Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2018-409-RC2, 2018

Hydrology and Earth System Sciences
Discussions

Interactive comment on "A Synthesis of Three Decades of Eco-Hydrological Research at Scotty Creek, NWT, Canada" *by* William Quinton et al.

Anonymous Referee #2

Received and published: 30 August 2018

General comments

Quinton et al. compile, summarize, and relate a number of studies that have led to a better integrated knowledge of environmental change (esp. hydrologic change) in the Scotty Creek catchment, Northwest Territories. This is an important research catchment in the context of Canadian cold regions hydrologic research and is increasingly recognized as an important long-term study site for informing our knowledge of changes in water resources across the circum-polar subarctic. The article is mostly well written, and is an excellent first-person (people?) account of the work conducted at this important site. It will be of general interest to the readers of HESS, especially those focused on cold regions.

Major comments

1. My main criticism is that this article could be alternatively titled 'My life's work'. There are ∼40 self-citations to the first author's work alone, which is highly unusual. However, I can appreciate that there is no real way to circumvent this, as doubtless the authors of this paper (especially the first author) have led the work at this site for many years and produced many important papers. However, as a comment, I wonder if they could include a section (or at least some more text) relating the work at Scotty Creek to other long-term northern, discontinuous permafrost research catchments, even ones that may have different physical conditions. That might give this broader appeal.

2. I don't find the first two paragraphs of the introduction particularly well written. In my opinion the first paragraph should talk about circum-polar subarctic cold regions/permafrost/hydrology work to begin with (at a large-scale) and then narrow to the region containing Scotty Creek. This paper starts with a rather abrupt introduction to the Liard River valley, and then expands in the second paragraph to the broader Mackenzie River basin. Restructuring and enhancing the circum-polar questions and implications would position this paper better in the broader literature. I think that is important, as it is certainly not standard to write a review paper in a hydrology journal that is focused on just one site, and it would be useful for the authors to really emphasize the critical nature of this work.

3. Sections 2 and 3 are a bit of a laborious read and describe processes and concepts that could easily be visually represented. Why not have a figure in Section 2 that shows the landscape units and how they function and interact hydrologically? This would be useful when the authors refer to the 'new conceptual framework for runoff generation' (P5, L23). Some of this would be easier to see than read (although I recommend that the text be retained). Section 3 could have a figure that shows some active layer conditions or processes (e.g. data for K vs. depth or some freeze-thaw conditions).

4. I miss much discussion on biogeochemical processes or storage and lateral fluxes of nutrients etc. I understand that has not been the focus at Scotty Creek, but I am surprised there are so few studies to refer to. Related to this, there is very little discus-

sion on vegetation changes at Scotty Creek except where the focus is the impacts on hydrologic processes. Surely some of the Baltzer work could be better highlighted. I would suggest giving more than a passing glance to the important Baltzer et al. 2014 GCB (P11, L26) study. Although Eco-Hydrological is included in the title, there surely isn't much eco content in the paper.

5. Figure 3 on the active layer and talik etc. could also include an additional pane or two showing the 'dual layered system' of flow (P12, L14).

6. How much longer will the increased hydrologic connectivity result in higher flows? If the wetlands are dewatering, when will the basin reach 'peak water'?? It seems to me that this concept related to glacier discharge could also be applied to Scotty Creek as the wetland storage decreases.

7. The conclusion ends abruptly. It almost seems like text were deleted by accident. There is no vision, no path forward, no high-level statement explaining the importance of the work. Something needs to be rewritten here.

Minor comments

P2, L5, should 'regions' be after 'warming'? Figure 1, this is obvious to Canadians, but probably 'Canada' could be labeled in the inset Way et al. (2018) report a study of isolated permafrost patches that I think could be tied to the work at Scotty Creek. https://www.the-cryosphere.net/12/2667/2018/

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2018-409, 2018.