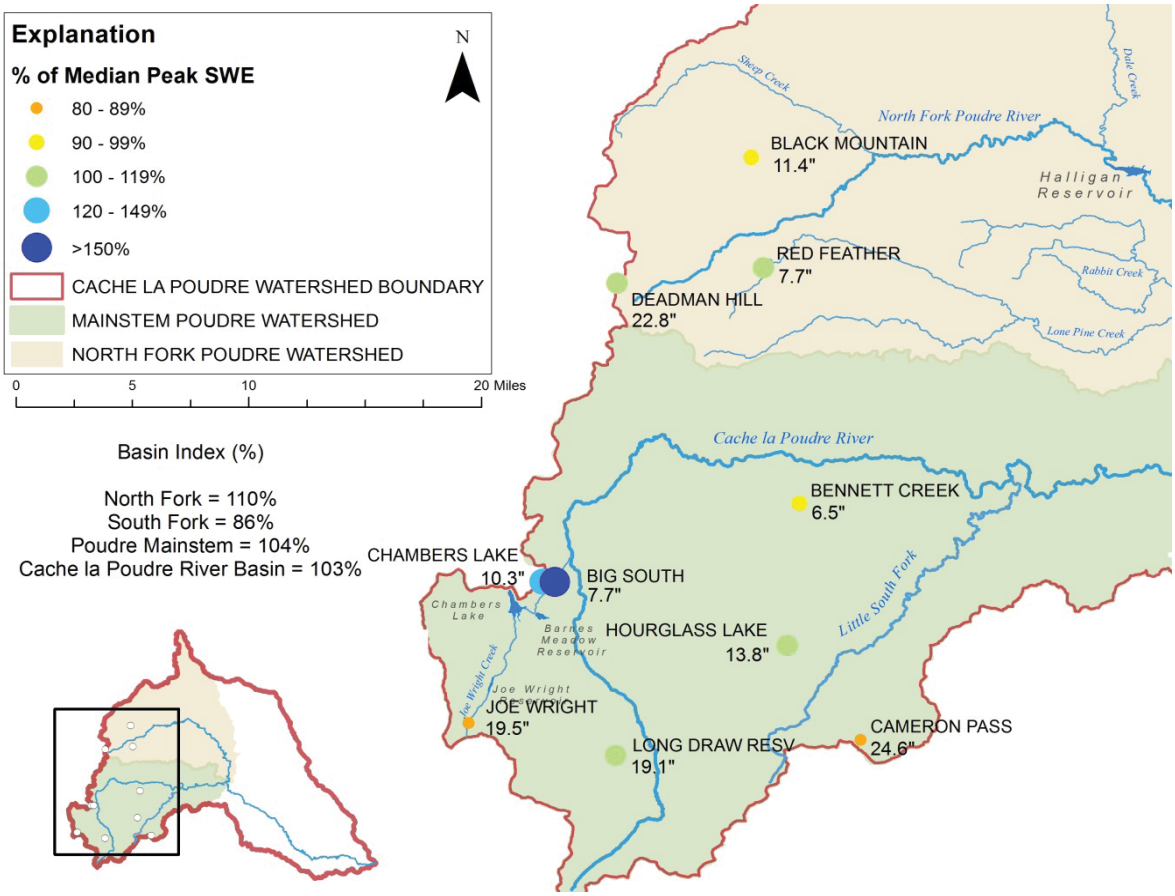


Figure 3 *- Percent of median peak snow water equivalent at snow monitoring sites throughout the Upper Cache la Poudre River watershed.*

WATER QUALITY INDICATORS

The Upper Cache la Poudre Collaborative Water Quality Monitoring Program tests for several key water quality indicators, including pH, conductivity, temperature and turbidity ***(Table 1)***. These key measurements provide a snapshot of water quality conditions, which are useful to identify trends or changes in water quality. Significant changes in water quality may provide an early warning of potential water pollution.

Table 1 - *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 compound, geosmin.
pH	pH is an important water quality parameter to monitor, as 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. Hardness is an index of the total calcium (Ca) and magnesium (Mg) in water.
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 throughout snowmelt runoff and peak streamflow. Water quality conditions vary with changes in elevation and contributing watershed area. All water quality indicators at key sites reported near the long-term median, indicating normal water quality conditions on the Poudre River during the 2017 snowmelt runoff season **(*Figure 4*)**. The following lists the range of values measured throughout the Mainstem watershed during spring water quality monitoring in 2017:

- Water temperature = 0.1° C – 13.6° C
- pH = 6.85 – 8.20
- Specific conductivity = 21.4 µS/cm – 109.4 µS/cm
- Turbidity =1.4 NTU – 14.0 NTU

Jorin Botte collects a grab sample on Joe Wright Creek below Chambers Lake.

WATER QUALITY INDICATORS CONTINUED

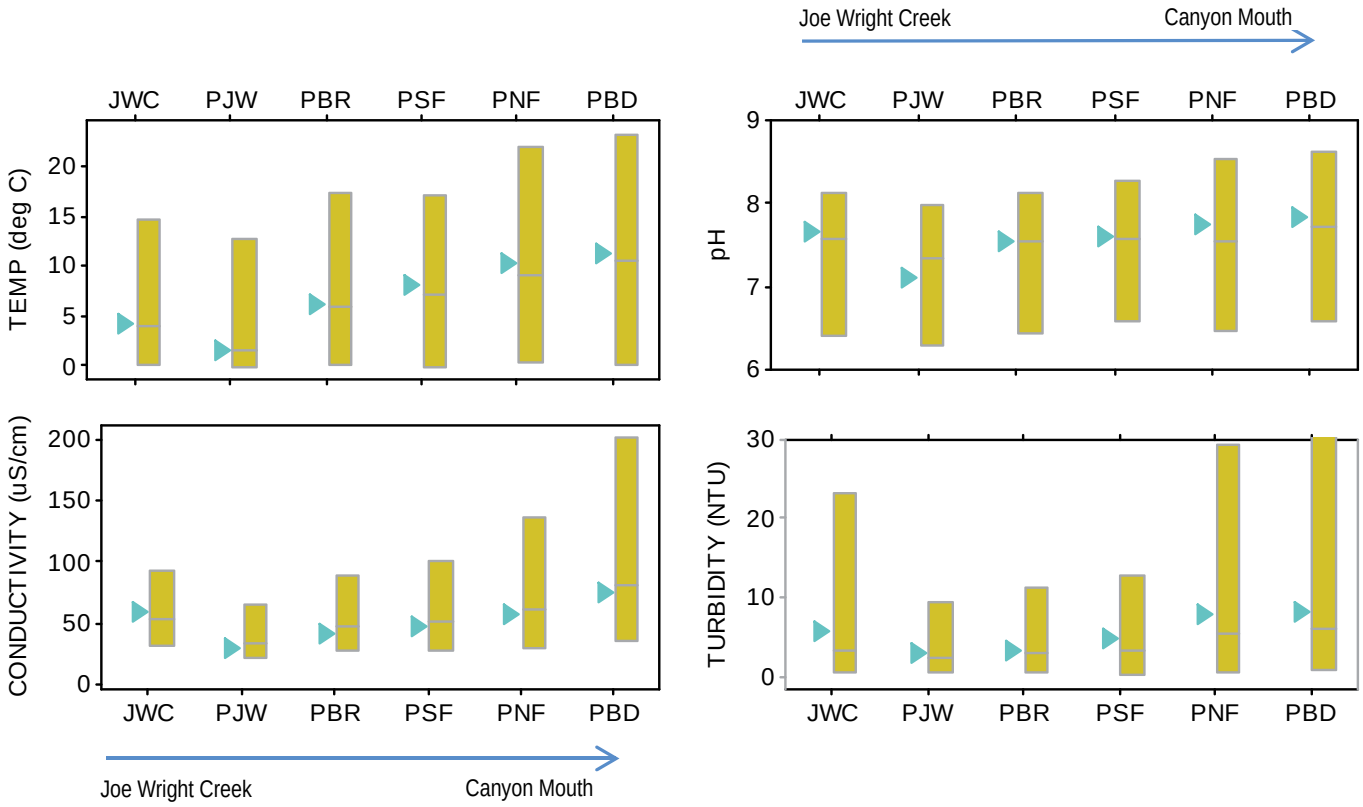
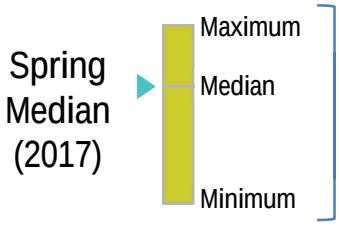


Figure 4 *– Water quality indicator data collected at key monitoring sites during Spring (April, May, June) 2017.*

Graphic Explanation



Data range based on long-term data record 2008-2016.

All water quality indicators at key sites reported near the long-term median, indicating normal water quality conditions.

MICROORGANISMS

Through the UCLP Collaborative Monitoring Program, the Poudre River is routinely tested for the presence of bacterial contamination by measuring the total amount of coliforms, an indicator organism for the presence of pathogenic bacteria.

In addition, *Escherichia coli (E. coli)* is measured and used as an indicator of human or animal fecal waste pollution since the source of origin is more specific than total coliforms. During the spring, snowmelt and rain serve as delivery mechanisms for *E. coli* and total coliforms from the surrounding watershed to the Poudre River.

Over the Spring 2017 monitoring season, *E. coli* and total coliforms were within the range of values seen in previous years, but slightly higher than the long-term median ***(Figure 5a, 5b)***. *E. coli* counts ranged from no detection to 579 cells per milliliter and total coliform ranged from 57 to 1,633 cells per milliliter.

The highest *E. coli* count was observed at PNF on April 10, which was the maximum *E. coli* count observed over the eight year monitoring record. Cell counts were measured nearly two orders of magnitude lower (5.2 cells per milliliter) on the following event on April 24 and remained notably lower in subsequent spring monitoring events in May and June.

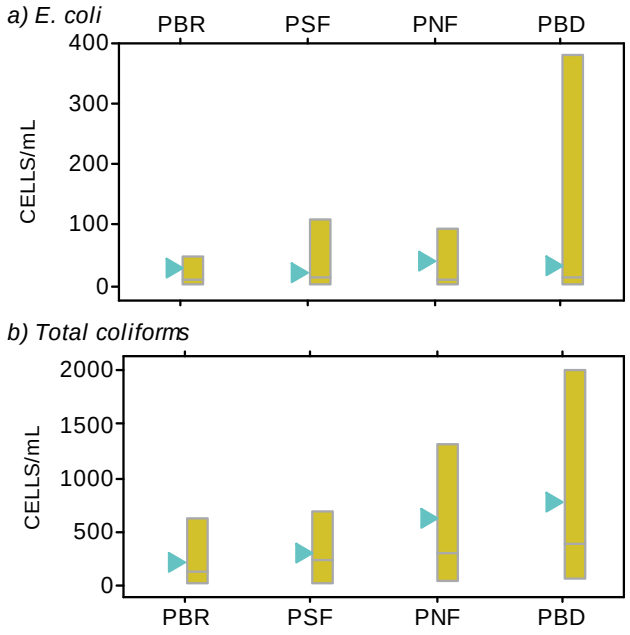


Figure 5 *– E. coli (a) and (b) T. coli counts on the Poudre River during the 2017 Spring water quality monitoring.*

E. coli **and total coliforms remained within the range of values seen in previous years, but were slightly higher than the long-term median.**

2016 UPPER CACHE LA POUDRE WATERSHED ANNUAL REPORT

The Upper Cache la Poudre Watershed Collaborative Monitoring Program recently released its 2016 Annual Report, which summarizes the hydrologic and water quality data collected in 2016 and provides a comparison of water quality from the years 2013-2016. The report also summarizes significant events, issues of concern, results from special studies, and data quality control. Water quality reports can be found online at *fcgov.com/source-water-monitoring*.