We thank the Reviewer for their comments on our manuscript. The Reviewer considered the manuscript to be interesting and of use for management of stream temperature, but requested further detail be provided to support the conclusions. We urge the Reviewer to read our responses to the other two Reviewers, particular to Anonymous Reviewer 2 where we have provided a quantitative evaluation of our model that demonstrates that our results do indeed support our conclusions. We wish to make it clear that measured data was used for modeling, and we performed no parameterisations other than where stated explicitly (i.e. for net radiation using the hemispherical images). We address the Reviewer's specific comments and propose revisions below.

1. I have read the manuscript and two previous reviews, and agree with all of the comments and suggestions of the other reviewers. Therefore, I will not repeat suggestions from the other two reviewers. The manuscript is interesting and provides useful information for potential riparian management strategies. However, the manuscript currently lacks the detail necessary to support the conclusions.

Thank you, we are pleased that the Reviewer acknowledges the importance of the study.

2. **General Comments**

The manuscript would benefit from a sensitivity analysis of each model parameter and variable. There is currently no discussion of how model inputs may affect the outcome and ultimately the conclusions of the paper. Lagrangian modelling techniques are very sensitive to changes in spatial and temporal scales. Therefore, an analysis and verification of water transit times within the reach is necessary.

Where this Lagrangian modeling technique has been used in previous studies of stream temperature a sensitivity analysis has not been performed on each variable unless substantial systematic bias has been observed (see for example Leach and Moore, 2011). Regarding the turbulent fluxes, please see our response to Anonymous Reviewer 2 (Point 4). We reiterate that no site specific parameterisation was performed for these variables, but we employed commonly used and previously published methods, and sought to improve on those previous representations by using multiple AWSs. Regarding net radiation and the associated model, please see our response to Anonymous Reviewer 2 (Point 6). The only site-specific parameterization of this model was via the hemispherical images, which were taken and processed to the exact specifications recommended in the manuscript in which it was originally evaluated and demonstrated to be highly accurate (i.e. Leach and Moore, 2010). Bed heat flux was measured, please see our response to Point 4.

Regarding transit times, please see our response to Anonymous Reviewer 2 (Point 4). We did verify travel times (as stated on Page 6447, Line 23) using reach-averaged velocity measurements at 200 m intervals throughout the reach.

3. Stream width would also likely be a very sensitive parameter given the model structure. It is important to know how width parametrization affects model results given the focus that has been placed on riparian shading in terms of a driving factor.

We did not paramaterise the stream surface width. It was measured at 50 m intervals along the reach (see Page 6447, Line 25). Please see our response to Dr. Westhoff (Point 11) where we describe calculating an average stream width for each modelled stream segment.

> 4. Further to verifying stream temperature simulations it would be useful to know the error in each of the simulated fluxes (and how bed heat flux was calculated). This is particularly important for the interpretation of results and was noted in previous reviews.

Please see our response to Anonymous Reviewer 2 (Point 5) where we have provided a quantitative evaluation of the stream temperature model, and demonstrate that it does support our conclusions.

Bed heat flux was measured directly, and thus it is not a simulated flux. For a description of what a bed heat flux plate measures and associated references, please see our response to Dr. Westhoff (Point 7) and Anonymous Reviewer 2 (Point 11). Bed heat flux is an aggregated measurement of radiative, conductive, convective and advective heat fluxes between the riverbed and the water column. We measured bed heat flux at three locations and at each this flux was very small.

We did not and do not have access to an eddy covariance tower, and so we cannot estimate the error in our turbulent fluxes. Furthermore, to our knowledge no stream temperature study has employed such a method to date. However, we reiterate that the methods we used are common and thus previously published for such modelling approaches.

RMSE for the net radiation model evaluation was in the order of magnitude of that observed by Leach and Moore (2010) i.e. 75 Wm^{-2} over the entire study period, this is very small in comparison to total energy input (see Figure 5 in the original manuscript) and we will be happy to state this.

> 5. The assumption that lateral groundwater inflow is negligible is not well supported. Further discussion from previous work may help support this argument. Also, the description of hyporheic exchange flow is not supported. Are there any data available to support the negative flux that is assumed over the entire reach? These terms are not included in the model; therefore, it's reasonable to assume that these fluxes are not key drivers if the model is simulating stream temperature correctly and there are no compensatory variables or parameters. A sensitivity analysis would help strengthen this argument.

Regarding lateral groundwater inflows please see our response to Anonymous Reviewer 2 (Point 10). Previous data demonstrates convincingly that no lateral inflows occur within this reach.

Our statement regarding hyporheic exchange in the original manuscript was not well thought through, since heterogeneous hyporheic exchange must occur within the reach owing to its gravel bed. We will remove our statement that 'the reach is characterised by slight downwelling conditions'. We only included measured heat flux in the model, which was very small (see Figure 2), and made no assumptions regarding these fluxes in the modeling approach.

There are no compensatory variables or parameters (since no parameterisation was performed), and the model predicts instantaneous cooling gradients with typically good accuracy and no evidence of substantial systematic bias (see response to Anonymous Reviewer 2, point 5). Therefore, as the Reviewer suggests, it is reasonable to assume that hyporheic exchange and groundwater are not key drivers of the patterns we observed.

6. **Specific Comments**
Page 6445 - What width are you referring to? i.e. wetted, channel, bankfull?

Stream surface width, we will state this.

7. Page 6447 - What is the temporal response time (resolution) of the stream temperature sensors? They are located within close proximity to one another the data are likely autocorrelated.

The response time of the micro-loggers is stated as < 20 minutes, but less for the thermistors. We compared the performance of all temperature sensors prior to deployment (Page 6446, Line 8) and did not observe lags in response time, nor did we need to apply correction factors.

Yes, these data are spatially autocorrelated because they display systematic patterns in their variation within the reach. However, this is not an issue since we performed no statistical analyses on the water temperature data and only the temperature observed at AWS_{Open} was used as an initial input to the model.

8. Please include units of measurement for all variables.

We will.

References

Leach JA, Moore RD. 2010. Above-stream microclimate and stream surface energy exchanges in a wildfire-disturbed riparian zone. *Hydrological Processes*. **24**: 2369–2381. DOI: 10.1002/hyp.7639

Leach JA, Moore RD. 2011. Stream temperature dynamics in two hydrogeomorphically distinct reaches. *Hydrological Processes*. **25**: 679–690. DOI: 10.1002/hyp.7854