

Interactive comment on “Reconstructing the natural hydrology of the San Francisco Bay-Delta watershed” by P. Fox et al.

Anonymous Referee #3

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This paper did a comprehensive study on the long-term mean annual water balance in the San Francisco Bay-Delta area, in order to investigate the impact of human activities on the Delta outflow. Under the “natural” landscape condition, the two components in the water balance equation: water supply (precipitation and rim inflows) and water use (evapotranspiration) are estimated. Precipitation and rim inflows are calculated based on historical data. The rate of evapotranspiration is estimated based on the vegetation distribution under the “natural” landscape condition. By comparing the “natural” Delta outflow with the current Delta outflow and the “unimpaired” Delta outflow, the study shows that the level of water use under “natural” condition and current condition is not very different, and the “unimpaired” Delta outflow overestimated the natural Delta outflow.

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The human interference on the natural hydrologic system has become a focus of hydrologic research in the last few years. This study brought an interesting case to show the comparison between natural water use and human water use. The paper has the potential to provide insights on the issue of human-water relationship, and to inspire new ideas on the hydrologic research in the era of Anthropocene. I have a few suggestions:

1. P3855, L22~23: The authors mentioned the effect of land use and forest management changes on the rim inflows. This effect is not considered in this study as explained in P3856, L3~6. If the water use in the Valley Floor is not the reason for the Delta outflow decline, then the rim inflows change might be the possible cause, assuming no significant changes in precipitation in the last 100 years. So it would be interesting to see the difference in rim inflows under “natural” condition and current condition.
2. A validation on the evapotranspiration estimation based on vegetation distribution would be helpful. The authors may compare the estimation results with the observed evapotranspiration in some other locations with similar vegetation distribution to see if they agree with each other.
3. P3863, L5~6: “in Cases V and VI, the mix of rainfed perennial grasslands was varied based on the volume of rim inflow to the Sacramento and San Joaquin basins.” Could the authors explain more about this relationship and how you determine the vegetation distribution in Cases V and VI based on this relationship?
4. Could the authors discuss the results in Table 5?
5. P3867, L16~19: This statement is a little bit confusing, especially the part: “the unimpaired outflow calculation assumes that water use upstream of the Delta is limited to only Valley Floor precipitation.”

Technical points

1. The abstract is a little bit too long;
2. The term ET₀ is defined as potential evapotranspiration (P3857, L20) and as grass

C1388

reference evapotranspiration (P3858, L5). Maybe choose one.

3. P3861, L1: change “sensitively analysis” to “sensitivity analysis”; change “uncertainty” to “uncertainty”.

4. P3865, L24: the current water use level should be 31.9 billion m³/yr, as mentioned in P3865, L13.

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C1389