Hydrol. Earth Syst. Sci. Discuss., 8, C4688–C4691, 2011
www.hydrol-earth-syst-sci-discuss.net/8/C4688/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Can we predict groundwater discharge from terrestrial ecosystems using eco-hydrological principals?" *by* A. P. O'Grady et al.

A. P. O'Grady et al.

anthony.ogrady@csiro.au

Received and published: 27 October 2011

We thank Dr Froend for his positive review of our manuscript: 'Can we predict groundwater discharge from terrestrial ecosystems using ecohydrological principals?'

Dr Froend has made some useful comments that will improve the clarity of the manuscript and we will adopt all of these on revision. In relations to the more specific comments:

8235 Ln 6-7: Provision of 'additional' water by groundwater. Agree with the point made but the authors may wish to also consider the ecological benefit of increased consis-

tency in water source that an aquifer provides

Dr Froend is correct, there is likely to additional benefits associated with increased consistency of supply both within and between years. A comment along these lines would be easy to incorporate

8240 ln 18: '..,thermodynamically less available' is not an explicit statement of what (I believe) the authors are implying, i.e. saline groundwater is less available to the vegetation due to differences in osmotic potentials.

As discussed in the response to the Zeppel review, we have deliberately chosen the phrase thermodynamic, as although salinity does affect water availability, other factors may as well. The point we are trying to make is that the vegetation response integrates these factors, whatever that may be.

8240 ln24-26 Surely soil water as well as groundwater loss via ET is not unique to arid and semi-arid systems, or have I misunderstood what was implied? Can the authors address this as a phenomenon across all sites, and comment on the relative contribution of GW to total discharge via ET?

Here Dr Froend raises an interesting point that we had not previously considered. There is indeed a significant negative correlation between the climate wetness index and the proportion of ET derived from groundwater (P=0.0024). See the attached supplementary figure. However, even at the arid end of the climate wetness index spectrum, groundwater discharge varied from approximately 20% to almost 100% of ET, thus on its own the relationship would have only low predictive power, especially at arid and semi arid sites. What we should say is at water limited sites, rather than just arid and semi arid sites as the figure does confirm that groundwater discharge is less likely at energy limited sites.

Figure 2b, no comment on the 2 outliers ?

As discussed in our comment to the Zeppel review, these two points are from tree belts

and we're unsure of the reasons for the departure of these sites. I suspect that it may have something do with the area over which these points are calculated rather than there being an inherent biological reason. In a revision we will explicitly make mention of this.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 8231, 2011.

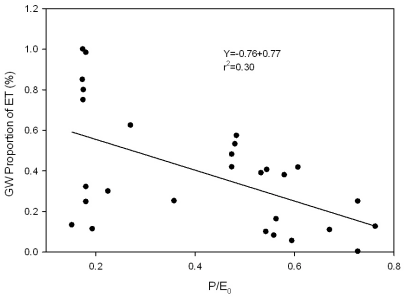

Fig. 1. Relationship between Climate Wettness Index (P/E0) and the proportion of total evapotranspiration derived from groundwater.