

Interactive comment on “Impacts of impervious cover, water withdrawals, and climate change on river flows in the Conterminous US” by P. V. Caldwell et al.

Anonymous Referee #1

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General comments

This paper addresses, as the title suggests, the impacts of impervious cover, water withdrawals, and climate change on river flows in the Conterminous US. The authors put together a number of modeling modules, applied it to the HUC8-scale watersheds, and analyzed the patterns observed in their model results. The key contribution is the systematic study of these impacts, both in isolation and combined.

The paper is well-structured, well-written, and addresses the topic which I believe should be of interest of HESS's readership. The authors are meticulous in describ-

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ing the model and results. The figures are appropriate and helpful in understanding their results. Overall, this is a nice, solid manuscript with results that may be used as a reference for future research.

Despite my overall positive comments, I have a few reservations. While I think that this is a good paper, it appears to be a good HYDROLOGY paper. Given that this is submitted to a special issue on ECOHYDROLOGY, I would have liked to see more analysis on the ecological aspects, but this is too much to ask at this point. I would therefore suggest that the authors better emphasize the ecological implications/connections of their results. The authors did a little of this in Discussion, but it should be expanded and elaborated more, including citing some more ecological references. Here are some thoughts in this direction:

- The results suggest considerable change in seasonal timing of flows in some watersheds. This can seriously affect the behavior (e.g., phenology) of aquatic organisms. Citing a few papers that show such effects would be nice.
- While the return flow rates from the thermopower sector are generally high, the returned water is of higher temperature, which could adversely affect aquatic life.
- Interbasin transfer projects are mentioned several times throughout the manuscript. Below is a recent work on the impacts of such projects on ecosystems (with focus on biodiversity):

Grant, E.H.C., H.J. Lynch, R. Muneeppeerakul, M. Arunachalam, I. Rodriguez-Iturbe, & W.F. Fagan. 2012. Interbasin water transfer, riverine connectivity, and spatial controls on fish biodiversity. PLoS ONE 7(3): e34170. doi:10.1371/journal.pone.0034170

I think these ecological perspectives would make the manuscript more balanced, and more suitable for this special issue.

Some additional specific comments:

- My impression is that the model results used for validation assume no impervious

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cover and no water withdrawals, but this is not very clear in section 2.2. This should be clearly stated and briefly justified in section 2.2.

- I'm guessing that "mm" on page 4280, line 23, is a typo.

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