List of Responses and Main Paper Changes

Dear Editor and Reviewers,

Thank you very much for your constructive comments on our manuscript entitled "Assessing blue-green water utilization in wheat production of China from the perspectives of water footprint and total water use" (Ms. No. hess-2013-548). We have made a major revision of the manuscript taking into account all the comments and responded to the issues raised. We hope that the revisions in the manuscript and our accompanying responses will be sufficient to make our manuscript suitable for further review.

Best wishes and yours sincerely,

Xinchun Cao, Pute Wu, Yubao Wang and Xining Zhao

Northwest A&F University

Responses to the comments from reviewer #2 (Report #1):

The comments of reviewer are in Helvetica font, while our responses are in Times New Roman font.

1. It is still questionable to define the GWF based on ET_c since ET_c is not the actual evapotranspiration.

Response: Actually, we defined the GWF based on effective precipitation (P_e) but not ET_c with reference to the early related researches. We revised the statement and clarified this point further in section 3.1.1 (**L137 ~ 143**)

2. In addition, it is another challenge to determine K_c for different locations and wheat varieties.

Response: The K_c values listed in Chen, et al. (1995) and Duan, et al. (2004) are the test results collected from irrigation experimental station located in different regions of China. Further explanation was posted in the revised manuscript with "K_c values listed in these references are the test results collected from irrigation experimental station located in

different regions of China" (**L123 ~ 124**)

3. Some data and parameters are difficult to obtain, such as IWC, η and α. The value of α is selected as 3%, α=5%, α=8%. These assumptions are lack of enough evidence, which make the results big uncertain.

Response: 1) The IWC (irrigation water capacity) is statistical data collected from each administration bureau of irrigation district. We explained it in **section 2.2** by "The statistical data including actual irrigation water capacity (IWC, the gross irrigation water diversion), crop yield, irrigation water utilization coefficient (η) and irrigated area from the administration bureaus of 442 irrigation districts in 30 provinces (Fig.1) are collected for this study" (**L110 ~ 112**).

2) The η, which is conducted by engineers work for administration bureau of irrigation district, is also collected from each administration bureau of irrigation district conducted by engineers work for administration bureau of irrigation district. It is explained in the revised manuscript by "The actual measurement of η was conducted by engineers work for administration bureau of irrigation district" (**L112 ~ 113**).

3) For the value of α. It is hard to be calculated and the empirical (not assumed) values referenced (WMR, 1999) are applied in this study. We clarified this point further with "The value of α recommended by the reference is consulted by irrigation engineering designers in China and it is widely considered accords with the actual conditions basically (Li, 2006)" in **section 3.2.1** (**L163 ~ 169)**.

4. The percolation (BW_p) is another problem and has not been satisfied responded.

Response: The BW_p falls into total water use (TWU) in the new version of manuscript. BW_p was elaborated deeply **in line 211 ~ 217** in the revised manuscript as follows:

BW_p, that can be calculated by Eq. (18), is the part of irrigation water infiltration into deep soil or groundwater mass that can neither be reused by crops during their growth stages, nor sever departments of social economy:

$$BW_p = IWC - BWF \quad (18)$$

Blue water footprint (BWF) of crop could not be satisfied if some more water withdrawal for percolation has not been supplied by the reservoir or the headwork of irrigation district. It is important for regional could be reduced by improving the quality of irrigation works.

5. (Special comment 1). Equation 2, A (area) is used but it is not used in other equations.

Response: The A (area) Equation 2 is regional crop planting area, and is not used in other equations. In order to differentiate, it was replaced with A_p in the revised manuscript (**L143** and **146**).

6. (Special comment 2) Equation 5, how about if $ET_c<P_e$?

Response: The crop is no need to be irrigated if $ET_c<P_e$, and Equation 5 was changed to (**L156**):

$$IWR=\begin{cases}0, & ET_c \leqslant P_e \\ ET_c-P_e, & ET_c > P_e\end{cases}$$

7. (Special comment 3) Equation 16, WF_I should be WFP_I.

Response: The WF_I on the right side of the equal sign was changed to WFP_I (**Equation 16, L200**).