Peer Review Report

Peer review report 1 On “Simulating the Effects of a Beaver Dam on Regional Groundwater Flow through a Wetland”

Original Submission

Recommendation:

Minor Revision

Comments to Author:

The manuscript Simulating the Effects of a Beaver Dam on Regional Groundwater Flow through a Wetland (Manuscript Number: EJRH-D-15-00068) was an enjoyable read. The manuscript provides new interpretation of the role of beaver dams in general, but I think another strength is the development of the conceptual model of a wetland illustrating that wetlands can be flow through systems. The manuscript should be of interest to hydrologist and ecologist that work in wetland environments.

Below I provide some specific comments, which addressed should make the manuscripts a stronger.

Within the abstract and the methods, the authors detail to field data providing head data pre-, post- and during the building stages of the dam. These data should be included within the manuscript either as supplemental data or as additional figures, i.e. water table maps. The data are important in the assessment of the conceptual models as well as evaluating the output from the MODFLOW model.

The abstracts indicates that there was minimal change in the flux following the emplacement of the dam. However, within the Results/Discussion section the authors state “...the volume of water moving through the wetland pond to increase 90%” (page 6). To be honest, I am not sure what is meant within the Results/Discussion; the wording is a little ambiguous. I am not sure if the authors are referring to the discharge into the wetland, out of the wetland, or both via surface pathways, groundwater pathways, or both surface and groundwater. How does (did) the surface flow change following the building of the dam? This could be clarified within the conceptual model (Figure 9 - see below).

Within the 3rd paragraph of the introduction (page 2), the authors present the argument that understanding the role of beaver dams as an effective restoration technique. This is an interesting perspective; one that I would have liked to have seen them return to in the discussion, even if it is brief. The purpose of the paper, to determine the hydrologic impacts of the dam, is meritorious and is worth publishing, but I think addressing the presented concern would strengthen the paper and allow for greater appeal.

The conceptual model needs more detail. The near-field head data should be incorporated to help refine and establish the models. I realize that the conceptual model is a simple representation, but with what is presented I do not have enough information (head data) to see the flow patterns. Given the low error between the MODFLOW model and the field data, the model does reproduce the scenario well. The refined conceptual model showing the system as a flow through system could also use some additional data to help support the interpretation. Ideally, the simulated Q into and out of the model could be provided (rather than just thicknesses of the arrows).

Is there any mass balance information available for the wetland (not model data), that could be used to help constrain the model output? This information would also strengthen the conceptual models (Figure 7) by adding to the background knowledge.

DOI of the original article: http://dx.doi.org/10.1016/j.ejrh.2015.10.001.

2214-5818/$ – see front matter
http://dx.doi.org/10.1016/j.ejrh.2015.12.023
The final paragraph of the Results/Discussion suggests that the forward model looked at both the absence of the clay unit with varying K values and also the size of the wetland (last sentence). The size of the wetland is the topic that is of concern. Figure 11 looks only at the variation in K values; nothing is shown that relates to the size of the wetland that would support this claim. Additionally, if the size of the wetland was changed in various scenarios was this independent of scenarios in which the K was changed?

On figure 2, the language in the legend does not match the text (1st paragraph of Method pg. 3 and the figure caption). Within the text, the yellow dots are listed as wells installed in May 2012; on the figure, the legend states that the piezometers were removed.

To what depth does the MODFLOW model extend? It is mentioned that the lower 6 layers were of varying thickness and extend to the depth of the aquifer. But how thick is the aquifer?

Line 3 - build should be built

Analytical Element Modeling may want to be included in the keywords