2022 Racetrack Creek Surface Water Monitoring Report

NRDP Contract 90022-TO 6

Prepared by the Clark Fork Coalition

Abstract

The purpose of this report is to present the results of seasonal instream flow monitoring associated with the Racetrack Lake water rights instream flow release from Racetrack Lake. This monitoring is required under the Racetrack Creek Water Management Plan and Streamflow Monitoring Plan, a Part of a Notice of Settlement for Application 76G-30106785. The Racetrack Lake water right allows for the release of 433 acre feet (AF) of storage or up to 8.33 cubic feet per second (CFS) during July and August. Racetrack Creek is identified as a Priority 1 watershed under NRDP's Upper Clark Fork Basin Aquatic and Terrestrial Restoration Plans (2019) (Restoration Plans). The goal of this effort is to work with the Racetrack Water Commissioner and water users under this plan to maintain stream gaging structures, calibrate rating tables for these structures and conduct flow measurements to ensure the instream benefits are maintained through the entire protected reach. This monitoring effort partially implements aquatic flow projects (Group 1 projects) described in section 3.2.1 of the Restoration Plans.

Introduction

In 2010, Clark Fork Coalition (CFC) submitted a Proposal Abstract to NRDP to purchase a storage Water Right in Racetrack Lake, an on-stream reservoir located in the headwaters of Racetrack Creek in the Flint Creek Mountain range. The Water Right authorizes the holder to store 433.33-acre feet (AF) of water per year. The water right was purchased with cost-share from the Columbia Basin Water Transaction Program. Upon completion of the water right transfer, CFC committed to filing a change of use application with DNRC to change the use of the Water Right from irrigation to instream flow for the benefit of the fishery resource of Racetrack Creek.

In 2018, DNRC issued a decision on CFC's application to change the Racetrack Lake storage water right from "irrigation" to "instream flow." According to the decision, CFC would only be able to protect the lake water released during summer low flows for the top 17 miles of Racetrack Creek to immediately below the Cement Ditch, which is where previous water right holders diverted the lake water to use for irrigation. Downstream of this so called "historical point of diversion" – a stretch where Racetrack Creek typically goes dry from irrigation withdrawals – DNRC said CFC had no legal authority to protect the water and ensure it reached the river.

Following a hearing in front of a DNRC hearings examiner and then an appeal to the Water Court, in April 2019, the Water Court ruled in CFC's favor and ordered DNRC to grant the change application to protect the entire Historic Diverted Volume (433.33 AF) instream in Racetrack Creek. The change application went through the public notice process and received several objections. The objectors and CFC developed a plan for managing and monitoring instream flow releases. CFC reached a settlement agreement with 14 of the 16 objectors. In September 2021, DNRC held a hearing for CFC and the two remaining objectors. DNRC dismissed the remaining objections from these two objectors.

In 2022, the first instream flow release was initiated from Racetrack Lake in accordance with the Racetrack Creek Streamflow Monitoring Plan. This plan was developed in conjunction with the objectors to the change application. Under this Water Management Plan a Streamflow Monitoring Plan was developed by KF2 Consulting with input by the CFC, water users and the water commissioner. In order to meet the measurement terms under this plan, the CFC installed 6 stream gaging structures described in Table 1 and depicted in figure 1 for the purpose of establishing rating curves from staff gages and stage height loggers that were utilized at these sites.

Site #	Water Source	Location	Rate	Measurement Type(s)
1	Racetrack Lake	Dam Outlet	Continuous	Telemetry utilizing a stage height logger, manual discharge measurements, parshall flume readings
2	Racetrack Creek	At Cement Ditch	As Needed	Staff gage, manual discharge measurements, flume
3	Racetrack Creek	Below Cement Ditch	Continuous	Staff gage, water level logger, manual discharge measurements
4	Racetrack Creek	Above Berg Diversion	Continuous	Staff gage, water level logger, manual discharge measurements
5	Racetrack Creek	Above Branch Ditch	Continuous	Staff gage, water level logger, manual discharge measurements
6	Racetrack Creek	Frontage Road	Continuous	Staff gage, water level logger, manual discharge measurements

Table 1- Locations of primary monitoring sites managed by the CFC in the upper Clark Fork Basin.

The individual monitoring sites are identified in the map (Figure 1). At each CFC monitoring site, a continuous data logger (HOBO) recorded both stream stage and water temperature data at 30 minute or 60 minute intervals, with the exception of site #2 which was added during the 2022 release per the Water Commissioner's request. The primary purpose of these data collection efforts was to quantify the magnitude and timing of water conditions in Racetrack Creek during the Racetrack Lake release (July 27th-August 20th). Water temperature data was also collected to determine if water temperatures exceeded threshold levels considered sustainable for salmonids.

In addition to the continuously monitored sites described above, the CFC also recorded data at other locations in Racetrack Creek (Table 2) as part of a synoptic flow study assist with understanding the reach scale impacts tied to the Racetrack Lake flow release. This report provides a narrative of

streamflow and water temperature conditions observed at each of monitoring sites funded by the NRDP.

Methods

At each of the continuously monitored locations, streamflow and water temperature was manually measured every 1-4 weeks between late June and August by CFC staff. These measurements were used to develop a rating curve for the continuous hydrographs. Individual flow measurements were tabulated using a Hach or Ott digital flow meter following standards established by the USGS (http://pubs.usgs.gov/wsp/ wsp2175/). To assure data reliability, the flow meters were calibrated monthly throughout the field season (and more frequently if needed). In accordance with the USGS measurement protocols, no individual velocity measurements in a stream cross section represented more than 10% of the total observed flow.

River stage and water temperature data was collected using data loggers that remotely recorded data at 30 or 60 minute intervals. Hobo data loggers were used at all sites during the 2022 field season with the exception of the Racetrack Lake Outlet, which utilized a McCrometer/Automata telemetry station. River stage data from the HOBOs loggers was correlated to flow by developing a stage-discharge rating curve for each site. The rating curves were produced by plotting the flow measurement data against the river stage data and calculating a power function from the plotted data. Using the equation from the rating curves, river stage data was extrapolated to develop a continuous hydrograph for each site. Although the locations of monitoring sites typically remain the same from season to season, small changes to a stream's cross sectional geometry (caused by natural morphological processes) may significantly impact the accuracy of previous years rating curves. Because of this, new rating curves were generated at all of the sites for the 2022 data.

The hydrographs and thermographs contained in appendix A were constructed from the extrapolated flow data and water temperature recordings from the data loggers. Streamflow data represents daily averages; maximum daily water temperature represents the highest individual daily reading. Meteorological data was retrieved from the National Climatic Data Center (https://www.ncdc.noaa.gov/climate-information) and Montana Climate Office (https://climate.umt.edu/).

Results

Streamflow and water temperature graphs for the 2022 monitoring season are provided in Appendix A, Figures 1-6 and Table 2.

Analysis & Conclusions

Racetrack Creek
Figures 1-6, Table 2

During the 2022 field season, Racetrack Creek followed a flow pattern that was similar to other area streams. After a typical snowmelt driven runoff, natural flows on Racetrack Creek began a recession toward irrigation influenced baseflow levels in early July. Releases from Racetrack Lake started on July 27th and extended until August 20st. The CFC telemetry station at the outlet of the dam was activated on July 22nd to track outflows from the reservoir, which averaged around 13.5 CFS during the course of the release with 8.33 CFS allocated for instream flow. According to the Water Commissioner Record, there was 45 miner's inches (1.1 cfs) overflow, 450 miner's inches (11.25 cfs) for the creek and 45 miner's inches (1.1 cfs) of "shrink" for total release rate of 540 miner's inches or 13.5 CFS. Telemetry data from the Racetrack Lake Outflow site is not included in the report due to a possible shift in the rating curve, however outflows were actively monitored by the Racetrack Water Commissioner and CFC via a combination of flume readings and manual discharge measurements (Table 2). CFC also actively managed a second telemetry station at Racetrack Lake that monitored lake levels in order to track the volume remaining in the reservoir during the course of the release.

Flows below the Cement Ditch monitoring location persisted from 4 to 10 CFS from July 27th until Racetrack Lake reservoir releases ended around August 20th. The protectable instream flow right below the Cement Ditch is 7.5 CFS. The reason for reduced flows from August 5th-9th was the result of a measurement concern by the Water Commissioner and some of the water users, which was resolved by the installation of a new flow monitoring site (staff gage) on August 9th immediately below the Cement Ditch. As a result of the concerns raised by the Water Commissioner and water users, instream flows were temporarily suspended between August 5th and August 9th.

Flows below the Cement Ditch generally remained depressed (less than 2 CFS) after the Racetrack release ended on August 20th until September 21st when fall precipitation augmented flows on Racetrack Creek. Flows were also monitored immediately below Cement ditch (spot measurements), Above Berg Diversion, Above Branch Diversion and at the Frontage road as required by the Streamflow Monitoring Plan, DNRC Change of Use Authorization and the Water Management Plan.

A synoptic flow study was also performed on August 16th for the purpose of determining how much of the Racetrack Lake instream flow was being delivered through the entire protected reach (Figure 2). In summary, 2.5 CFS of flow was measured upstream of the Racetrack Creek confluence with the Clark Fork River of the total 8.33 CFS released from Racetrack Lake for instream flow. The diminishment in flow at the confluence is attributable to a combination of factors including the required 10% loss from the lake to the Cement ditch, natural streambed losses, a leaky headgate in the protected reach and the maintenance of pre-release irrigation levels under the Water Management Plan below the Cement Ditch.

Appendix A

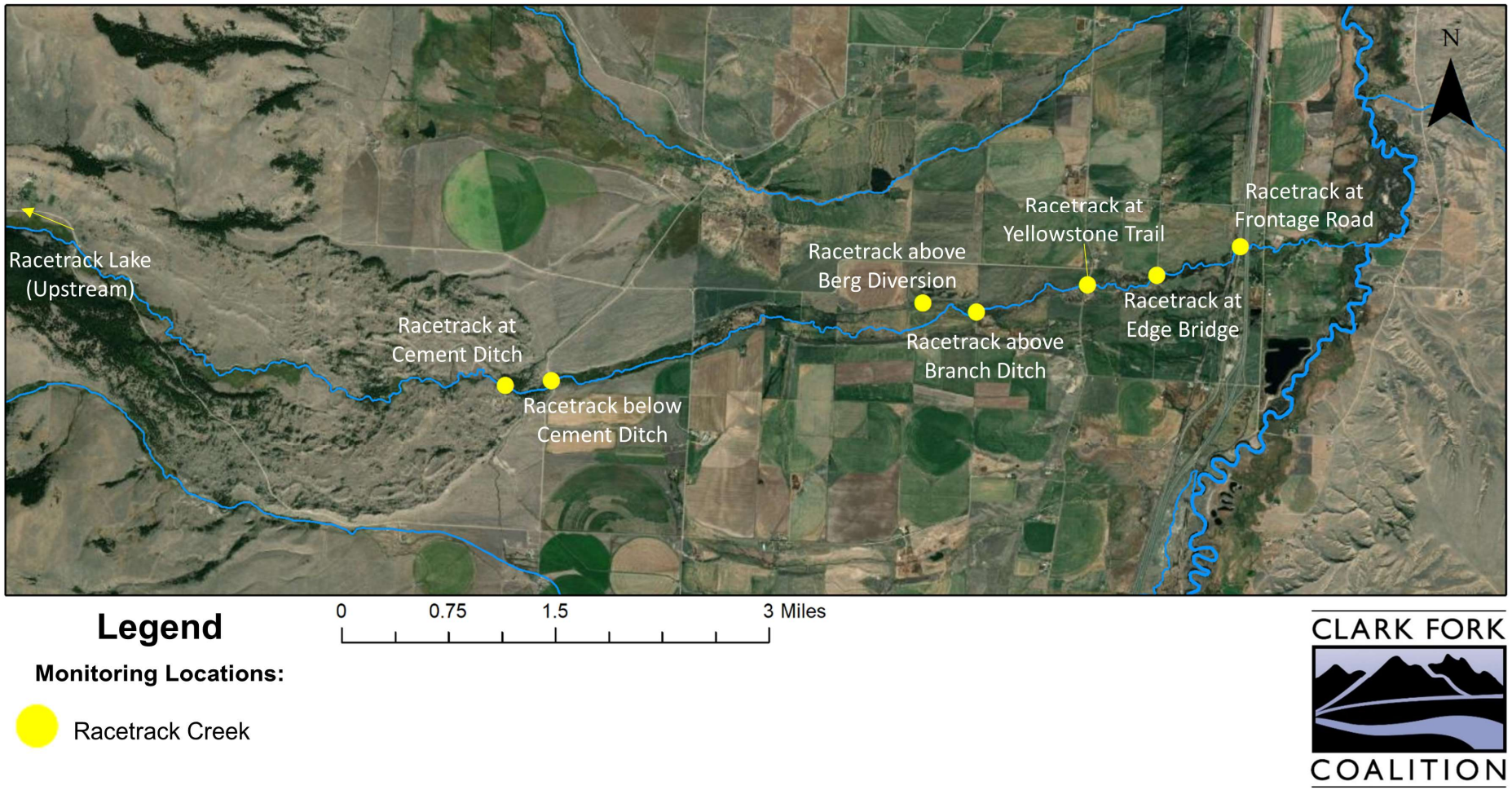

Figure 1: Map of 2022 monitoring locations

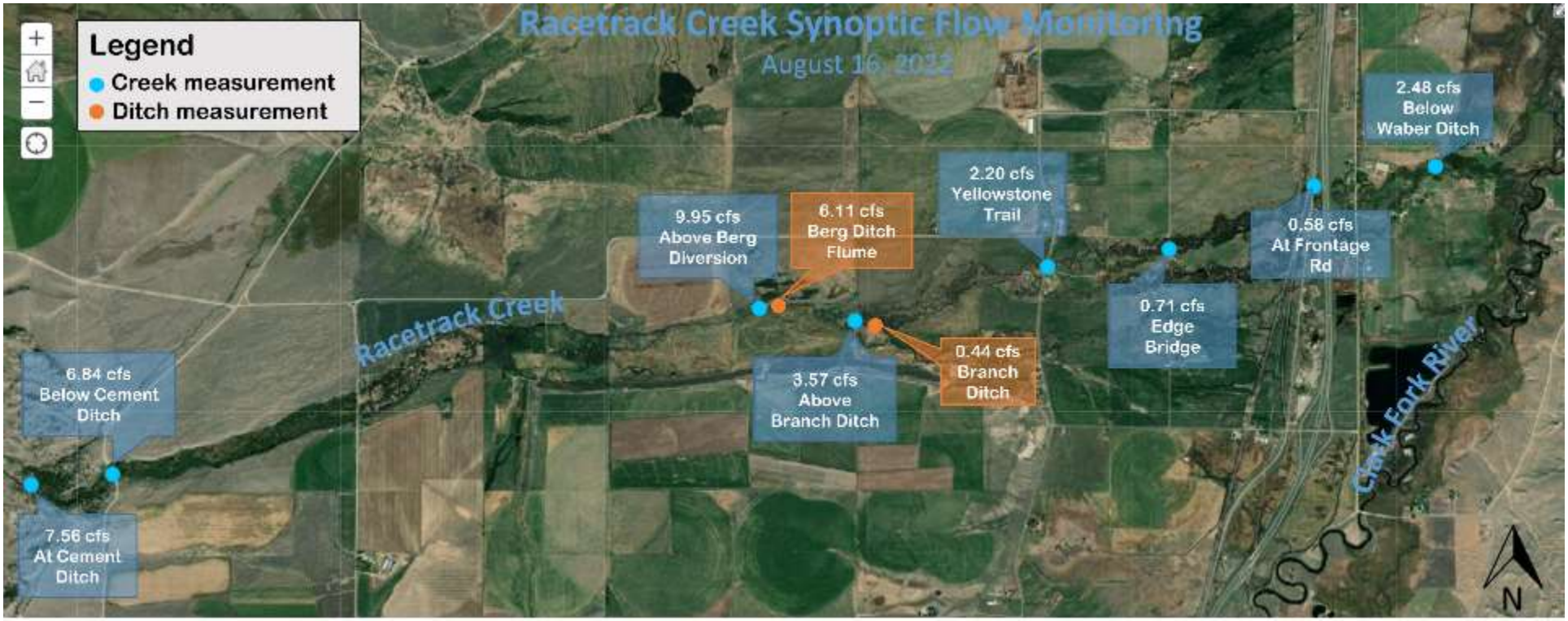

Figure 2: Map of August 16, 2022 Racetrack Creek synoptic flow monitoring sites and discharge measurements

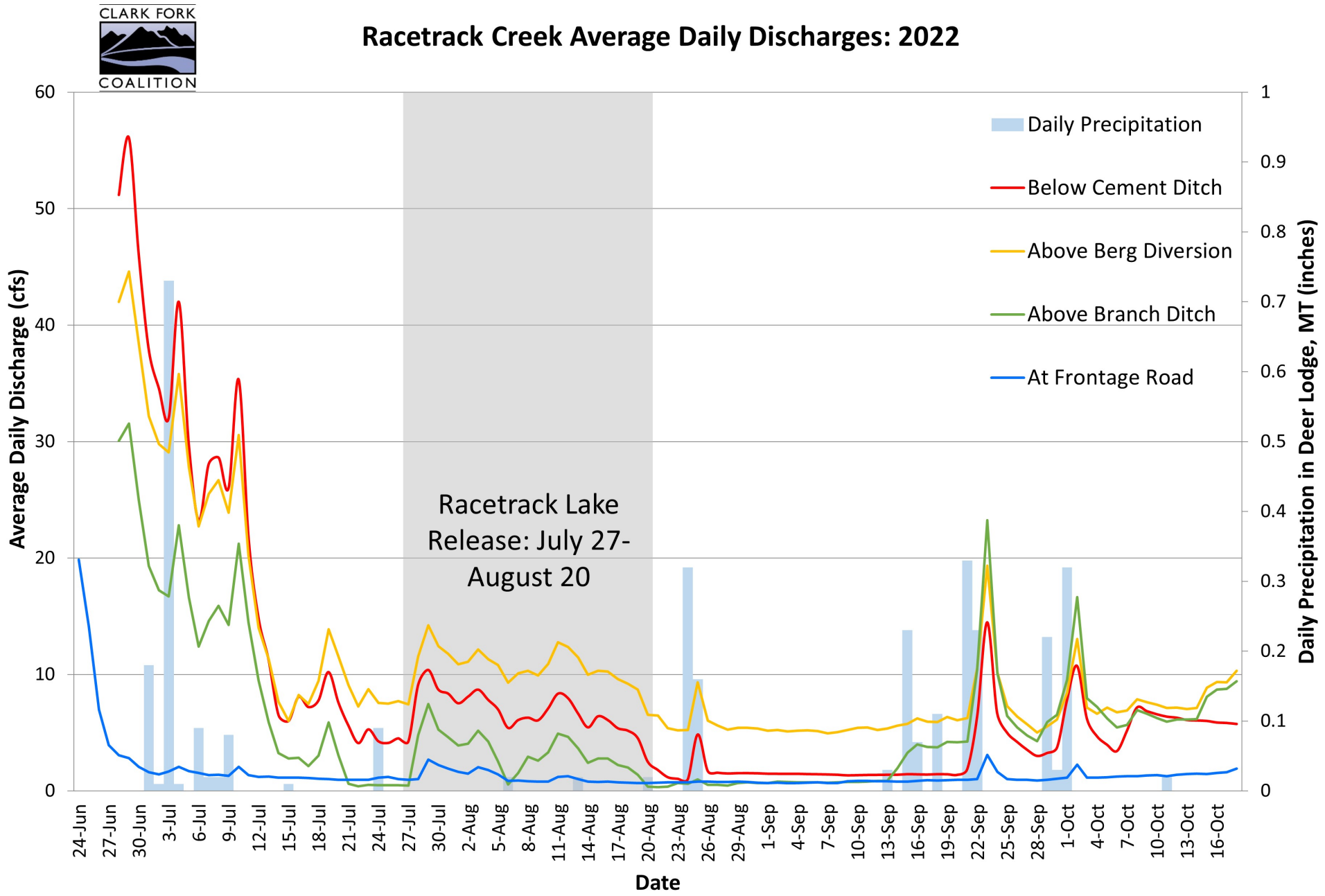

Figure 3: Racetrack Creek average daily hydrographs for the 2022 irrigation season.

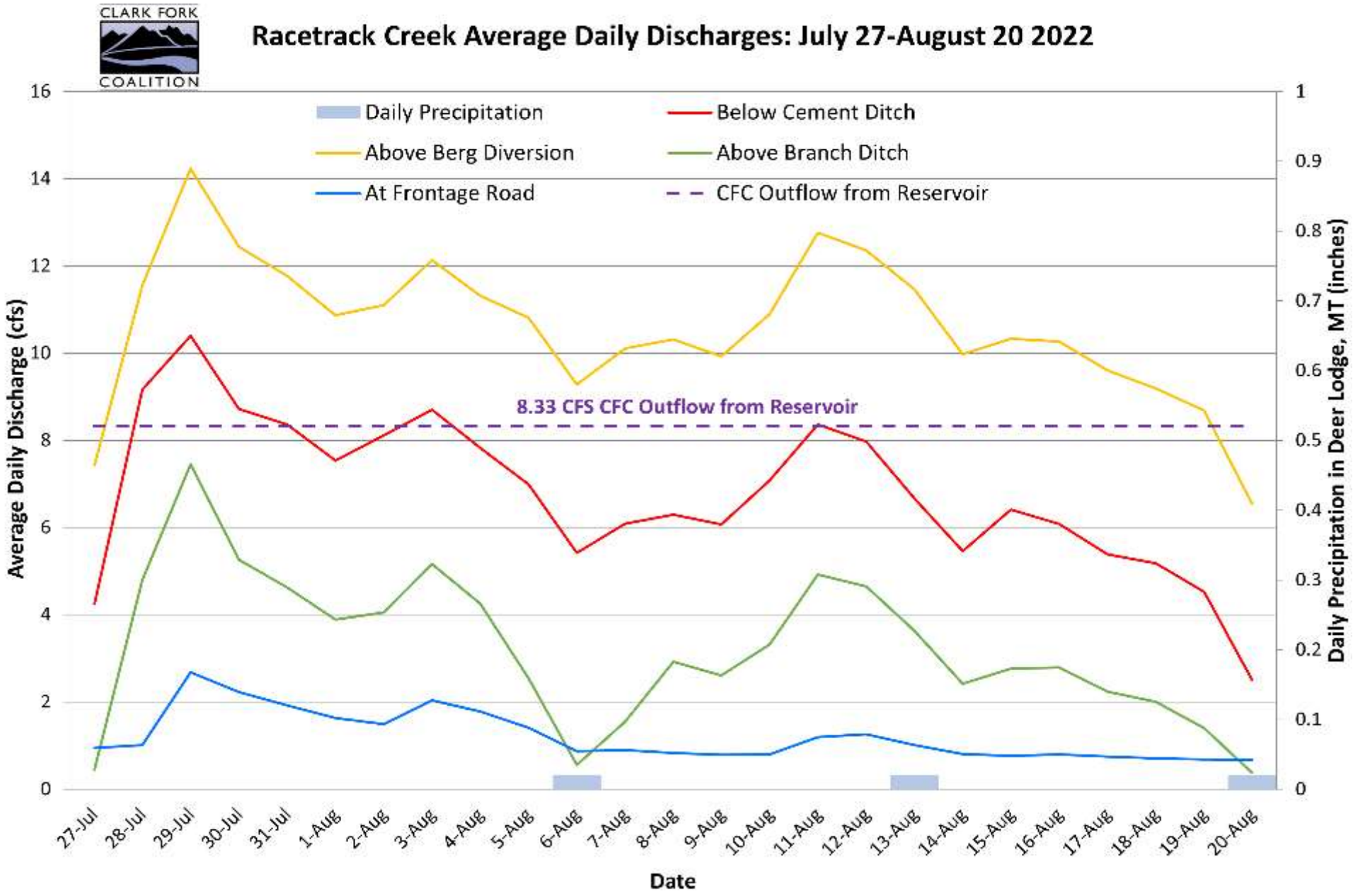

Figure 4: Racetrack Creek average daily hydrographs during the Racetrack Lake release from July 27-August 20.

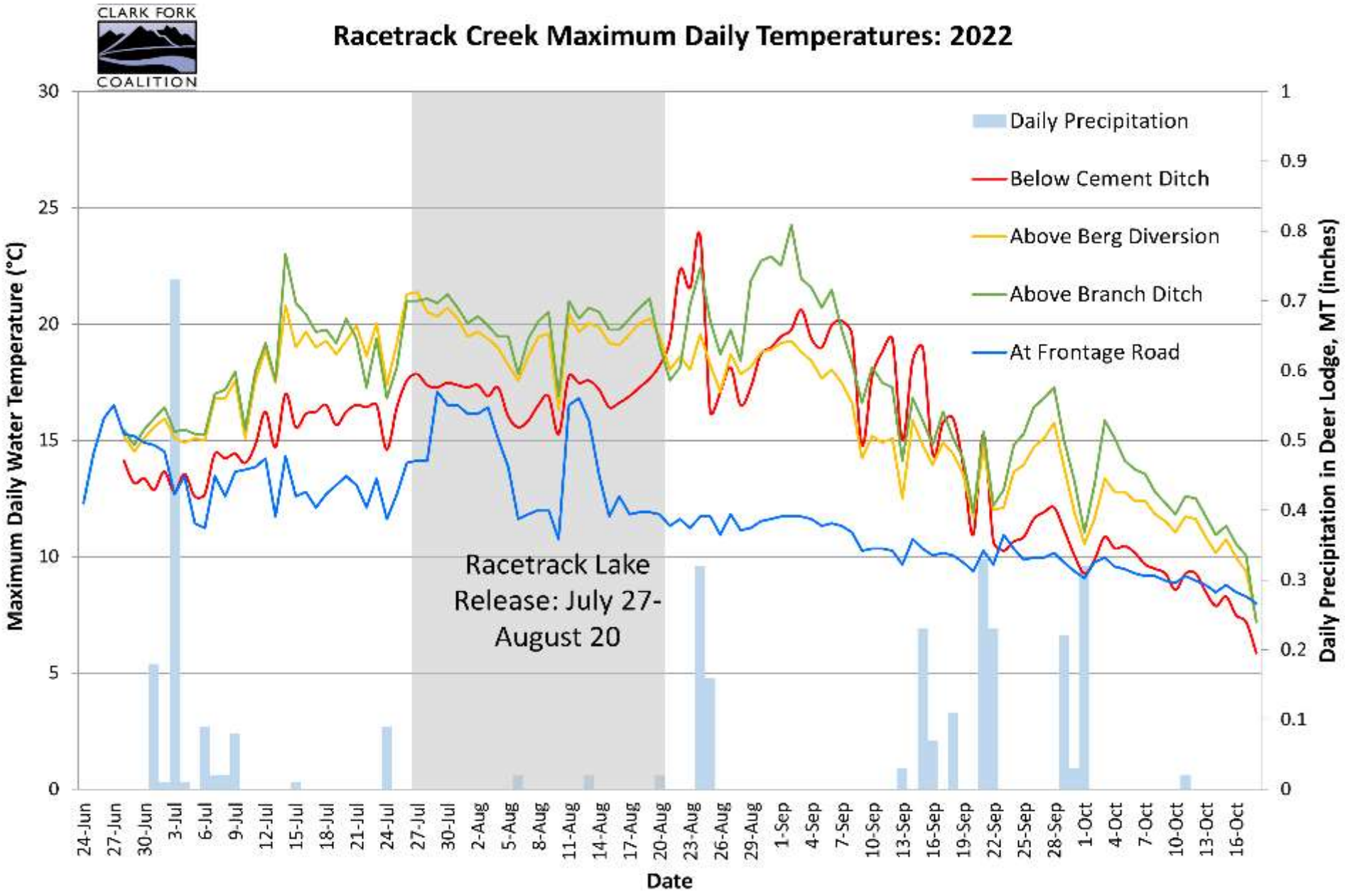

Figure 5: Racetrack Creek maximum daily thermographs for the 2022 irrigation season.

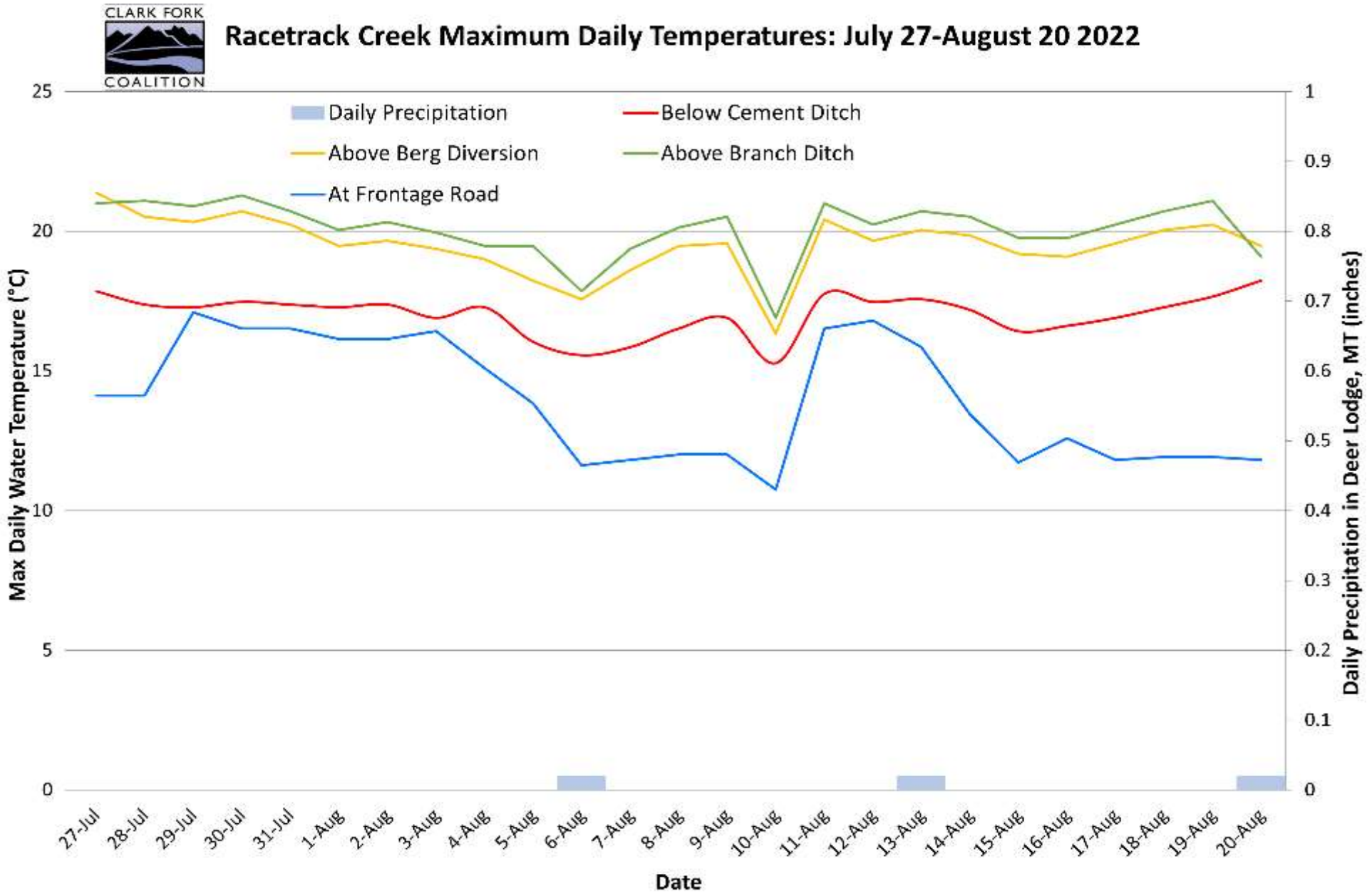

Figure 6: Racetrack Creek maximum daily thermographs during the Racetrack Lake release from July 27-August 20.

2022 Manual Discharge Measurements

Location	*Date*	*Time of Measurement*	*Discharge (cfs)*
Racetrack Outflow from Reservoir	*7/21/2022*	*5:30 PM*	*2.23*
	8/18/2022	*11:22 AM*	*14.20*
Racetrack at Cement Ditch	*8/9/2022*	*11:42 AM*	*5.90*
	8/10/2022	*2:09 PM*	*7.51*
	8/11/2022	*1:06 PM*	*9.22*
	8/16/2022	*12:10 PM*	*7.56*
Racetrack at Edge Bridge	*8/16/2022*	*1:00 PM*	*0.71*
Racetrack at Yellowstone Trail	*8/16/2022*	*12:22 PM*	*2.20*
Racetrack below Waber Diversion (near confluence)	*8/16/2022*	*3:00 PM*	*2.48*

Table 2- Spot measurements for the 2022 irrigation season.