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Interactive comment on "Water-use dynamics of an alien invaded riparian forest within the mediterannean climate zone of the Western Cape, South Africa" *by* Bruce C. Scott-Shaw et al.

Anonymous Referee #1

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Manuscript Number: HESS-2016-650 (Scott-Shaw et al)

I have reviewed this manuscript and I have the following comments.

GENERAL COMMENTS The manuscript describes an experiment conducted in a riparian zone along the Buffeljags river in the Western Cape Province of South Africa. The authors quantified the transpiration dynamics of a mix of indigenous and invasive alien tree species in relation to climatic and soil factors. They observed significant differences in daily sap flow rates in both the indigenous and invaded stands. Overall, they conclude that the invasive alien trees used up to six times more water than the indigenous species. The authors assert that there would be a significant hydrological gain if the invasive alien species are removed from riparian forests and rehabilitated

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back to their natural state.

EVALUATION

The manuscript is generally well written and it addresses a topical issue on the incremental water use by invasive alien plants over and above that used by indigenous vegetation. I have a few concerns though:

HESS is an international journal and my concern is that the way this manuscript is presented seems to target a South African audience. This is evident in the 'Introduction' and the 'Discussion and Conclusions' section where there is not a single reference to relevant international literature on alien invasive species. Where international literature is cited, it is on methodological issues, but not the invasive alien plants problem. Invasive alien plants are a global problem and the authors should present their manuscript in a way that appeals to an international audience. The authors have a rich data set which allows them to do this. For example, how do the water use rates of the invasive alien species studied here compare with that from studies outside the borders of South Africa? A more preferable route will be for the authors to use this data to validate a relevant international model e.g. MAESTRA, Shuttleworth and Wallace or others which other researchers elsewhere can use. The 'Discussion and conclusions' section is very weak. An extensive revision of that section is necessary along the lines suggested here and clearly stating what is novel about this study given that it is well known that alien species use more water than indigenous ones. Secondly, reference is made to total evaporation (evapotranspiration) in Fig. 8. Where was this measured or modelled? What assumptions are the authors making given that they only measured tree transpiration?

SPECIFIC COMMENTS - Abstract line 26: add the phrase . . . "of the heat pulse velocity sap flow technique" after the phrase . . ."heat ratio method". Not every one will understand this abbreviation. - Abstract general: presenting the water use values in liters only doesn't mean much to a water resources manager or other decision maker. I

would prefer to see area averaged transpiration values (in mm), compared for example, to ETo and/or rainfall. - Pg 3 lines 32-44: How was the LAI measured? - Pg 3 line 48: Indicate that the diameter was measured at breast height (DBH) - The HRM method of the HPV technique is well known in eco-physiological/eco-hydrological cycles. So there is no need for the details on Pg 4 lines 15 to 35. Remove this text. What would add value is more detail on: probe insertion depths and circumferential arrangements and how the conducting sap wood area was determined. Text for the water use modelling will also be appropriate in this section. - Pg 4 line 43 – sentence beginning with " Given the homogenous. . .." Doesn't make sense. Please revise. - Pg 5 line 20: To confirm direct use of ground water, it would have been nice to do this using stable isotopes rather. Include this data if you have it. - Pg 6 first paragraph: Fig 8 is discussed before Figs 6 & 7 which only appear on pg 7. Either revise the text or change the order of the Figs. There is also a mismatch with the units. The text, Pg 7 line 7 presents L/d, but Fig 8 presents water use in mm. Clarify this. - Pg 7, lines 39-40: Not clear if the annual transpiration and ETo are for a single year or averages over 3 years. Please clarify. - Pg 8 "Discussion and Conclusion". As stated earlier, this section is very weak and I would prefer to see; 1) comparisons between the results found here and what other researchers found, and; 2) comparisons with international literature. - I also have issues with the references: o The following references are missing in the reference list ïĆğ Everson et al., 2007; ïĆğ Richardson et al., 2007 ïĆğ O'Grady et al., 2005 ïĆğ Miller et al., 2007; ïĆğ Everson et al., 2006; ïĆğ Uddin and Smith, 2014. o Format of the references in the references list is not consistent. Some journals are written in full while others are abbreviated. In places it is not clear to who reports are written for e.g. pg 11 lines 10-11 and other places. For other references, journal names are replaced with address of the institution. For example, pg 11 line 38 is a publication in the Agricultural and Forest Meteorology journal which is bizarrely replaced by the institutional address. There are other such instances which need attention.

Comments end.

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