Thompson River Drainage Temperature Monitoring Report: 2022-2023

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Introduction

This document contains summarized temperature data collected in the Thompson River drainage in 2022 and 2023. Each summer, temperature loggers are deployed during periods of low flow and high temperature. These temperature loggers, also known as thermographs, are programmed to record stream temperature every half hour. Thermographs are deployed throughout Montana rivers and streams to help inform management decisions, specifically regarding "hoot owl" restrictions. Hoot owl restrictions for recreational trout fisheries are applied when stream temperatures exceed 23℃ for three consecutive days. These restrictions generally include a fishing closure from 2 pm to midnight and can also encompass closures of critical fish habitat such as whole rivers, stream mouths or other areas of thermal refuge. Such closures can also be applied where there is insufficient stream flow is documented.

In the Thompson River drainage, thermographs are deployed by hammering rebar into the stream bed, then wiring the thermograph to the rebar as close to the substrate as possible. These loggers are programmed to begin collecting temperature data on July 1st and are deployed through the end of September. This time frame captures the most sensitive period for native and recreational trout fisheries. Currently, six locations on the mainstem Thompson River are monitored and the site above West Fork confluence is the location monitored for hoot owl restrictions. This section of river has not exceeded 20℃ in recent years and is among the coolest sections of the river during the summer (Table 1; Figures 1-4).

Flow conditions were considerably different between 2022 and 2023 in northwest Montana. Stream discharge is generally observed in a water year, which begins on October 1st and ends on September 30th of the following year. A water year captures winter precipitation, subsequent run-off and baseflow periods. The 2022 water year had average precipitation despite warmer than average temperatures. In March, snowpack in the Lower Clark Fork River drainage was 102% of the average snowpack from 1990-2020, and at the beginning of June snowpack was 189% of the average snowpack (USDA NRCS 2022a; USDA NRCS 2022b; USDA NRCS 2022c). The Thompson River 2022 water year annual mean daily stream flow was 432.8 cubic feet per second (cfs). The annual mean of water years 1957-2023 is 426.4 cfs (USGS 2022), therefore the 2022 annual mean was slightly higher than average. In 2023, the world experienced the hottest summer and year on record (NOAA 2023). In March of 2023, annual snowpack was 88% of average snowpack from 1990-2020 (USDA NRCS 2023a). The Lower Clark Fork, and the rest of Montana, experienced an early, rapid snow melt where snowpack percentages dropped from normal to less than 50% of normal throughout the state in early May. Snowpack in the Lower Clark Fork dropped to 23% of the average by the beginning of June (USDA 2023, USDA NRCS 2023b). This below average snowpack in May and June resulted in stream flows falling to record lows as early as June (MTDNRC 2023). In 2023, the Thompson River peaked at 1940 cfs on May 6th, whereas average peak discharge most often occurs in late May or early June. The annual mean daily discharge of the Thompson River in the 2023 water year was 260.4 cfs. Water Year 2023 was the 9th lowest year of mean daily discharge since 1957 (USGS 2023). The 2022 and 2023 water years had considerably different flow conditions and comparing them can

provide insight into stream temperatures during future low water years (Table 1). Table 1 summarizes mean, maximum, and mean daily maximums in each stream in which temperature was monitored in the Thompson River drainage in 2022 and 2023 and provides for quick comparisons.

The Thompson River is a recreational trout fishery located in Sanders County, MT. This fishery provides angling opportunity for Rainbow Trout *Oncorhynchus mykiss* (RBT) and Brown Trout *Salmo trutta* (LL), and is an important native fishery, inhabited Bull Trout *Salvelinus confluentus* (BULL), Westslope Cutthroat Trout *Oncorhynchus clarkii lewisi* (WCT) and Mountain Whitefish *Prosopium williamsoni* (MWF). The Thompson River is a migratory corridor for BULL, with some of its headwater tributaries being important spawning and rearing habitat. Several headwater tributaries are strongholds for one or both native trout species including stream-resident life history forms. Bull Trout have among the lowest upper thermal tolerance and thermal optimum for growth of freshwater fish species in North America. Due to these physiological constraints, Bull Trout are generally not found in streams where temperatures exceed 15 °C for extended periods of time (Selong et al. 2001). Elevated temperatures in tributary streams, whether it be from natural (ex., losing stream reaches) or from anthropogenic disturbance (ex., significant removal of riparian) may facilitate the expansion of non-native trout into critical native trout strongholds. This phenomenon has been observed in several tributaries in recent years.

The Thompson River and its tributaries have been extensively monitored and described in previous reports (Blakney et al. 2022; Kreiner and Terrazas 2020; Kreiner and Terrazas 2018). Each year Montana Fish, Wildlife and Parks staff conducts mainstem and tributary electrofishing surveys as well as Bull Trout redd counts. The objectives of these sampling efforts include population estimates, describing fish community composition, documenting the distribution of fish species and genetic status of WCT populations. Monitoring temperature in the Thompson River and its tributaries informs management decisions for angling, such as establishing hoot owl restrictions, decisions regarding native fish conservation and stream restoration projects, and can be evaluated alongside fish population data to better understand fish distribution, community composition and invasion dynamics of non-native salmonids in tributaries.

Table 1. Mean Daily, Maximum, and Mean Daily Maximum temperatures (temp.) during July and August in 2022 and 2023.

Stream Name	Location Rkms	July Mean Daily Temp. 2022	July Mean Daily Temp. 2023	July Maximum Temp. 2022	July Maximum Temp. 2023	July Mean Daily Maximum Temp. 2022	July Mean Daily Maximum Temp. 2023	August Mean Daily Temp. 2022	August Mean Daily Temp. 2023	August Maximum Temp. 2022	August Maximum Temp. 2023	August Mean Daily Maximum Temp. 2022	August Mean Daily Maximum Temp. 2023
Bear Creek	2.6	10.6		13.7		11.8		11.5		13.4		12.4	
Bear Creek	4.5		10.5		12.7		11.7		10.9		13.5		11.9
Bear Creek	6.1	10.3	10.8	13.4	12.9	11.6	11.8	11.4	11.2	13.7	13.3	12.4	11.8
Beatrice Creek	0.2	7.9	8.6	10.9	11.3	9.3	10.4	8.5	9.0	10.5	11.7	9.9	10.3
Big Hole Creek	4.2	9.4	11.1	14.3	15.0	11.9	13.8	10.9	15.5	14.7	11.6	13.2	13.7
Big Rock Creek	1.0	13.2	13.7	17.7	16.8	15.2	15.2	13.8	13.8	16.6	16.8	15.3	15.0
Big Rock Creek	4.8	12.2	12.6	16.3	16.1	14.0	14.5	12.9	12.8	15.5	16.2	14.4	14.2
Big Rock Creek	7.2	11.7		15.8		13.4		12.3		15.0		13.8	
Big Rock Creek	10.0	11.5		16.4		13.8		11.9		15.7		14.1	
Big Rock Creek	15.9	9.7		11.7		11.2		9.2		11.5		10.2	
Chippy Creek	4.1	12.6	13.3	17.4	17.7	15.0	16.0	13.7	13.6	17.2	17.8	15.9	15.6
Deerhorn Creek	0.1	7.8	8.2	10.2	10.4	8.9	9.8	8.6	8.5	10.9	10.9	10.1	9.8
Fishtrap Creek	0.2	10.9	11.5	15.7	16.2	13.7	14.9	11.8	10.8	17.7	16.4	14.9	14.1
Fishtrap Creek	4.8	11.6	13.7	17.4	19.9	14.9	17.7	12.3	13.7	17.3	20.1	15.4	16.8
Fishtrap Creek	11.4	8.9	10.2	13.8	16.6	12.1	12.7	10.1	9.8	13.3	12.8	12.2	11.5
Fishtrap Creek	16.8	9.7	9.9	13.1	13.0	11.8	12.3	9.7	9.3	12.7	12.5	11.6	11.3
Fishtrap Creek	20.8		13.5		17.2		16.0		13.2		16.9		14.9
Fishtrap Creek	21.1	15.0		20.5		17.8		15.1		19.5		17.5	
Jungle Creek	1.3	8.3	9.1	10.7	11.3	9.3	10.3	9.1	9.5	11.0	11.7	9.9	10.3
Jungle Creek	5.8	7.0	7.5	8.9	8.9	7.9	8.4	7.6	8.9	8.8	7.7	8.3	8.2
Little Rock Creek	4.3	11.4	11.8	14.1	14.7	12.4	13.2	12.5	12.5	14.3	15.3	13.3	13.5
Little Thompson River	0.1	15.8	16.4	22.6	22.3	19.7	20.6	16.1	15.9	21.5	22.0	19.6	19.1
Murr Creek	2.7	11.0	11.7	14.9	14.7	12.5	13.4	12.2	12.3	14.9	15.0	13.8	13.6
NF Murr Creek	0.1		10.8		13.4		12.0		11.5		13.6		12.5

Stream Name	Location Rkms	July Mean Daily Temp. 2022	July Mean Daily Temp. 2023	July Maximum Temp. 2022	July Maximum Temp. 2023	July Mean Daily Maximum Temp. 2022	July Mean Daily Maximum Temp. 2023	August Mean Daily Temp. 2022	August Mean Daily Temp. 2023	August Maximum Temp. 2022	August Maximum Temp. 2023	August Mean Daily Maximum Temp. 2022	August Mean Daily Maximum Temp. 2023
SF Murr Creek	4.2	10.3	10.7	12.5	11.8	10.9	10.9	11.6	11.5	12.6	12.4	11.9	11.6
NF Little Thompson	0.7	12.4	13.1	17.4	17.8	14.9	15.8	13.7	13.7	16.9	17.9	15.8	15.5
Shroder Creek	0.1	10.7	11.0	13.5	13.3	11.7	11.9	11.5	11.5	13.8	14.1	12.3	12.3
Shroder Creek	2.7		9.8		11.6		10.7		10.3		12.1		11.0
Shroder Creek	5.3	8.2	8.8	10.1	10.3	8.7	9.4	9.2	9.6	10.6	11.0	9.7	10.0
Thompson River	1.5	13.7	15.4	18.3	19.7	16.0	18.3	14.0	14.8	18.4	19.6	16.4	17.2
Thompson River	11.7	14.0	15.3	18.2	18.9	16.6	17.6	14.4	14.7	18.0	18.3	16.3	16.2
Thompson River	26.1	16.3	16.8	22.8	22.2	19.8	20.6	16.3	16.1	21.6	22.1	19.7	19.3
Thompson River	38.2	16.1	17.2	19.6	19.4	18.4	18.3	15.8	16.1	18.8	19.8	16.9	17.4
Thompson River	50.4	14.8	15.5	20.7	19.9	17.6	18.2	14.2	14.3	19.2	17.6	17.0	15.7
Thompson River	65.3	17.3	18.0	21.8	21.3	18.7	19.8	16.7	16.6	20.3	21.2	18.4	18.7
WF Fishtrap Creek	0.6	9.5	10.0	12.8	13.2	11.2	12.1	9.6	10.1	12.3	14.1	11.2	11.8
WF Fishtrap Creek	8.9	8.7	9.0	11.1	10.8	9.6	9.9	9.1	9.3	10.7	11.1	9.8	9.8
WF Thompson River	0.3	9.0	10.0	11.3	12.0	10.2	11.3	9.4	10.3	11.1	12.2	10.5	11.2
WF Thompson River	8.0	8.6	9.4	11.0	11.6	9.8	10.5	9.1	9.7	10.9	11.7	9.9	10.4

Thompson River

The Thompson River is an important recreational angling fishery for LL and RBT in Region 1. The mainstem Thompson River also contains native species; low densities of BULL and WCT, and an abundant population of MWF. Brook Trout (EB) are also present in low abundance in the upper mainstem. The Thompson River is an important migration corridor for BULL returning to tributaries to spawn. Thermographs are located at the ACM Bridge (river kilometer- rkm 1.5), above the West Fork Thompson River (abv. WFTR, rkm 11.7), below Little Thompson River (blw. LTR, rkm 26), below Chippy Creek (blw. Chippy, rkm 38.2), below Big Rock Creek (blw. Big Rock, rkm 50.4), and below Murr Creek (blw. Murr, rkm 65.3).

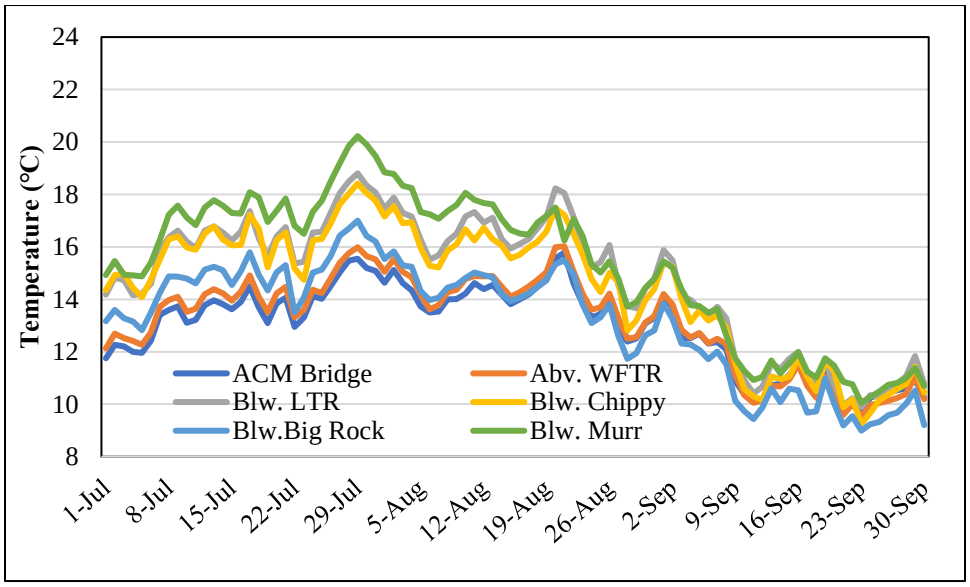

Figure 1. Mean daily temperatures in 2022 throughout the mainstem Thompson River at the ACM Bridge (rkm 1.5), above the West Fork Thompson River (Abv. WFTR, rkm 11.7), below the Little Thompson River (blw. LTR, rkm 26), below Chippy Creek (blw. Chippy, rkm 38.2), below Big Rock Creek (blw. Big Rock, rkm 50.4), and below Murr Creek (blw. Murr, rkm 65.3).

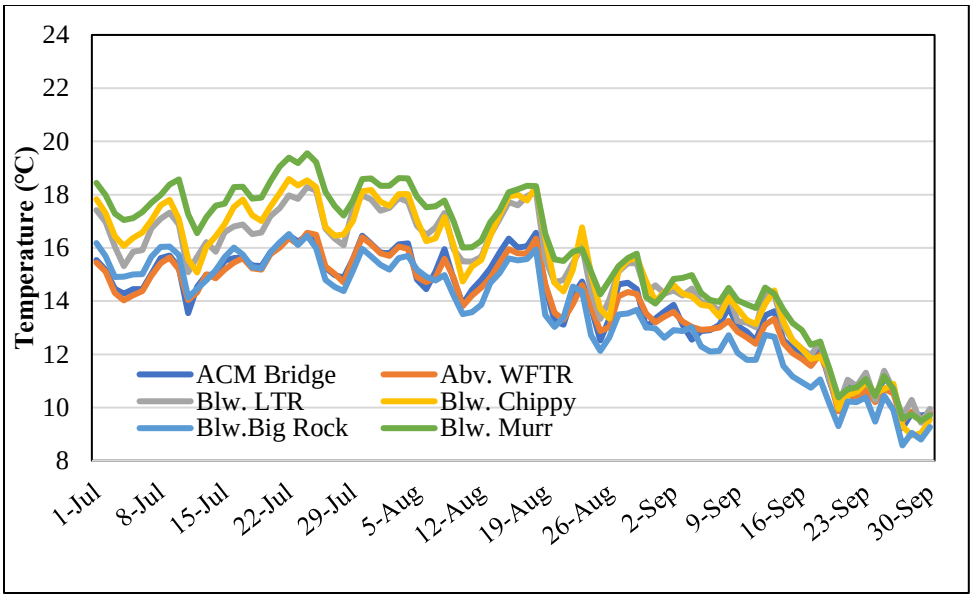

Figure 2. Mean daily temperatures in 2023 throughout the mainstem Thompson River at the ACM Bridge (rkm 1.5), above the West Fork Thompson River (Abv. WFTR, rkm 11.7), below the Little Thompson River (blw. LTR, rkm 26), below Chippy Creek (blw. Chippy, rkm 38.2), below Big Rock Creek (blw. Big Rock, rkm 50.4), and below Murr Creek (blw. Murr, rkm 65.3).

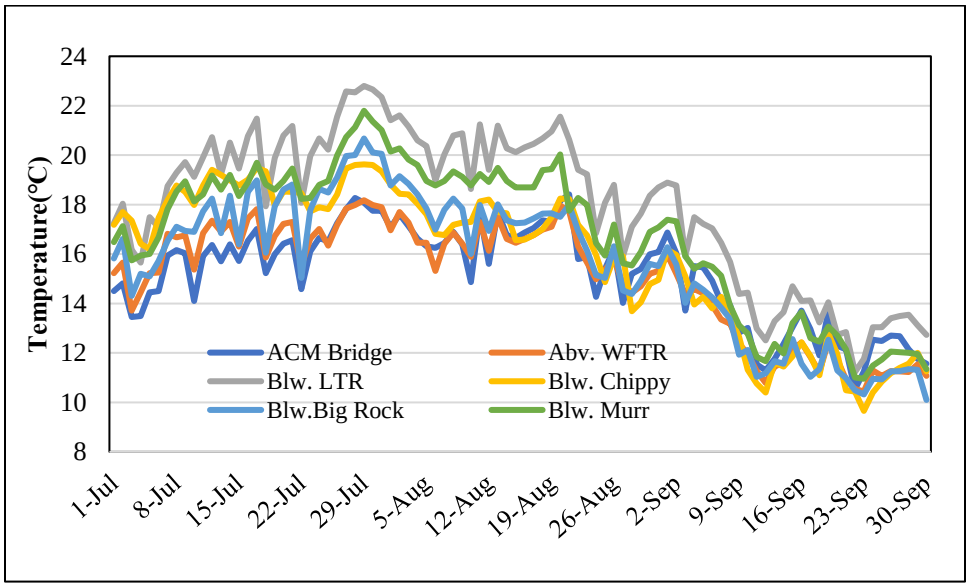

Figure 3. Maximum daily temperatures in 2022 throughout the mainstem Thompson River at the ACM Bridge (rkm 1.5), above the West Fork Thompson River (Abv. WFTR, rkm 11.7), below the Little Thompson River (blw. LTR, rkm 26), below Chippy Creek (blw. Chippy, rkm 38.2), below Big Rock Creek (blw. Big Rock, rkm 50.4), and below Murr Creek (blw. Murr, rkm 65.3).

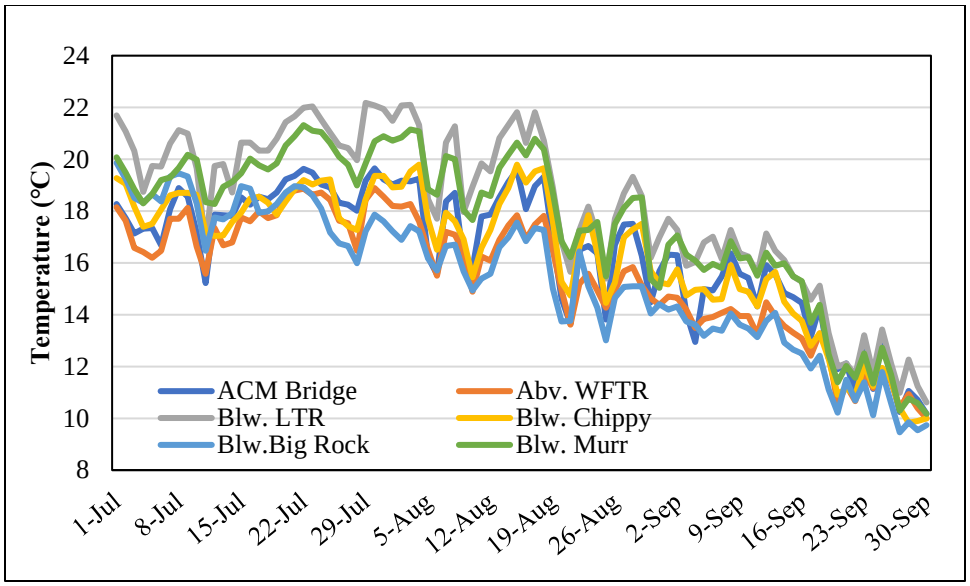

Figure 4. Maximum daily temperatures in 2023 throughout the mainstem Thompson River at the ACM Bridge (rkm 1.5), above the West Fork Thompson River (Abv. WFTR, rkm 11.7), below the Little Thompson River (blw. LTR, rkm 26), below Chippy Creek (blw. Chippy, rkm 38.2), below Big Rock Creek (blw. Big Rock, rkm 50.4), and below Murr Creek (blw. Murr, rkm 65.3).

West Fork Thompson River

West Fork Thompson River is an important BULL spawning and rearing tributary, and native fish stronghold in the Thompson River drainage. This stream is occupied by WCT, BULL, and low densities of RBT and LL in the lower 3 rkms. In the upper reaches of the stream, WCT are non-hybridized.

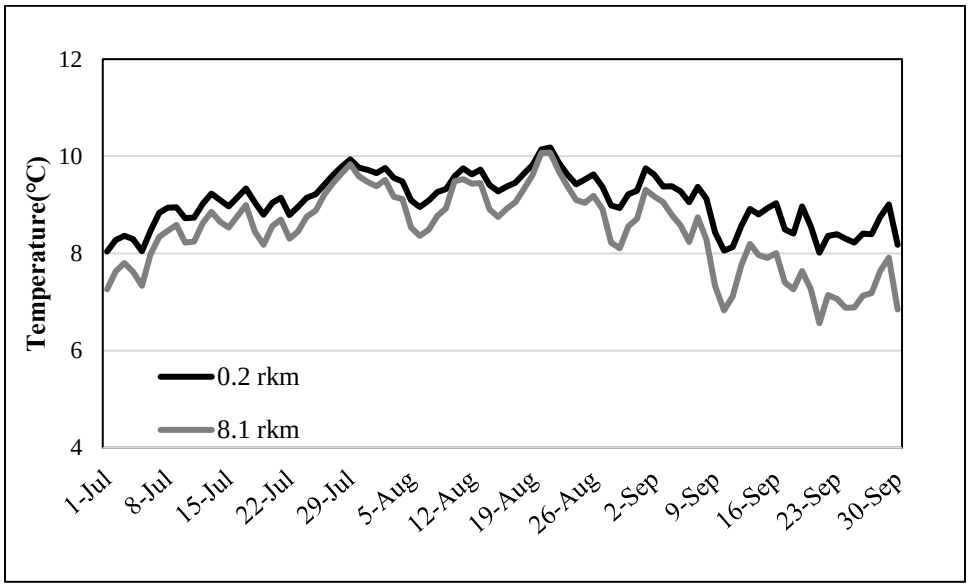

Figure 5. Mean daily temperatures at rkms 0.2 and 8.1 in the West Fork Thompson River in 2022.

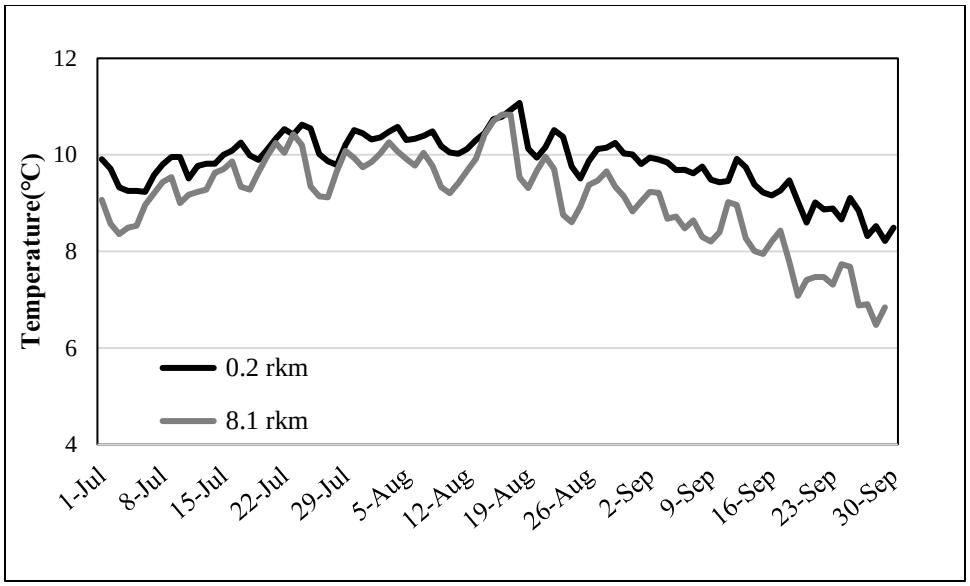

Figure 6. Mean daily temperatures at rkms 0.2 and 8.1 in the West Fork Thompson River in 2023.

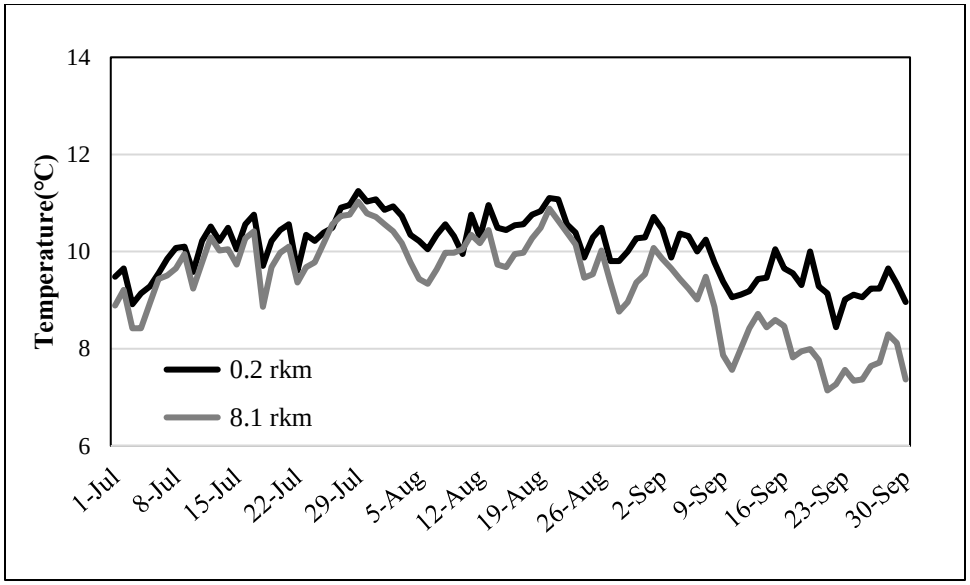

Figure 7. Maximum daily temperatures at rkms 0.2 and 8.1 in the West Fork Thompson River in 2022.

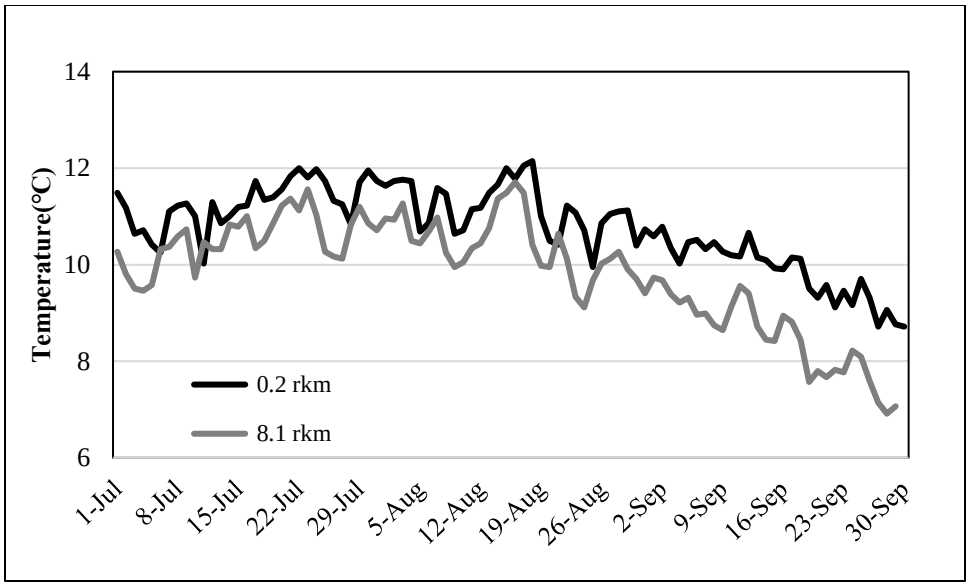

Figure 8. Maximum daily temperatures at rkms 0.2 and 8.1 in the West Fork Thompson River in 2023.

Bighole Creek

Big Hole Creek is a tributary to the Thompson River at rkm 16.1 and is fishless above a barrier at rkm 0.1. This stream is a candidate for future native WCT conservation efforts in the Thompson River Basin. Data for Bighole Creek has only been captured July and August due to its remote location.

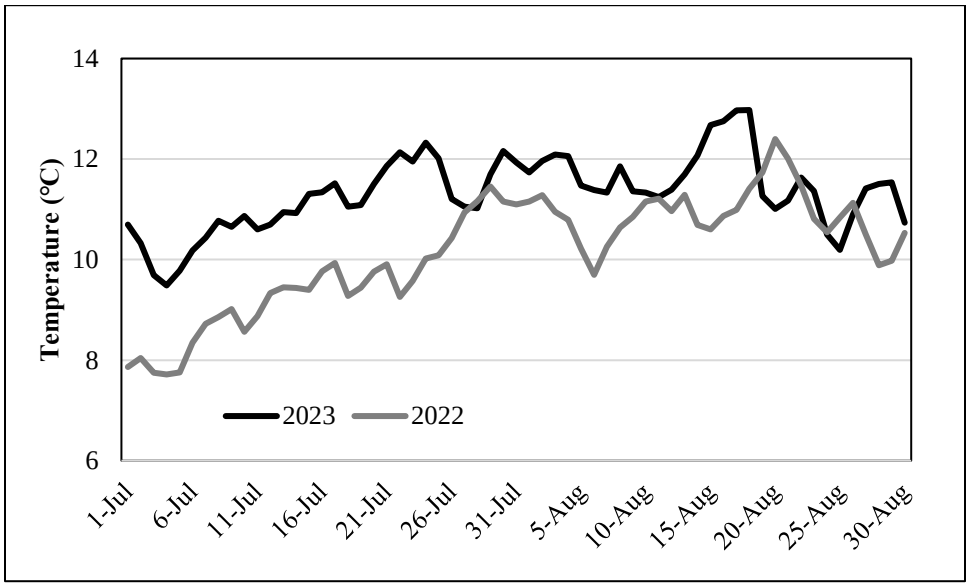

Figure 9. Mean daily temperatures in Bighole Creek at rkm 4.2 in 2022 and 2023.

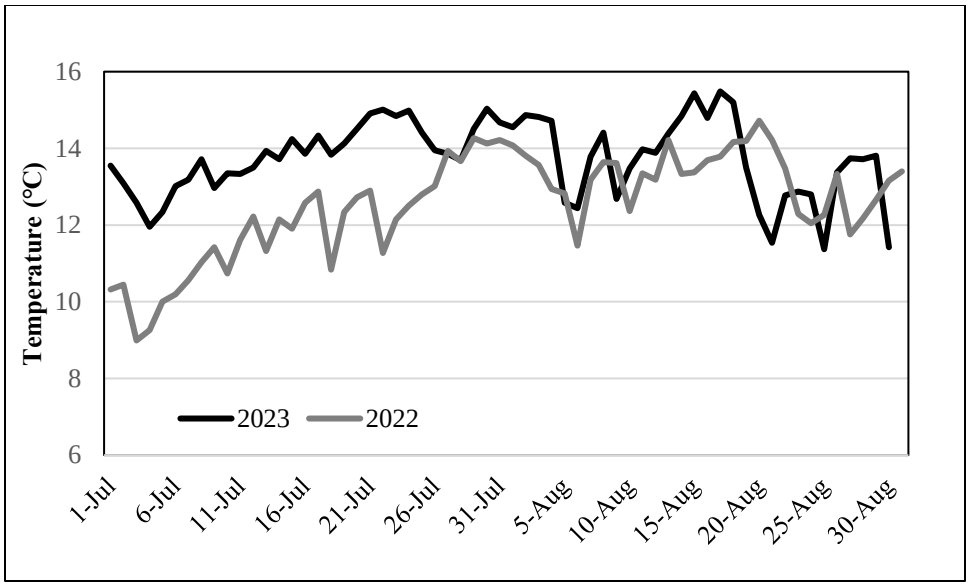

Figure 10. Maximum daily temperatures in Bighole Creek at rkm 4.2 in 2022 and 2023.

Deerhorn Creek

Deerhorn Creek is a tributary to the Thompson River entering at rkm 22.1. The lower reaches of Deerhorn Creek are occupied by low densities of WCT, BULL, LL, EB and RBT. In upper Deerhorn, above rkm 2.1, non-hybridized WCT are present.

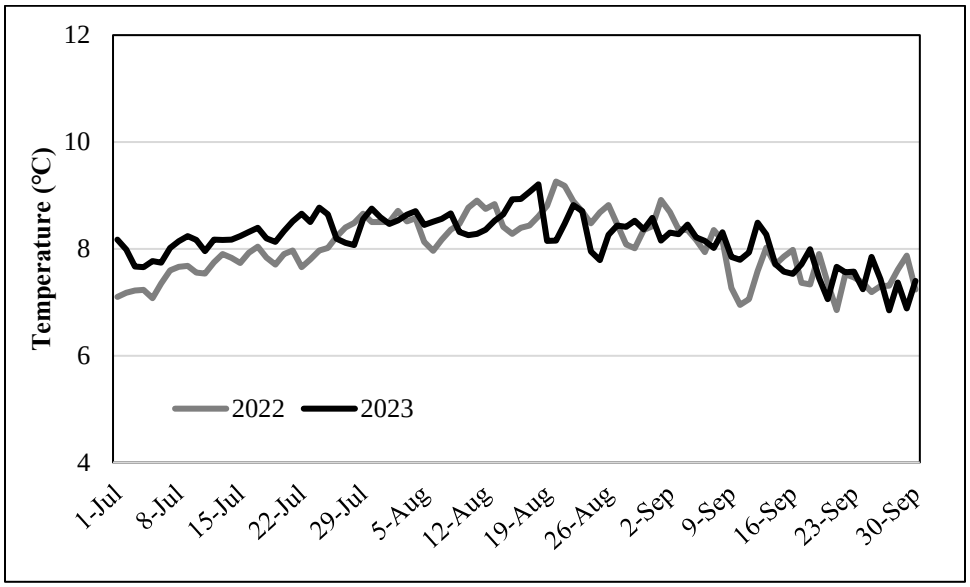

Figure 11. Mean daily temperatures in Deerhorn Creek at rkm 0.1 in 2022 and 2023.

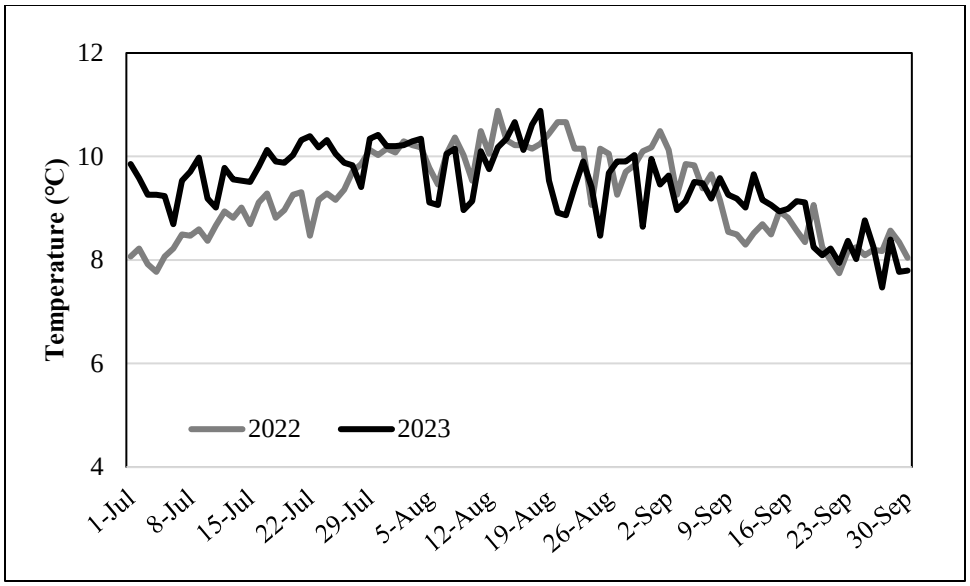

Figure 12. Maximum daily temperatures in Deerhorn Creek at rkm 0.1 in 2022 and 2023.

Fishtrap Creek

Fishtrap Creek, at tributary to the Thompson River at rkm 24.6, is a Bull Trout spawning and rearing stream, as well as a native fish stronghold in the Thompson River. Non-hybridized populations of WCT occur in the drainage, as do low densities of LL, RBT, and EBT. Thermographs are placed throughout Fishtrap Creek to monitor temperatures as the important native fish strongholds within the system may be susceptible to encroachment by non-native salmonids which are present in the lower reaches of the system. Thermographs are placed at the mouth (rkm 0.2), Rabbit Run (rkm 4.8, above Jungle Creek in a water losing stretch of stream named for the access road Rabbit Run), below Beatrice Creek (blw. Beatrice, rkm 11.4), below West Fork Fishtrap Creek (blw. WFFTCR, rkm 16.8). In 2022 a thermograph was placed above Radio Creek (abv. Radio, rkm 21.1), and in 2023 the thermograph was placed below Radio Creek (blw. Radio, rkm 20.9). This discrepancy is also noted on each figure.

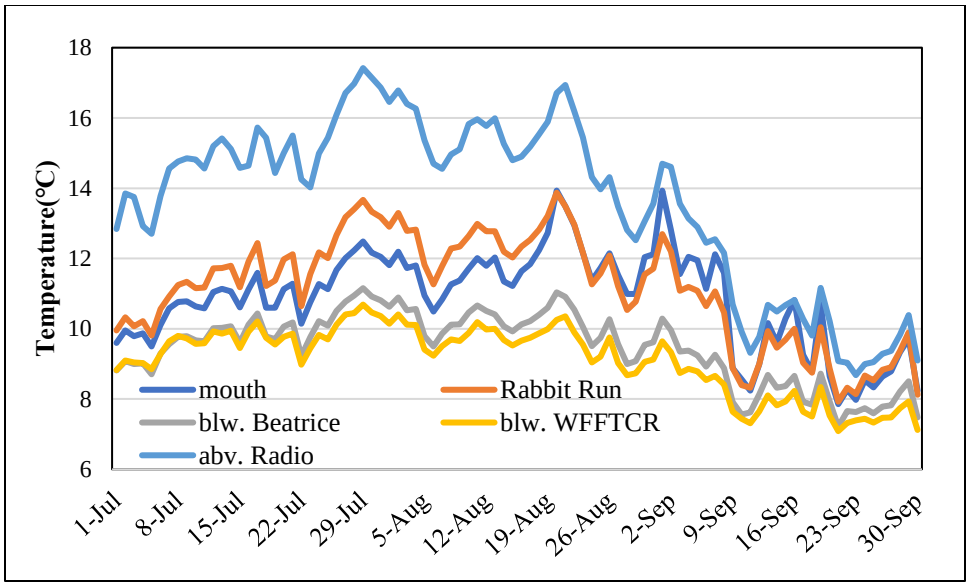

Figure 13. Mean Daily Temperatures in Fishtrap Creek in 2022 at the mouth (rkm 0.2), Rabbit Run (rkm 4.8, above Jungle Creek in a water losing stretch of stream named for the access road Rabbit Run), below Beatrice Creek (blw. Beatrice, rkm 11.4), below West Fork Fishtrap Creek (blw. WFFTCR, rkm 16.8), and above Radio Creek (abv. Radio, rkm 21.1).

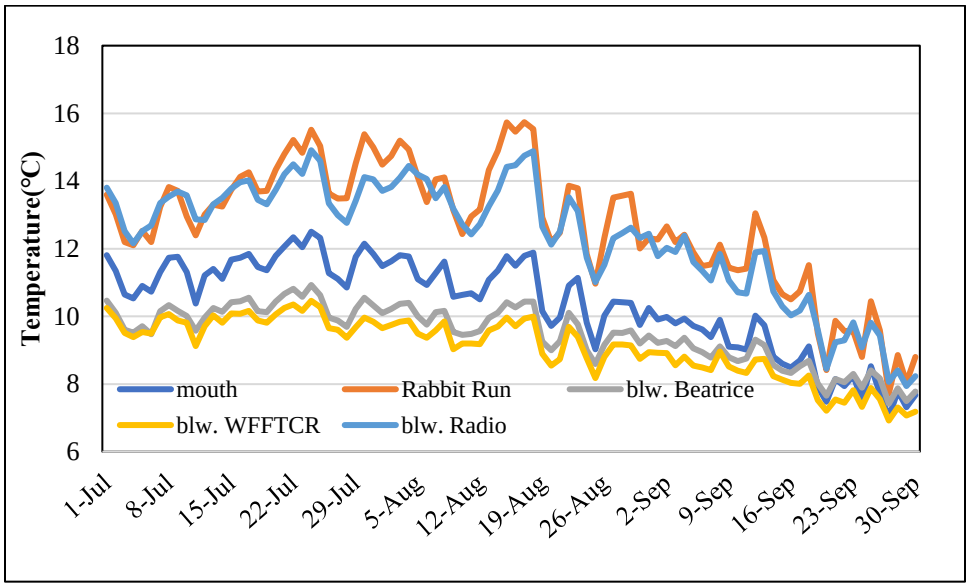

Figure 14. Mean Daily Temperatures in Fishtrap Creek in 2023 at the mouth (rkm 0.2), Rabbit Run (rkm 4.8, above Jungle Creek in a water losing stretch of stream named for the access road Rabbit Run), below Beatrice Creek (blw. Beatrice, rkm 11.4), below West Fork Fishtrap Creek (blw. WFFTCR, rkm 16.8), and below Radio Creek (blw. Radio, rkm 20.9).

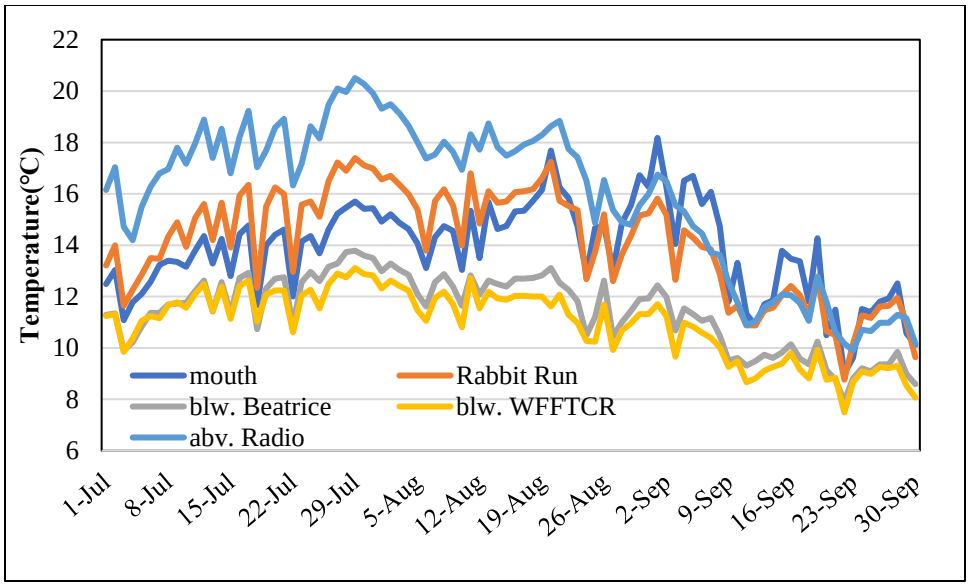

Figure 15. Maximum daily temperatures in Fishtrap Creek in 2022 at the mouth (rkm 0.2), Rabbit Run (rkm 4.8, above Jungle Creek in a water losing stretch of stream named for the access road Rabbit Run), below Beatrice Creek (blw. Beatrice, rkm 11.4), below West Fork Fishtrap Creek (blw. WFFTCR, rkm 16.8), and above Radio Creek (abv. Radio, rkm 21.1).

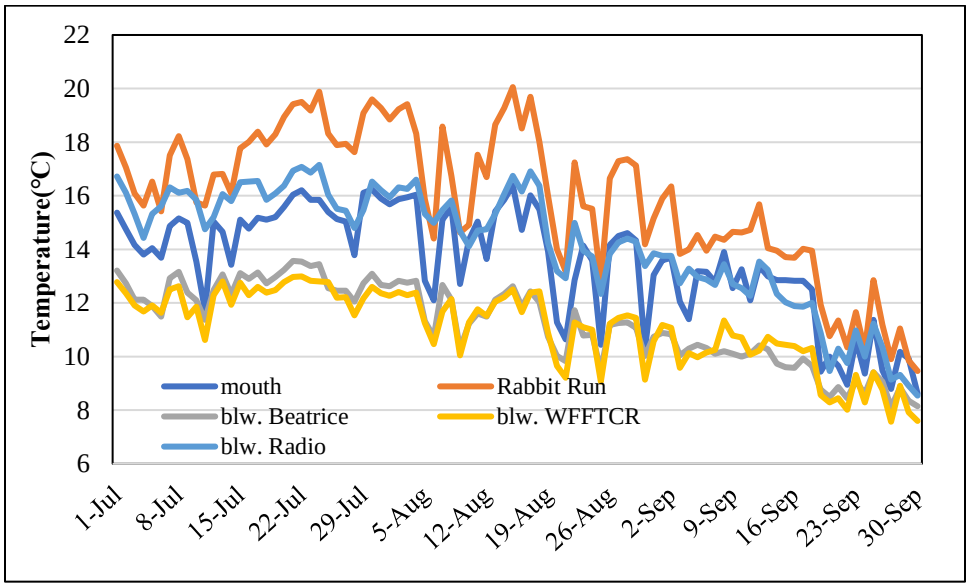

Figure 16. Maximum daily temperatures in Fishtrap Creek in 2023 at the mouth (rkm 0.2), Rabbit Run (rkm 4.8, above Jungle Creek in a water losing stretch of stream named for the access road Rabbit Run), below Beatrice Creek (blw. Beatrice, rkm 11.4), below West Fork Fishtrap Creek (blw. WFFTCR, rkm 16.8), and below Radio Creek (blw. Radio, rkm 20.9).

Jungle Creek

Jungle Creek is a tributary to Fishtrap Creek at rkm 1.6. The fish community is comprised solely of WCT and BULL. Upper reaches of the stream are occupied by non-hybridized WCT.

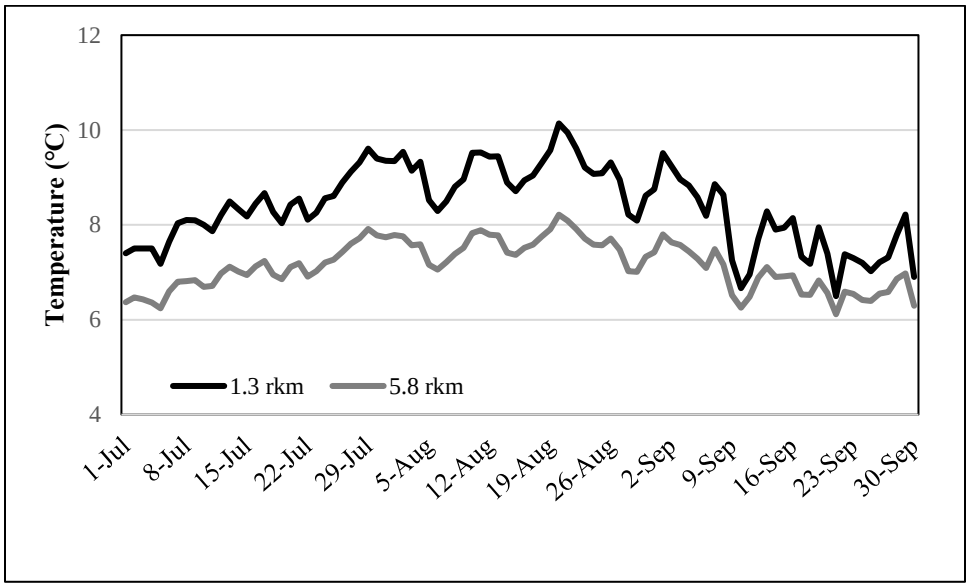

Figure 17. Mean daily temperatures in Jungle Creek at rkms 1.3 and 5.8 in 2022.

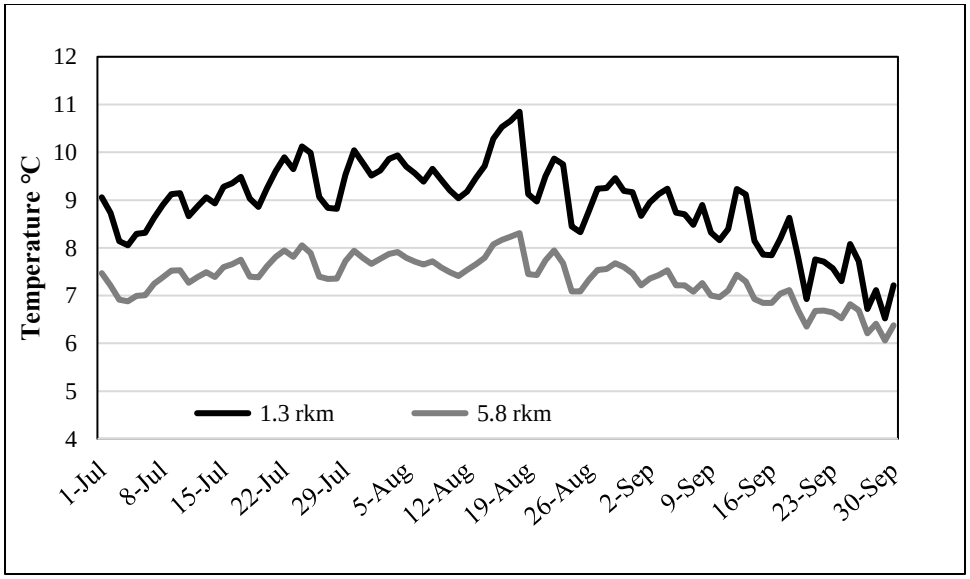

Figure 18. Mean daily temperatures in Jungle Creek at rkms 1.3 and 5.8 in 2023.

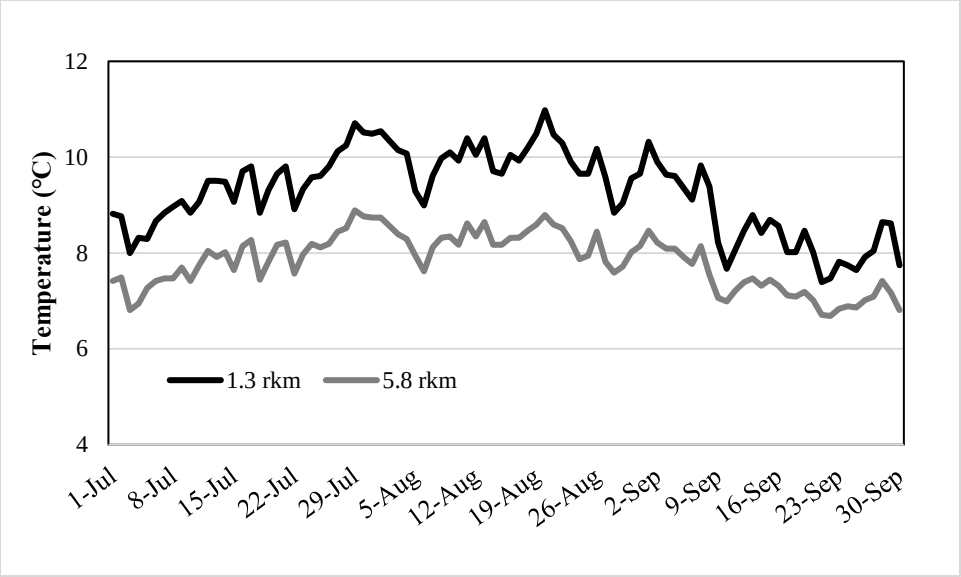

Figure 19. Maximum daily temperatures in Jungle Creek at 1.3 rkm and 5.8 rkm in 2022.

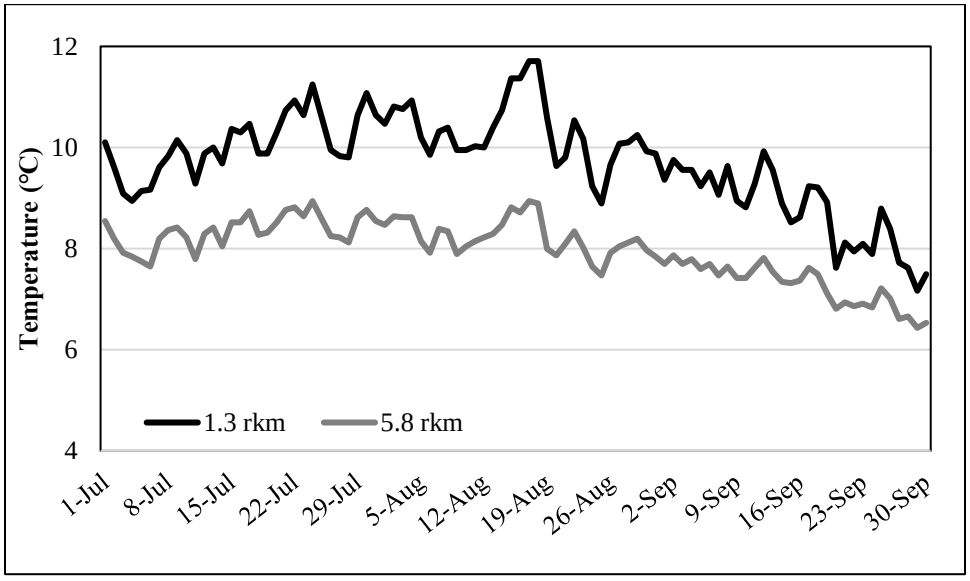

Figure 20. Maximum daily temperatures in Jungle Creek at rkms 1.3 and 5.8 in 2023.

Beatrice Creek

Beatrice Creek is a tributary to Fishtrap Creek at rkm 12.0. Beatrice Creek is occupied by BULL and WCT. In previous years, this stream was an important spawning and rearing tributary, but BULL presence and spawning has declined in recent years.

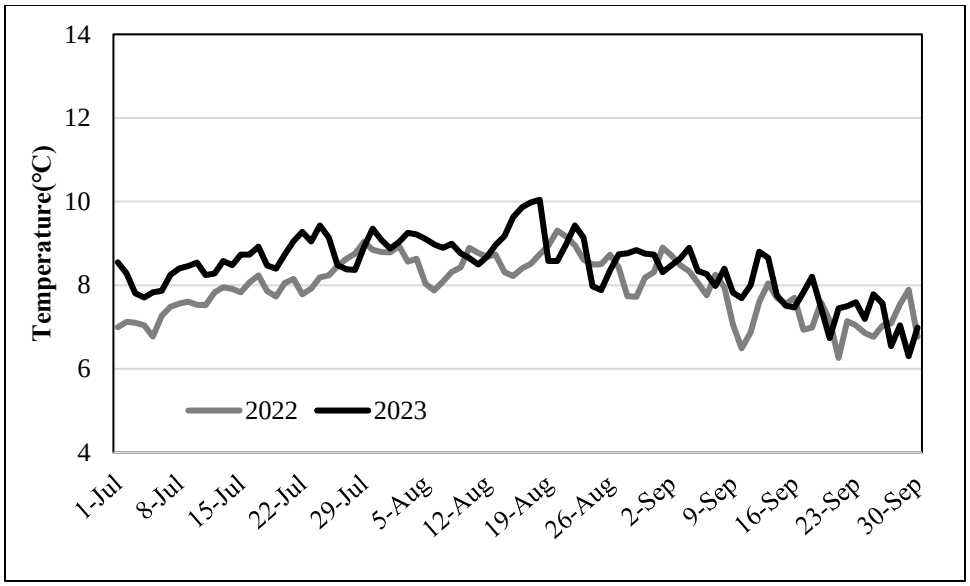

Figure 21. Mean daily temperatures in Beatrice Creek at rkm 0.2 in 2022 and 2023.

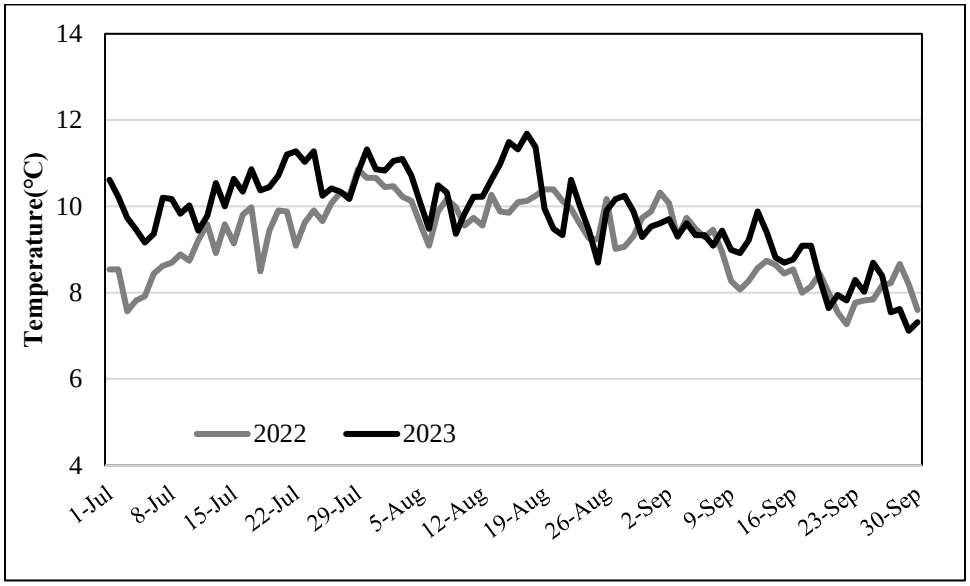

Figure 22. Maximum daily temperatures in Beatrice Creek at rkm 0.2 in 2022 and 2023.

West Fork Fishtrap Creek

West Fork Fishtrap Creek is a tributary to Fishtrap Creek at rkm 17.0. West Fork Fishtrap Creek is an important stream for native fish, and is occupied by BULL and WCT, with BULL making up close to 50% of the general fish community in some portions of the drainage. A lone LL was observed in the lower reaches in 2021 and was the first documentation of the species in the stream (Blakney et al. 2022). A lone hybrid WCT was also recently identified via genetic testing (Kovach et al. 2019a; Blakney 2021). Due to the low water in 2023, the lower 0.5 rkms of West Fork Fishtrap Creek went dry. The dry reach began at or near the site where the lower thermograph was installed. The temperature data does not show the thermograph going dry,

which suggests it was most likely in an isolated pool before the stream was reconnected. The spike in temperature in mid-August likely marks this time period as when the stream became disconnected, and the thermograph was possibly isolated while remaining in water.

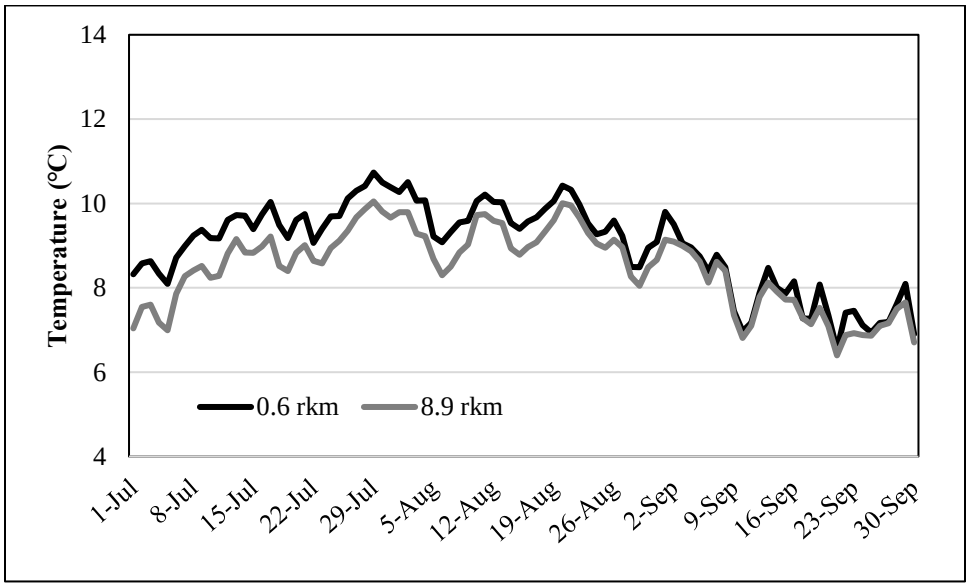

Figure 23. Mean daily temperatures in West Fork Fishtrap Creek at rkms 0.6 and 8.9 in 2022.

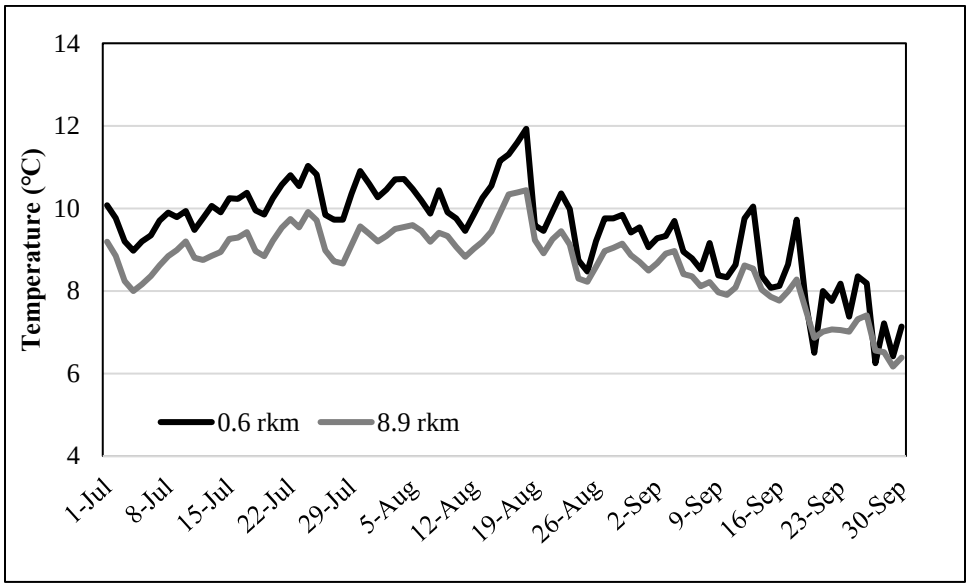

Figure 24. Mean daily temperatures in West Fork Fishtrap Creek at rkms 0.6 and 8.9 in 2023.

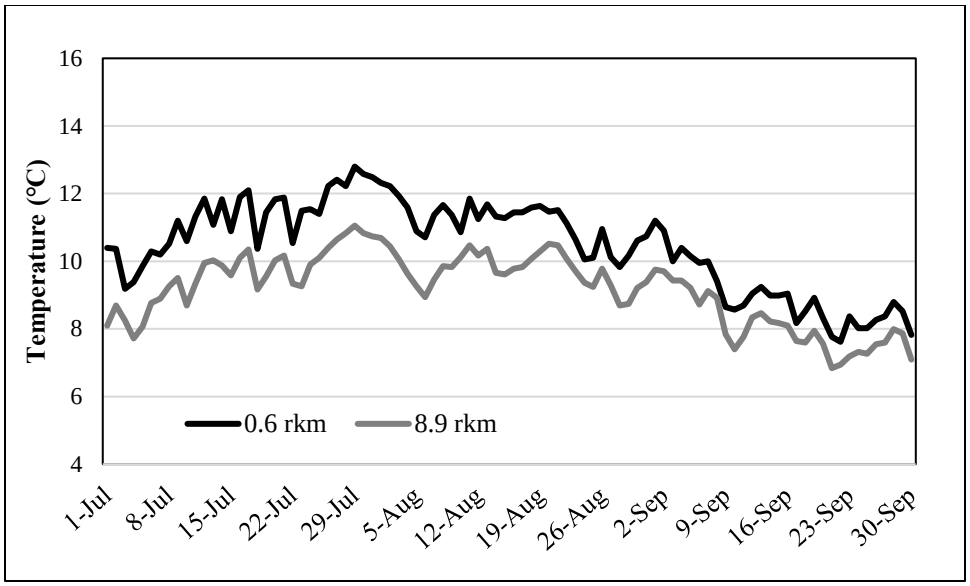

Figure 25. Maximum daily temperatures in West Fork Fishtrap Creek at rkms 0.6 and 8.9 in 2022.

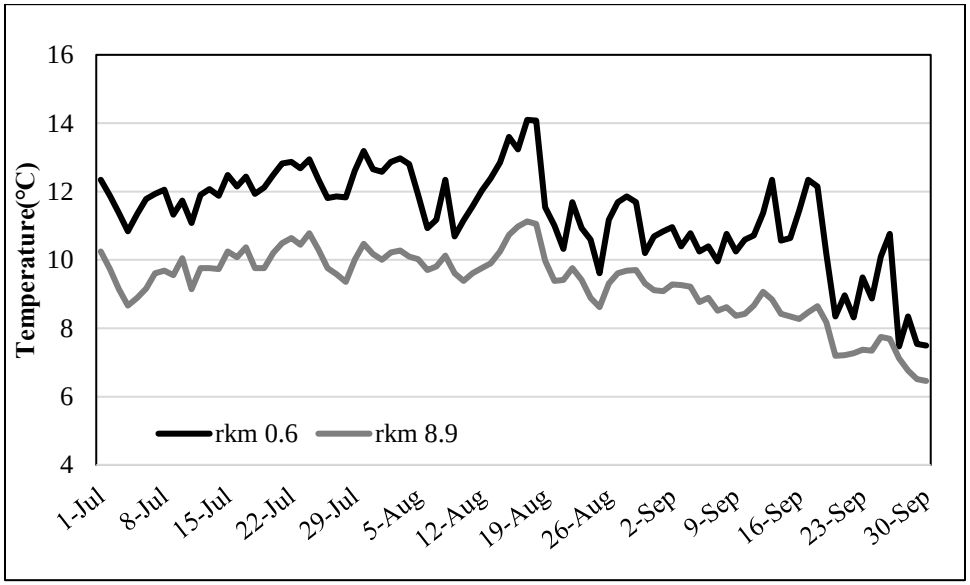

Figure 26. Maximum daily temperatures in West Fork Fishtrap Creek at rkms 0.6 and 8.9 in 2023.

Little Thompson River

Little Thompson River is a major tributary to the Thompson River at rkm 28. Historically, this stream was populated by WCT, but community composition has shifted to an abundant population of EB widely distributed throughout the mainstem and its tributaries along with RB and LL at lower densities. This stream is the warmest documented tributary to the Thompson River, and its influence is responsible for creating the highest temperatures recorded in the

Thompson River below its confluence every year. Non-hybridized WCT do still occur in a few tributary streams.

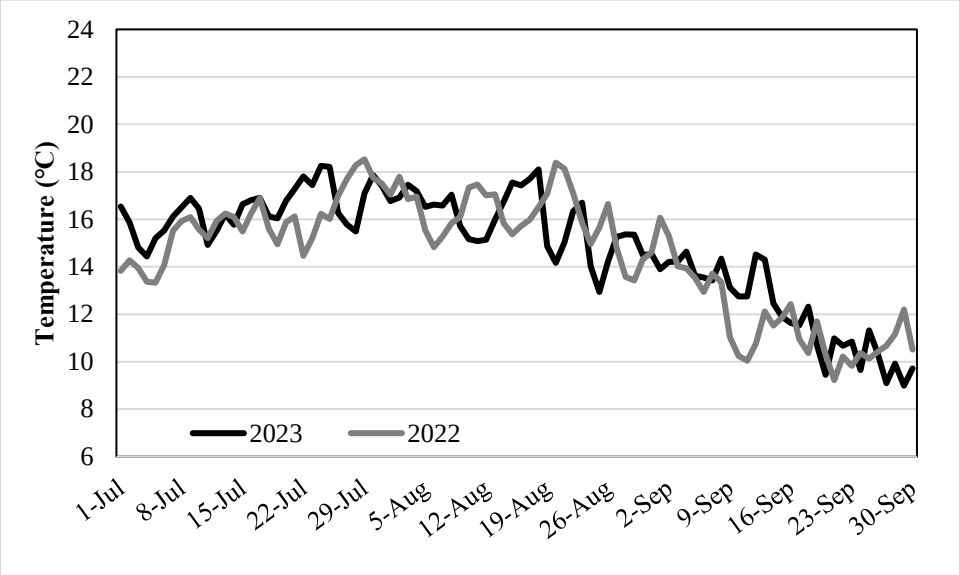

Figure 27. Mean daily temperatures in Little Thompson River at rkm 0.0 in 2022 and 2023.

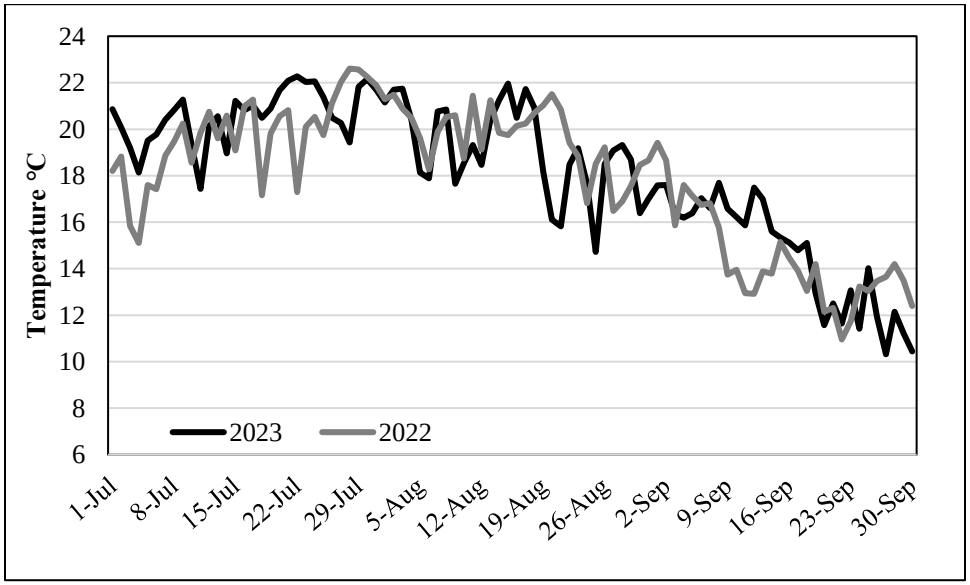

Figure 28. Maximum daily temperatures in the Little Thompson River at rkm 0.0 in 2022 and 2023.

Little Rock

Little Rock Creek is a tributary to the Little Thompson River at rkm 2.3. The lower reaches are occupied by WCT and EB, while higher up in the drainage is only occupied by WCT. An earthen diversion at rkm 4.3 diverts all the perennial baseflow via a transbasin diversion into another Little Thompson River tributary, Marten Creek. While the water right only allows this take for a portion of the year, the diversion operates the water year-round.

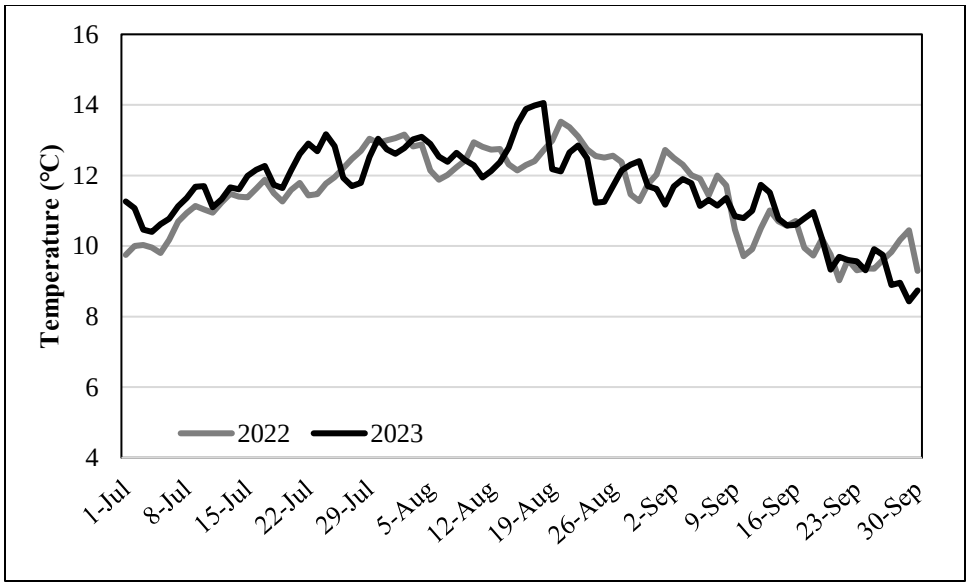

Figure 29. Mean daily temperatures in Little Rock Creek above the diversion at rkm 4.3 in 2022 and 2023.

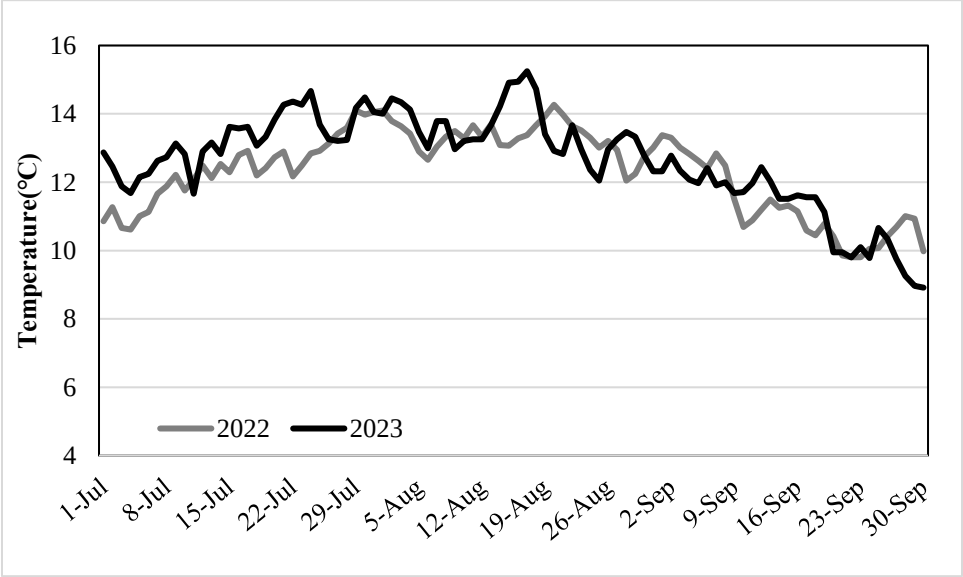

Figure 30. Maximum daily temperatures in Little Rock Creek above the diversion at rkm 4.3 in 2022 and 2023.

North Fork Little Thompson

North Fork Little Thompson is a tributary to the Little Thompson at rkm 11.0, and is occupied by WCT, LL, RB and EB in the lower reaches of the stream. The upper reaches of the stream are occupied by moderate densities of non-hybridized WCT.

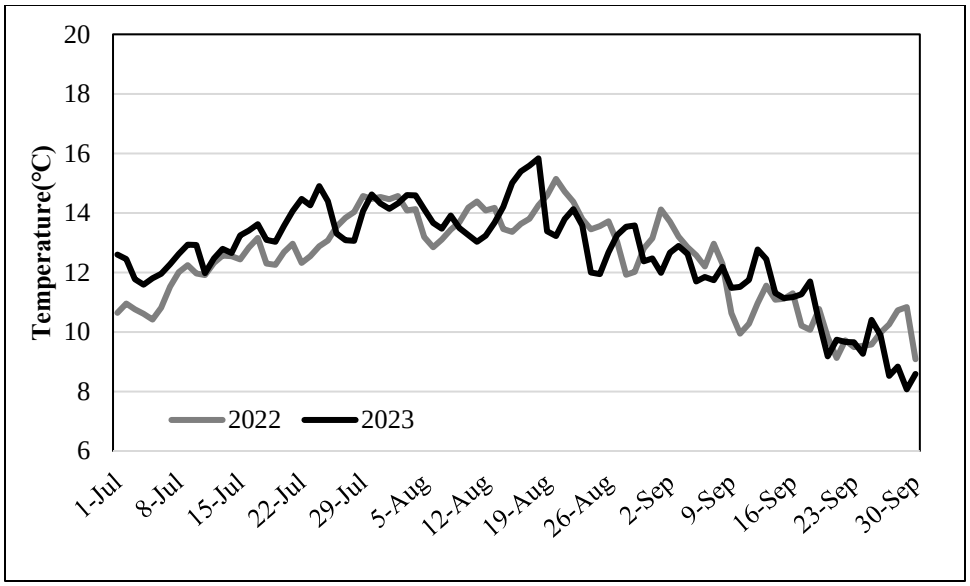

Figure 31. Mean daily temperatures in North Fork Little Thompson at rkm 0.7 in 2022 and 2023.

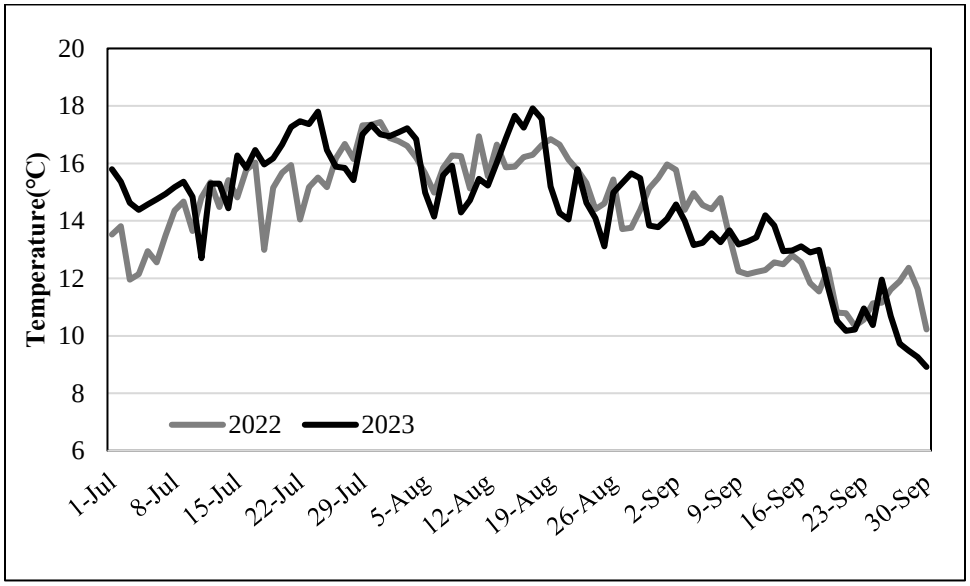

Figure 32. Maximum daily temperatures in North Fork Little Thompson at rkm 0.7 in 2022 and 2023.

Bear Creek

Bear Creek enters the Thompson River at approximately rkm 35.0. The section of stream monitored in Bear Creek is above a waterfall barrier at rkm 2.6, above which was previously fishless. In 2020, 290 WCT were translocated into Bear Creek between rkms 2.6 and 6.4, with an additional 101 fish translocated to the same section of stream in 2022. Bear Creek has received non- hybridized WCT from Big Rock Creek, Chippy Creek, Alder Ditch, and North Fork Little Thompson (Blakney et al. 2022). This stream is currently being monitored for recruitment, parentage and population dynamics. In 2022, the thermograph installed at rkm 6.1 went dry at

the end of August. For this thermograph only July and August data are displayed, while the data for the lower site at rkm 2.6 continues through September.

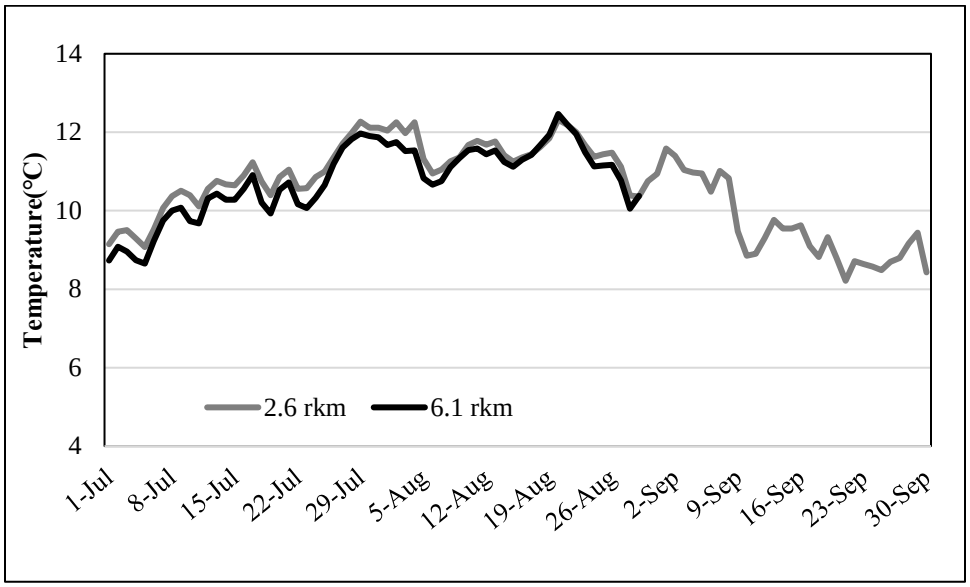

Figure 33. Mean daily temperatures in Bear Creek at rkms 2.6 and 6.1 and in 2022.

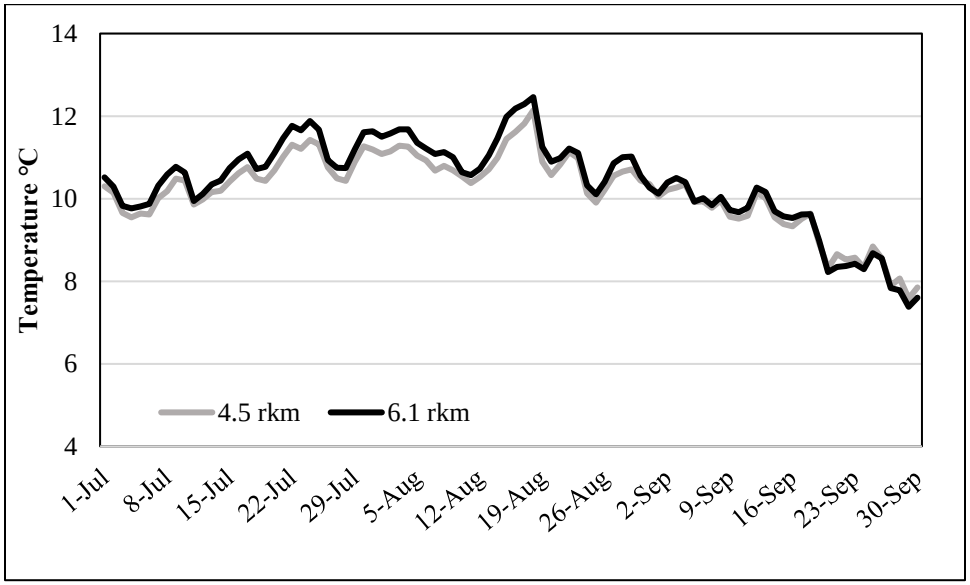

Figure 34. Mean daily temperatures in Bear Creek at rkms 4.5 and 6.1 in 2023.

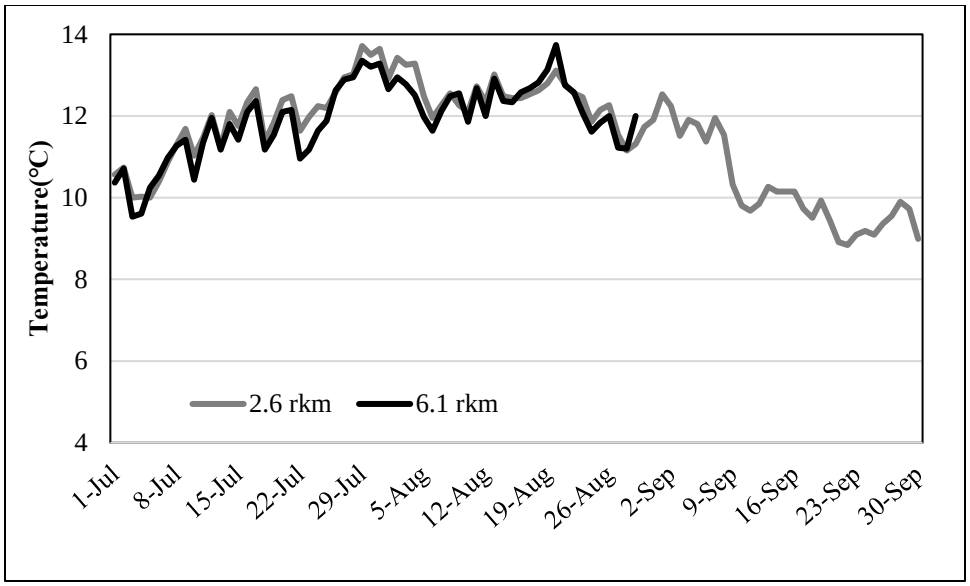

Figure 35. Maximum daily temperatures in Bear Creek at rkms 2.6 and 6.1 in 2022.

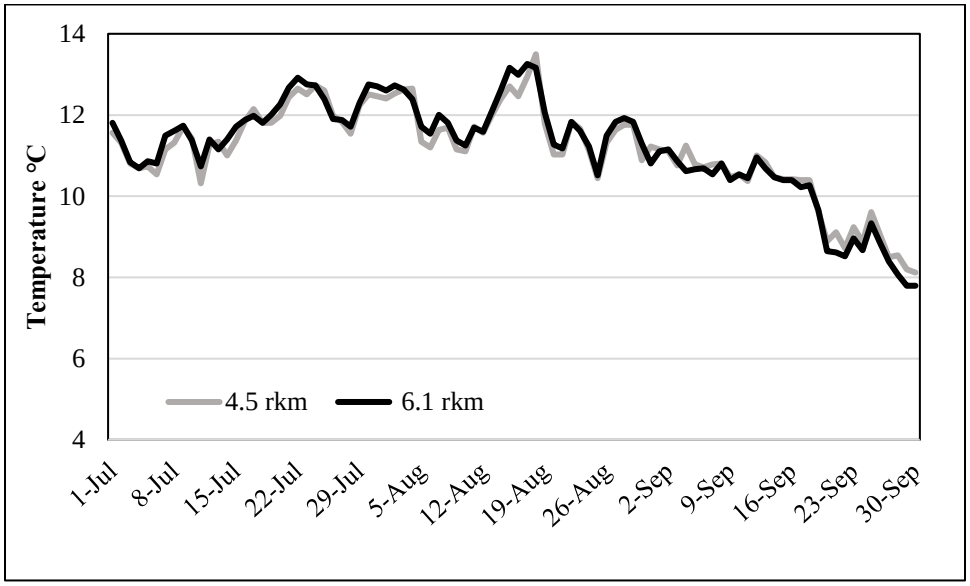

Figure 36. Maximum daily temperatures in Bear Creek at rkms 4.5 and 6.1 in 2023.

Chippy Creek

Chippy Creek is a tributary to the Thompson River at rkm 38.4. The lower reaches are inhabited by LL, RB and EB. The middle reaches of this tributary are occupied by non-hybridized WCT as well as low to moderate densities of LL and EB. The upper distribution of both native and non-native salmonids in the drainage is unknown.

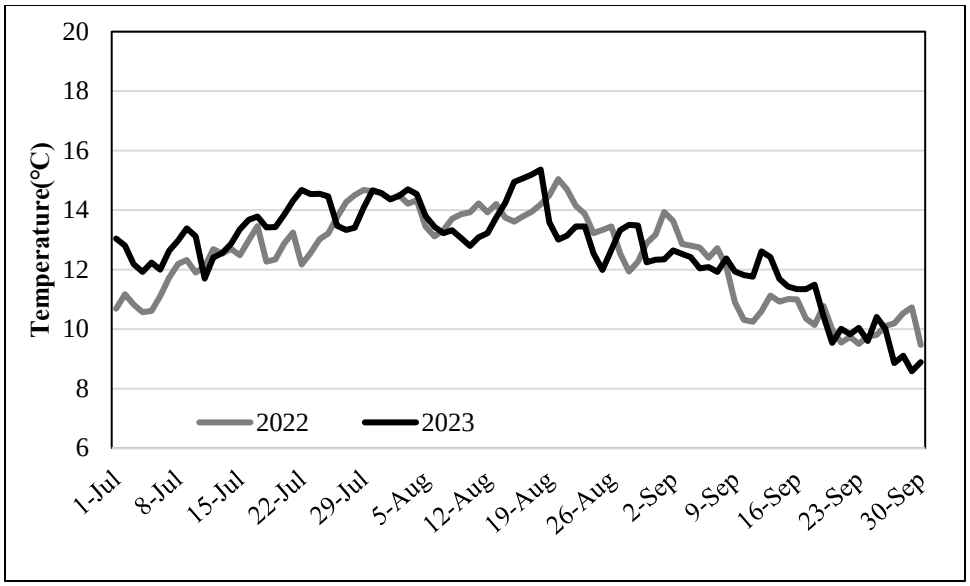

Figure 37. Mean daily temperatures in Chippy Creek at rkm 4.1 in 2022 and 2023.

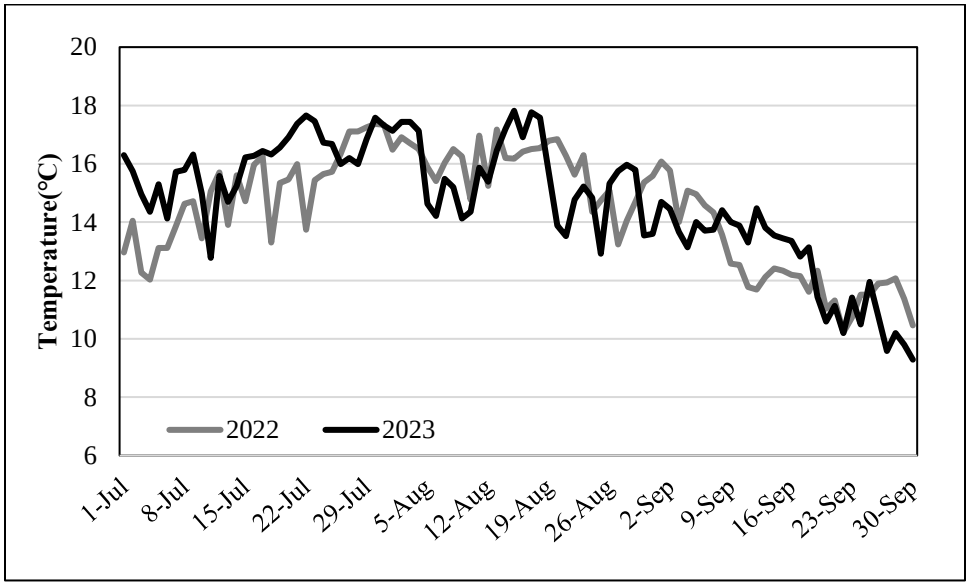

Figure 38. Maximum daily temperatures in Chippy Creek at rkm 4.1 in 2022 and 2023.

Big Rock Creek

Big Rock Creek is a tributary to the Thompson River at approximately rkm 52.4 . Big Rock Creek is occupied by LL, RBT, WCT, and BULL. A small population of BULL is present in this stream, and non-hybridized WCT occupy the headwaters of this drainage. Non-native salmonids (mainly LL but also RBxWCT hybrids) have been expanding distribution within the stream, which is a cause for concern. Nearly entire drainage burned in the Chippy Creek Fire in 2007. The exposure of the stream from loss of a mature riparian canopy has likely caused water temperatures to rise above ideal BULL temperatures, with many days above 15 °C. This stream is a candidate for a barrier, which could slow or stop the movement of non-natives upstream.

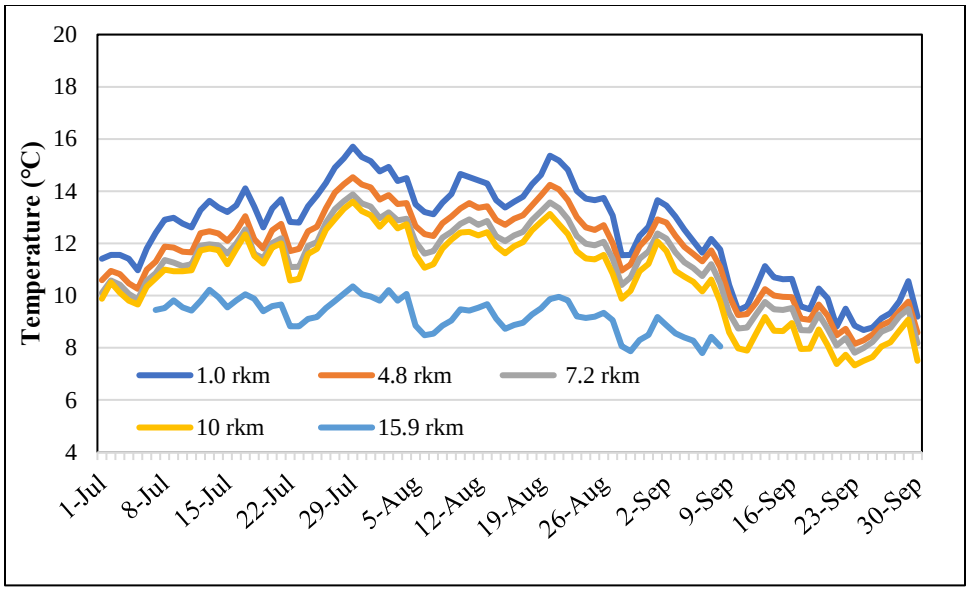

Figure 39. Mean daily temperatures in Big Rock Creek at rkms 1.0, 4.8, 7.2, 10, and 15.9 in 2022.

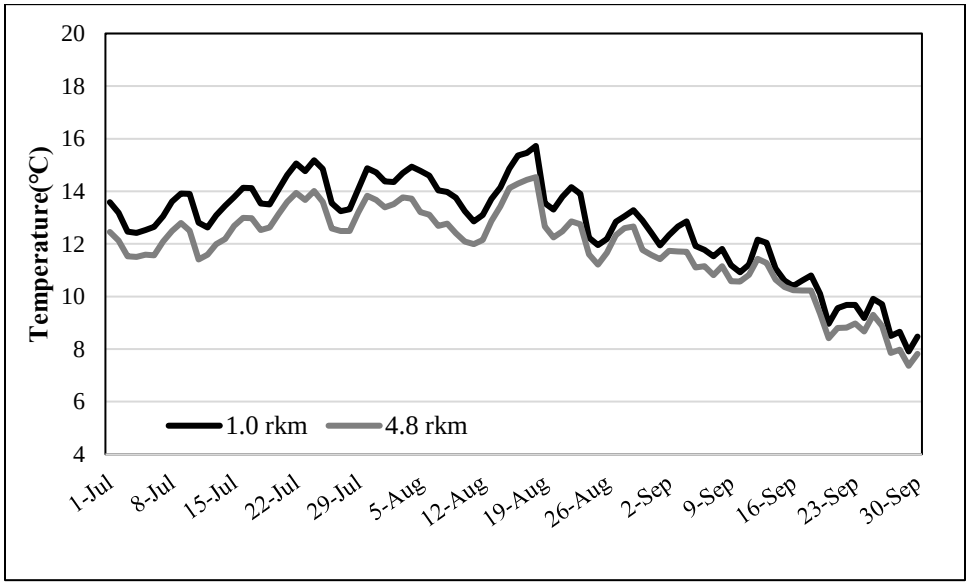

Figure 40. Mean daily temperatures in Big Rock Creek at rkms 1.0 and 4.8 rkm in 2023.

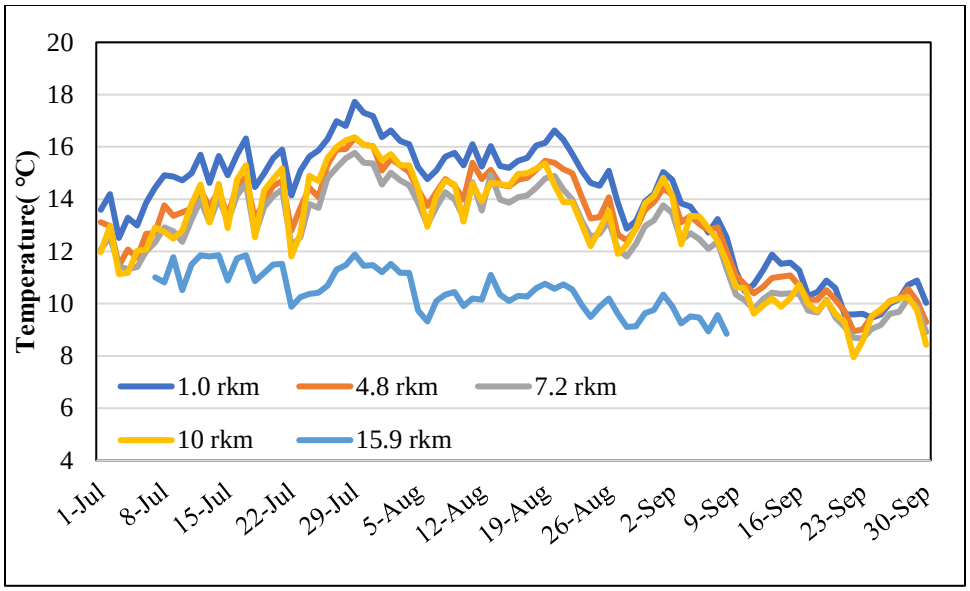

Figure 41. Maximum daily temperatures in Big Rock Creek at rkms 1.0, 4.8, 7.2, 10.0, and 15.9 in 2022.

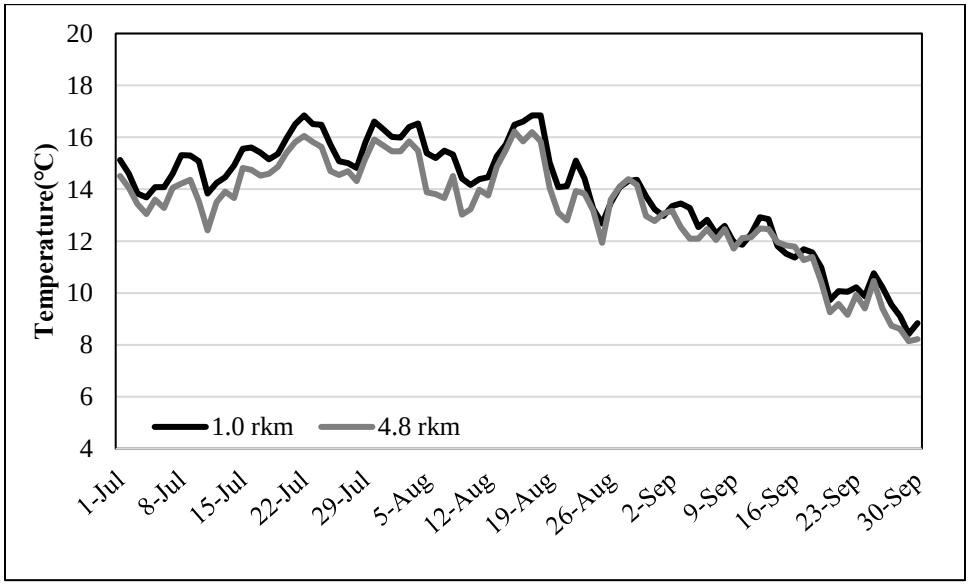

Figure 42. Maximum daily temperatures in Big Rock Creek at rkm 1.0 and 4.8 in 2023.

Shroder Creek

Shroder Creek is a tributary to the Thompson River at rkm 63.2. Shroder Creek has a barrier falls located at 0.6 rkm. Above this barrier Shroder Creek was previously fishless. Beginning in 2021, FWP translocated 124 non-hybridized WCT from Four lakes Creek, North Fork Little Thompson and Chippy Creek. In 2022 another 124 WCT were relocated to Shroder Creek, from Alder Creek and Big Rock Creek. In 2023 Shroder Creek received 33 WCT from Indian Creek. This stream is currently being monitored for recruitment, parentage and population dynamics.

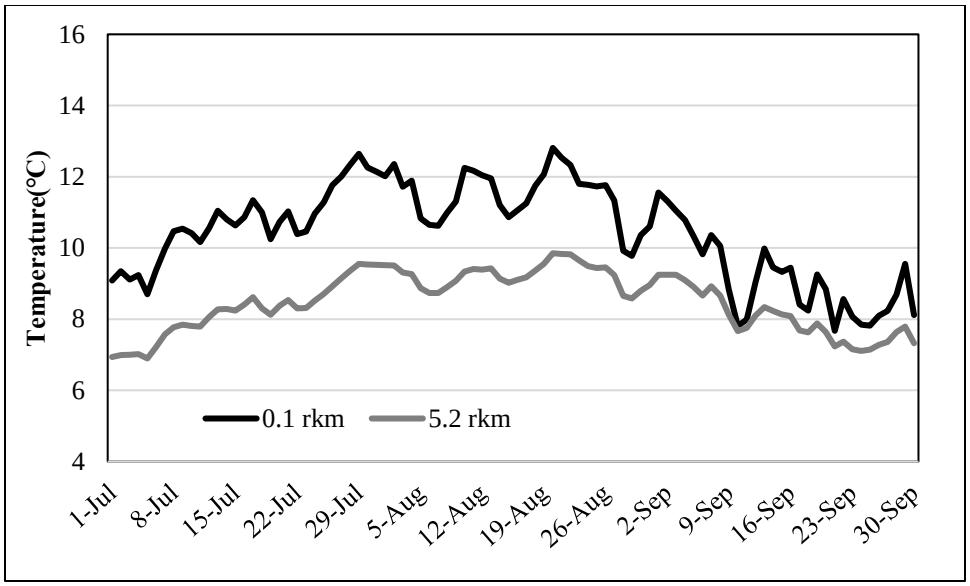

Figure 43. Mean daily temperatures in Shroder Creek at rkms 0.1 and 5.2 in 2022.

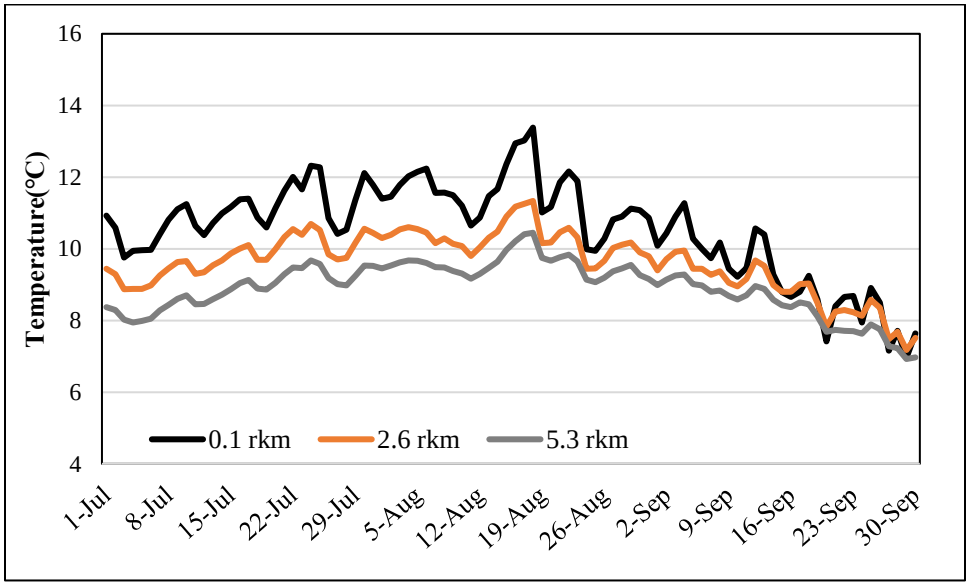

Figure 44. Mean daily temperatures in Shroder Creek at rkms 0.1, 2.6, and 5.3 in 2023.

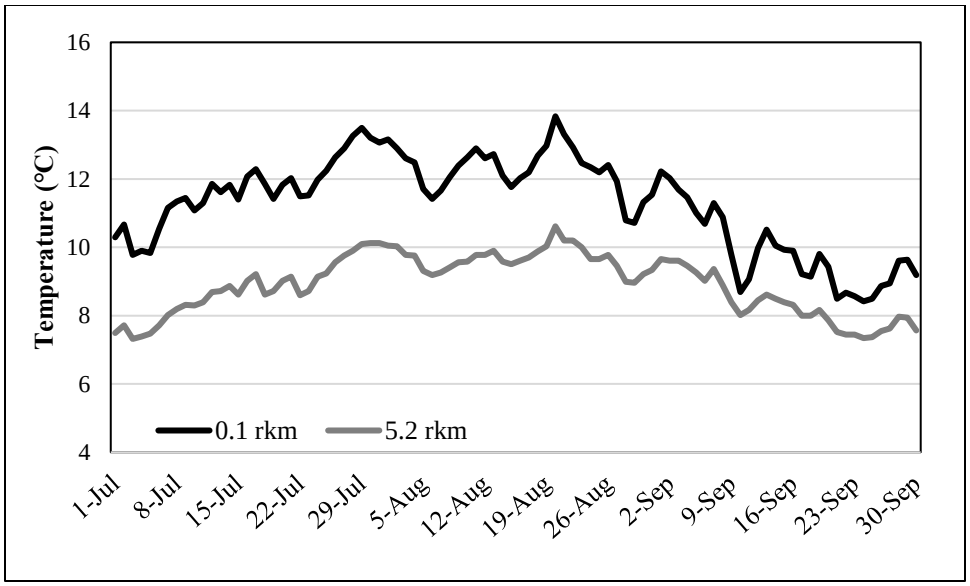

Figure 45. Maximum daily temperatures in Shroder Creek at rkms 0.1 and 5.2 in 2022.

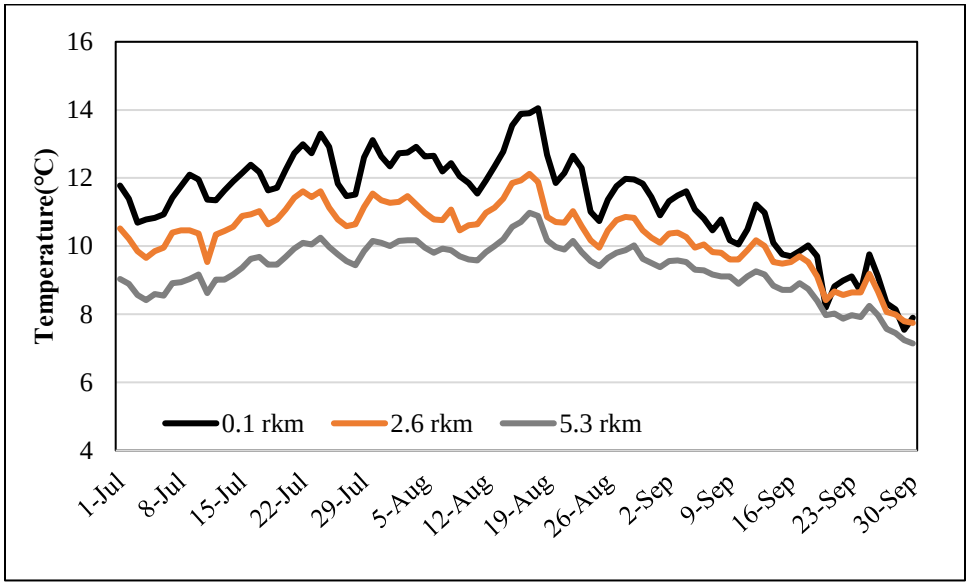

Figure 46. Maximum daily temperatures in Shroder Creek at rkms 0.1, 2.6, and 5.3 in 2023.

Murr Creek

Murr Creek is occupied primarily by EB in the lower reaches of the stream. Above a barrier falls at rkm 2.3 only EB are present and extend through the entire North Fork and into the lower South Fork. In the South Fork barrier falls are located at rkm 6.1, above which was previously fishless. In 2021, FWP translocated 131 non-hybridized WCT to the South Fork Murr Creek from Four Lakes Creek, North Fork Little Thompson and Chippy Creek. In 2022, 133 fish were translocated from Indian Creek and Alder Creek. This population is being monitored for recruitment, parentage and population dynamics.

Three thermographs were placed in Murr Creek. One in the mainstem of Murr Creek at rkm 2.7. Then two thermographs were placed in the North Fork and South Fork of Murr respectively, about 100 yards from one another but representing completely different drainages. The thermograph in North Fork Murr Creek (NF) is located at rkm 0.1. South Fork Murr Creek (SF) is considered the continuation of Murr Creek in the hydrography GIS layer, and so this thermograph is located at rkm 4.2. In 2022, the thermograph in the South Fork went dry at the beginning of September. The data for rkm 2.7 continues through September, but the South Fork data only displays July and August.

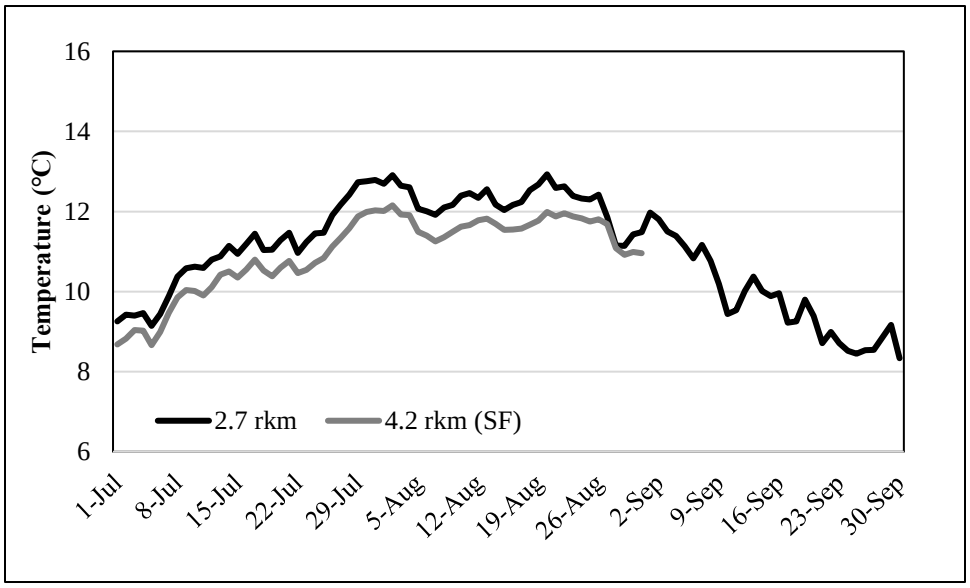

Figure 47. Mean daily temperatures in Murr Creek in the mainstem at rkm 2.7 and in the South Fork Murr Creek at rkm 4.2 in 2022. Only July and August are shown as the South Fork Murr Creek thermograph went dry at the beginning of September.

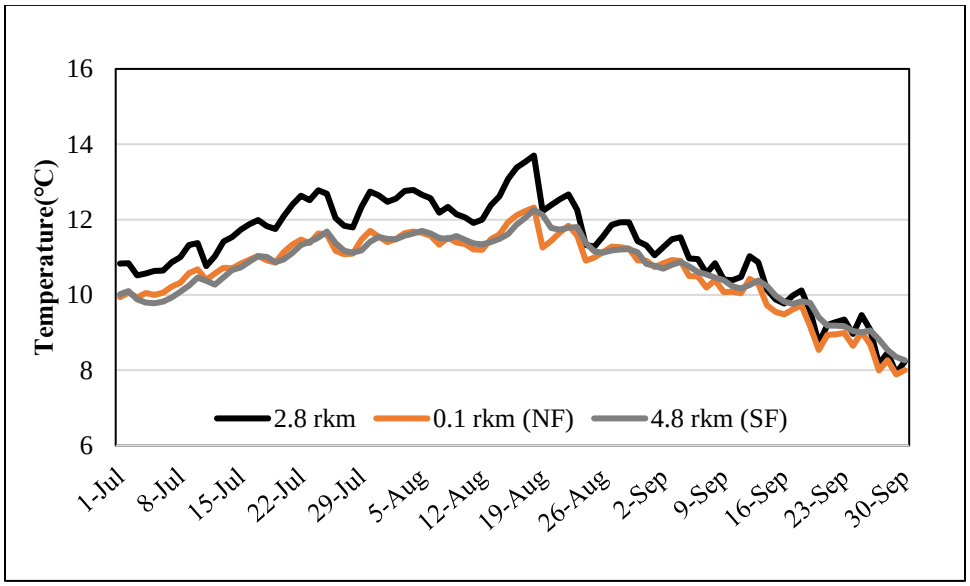

Figure 48. Mean daily temperatures in Murr Creek in the mainstem at rkm 2.7, in the South Fork of Murr at 4.2, and in the North Fork of Murr at rkm 0.1 in 2023.

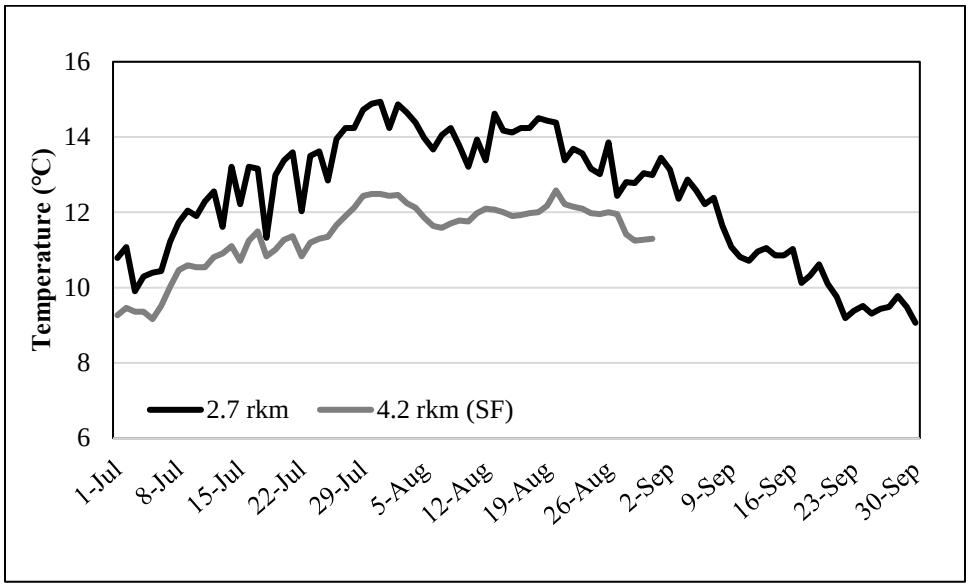

Figure 49. Maximum daily temperatures in Murr Creek in the mainstem at rkm 2.7 and in the South Fork of Murr at rkm 4.2 in 2022. This data only displays July and August as the thermograph in the South Fork of Murr went dry at the beginning of September.

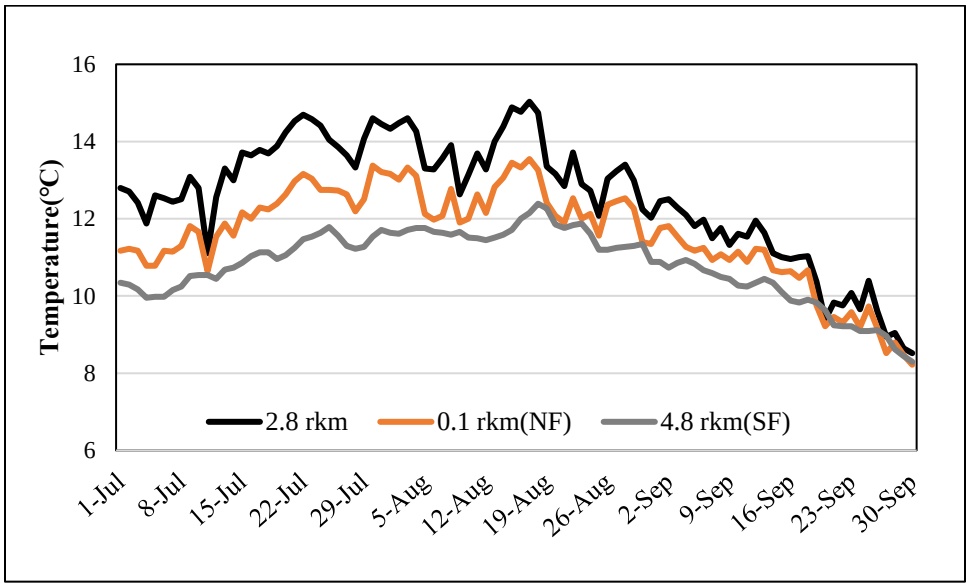

Figure 50. Maximum daily temperatures in Murr Creek in the mainstem at rkm 2.7, in the South Fork of Murr at rkm, and in the North Fork of Murr at rkm 0.1 in 2023.

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