

Interactive comment on “Ubiquitous increases in flood magnitude in the Columbia River Basin under climate change” by Laura E. Queen et al.

Laura E. Queen et al.

philip.mote@oregonstate.edu

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We are grateful to Reviewer 4 for a constructive and insightful review, and for describing the paper as important and relevant to HESS. Below we outline our plans for heeding the excellent points raised in this review.

1. Major revisions to the paper would be required to meet this quite appropriate and thoughtful recommended improvement. We suggest an analysis of the historical representation of annual maximum flows within the hydrologic modeling setup. As a comparison, we will use a set of streamflows called No Reservoirs No Irrigation (NRNI; RMJOC 2017). Developed by federal agencies to support practical analysis, the NRNI dataset exists at ~190 sites across the Columbia River Basin, and are adjusted to cor-

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rect for reservoir management and the diversions and evaporation associated with both the reservoirs and with irrigated agriculture. This dataset is suitable for comparisons with our modeling setup, and we plan to use all the NRNI locations in this analysis, paying particular attention to locations along the Willamette, Columbia, and Snake and in basins with minimal flow control. We will compare the annual maximum daily flow statistics (return period curves as in Figure 2, without GEV fits; and twin-violin plots as in Figure 9) for 1960-2008 from the observed and simulated records. These historical performance results will inform our interpretation of the projected changes in annual maximum daily flow. We would select an appropriate metric like the 90th percentile of annual maximum daily flows, and compare the historical simulations.

2. The above analysis may also help to assess the quality of the PRMS 20th century simulations and provide guidance about whether the PRMS results should be excluded from the ensemble analysis. From Figure 7, it is clear that such a decision would change the results in some places like the lower Columbia and the Snake.

3 The points raised in the table are good recommendations for clarifying and expanding the text and we will address them all in our revisions.

River Management Joint Operating Committee (RMJOC). (2017). NRNI Flows 1929-2008 Corrected 04-2017. Bonneville Power Administration. Retrieved from <https://www.bpa.gov/p/Power-Products/Historical-Streamflow-Data/Pages/No-Regulation-No-Irrigation-Data.aspx>

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-474/hess-2019-474-AC1-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-474>, 2019.

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