State of Oregon Department of Environmental Quality

Seasonal variation and critical period for temperature

Technical Support Document

Willamette Subbasins

March 2024

5 Seasonal variation and critical period for temperature

Per OAR 340-042-0040(4)(j) and 40 Code of Federal Regulation130.7(c)(1), TMDLs must identify any seasonal variation and the critical condition or period of each pollutant, if applicable.

DEQ reviewed available temperature data to determine seasonal temperature variation and the critical period. The critical period is based on when seven-day average daily maximum stream temperatures (7DADM) exceed the applicable temperature criteria.

FIG through FIG show box-and-whisker plots (boxplots) of the seasonal variation of 7DADM temperatures and the critical period at select USGS gage station monitoring locations identified as having category 5 temperature impairments on the 2022 Integrated Report. When multiple monitoring sites were available, the sites with multiple years of data were selected. Temperature data were grouped by the first and second half of each month. The month was split on the 15th with the first group including all results measured on the 1st through the 14th day and the second group including all results measured on the 15th through the end of the month. The boxplots are Tukey style boxplots with the middle line representing the median and ends of the box representing the temperature range between the first and third quartiles (25th – 75th percentile). The whiskers extend to values no further than 1.5 times the interquartile 7DADM temperature range (1.5 times the difference between 25th and 75th percentiles). The points represent individual 7DADM temperatures values beyond 1.5 times the interquartile range. The dashed line corresponds to the applicable temperature criteria. The shaded yellow area identifies the period when 7DADM temperatures exceeded the appliable temperature criteria.

The plots show that maximum stream temperatures typically occur in July or August. This period usually coincides with the lowest annual stream flows, maximum solar radiation fluxes, and warmest ambient air temperature conditions.

The period of temperature criteria exceedance varies based on monitoring location.

DEQ uses the critical period to determine when allocations apply. In setting this period, DEQ relied upon monitoring sites with the longest period of exceedance. When downstream monitoring sites have longer exceedance periods relative to upstream waters, the longer period is used as the critical period for upstream waterbodies. This is a margin of safety to ensure warming of upstream waters does not contribute to downstream exceedances.

Based on review of available temperature data, the overall critical period upstream from the Newberg Pool of the Willamette River is **April 1 through November 15** (based on upper box plot whiskers, Figure 5-23). From Newberg Pool, where salmonid spawning no longer occurs, downstream to the confluence of the Willamette River with the Columbia River, the critical period is June 1 through September 30.

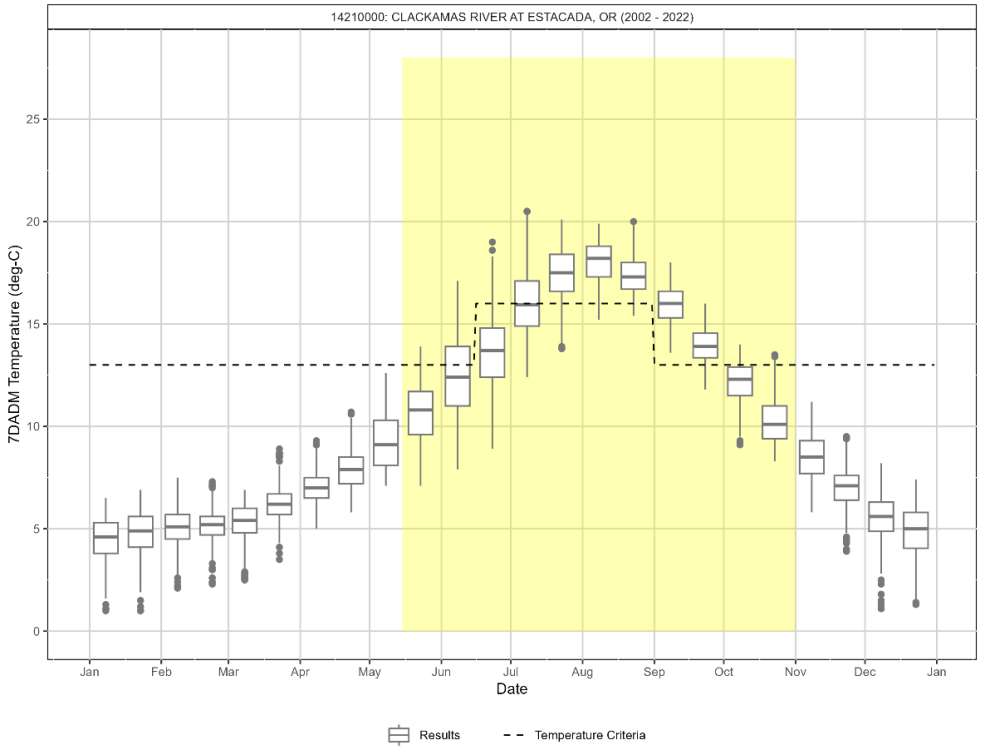


Figure 5-1. Seasonal variation and critical period at 14210000 Clackamas River at Estacada

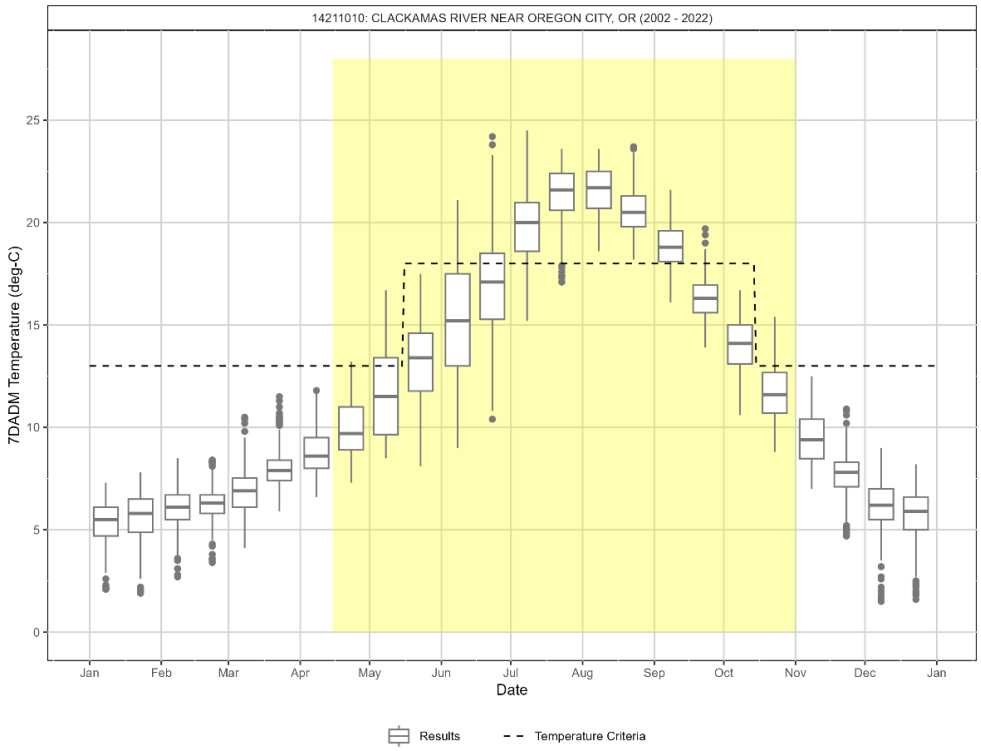


Figure 5-2. Seasonal variation and critical period at 14211010 Clackamas River nr Oregon City

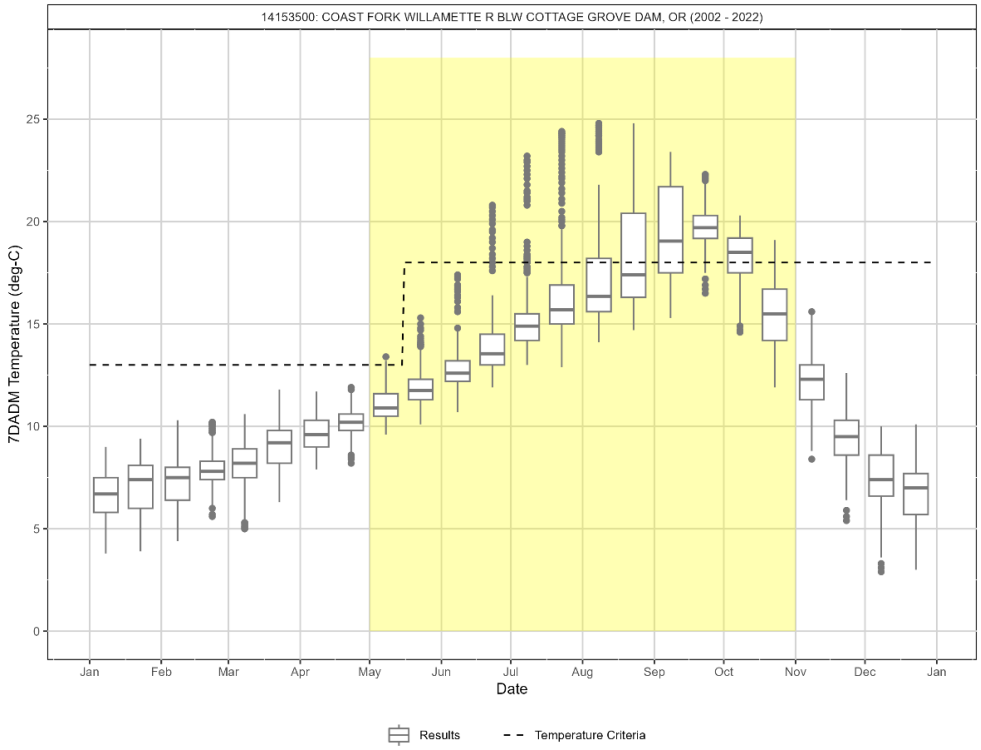


Figure 5-3. Seasonal variation and critical period at

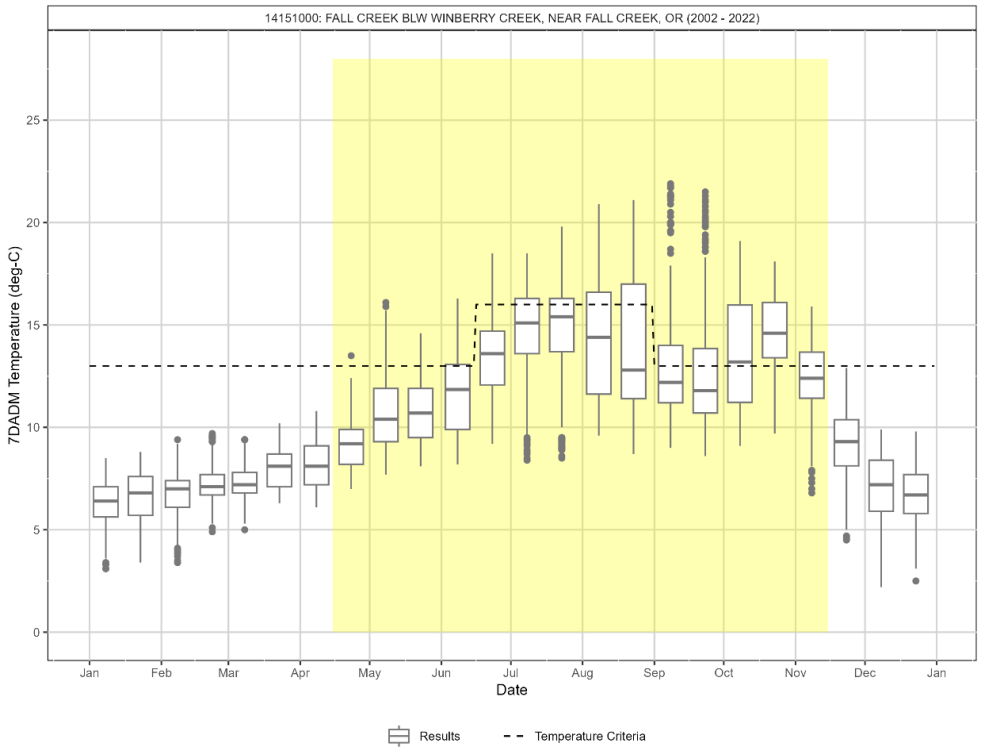


Figure 5-4. Seasonal variation and critical period at

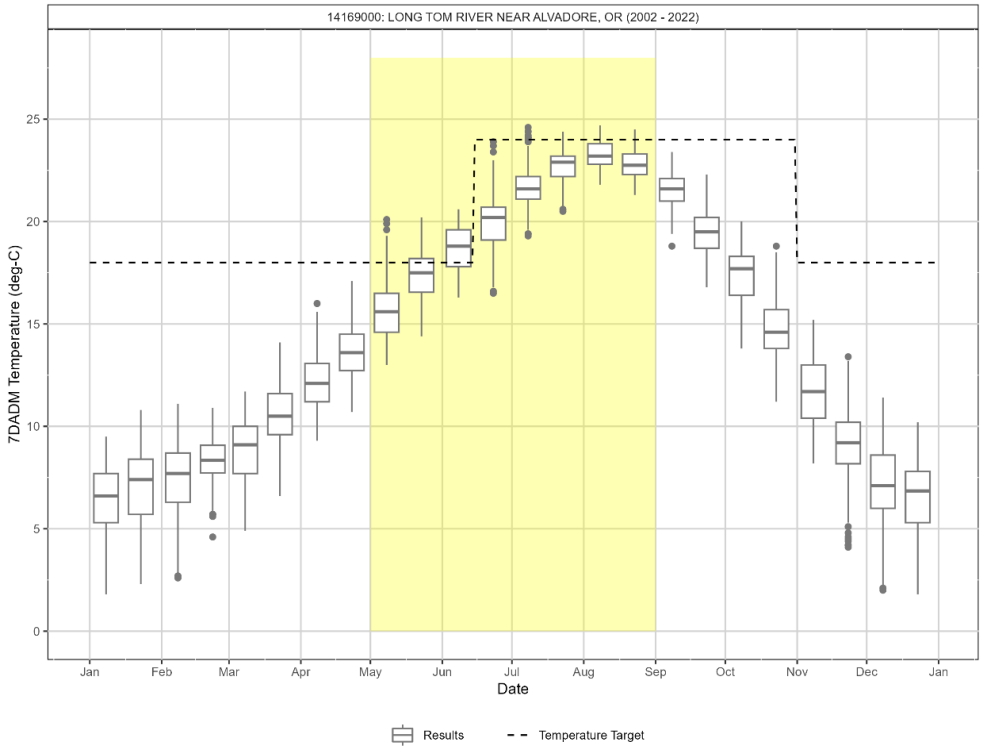


Figure 5-5. Seasonal variation and critical period at 14169000 Long Tom River near Alvadore

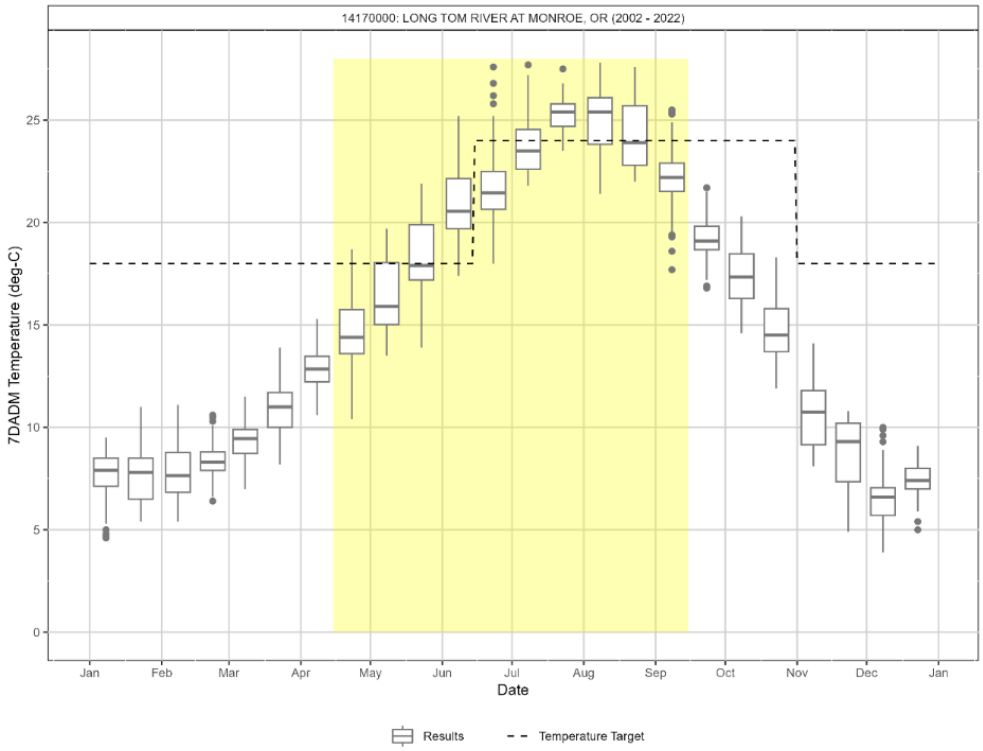


Figure 5-6.Seasonal variation and critical period at

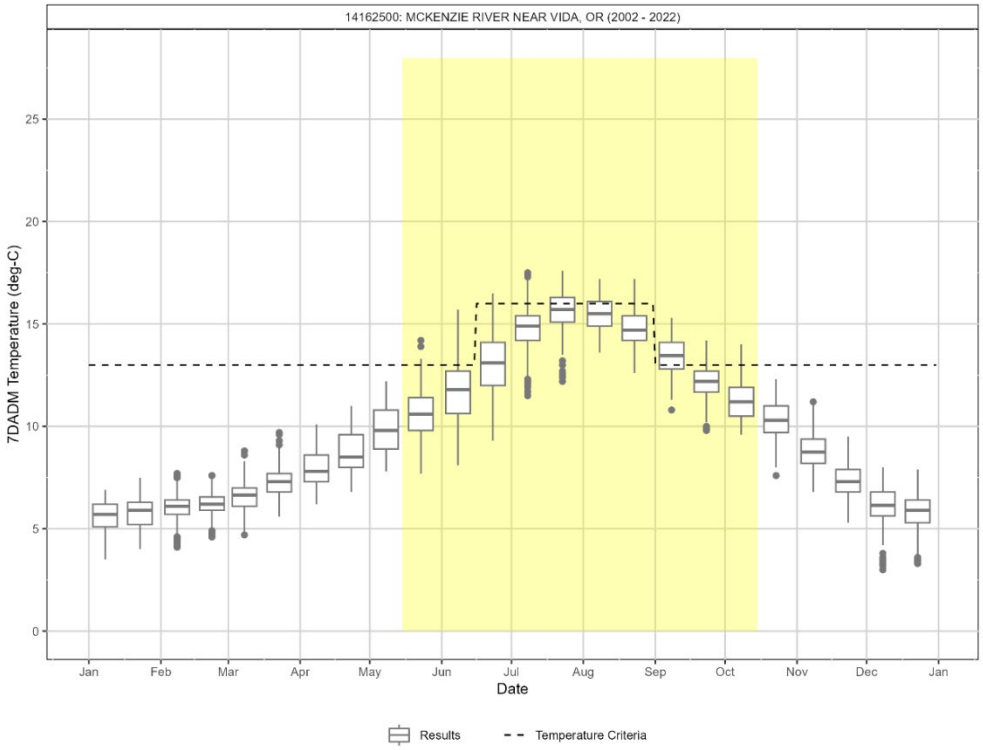


Figure 5-7. Seasonal variation and critical period at

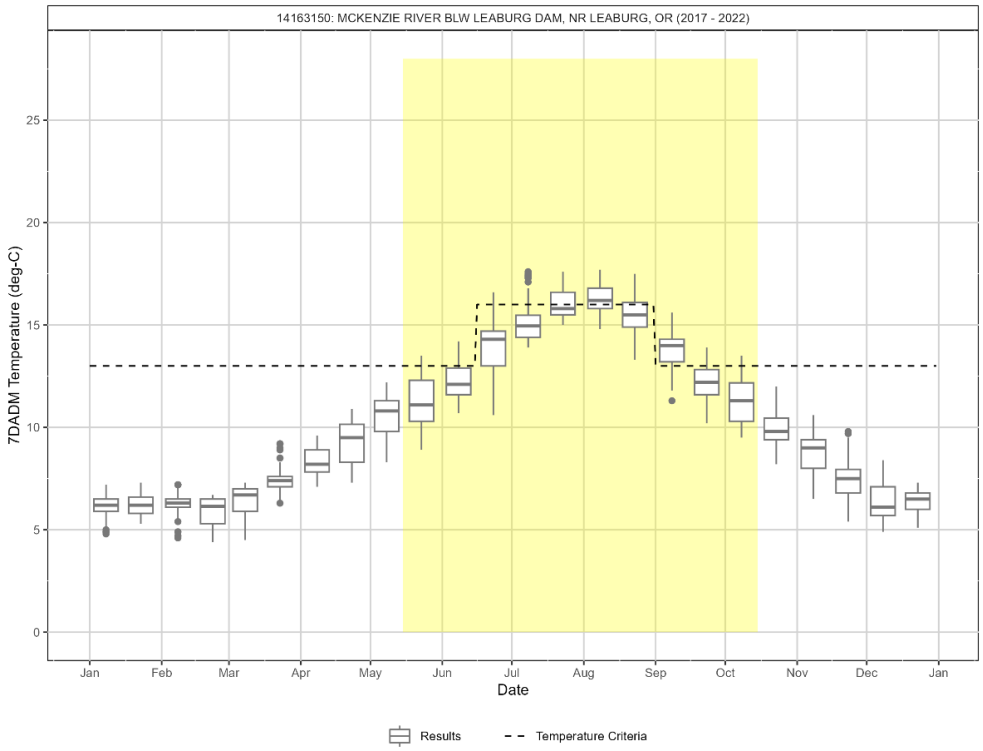
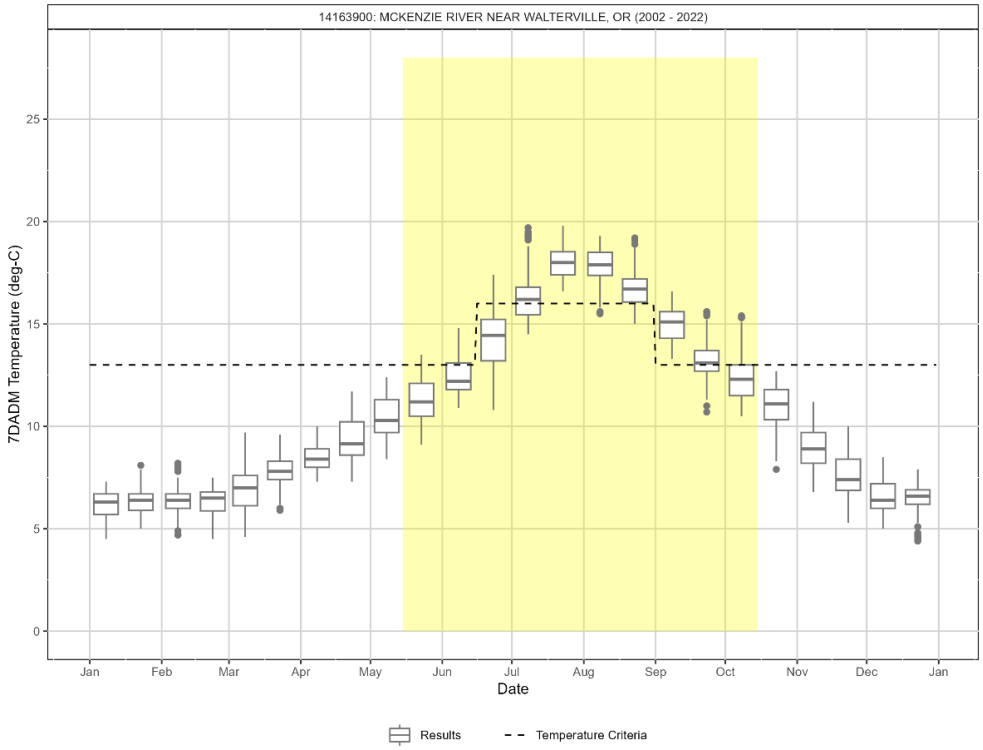


Figure 5-8. Seasonal variation and critical period at



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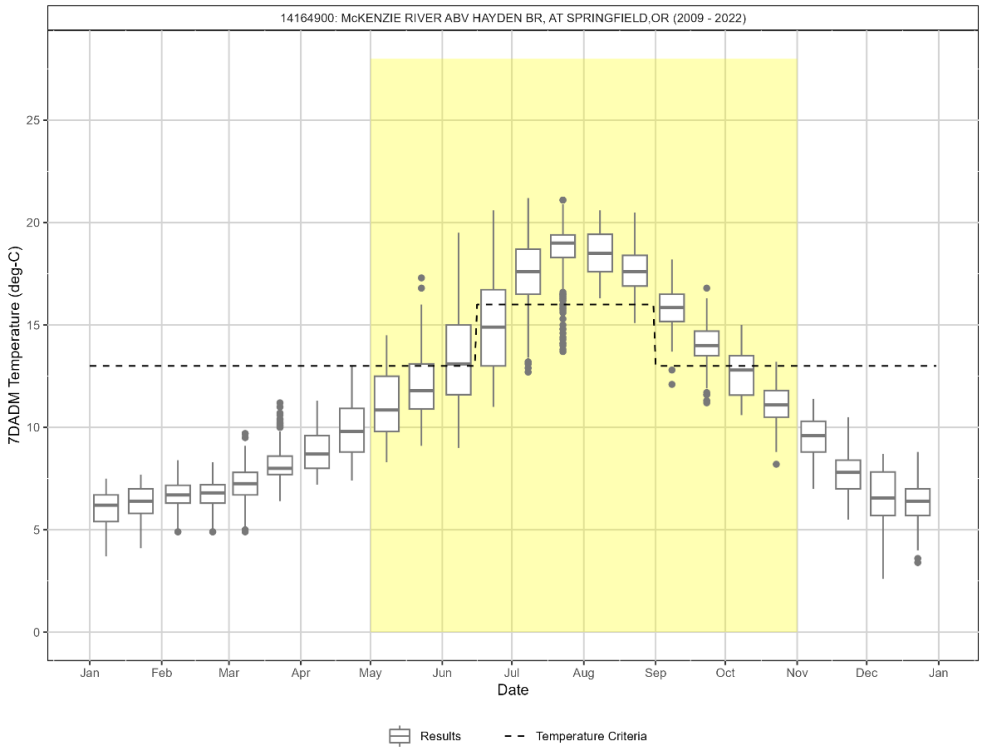


Figure 5-10. Seasonal variation and critical period at

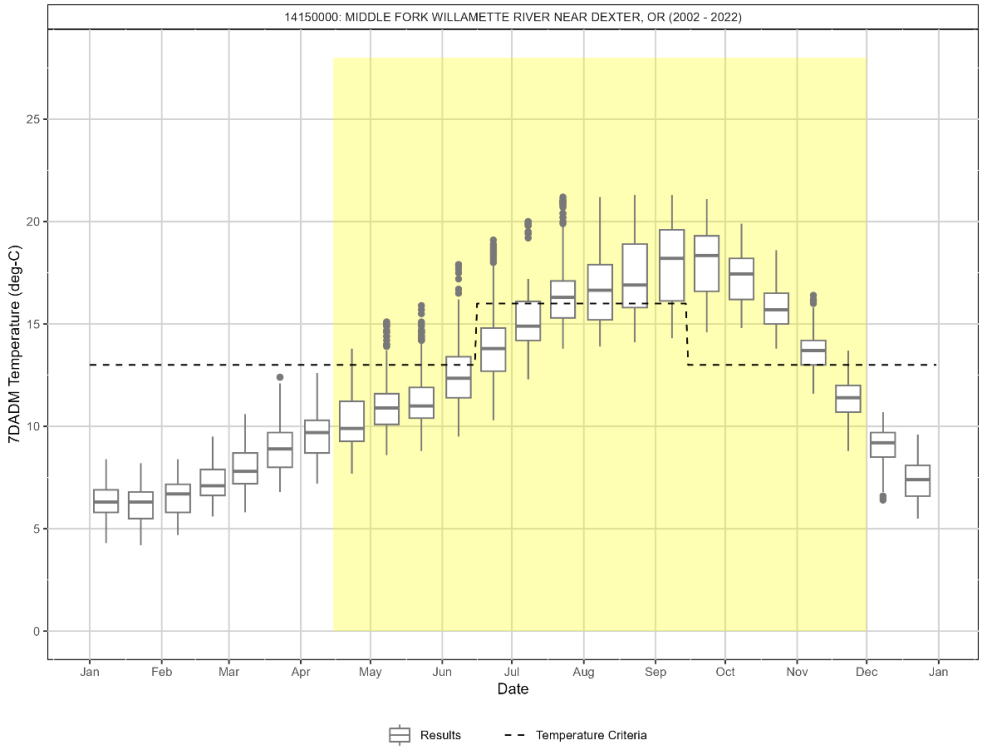


Figure 5-11. Seasonal variation and critical period at

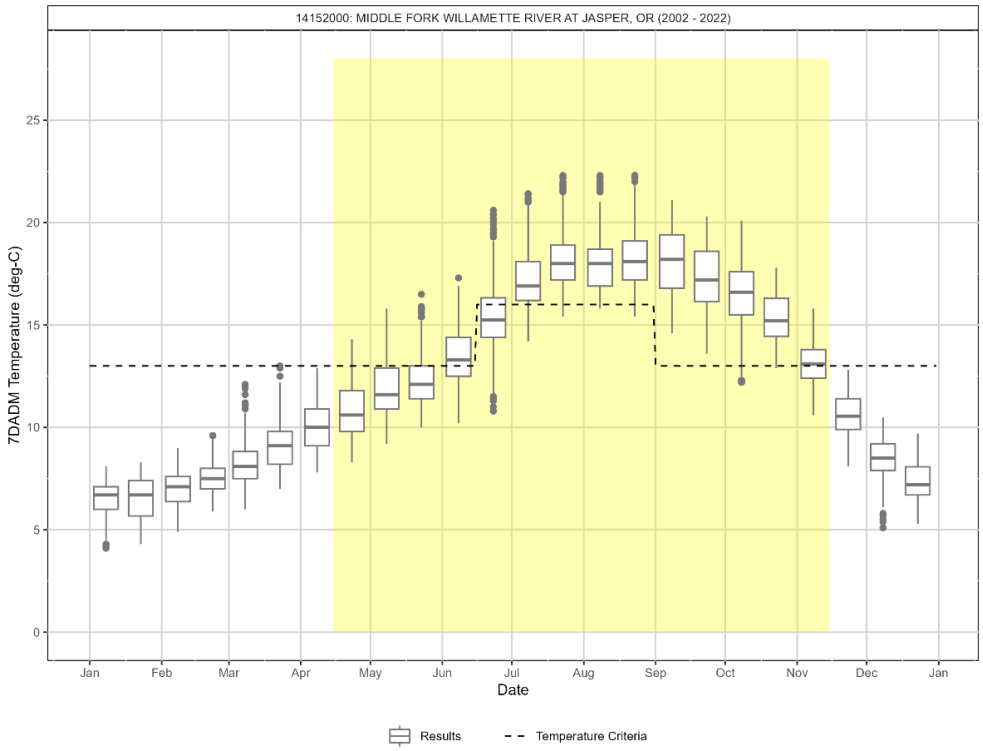
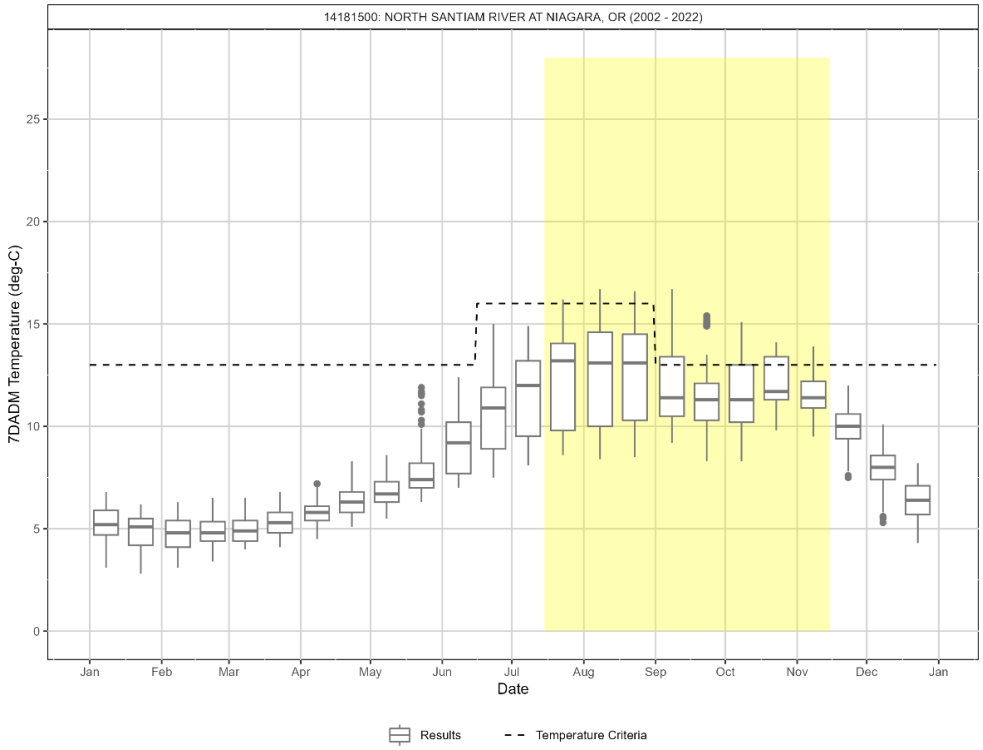


Figure 5-12. Seasonal variation and critical period at



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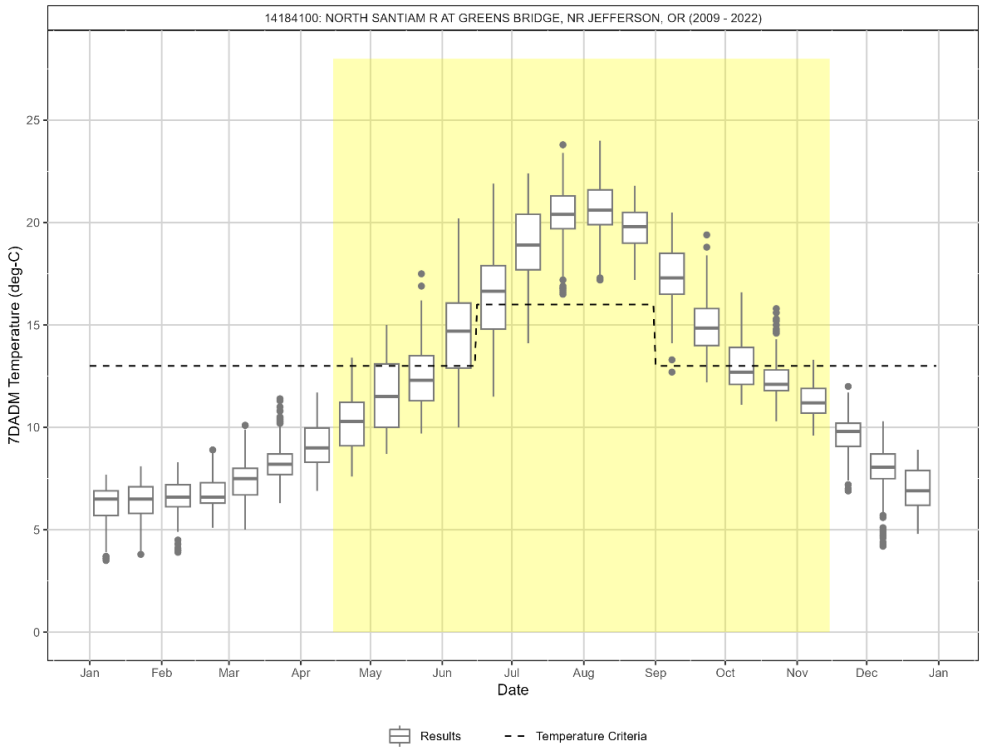
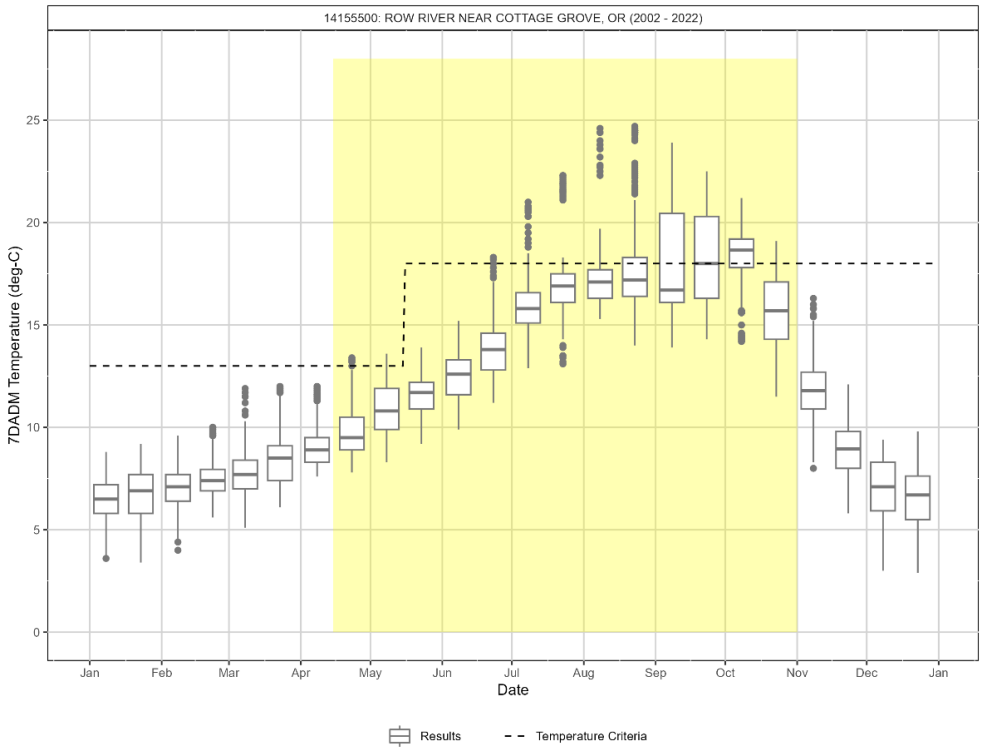


Figure 5-14. Seasonal variation and critical period at



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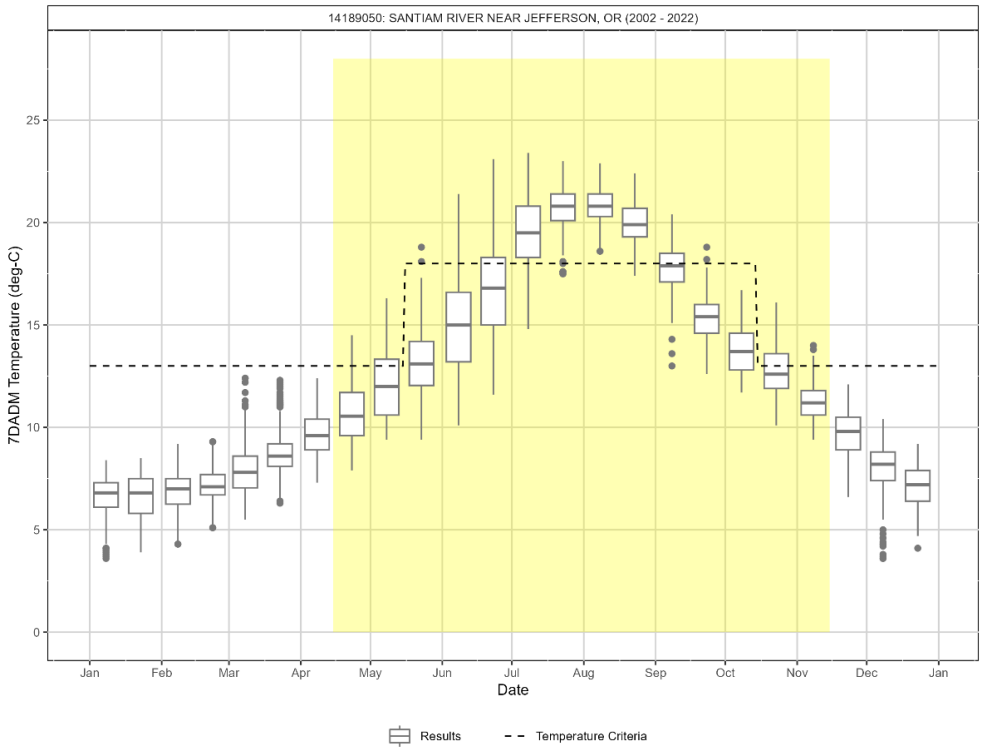

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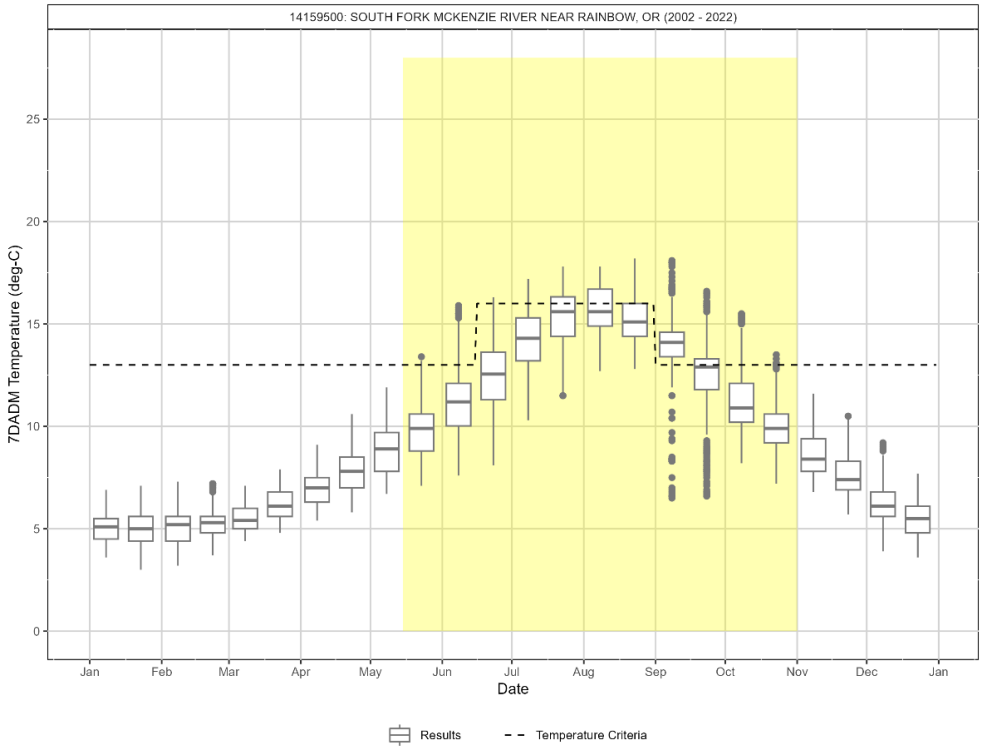

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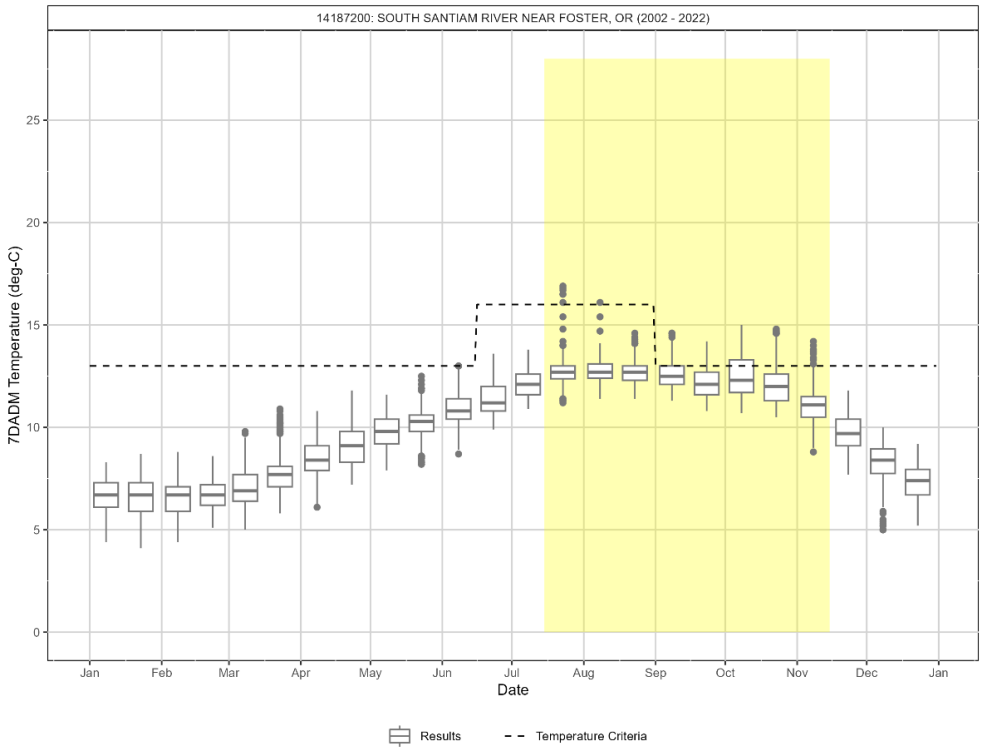

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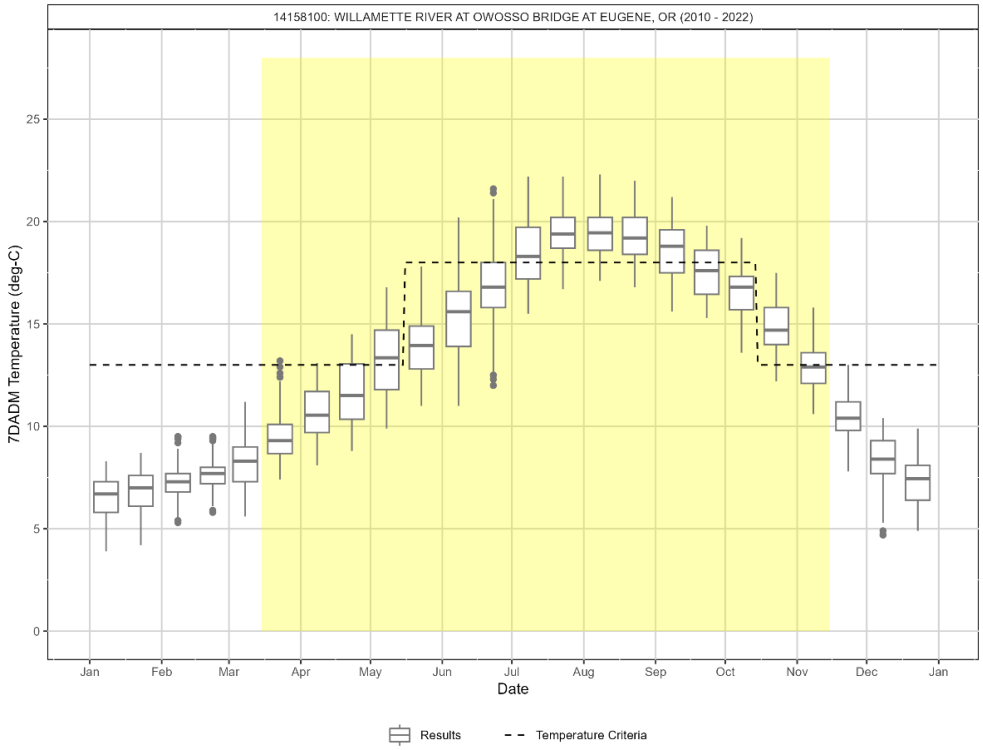

Figure 5-19. Seasonal variation and critical period at

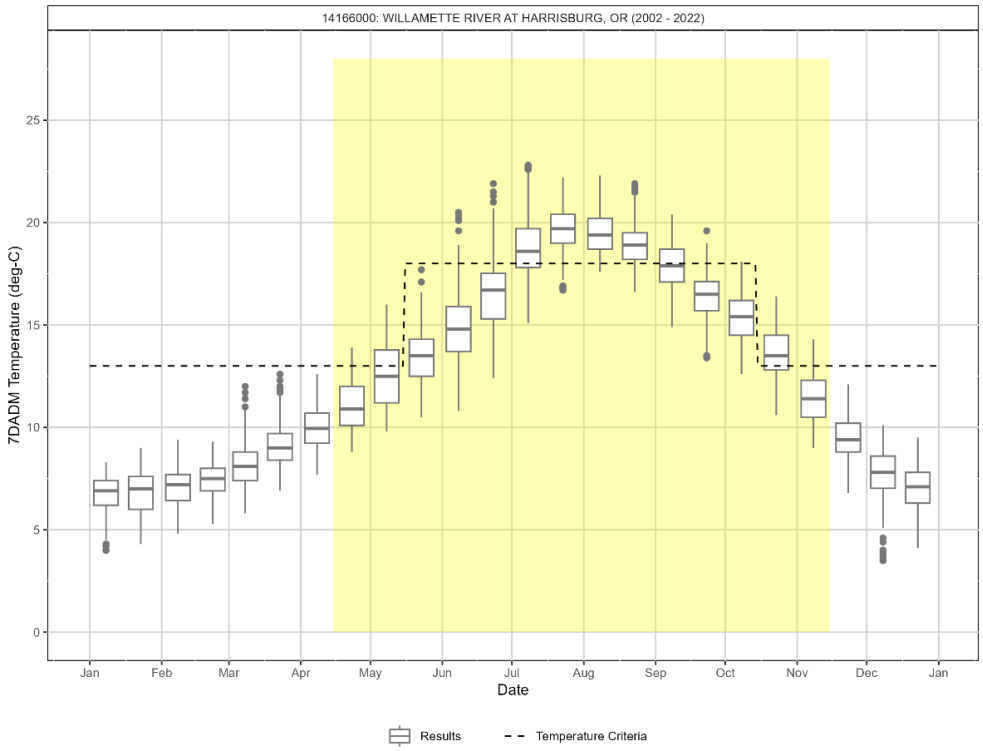

Figure 5-20. Seasonal variation and critical period at

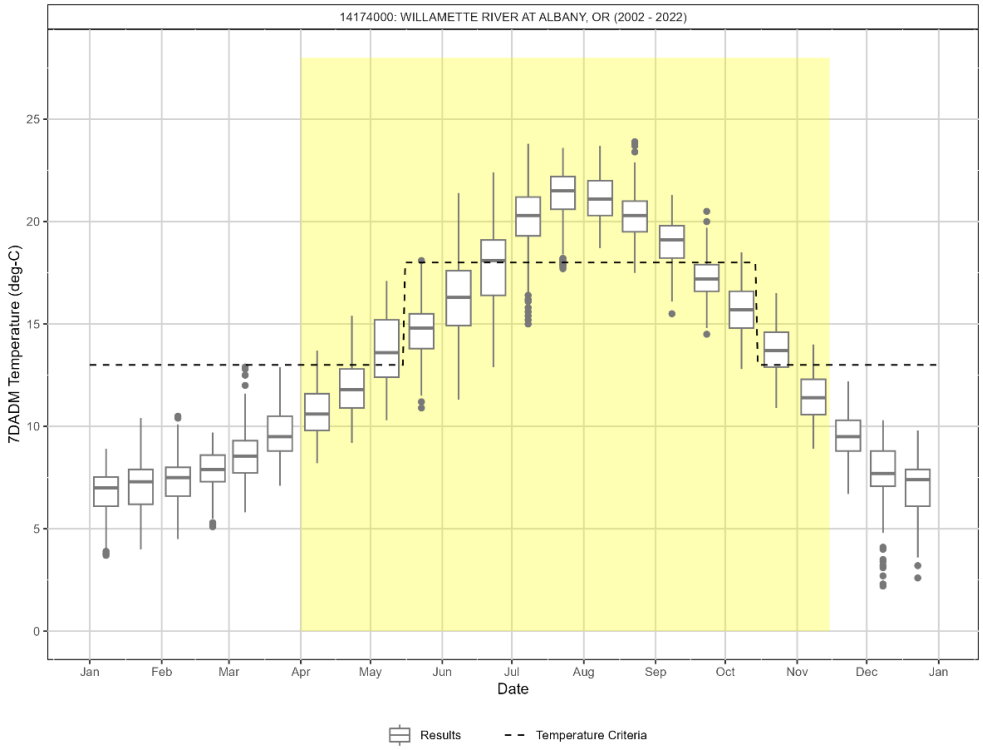

Figure 5-21. Seasonal variation and critical period at 14174000 Willamette River at Albany

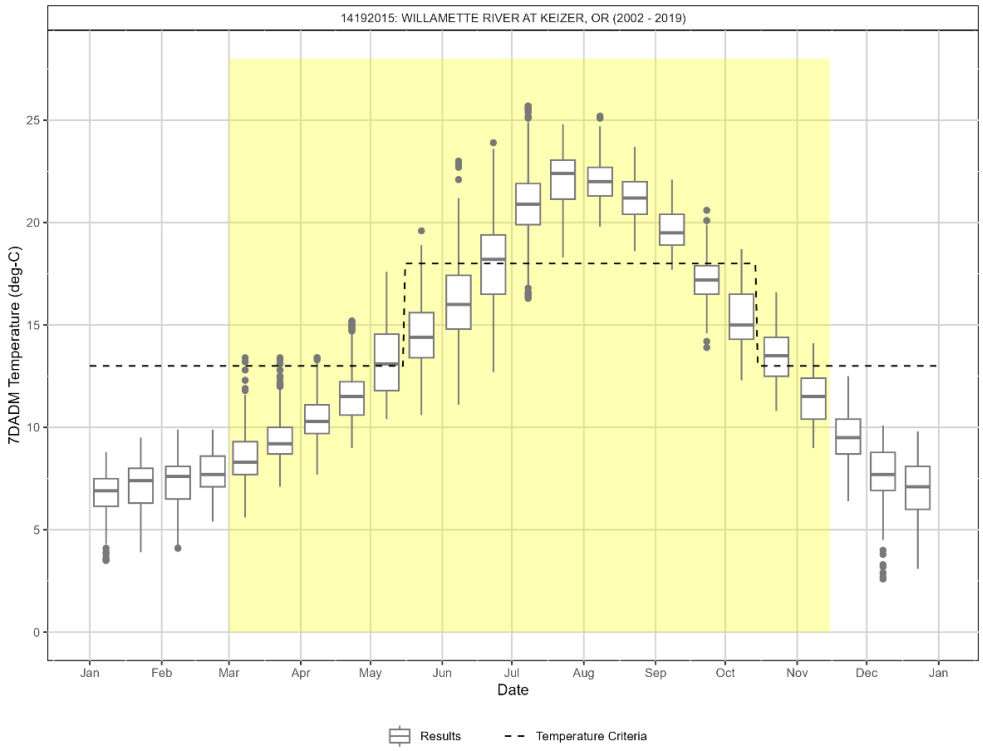

Figure 5-22. Seasonal variation and critical period at 14192015 Willamette River at Keizer

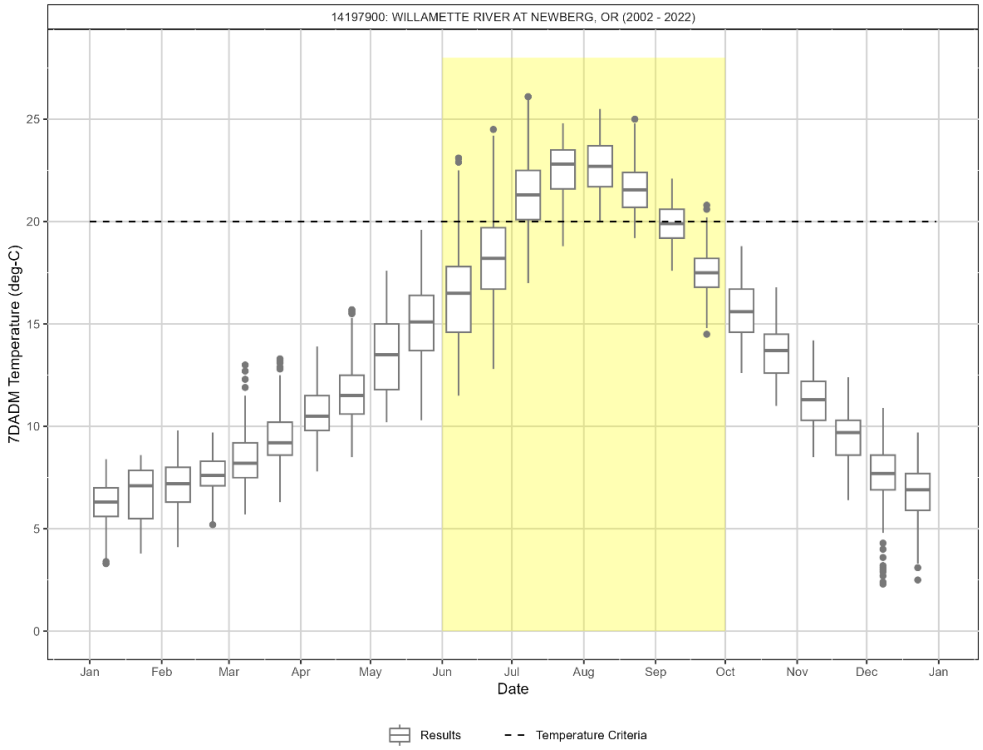

Figure 5-23. Seasonal variation and critical period at 14197900 Willamette River at Newberg

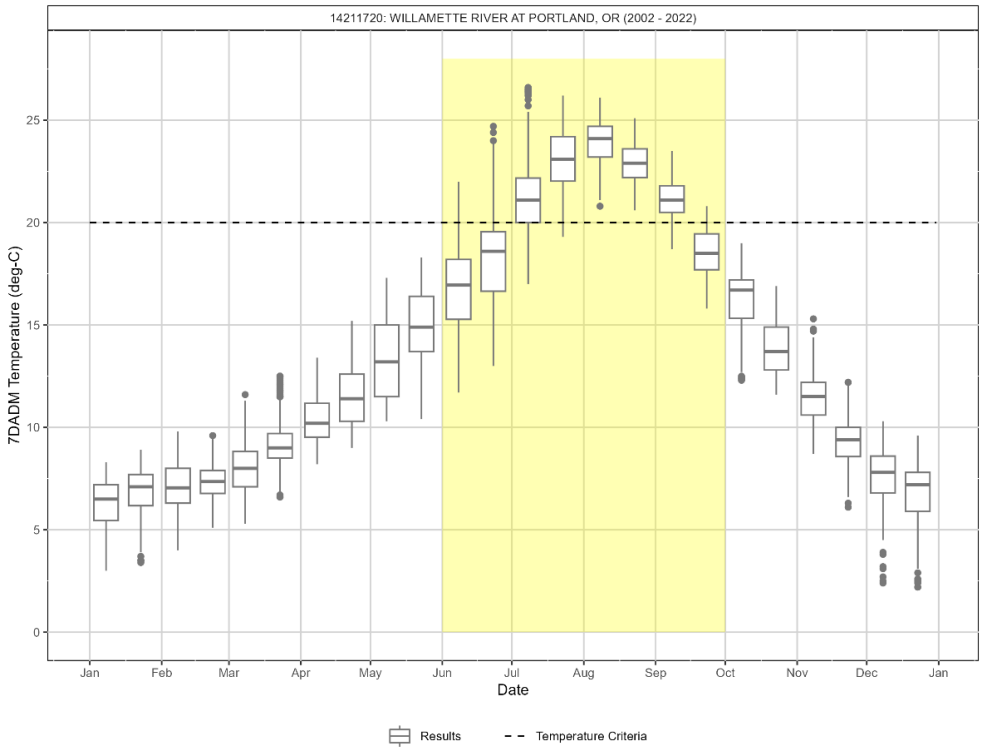

Figure 5-24. Seasonal variation and critical period at 14211720 Willamette River at Portland

Translation or other formats

5.1.1.1 **Español** | 한국어 | **繁體中文** | **Русский** | **Tiếng Việt** | **العربية**
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