

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
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Comment on hess-2022-116

Anonymous Referee #2

Referee comment on "An improved model of shade-affected stream temperature in Soil & Water Assessment Tool" by Efrain Noa-Yarasca et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-116-RC2>, 2022

This paper incorporates a riparian shading component in the original Ficklin stream temperature coupled within SWAT. The authors were successful with this incorporation and found that including riparian shading improves the usefulness of the Ficklin model. Overall, the paper is well written and the organization is clear. My comments are mostly minor, with only a few major comments.

The introduction is well done, but I think more citations are needed to back up sentences and arguments. This happens throughout the introduction, but especially in lines 40-50 when discussing what influences water temperatures.

I am not sure what the authors mean by "restriction of the watershed hydrological process" on lines 58-59.

It may be beneficial for the reader to understand the importance of stream temperature for the DMW. What are the major aquatic species in the DMW that might be influenced by higher stream temperatures? Have there been any fish kills, etc. in the past? I realize that this is a more of a model development paper but including this information will also help understand the application.

Line 141. I am not sure what "...overlying as far as possible on 12-digit HUC boundaries..."

Did the authors examine the influence of tile drainage on stream temperature? I realize that this was not part of the study, but am just interested.

Include the Forest Grove weather station on Figure 1.

The calibration and validation procedure for streamflow and stream temperature described in the Results and Discussion should be part of the Methods section, as these are not results. Additionally, the streamflow was calibrated using SWAT-CUP, but how was the stream temperature calibrated? Manually?

Remove the word "In" at the beginning of the sentence on line 178.

Section 2.3 is well explained, and the integration is clear. Nice work on this.

SWAT uses HRUs to simplify water budget calculations and each HRU type is represented (if I remember correctly) as a percent (or area) of the subbasin. (Please correct me if this is not the case). In this case, how did the authors implement a 30m buffer around the stream when individual HRU types might be distributed throughout the subbasin? If this is indeed the case, did the different riparian scenarios influence the hydrologic results?

PBIAS should be defined.

Section 3.2.1. Why would the shade factor in winter be greater than in the summer? More explanation on this would be beneficial.

This is minor, but the C1 and C2 parameters discussed in the Results are presented as c1 and c2 in the methods. I had to go back into the methods to double check that this was the case.

I would consider using mean absolute error (MAE) in addition to NSE for stream temperature calibration, largely because the NSE can be an issue for small values (such as stream temperature). In addition, using the MAE is easier to interpret for stream temperature.

In Figure 3A it seems that the modified model (and probably the Ficklin model too) has issues with simulating the stream temperature during the winter. I was wondering if the authors could comment on this.

Figures 5 -8 are a great way to summarize all of the scenarios and resulting changes.

