Fall Creek Surface Water Temperature Report

fRI Research, Water and Fish Program

January 12, 2026

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About the Authors

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Any opinions expressed in this report are those of the authors, and do not necessarily reflect those of the organizations for which they work, or fRI Research.

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Freshwater Conservation Canada's (formerly Trout Unlimited Canada) mission is to conserve, protect, and restore Canada's freshwater ecosystems and their coldwater resources for current and future generations.

Learn more at https://www.freshwaterconservationcanada.org/

Acknowledgements

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1. Introduction

Fall creek is located ~45km southwest of Rocky Mountain House, Alberta. The lower portion of the creek provides spawning habitat for Ram River and North Saskatchewan river Bull Trout (Salvelinus confluentus), a species that is currently listed as threatened in Alberta (Alberta Government 2024; Alberta Government 2026). A waterfall barrier 7.5 km upstream prevents Bull Trout from accessing the upper portion of Fall Creek (Judd et al. 2023). In 2026 translocation efforts will aim to move Bull Trout above these falls where Cutthroat Trout (Onchorhynchus clarkii) were previously stocked and have established populations (Judd et al. 2023). Headwaters tend to be the coolest portion of a watershed as mean daily water temperatures increase with distance downstream (Cassie 2006). Bull Trout are a cold-water species with an optimal growth temperature range of 10-15°C (Selong et al. 2001) and are typically found in streams with a maximum temperature of 18°C (Dunham et al. 2003). However, the surface water temperature profile of Fall Creek above the falls has not been previously described. This report aims to identify the temperature profile of the upper Fall Creek watershed prior to translocation efforts.

2. Methods

During the summer of 2025 Freshwater Conservation Canada (FCC) deployed 13 water temperature loggers above the waterfall barrier on Fall Creek during July 9th and 10th (Figure 2). One additional logger was deployed at Gloomy Creek, a tributary of Fall Creek that holds particular interest due to its potential contribution to overall streamflow and potential thermal buffering. HOBO Tidbit MX2203 Loggers were placed at approximately 1 km intervals. To avoid data skew caused by smaller, ephemeral or unnamed tributaries, placement is adjusted to just upstream of such confluences rather than adhering to the 1 km interval mark. This ensures that logger data reflect baseline conditions in the main channel rather than localized cooling or warming effects from nearby inflows. Water temperatures (°C) were recorded at one-hour intervals.

Data from the loggers was collected on October 7th and 8th. The data underwent a QAQC process based on Alberta Environment and Parks (AEP) standard operating procedure (SOP) for external agencies (AEP 2019). Data was removed from the dates of deployment and date of download; no other data was removed. For each site daily and weekly moving means (Appendix), monthly means (Table 1), daily standard deviations (Figure 4), monthly standard deviations (Table 1) and average daily standard deviation (Figure 5) were calculated. Sites where hourly temperatures exceeded 15°C were identified.

3. Results

Overall, 8 of the 14 sites did not exceed 15°C from July to September 2025. Sites 318, 317, 316, 315, 319, 307, 320, and 309 stayed below 15°C while sites 308, 310, 311, 312, 313, 314 recorded temperatures above 15°C. The sites that did not exceed 15 °C were predominantly located at the upstream end of the watershed. All but three sites recorded the highest monthly mean in the month of August (Table 1). Sites 308, 309, and 310 recorded their highest monthly means in September (Table 1). None of the sites exceeded 18°C during the summer of 2025, and sites that exceeded 15 °C did so for only a few hours daily. Site 319 had the coldest mean temperature during the month of August at 8.7 ± 1.1°C and was on Gloomy Creek (a tributary to the mainstem). Site 314, the farthest downstream site had the warmest mean temperature during the month of August at 11.4 ± 1.9°C, whereas the farthest upstream site on the mainstem (318), had the lowest mainstem mean August temperature of 9.4 ± 1.6°C. The lowest average daily standard deviation (a surrogate for thermal variability) was recorded at Site 319 (0.9°C) (Figure 5). Site 314 had the highest average daily standard deviation at 1.5°C (Figure 5). Site 318 had an average daily standard deviation of 1.2 (Figure 5). Site 319 is on Gloomy Creek (Figure 2) and is the 5th most upstream site. Moving from upstream to downstream along the mainstem, each site increases in mean august temperature.

4. Discussion

Generally, in Fall Creek surface water temperatures increase in temperature as sites move farther downstream. Surface water temperatures stay below the maximum limit for Bull Trout (Dunham et al. 2003). Monthly mean, daily temperatures, and average daily temperature all increase with distance downstream. All sites above the gravel road in the center of the study area stayed below 15°C (Bull Trout optimal growth temperature, Selong et al. 2001), while only one site (Site 320) below the gravel road remained below 15°C. Reduced variability in surface water temperature higher up in the watershed and in Gloomy Creek, suggest a greater influence from ground water and / or shading which appears to be less prevalent downstream. When considering the summer thermal requirements of Bull Trout, sites further upstream are likely best for attempting remote stream site incubation assuming adequate flow remains through the winter months. The absence of any measurable cooling occurring between sites when comparing mean temperatures in the downstream direction suggests there is no major increase / input of groundwater that can be detected through these data. Overall, the thermal profile of this system suggests adequate temperatures are present for Bull Trout during the open spring and summer months.

5. Tables and Figures

Table 1. Monthly mean and standard deviation of water temperature (°C) at 13 sites along Fall Creek, and one site on Gloomy Creek (Site 319), a tributary to Fall Creek mainstem, in 2025.

Site Number	Monthly Mean Temperature (°C)				Kilometers Downstream
	Jul	Aug	Sep	Oct	
318	8.3 ± 1.8	9.4 ± 1.6	8.5 ± 1.8	4.5 ± 1.5	0
317	8.4 ± 1.7	9.4 ± 1.4	8.6 ± 1.5	5.1 ± 1.2	1
316	8.5 ± 1.7	9.5 ± 1.4	8.6 ± 1.6	4.9 ± 1.4	2
315	8.5 ± 1.6	9.5 ± 1.4	8.7 ± 1.4	5.6 ± 1.1	3
319	7.9 ± 1.2	8.7 ± 1.1	8.2 ± 1.2	5.7 ± 1.0	4
307	8.6 ± 1.4	9.6 ± 1.3	9.3 ± 1.2	6.6 ± 1.0	5
320	8.9 ± 1.6	10.0 ± 1.5	9.9 ± 1.59	6.9 ± 1.2	6
308	9.1 ± 1.7	10.3 ± 1.6	10.3 ± 1.8	7.0 ± 1.4	7
309	9.3 ± 1.6	10.5 ± 1.5	10.5 ± 1.5	7.4 ± 1.1	8
310	9.5 ± 1.7	10.8 ± 1.8	10.9 ± 1.9	7.7 ± 1.5	9
311	9.7 ± 1.8	10.9 ± 1.9	10.6 ± 1.8	7.3 ± 1.2	10
312	9.8 ± 1.8	11.0 ± 1.9	10.3 ± 1.8	7.0 ± 1.2	11
313	10.0 ± 1.9	11.2 ± 1.8	10.9 ± 1.6	8.2 ± 1.2	12
314	10.2 ± 2.0	11.4 ± 1.9	10.9 ± 1.9	7.5 ± 1.4	13

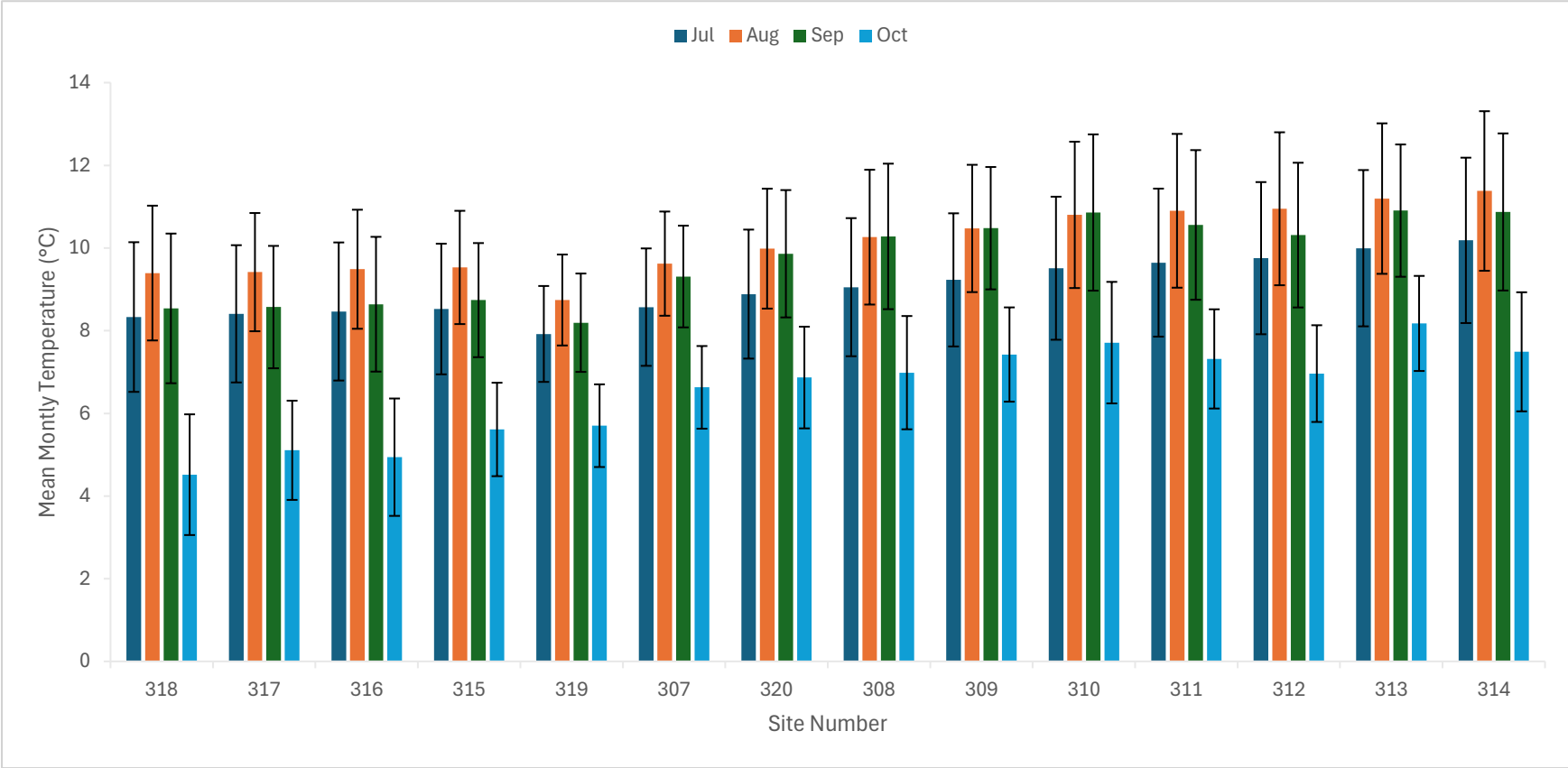

Figure 1. Monthly mean and standard deviation (error bars) of water temperature (°C) at 13 sites along Fall Creek, and one site on Gloomy Creek (Site 319), a tributary to Fall Creek mainstem, in 2025.

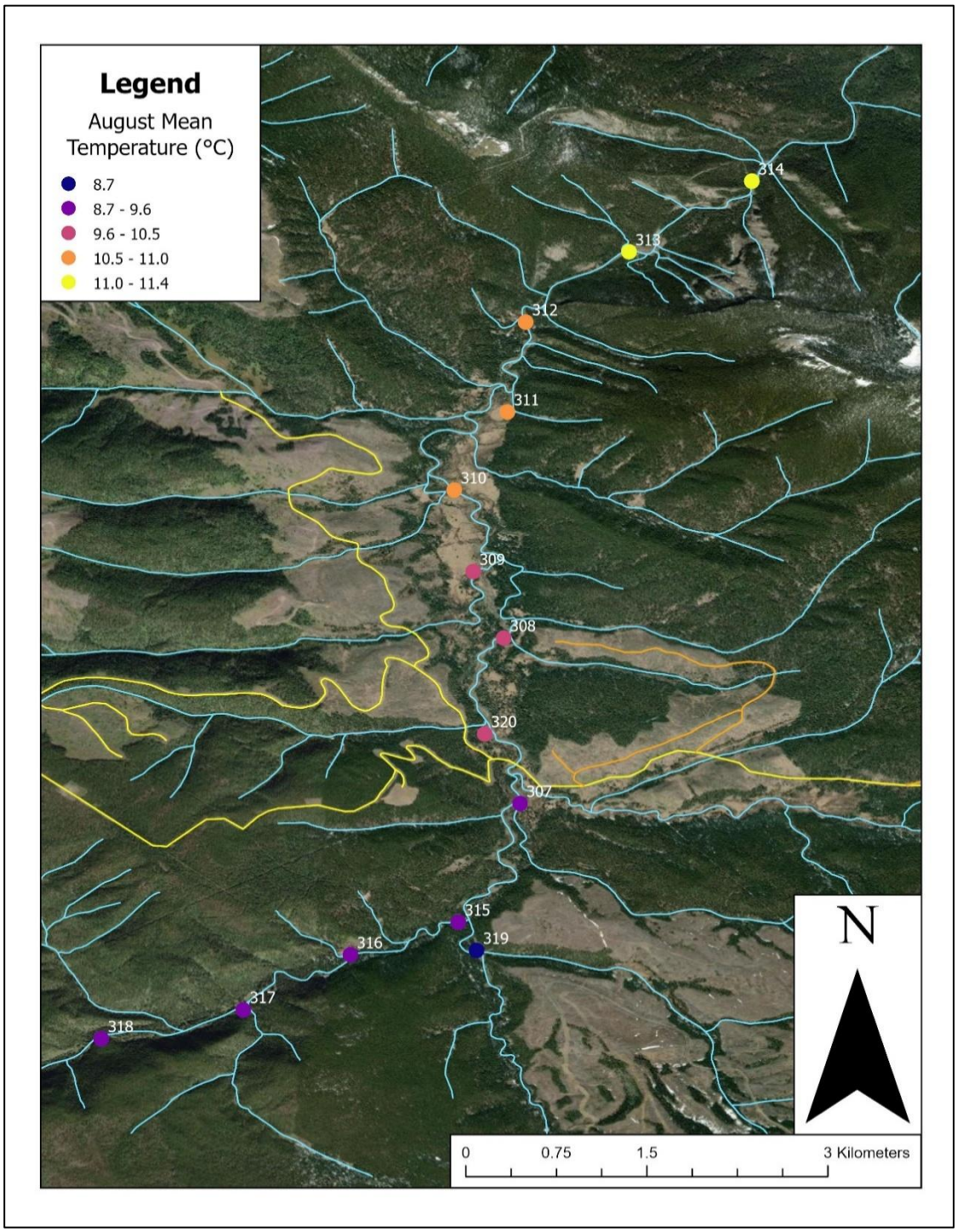

Figure 2. Temperature logger locations above the waterfall along Fall Creek and Gloomy Creek (Site 319), a tributary to Fall Creek mainstem. Cold to warm colours indicate August mean temperature moving from 8.7°C to 11.4°C. Yellow and orange lines represent gravel and unimproved roads respectively; blue lines represent streams.

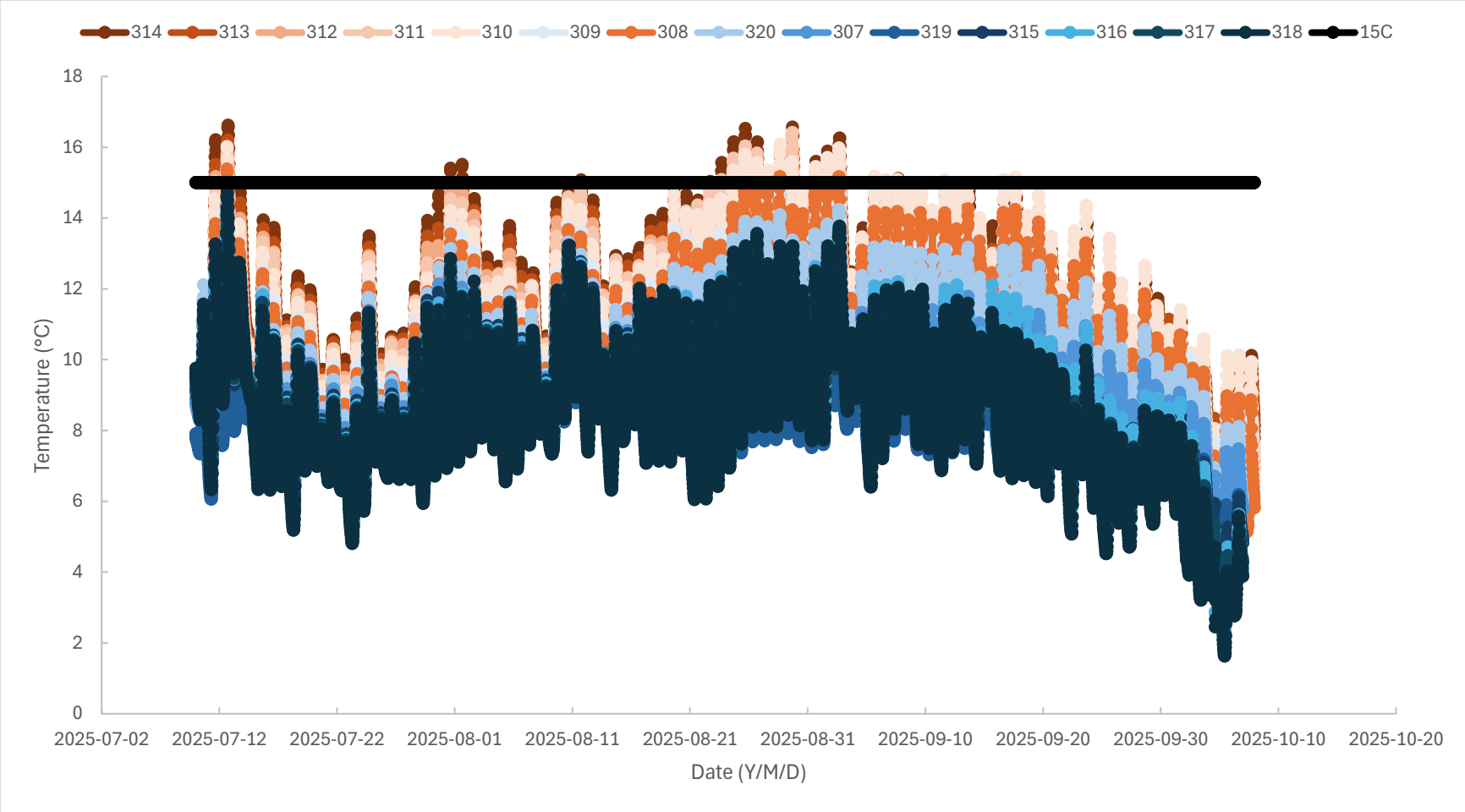

Figure 3. Hourly water temperatures at 13 sites (each site is denoted by a different colour) along Fall Creek, and one site on Gloomy Creek (Site 319) a tributary to Fall Creek, from July 10th to October 7th, 2025. The black line represents 15°C, Bull Trout's maximum optimal growth temperature (Selong et al. 2001). Each dot represents an hourly water temperature measurement. The sites are arranged starting with the most upstream site (site 318) to the most downstream site (site 314). Blue colours represent sites where the water temperature does not exceed 15°C while red colours are sites that exceeded 15°C.

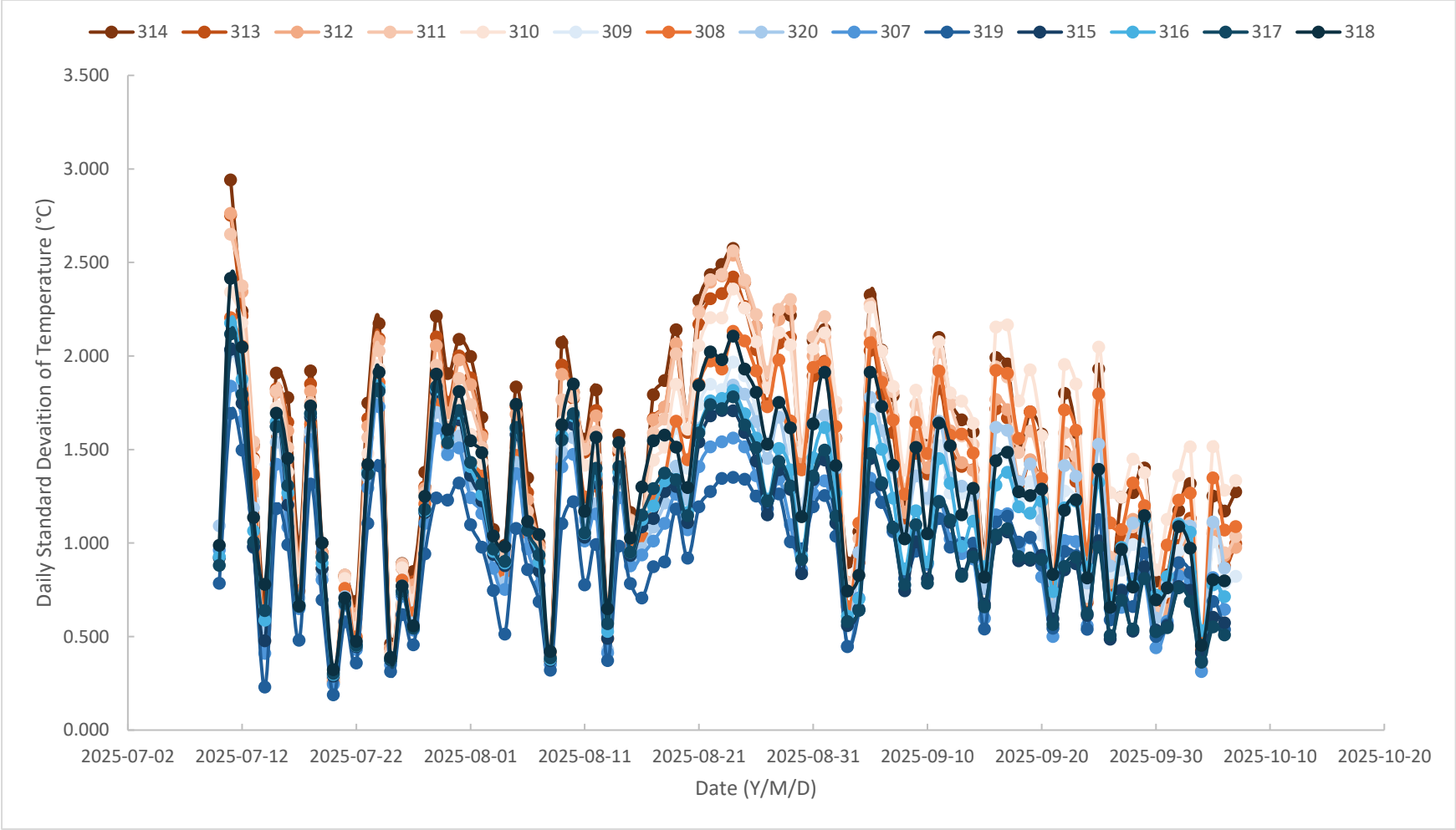

Figure 4. Daily standard deviation of water temperature (°C) at 13 sites (each site is denoted by a different colour) along Fall Creek, and one site on Gloomy Creek (Site 319), a tributary to Fall Creek mainstem, from July 10th to October 7th, 2025. The sites are arranged staring with the most upstream site (site 318) to the most downstream site (site 314). Blue colours represent sites where the water temperature does not exceed 15°C while red colours are sites that exceeded 15°C.

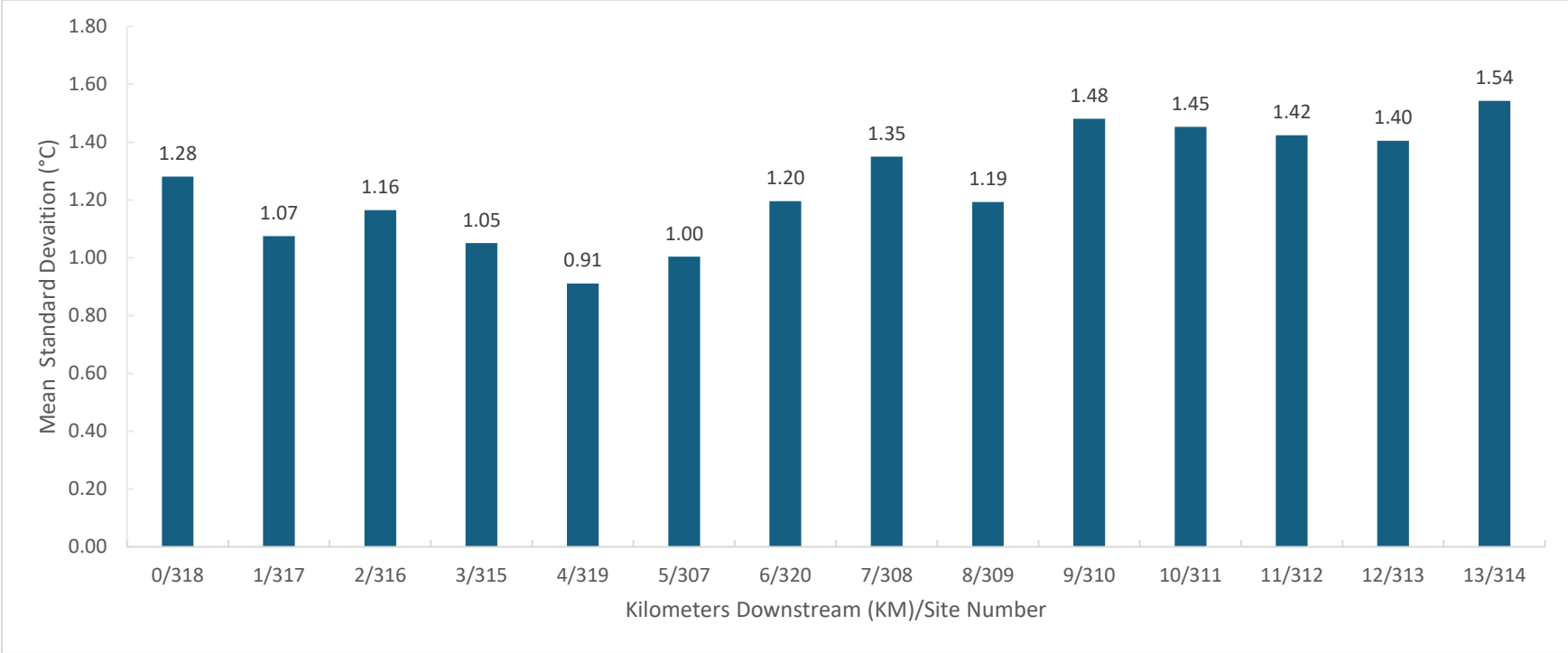

Figure 5. Average daily standard deviation (SD) of water temperature (°C) along Fall Creek and Gloomy Creek (Site 319), a tributary to the Fall Creek mainstem, from July 10th to October 7th, 2025. Kilometer (km) 0 indicates the most upstream site. Sites were spaced approximately one KM apart except for Site 319, which is within 1km of site 315, but is placed in a tributary of the mainstem. The number on top of the bars indicate the mean daily SD at each site.

LITERATURE CITED

Alberta Government. 2024. Species at Risk Implementation Report, Fall Creek Reclamation Project. https://open.alberta.ca/dataset/dba265e9-df66-4012-ac48-99f10e4f51a1/resource/691858b5-62c4-4b5e-afb9-79e3315889db/download/epa-sar-fall-creek-reclamation-project-2024.pdf

Alberta Government. 2026. Fish species at risk, At-risk reports on fish species in Alberta, including the lake sturgeon. Retrieved January 5, 2026, from https://www.alberta.ca/fish-species-at-risk

Caissie, D. (2006), The thermal regime of rivers: a review. Freshwater Biology, 51: 1389-1406. https://doi.org/10.1111/j.1365-2427.2006.01597.x

Dunham, J., B. Rieman, and G. Chandler. 2003. Influences of Temperature and Environmental Variables on the Distribution of Bull Trout within Streams at the Southern Margin of Its Range. North American Journal of Fisheries Management 23:894-904.

Judd, C., M. Rodtka, and Z. Spence. 2023. Ram River bull trout assessment, 2017–2022. ACA Project Report: Final, produced by Alberta Conservation Association, Sherwood Park, Alberta, Canada. 20 pp + App https://www.ab-conservation.com/downloads/report_series/Ram_River_Bull_Trout_Assessment_2017-2022.pdf

Selong, J.H., T.E. McMahon, A.V. Zale, and F.T. Barrows. 2001. Effect of temperature on growth and survival of bull trout, with application of an improved method for determining thermal tolerance in fishes. Transactions of the American fisheries Society, 130(6), pp.1026-1037.

Appendix: Water Temperature Profiles by Site

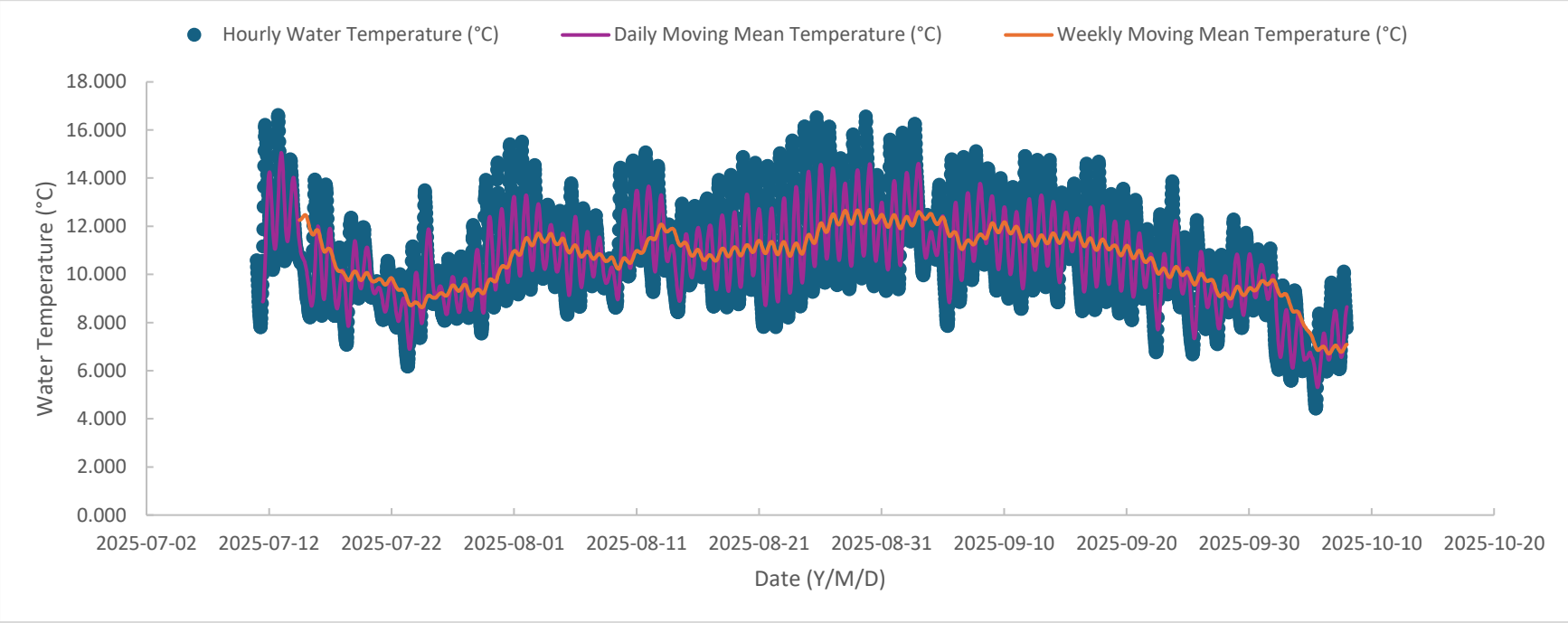

Figure 6. Site 314 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

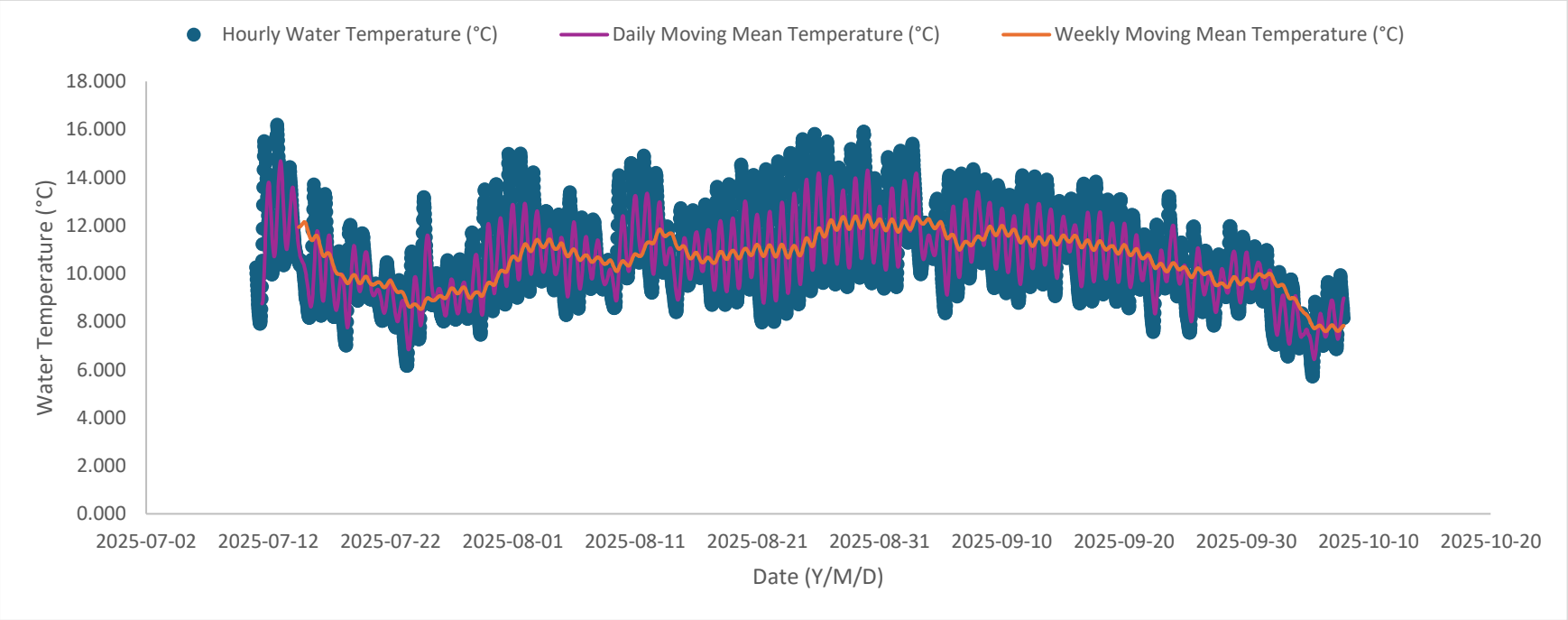

Figure 7. Site 313 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

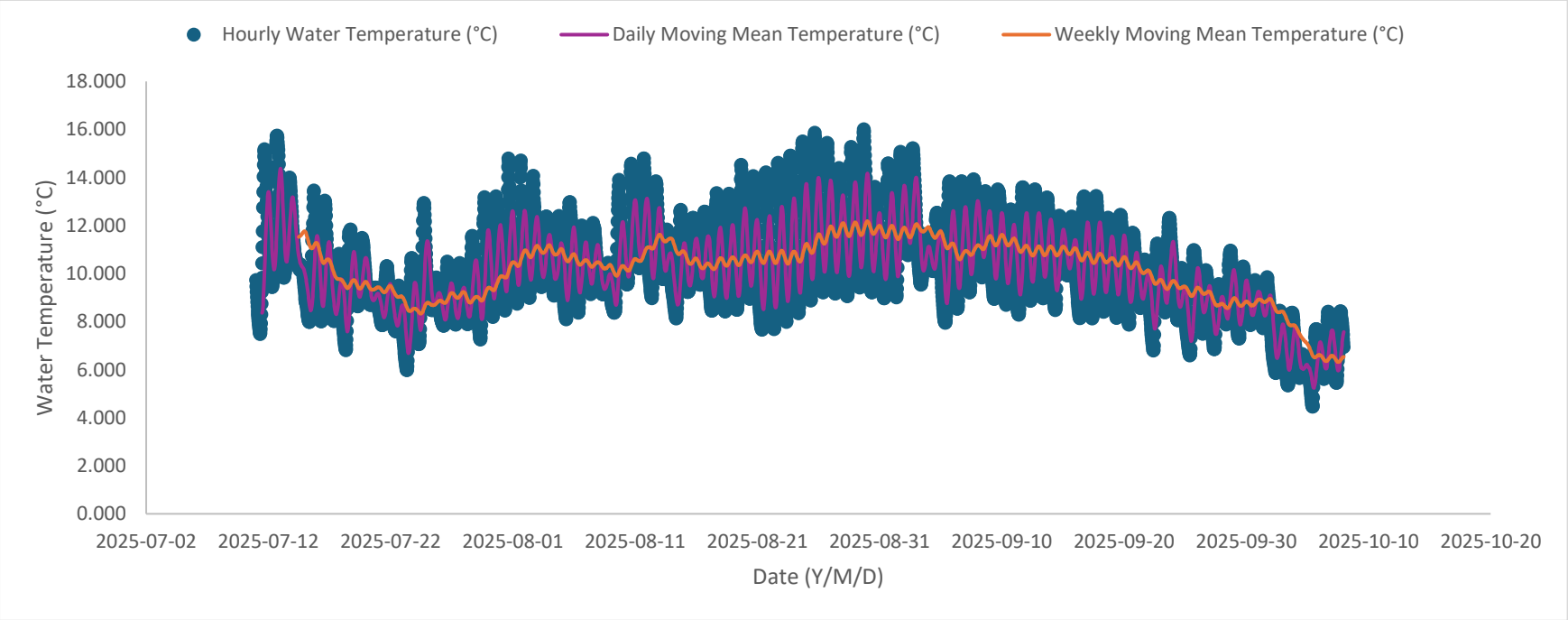

Figure 8. Site 312 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

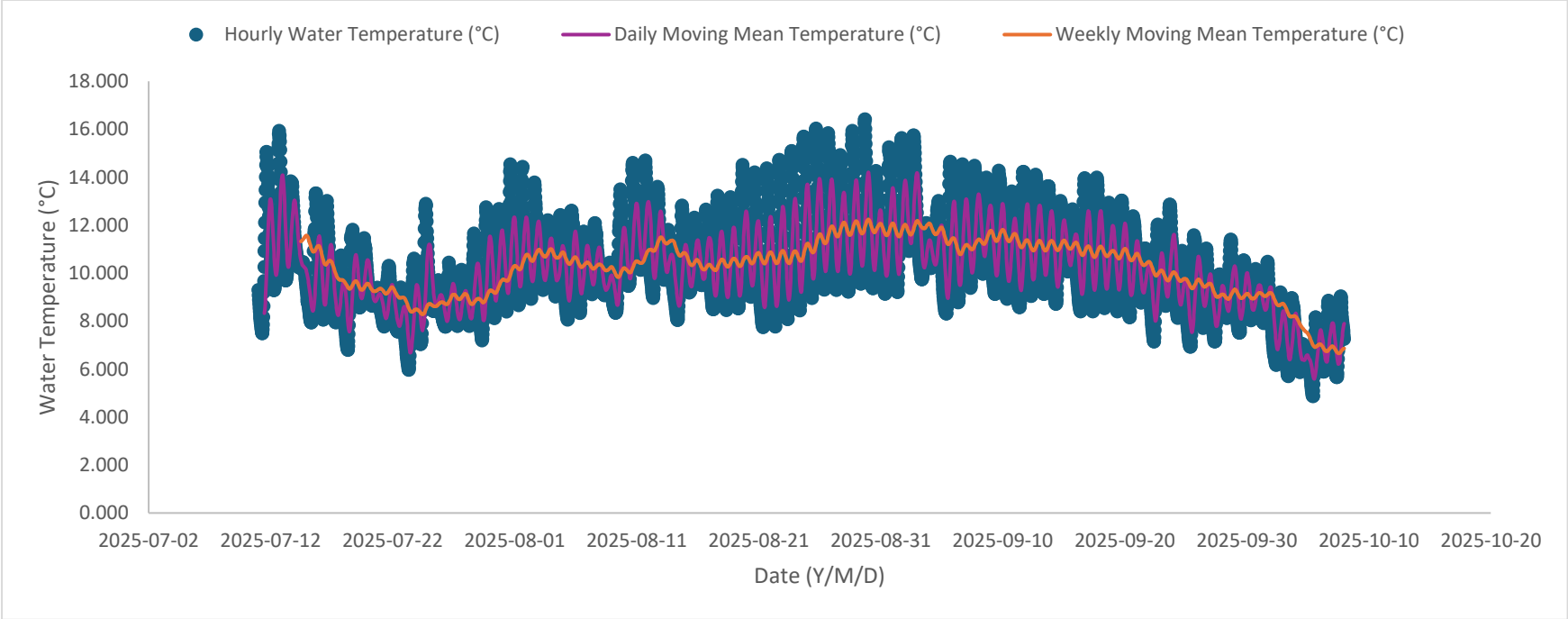

Figure 9. Site 311 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

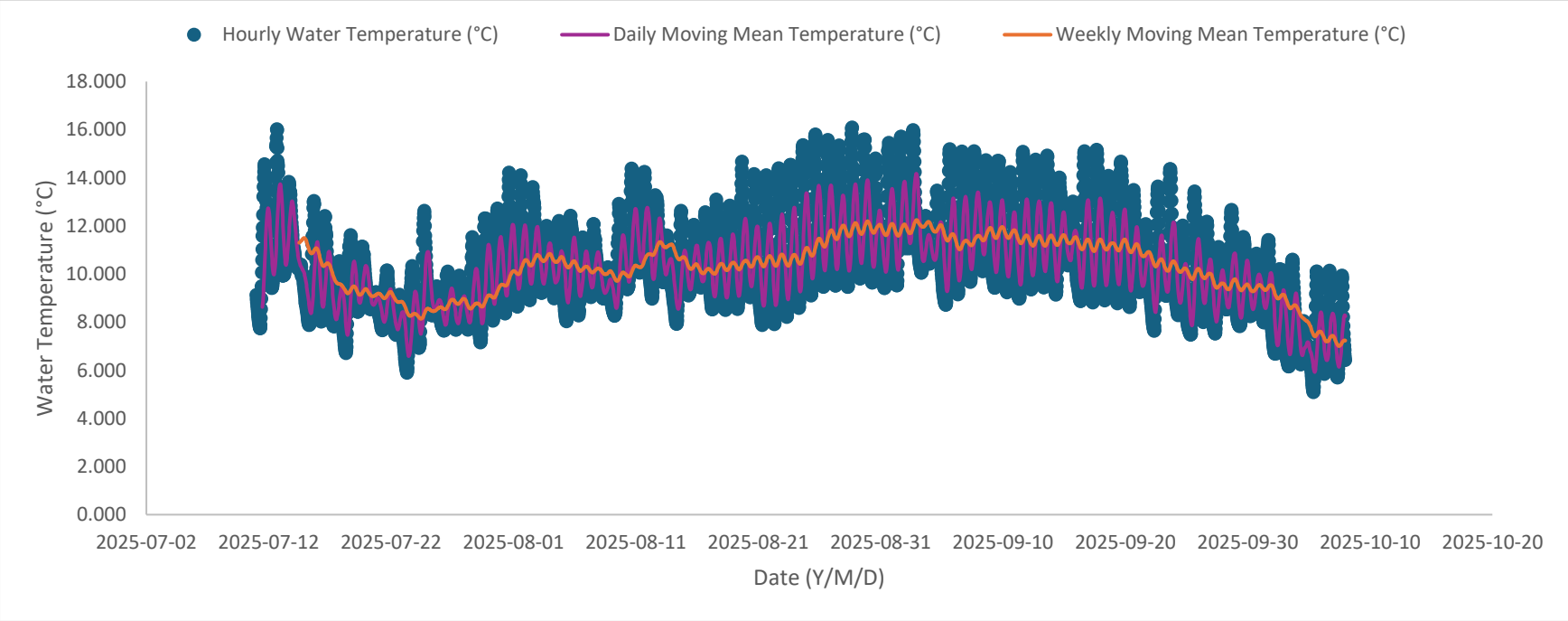

Figure 10. Site 310 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

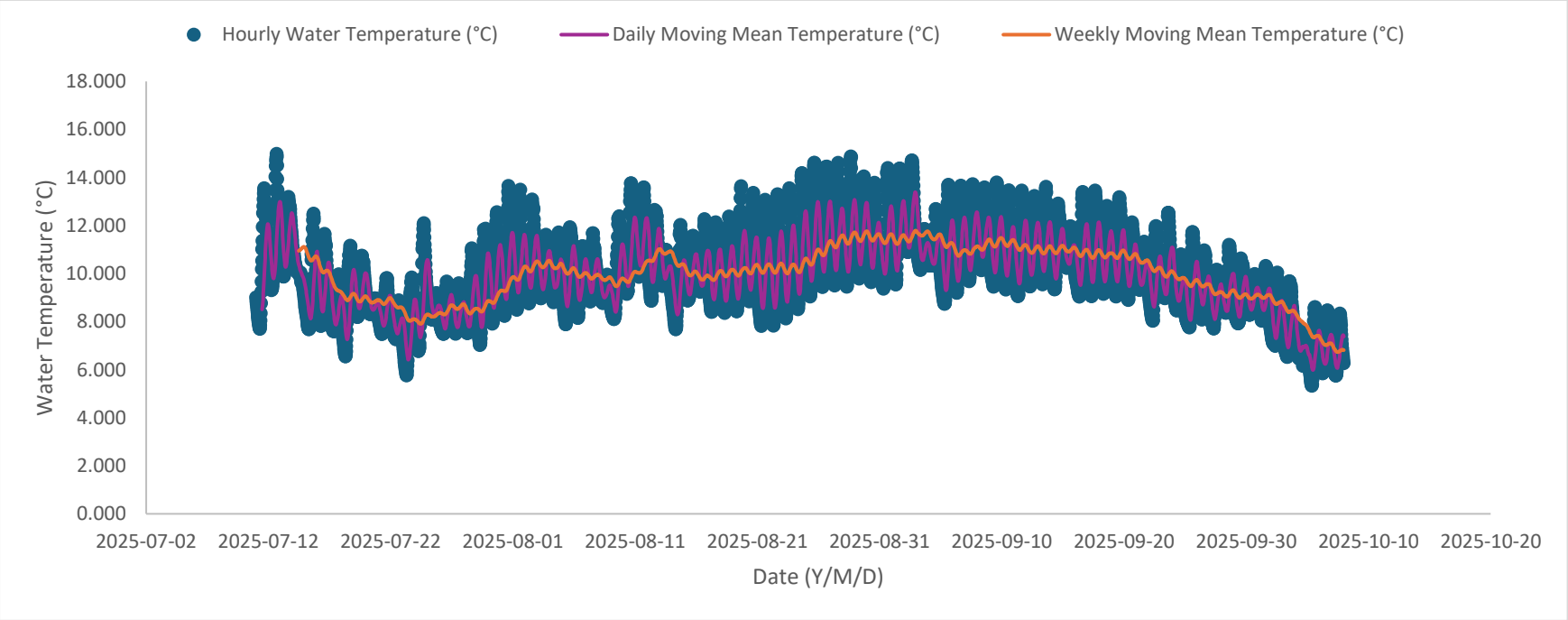

Figure 11. Site 309 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

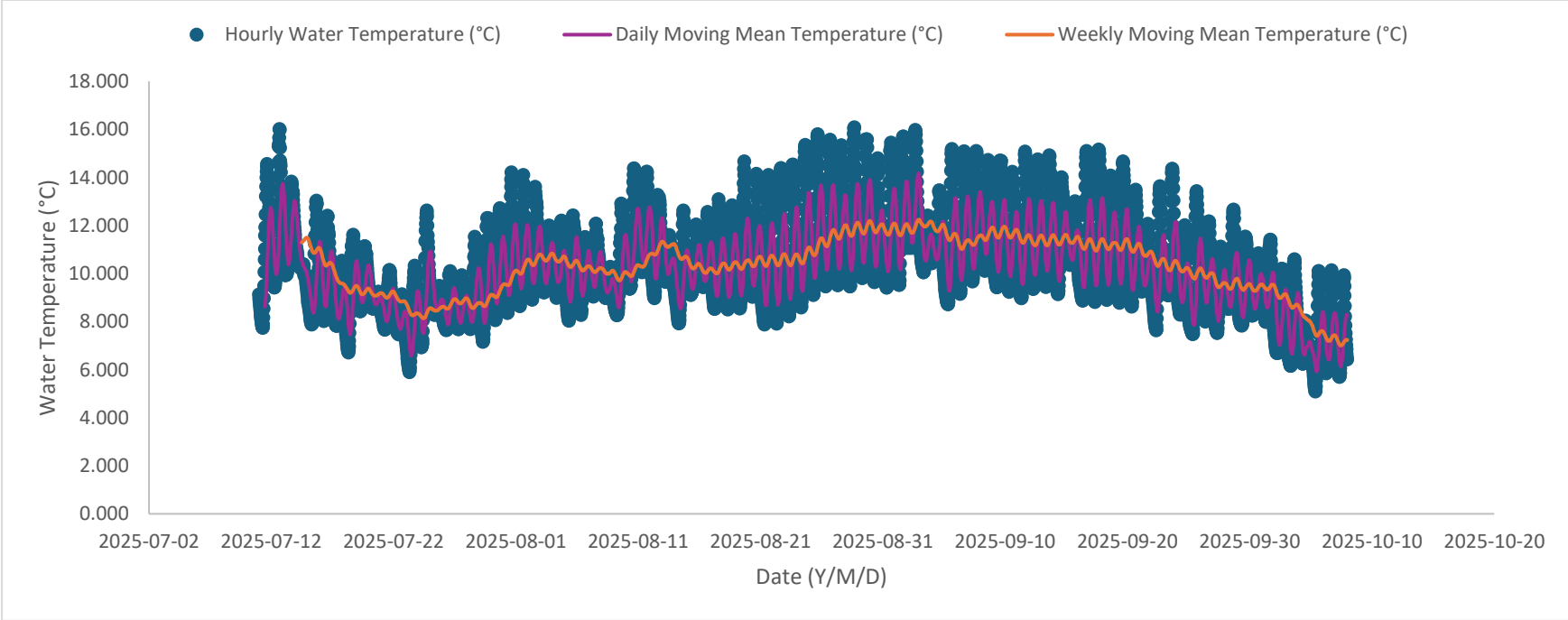

Figure 12. Site 308 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

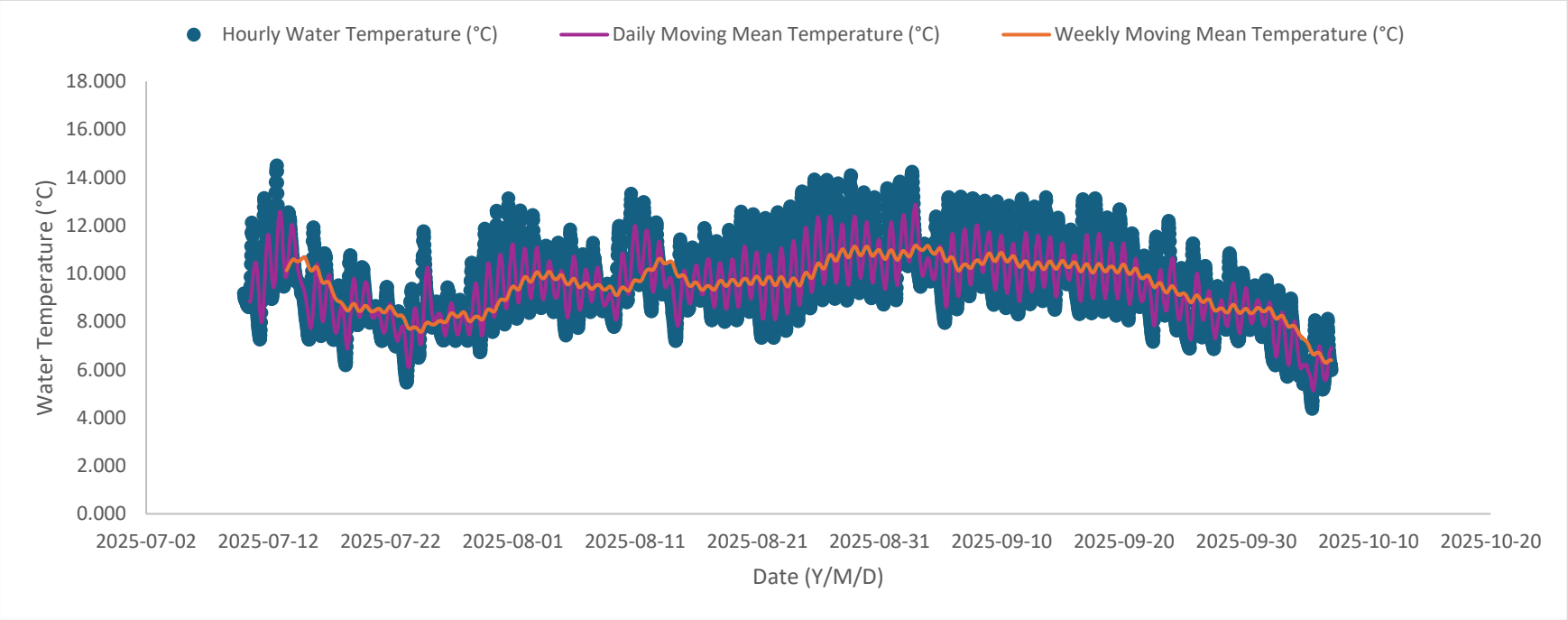

Figure 13. Site 320 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

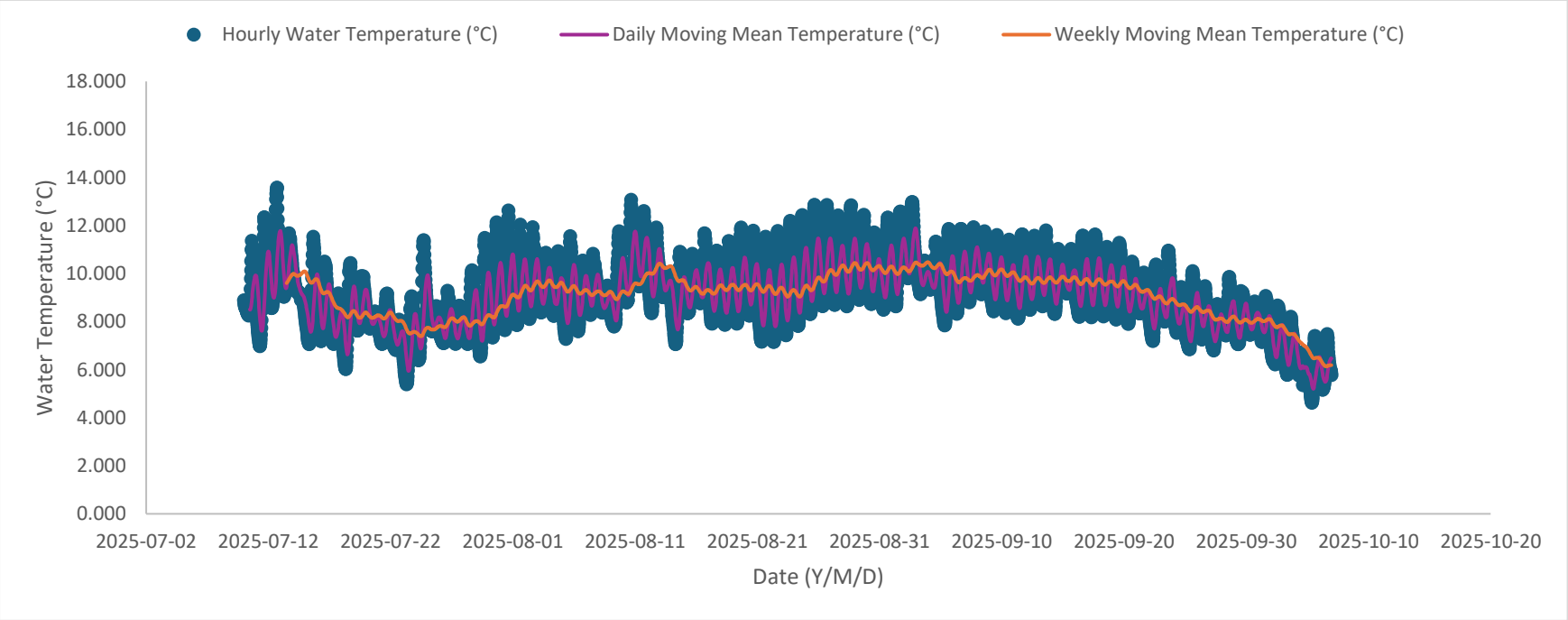

Figure 14. Site 307 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

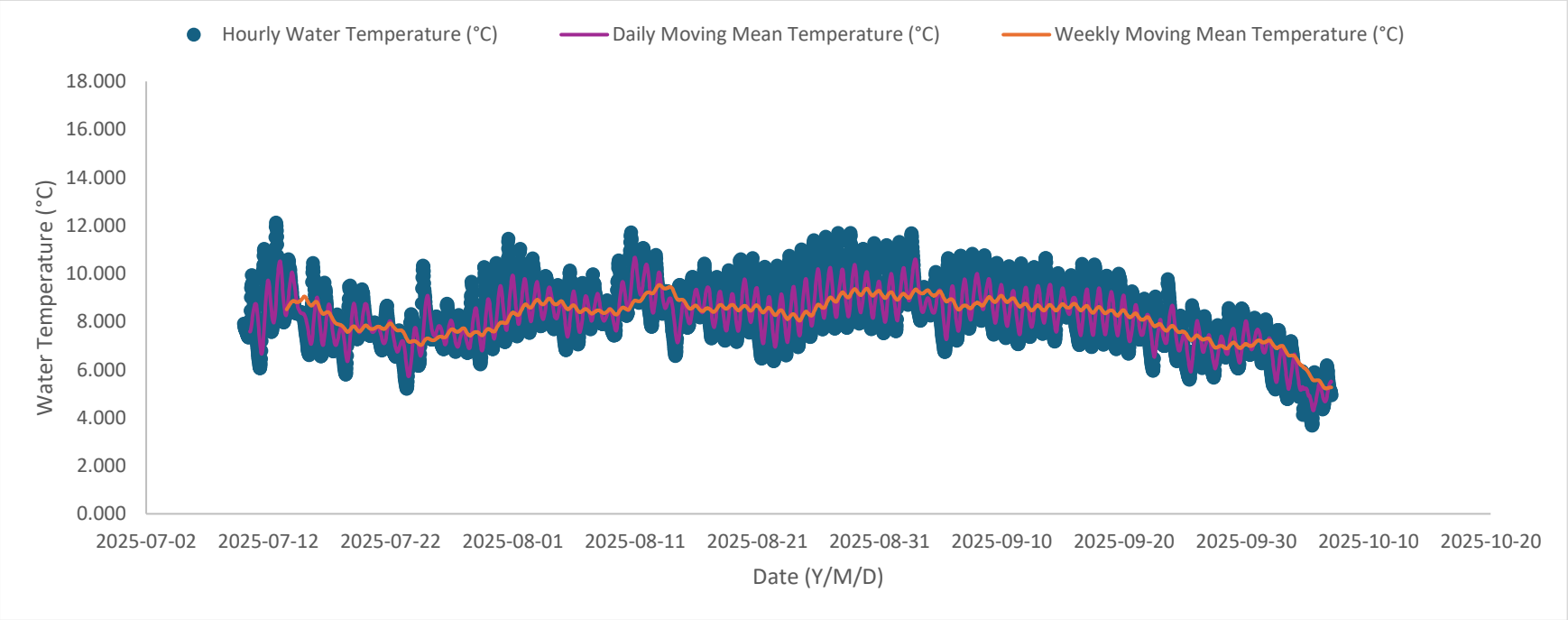

Figure 15. Site 319 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature. Site 319 is on Gloomy Creek a tributary to Fall Creek mainstem.

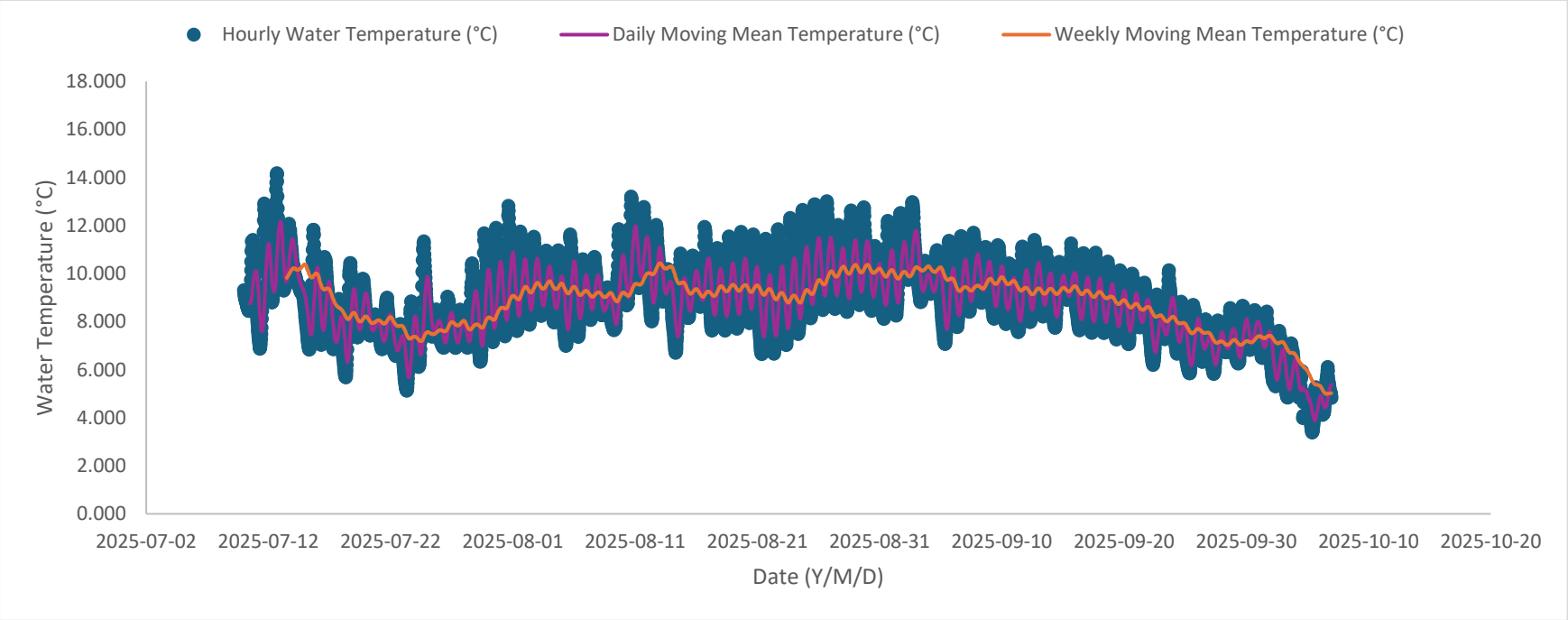

Figure 16. Site 315 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

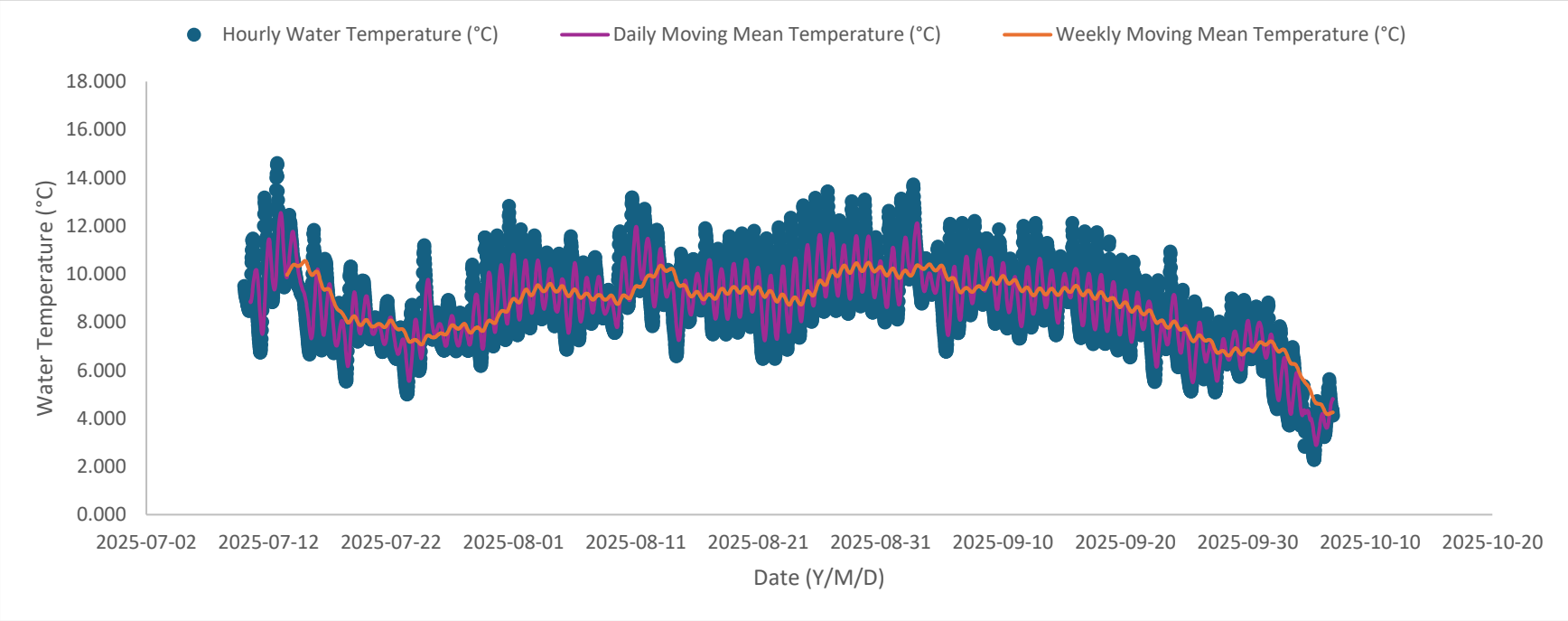

Figure 17. Site 316 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

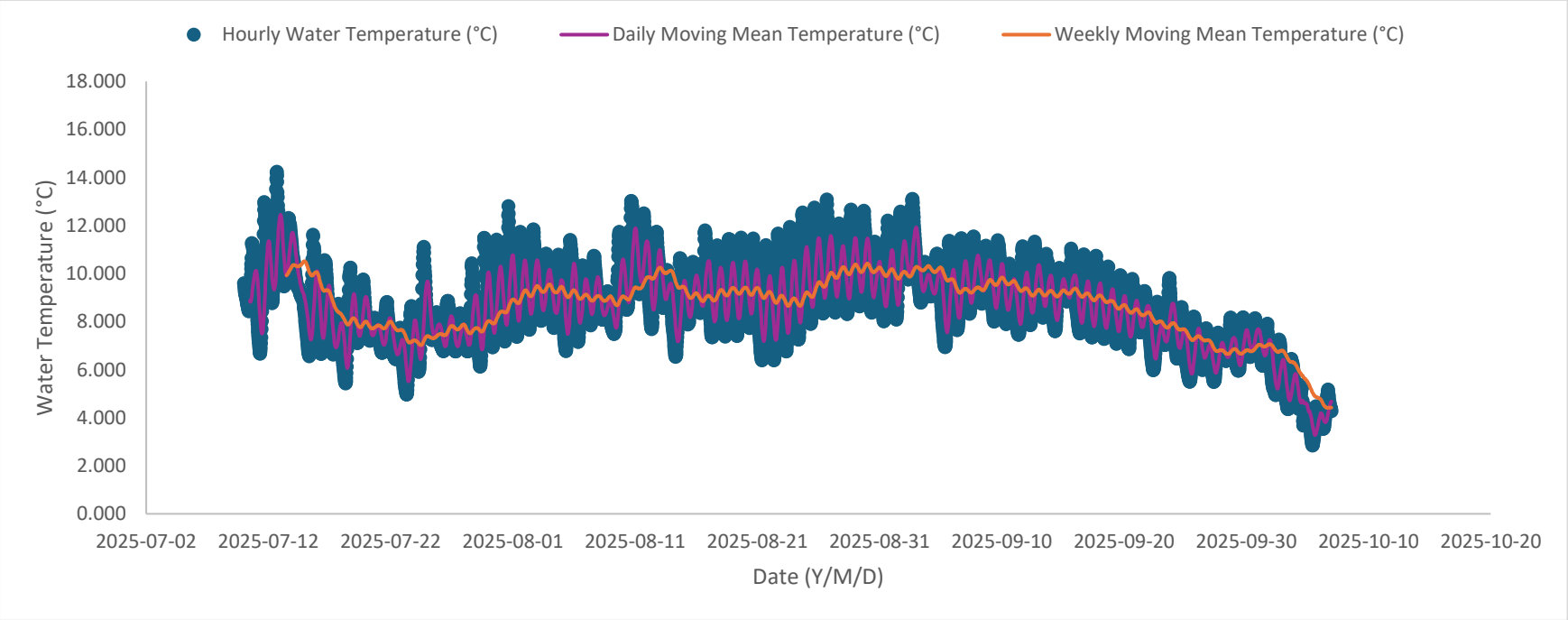

Figure 18. Site 317 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

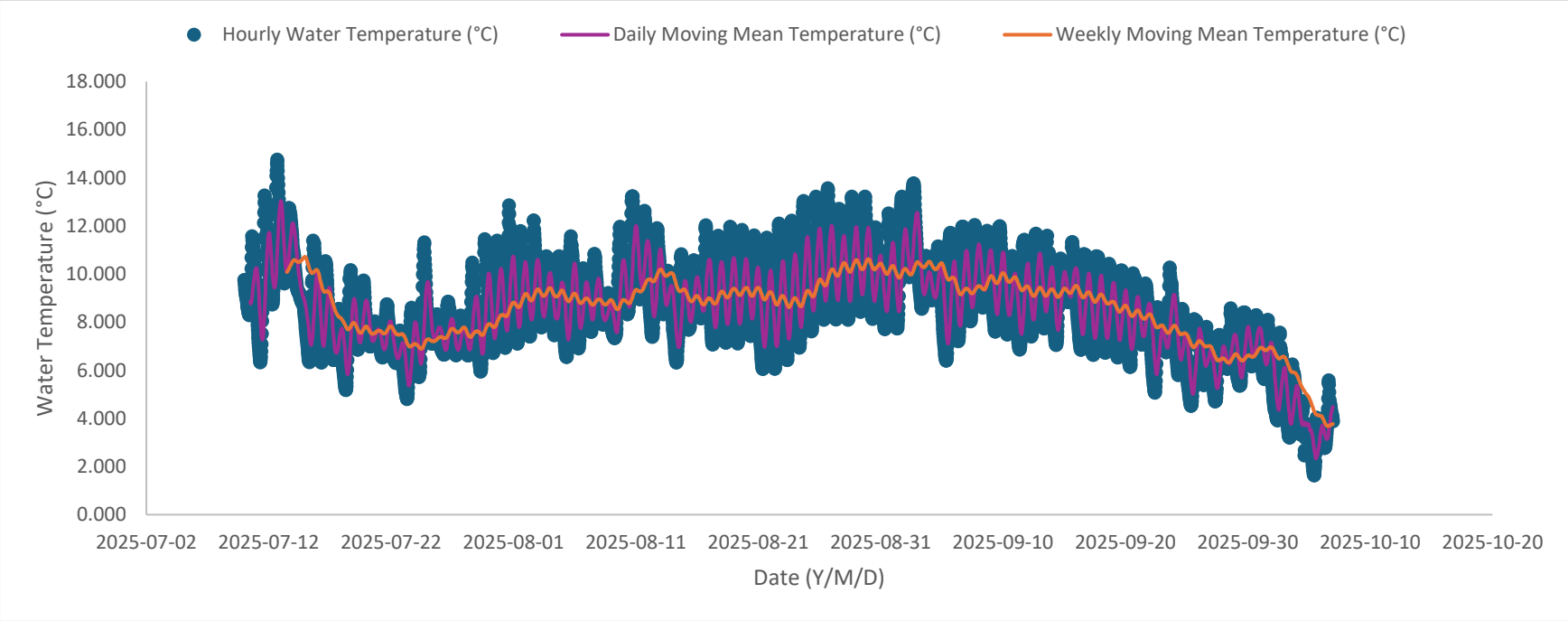

Figure 19. Site 318 water temperature profile from July 10th to October 7th, 2025. The blue dots represent the hourly water temperature. The purple line represents the daily moving mean of the water temperature. The orange line represents the weekly moving mean of water temperature.

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