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Interactive comment on "Interplay of changing irrigation technologies and water reuse: Example from the Upper Snake River Basin, Idaho, USA" *by* Shan Zuidema et al.

Anonymous Referee #1

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Review of manuscript HESS-2020-135, entitled "Interplay of changing irrigation technologies and water reuse: Example from the Upper Snake River Basin, Idaho, USA" by S. Zuidema, D. Grogan, A. Prusevich, R. Lammers, S. Gilmore, and P. Williams This paper describes a study where a distributed hydrological model was used to investigate the effects of managed aquifer recharge (MAR) on the system-scale efficiency of modernizing irrigation technology and the resulting changes to the reuse of non-consumptive losses in the semi-arid Upper Snake River Basin (USRB) of western Wyoming and southern Idaho, USA. The manuscript is well written, organized, and certainly fits the scope of a journal like HESS. Authors proper acknowledge the difficulties in modelling a complex system such as the Upper Snake River Basin, with reservoirs

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management influencing river flow, and irrigation management the aquifer recharge, by taking into account modelling uncertainties and bias when discussing the main findings extracted from their simulation scenarios. In my opinion, the paper should be accepted for publication in HESS after some minor review. Minor comments: Page 1, L3: There seems to be a misplaced "and" in the middle of authors names. Page 2, L11-13: Please elaborate more on this statement. It is not very clear why the economics of running a more efficient system leads to an increased water consumption. Page 5, L3: Please check the need of including L twice in the text between brackets. Page 5, L4: Please check if infiltration or percolation. P4, L31: Please explain clearer how irrigation efficiency was defined. Was it in terms of factions of B + N + L? Page 7, L2: It should be soil water content above field capacity, not saturation. Page 7, L14-18: If I understood it correctly, you defined consumptive and non-beneficial losses based on the characteristics of irrigation methods. Can you add some examples or assumptions made? Page 8, L4: Did reservoir data include consumptions also? Page 8, L22: What was the adaptation made to FAO56? Page 8, L22-23. There is no such thing as reference PET. There is a reference ET, a crop ET (that refers to crop evapotranspiration potential values) and an actual ET. Please check Allen et al. (1998). Page 9, L2-8: Are these comparisons between observations and model outputs (flow, river discharge, storage) on a daily or monthly basis? Page 9, L24-27: I agree that hydrological modelling of basins with reservoir is a challenging task. This is even more true when using distributed models. I just don't see why you choose to cite a paper still under review when there is already some literature on this issue. Page 10, L16-18: Beneficial consumption of water refers to plant transpiration while non-beneficial consumption is the soil evaporation component. In your model how is ET partitioned in these two components? Unless I've missed this was not explained.