Author responses to reviewer comments on the manuscript entitled

"The influence of riparian evapotranspiration on stream hydrology and nitrogen retention in a subhumid Mediterranean catchment"

By Anna Lupon, Susana Bernal, Sílvia Poblador, Eugènia Martí and Francesc Sabater

Dear Dr. Stamm**,**

Many thanks for the additional comments on the manuscript. We have considered them in the new revised version of the manuscript and the supplementary materials.

Following your suggestion, we have clarified the definitions and values for the riparian basal area. Furthermore, we agree that higher water tables may not increase the groundwater residence time, and we have changed the manuscript accordingly. Finally, your editing suggestions have been also included in the text.

We hope these changes correctly address your comments.

Sincerely,

Anna Lupon, Susana Bernal, Sílvia Poblador, Eugènia Martí, Francesc Sabater

Editors comments

Thank you for uploading the revised manuscript. You have properly addressed the points and questions that have been raised. There are just of few things that need clarification before I can accept the paper for publication:

L. 34: The word "stems" might be more appropriate than "derives". **Answer:** OK.

L. 38: Insert "concentrations" or "levels" after inorganic N. **Answer:** OK.

L. 41 – 43: I still cannot see why a higher water table should increase the residence time. The average residence time is given by the ratio between water-filled volume in the flow domain and the flux. Generally the hydraulic gradients towards a stream increase with increasing water table causing higher flux rates. Hence, from a hydraulic point of view I disagree with your argument. However, a higher water table may establish the contact of the groundwater with organic topsoil (as you point out) possibly causing denitrification. Please clarify. **Answer:** That's right; the sentence could bring the reader to some confusion. Thus, we have decided to delete our reference to the residence time from this sentence (lines 40-43).

Definition and values for basal area. This aspect is still confusing. On the one hand, you use slightly different terms. On L. 96 you mention total basal area, on L. 123 you mention area-specific BA. Do the two terms mean the same quantity or not? Furthermore, your explanation on L. 96 – 98 is not clear: As you define BA on L. 96/97 it is a value for a single, individual tree (dimension: an area such as m2). How can this value increase 12-fold along the catchment? Or do you refer to area-specific BA as explained on L. 122 – 124 (dimensionless: m2 m-2)? This area-specific BA however, is not given by the equation on L. 96/97. Finally, the statement about the 12-fold increase (L. 98) seems to contradict the values you provide in Tab. 1. From your data on mean width

of the riparian forest and the tree basal area per unit river length one can calculate the BA per unit riparian area. The resulting numbers are 0.023 and 0.031 for the headwater and the valley reaches, respectively. Hence, the difference seems to be much lower. You have to clarify these issue.

Answer: We agree that basal area definitions were confusing. We express basal area in three different ways. Tree individual's basal area (BA, in cm^2) is defined as $BA = \pi * (DBH / 2)^2$, with *DBH* being the tree diameter at breast height. Total basal area (total BA, in m^2) is defined as the sum of all tree individuals' BA measured in a riparian area. Finally, area-specific basal area (BA_{sp}, in m^2 BA ha^{-1}) is the total BA weighted by riparian area (i.e. total BA/riparian area).

Note that total BA increases 12-fold along the catchment, but certainly not the area-specific basal area. This result indicates that the number of riparian trees increase from headwaters to the valley bottom, but not their density.

To clarify that point, we now specify that total basal area of riparian trees referred to the sum of individual tree basal area (line 96), while area-specific basal area (now named $BA_{sp,i}$) was calculated by dividing the total BA for a given species by the total area of the inventoried riparian plots (line 123; Equation 1). Further, Table 1 now shows the total basal area from the two reaches (822 vs 1354 m^2, respectively), which we believe that better supports the idea that total basal area increase from headwaters to the valley bottom.

L. 102 – 114 (not 115 – 116!): Use the present tense. **Answer:** OK.

Table 2: Is it correct that for Qgw there was no seasonal difference? If yes, is this due to the fact that most of values were zero? **Answer:** We did not perform a Wilcoxon rank sum test (or any other statistical test) for "$Q_{gw} < 0$"; this variable was just used to indicate the number of days that stream hydrological retention occurred during each period. We have clarified that point in the new manuscript by indicating in the caption of Table 2 that statistical information was only referring to Q_{gw} and h_{gw}

In addition, I have two suggestions. Feel free to consider them or leave the manuscript as it is: (i) Fig. R1: By including this figure in the SI you would strengthen the evidence provided to the reader that there was little N transformation occurring during sampling (L. 140). (ii) Fig. R2: Also this figure could be useful is it was included into the SI (L. 114 – 116). **Answer:** Following your suggestion, we have included Figure R1 in the supplementary materials (new Figure S2). However, we have decided to not include Figure R2 as this information is already published in Bernal et al. 2015.