

Interactive comment on “Nitrate retention capacity of milldam-impacted legacy sediments and relict A horizon soils” by Julie N. Weitzman and Jason P. Kaye

Anonymous Referee #2

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This article is suitable for publication in soil. It describes the difference in NO₃ movement between different horizons of soil which were either present prior to the milldam being created, or deposited as sediments.

The manuscript clearly describes the context of the work, and provides a good summary into the history and formation of these anthropogenic soil profiles. The site is well described, and methodological approaches used are appropriate.

While the results and discussion section clearly outlines the results obtained, it is somewhat light on regarding discussion. I would encourage the authors to provide more insights into the processes driving the results obtained, with support from appropriate literature; furthermore, there is only a limited connection of this research with the

literature, based on the limited citations present in the discussion.

The presentation of the soil properties in the results section is quite comprehensive – maybe a bit too much so. I would like the authors to consider abridging this section and focussing on the results immediately relevant to NO₃ transfer. Moreover, if this section were to be presented prior to the NO₃ leaching results, it would provide a greater context for discussion of those results, and the opportunity to finish off the discussion with a clear description of how the results link together, what you have learnt about each horizon, and how does all this information fit together to understand how NO₃ would flow through this system if it was undisturbed?

Following on, some more discussion about restoration would have been helpful for those not in that space – what are the environmental benefits of restoration – magnitude changes in NO₃ losses?

Finally, it was somewhat confusing to get through most of the paper, only to read that one whole section of results (time series 15NO₃ vs native NO₃) is likely to have been compromised due to preferential flow. I would encourage the authors to consider the value of retaining the time series experiment in the manuscript – how much value does it actually add, or, would it be missed if it wasn't there?

Detail:

Intro: P2 L7: The “Williams 2000” citation was not found in the list of references P4 L5: I'm not sure the cultural question regarding restoration was actually addressed in this manuscript. If this is an important aspect, a section at the end demonstrating the predicted in-situ effects of restoration would be of value. P5 L8: The “Brush 2008” citation was not found in the list of references.

Materials and Methods: P7 L6: Why was K₂SO₄ used as N-free water? P7 L6: How was the pore volume estimated? P7 L27: what was the soil:solution ratio of the 2M KCl extraction, and what were the conditions for mixing? P9:L1: The 15N recovery

vs retention section is not well explained. Please articulate more clearly the value of presenting the results in both ways, or consolidate Fig 2 and 3, which appear to show equivalent results.

Results and discussion: P11 L23: please spell out "atm%" P13 L9: If it is proposed that low NO₃ uptake is the reason for the large NO₃ leaching losses, please discuss some of the processes which may be governing NO₃ uptake, and why these are low in this soil - ... how does this compare with other milldams or equivalent textured soils? P14 L24: I'm not familiar with the term "well-sorted soil". Conclusions: P15 L20: The comment regarding restoration of the site may lead to an initial decrease in NO₃ retention capacity – some comments around the magnitude and importance of this proposed decrease would be of value – how does it rate compared to the landscape as a whole?

References: - Castellano and Kaye (2009) not mentioned in paper - Merrits et al (2010) not mentioned in paper.

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Discussion paper

