



***Interactive comment on* “The cumulative effects of forest disturbance on streamflow in a large watershed in the central interior of British Columbia, Canada” by M. Zhang and X. Wei**

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General comments The paper presents an interesting examination of the hydrologic impacts of multiple forest stressors (logging, fire, insect infestation) on streamflow. The methods employed are sound, as is the interpretation of the study results. Nevertheless, the paper would benefit from thorough editing, and I have made suggested wording changes directly on the paper. I also think that the overall quality of the Figures could be improved (e.g. larger axis titles, more distinct lines and symbols).

Authors' responses: We have addressed all editorial errors and improved the quality

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of all figures as suggested. Please see our specific responses and supplements for revised text, figures and tables. Thanks for your constructive suggestions and great efforts in reviewing this paper.

Specific comments

1. Page/line 2862/26: The study by Talbot and Plamondon (2002) was conducted in Quebec, not in British Columbia as stated in the text. Authors' responses: Yes. It's in Quebec. We revised our statement.

2. 2863/14-18: Is there also a category for MPB and fire? Authors' responses: According to our data, there are no forest stands having both MPB attack and fire burned.

3. 2865/24-25: "It has been recognized as the best temperature-based potential evaporation estimation method by many hydrologists" – is that the case for British Columbia? Authors' responses: To date, there's no research comparing the performance of several temperature-based potential evaporations in British Columbia. It's difficult to make such a statement. Thus, we have deleted this sentence to avoid value-based comment as suggested by Reviewer 2. However, we did compare the Hargreaves and Thornthwaite, two commonly used temperature-based potential evaporation estimation methods. According to the Thornthwaite equation, potential evaporation is 0 when mean air temperature is below 0 °C. Since in British Columbia, most winter months have mean air temperature below 0 °C, this method can cause large errors in the estimation of potential evaporations for winter months. Therefore, we preferred the Hargreaves equation in our study.

4. 2865/25: Equation 1 – how is w derived? Authors' responses: W is the plant available water coefficient, and larger values of w mean greater evapotranspiration. According to Zhang et al.'s (2001), w varies from 0.5 to 2 among different vegetation types. For fully forested watershed, the best fit value of w is 2. In the Baker Creek watershed, the forested area covers only about 80

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5. 2866/16: The “CUSUM control chart” needs to be explained. Authors’ responses: We revised it. “Both the CUSUM control chart (the cumulative sum control chart) and the Mann-Whitney U test were applied to determine identified the breakpoint with statistical significance. The CUSUM control chart, a widely used change point detection method was applied to identify the breakpoints of statistical significance (Barnard, 1959).”

6. 2870/19: Where is the Tocaintins River located? Authors’ responses: It’s in Brazil. We added the location of the Tocaintins River in the text.

7. Figure 1: A scale for the Baker Creek watershed is needed. Figure 4 Legend – I suggest using “logging” rather than “Logging” throughout Figure 5. Why are there 2 separate Figures here? The top panel could be deleted, and the Figure caption would have to be reworded accordingly. Authors’ responses: We revised Figure 1 and combined Figures 4 and 6. Please see the supplements for more details.

8. 2861/7-8: “climate, precipitation in particular due to topographic effect in the watershed” this phrasing is awkward Authors’ responses: We revised our statement. “Given large spatial variations in climate and precipitation in particular due to topographic effect, ...”

9. 2865/22: “temperature-based methods Hargreaves method” needs to be reworded Authors’ responses: We revised our statement. “the Hargreaves equation (Hargreaves and Samani, 1985) was applied to compute potential evapotranspiration (Equation (2)). It requires only mean, minimum and maximum air temperature, and extraterrestrial radiation (Shuttleworth, 1993; Sankarasubramanian et al., 2001), which are available in the study watershed.”

10. 2870/3: “Such thresholds tend to be various” “varied”? “variable”? Authors’ responses: We revised it. “Such thresholds tend to be variable.”

11. 2874/16 “:This incredible high level”. Delete “incredible”? Authors’ responses: We

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deleted it.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/9/C1966/2012/hessd-9-C1966-2012-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 2855, 2012.

HESSD

9, C1966–C1970, 2012

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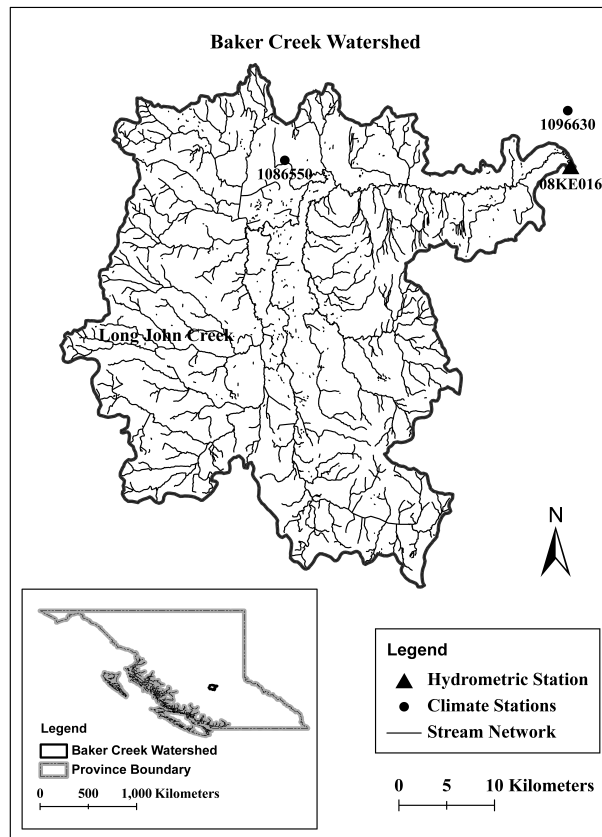


Fig. 1. Location of the study watershed in the central interior of British Columbia, Canada