Response to the comments of Anonymous Refereeson submission of hess-2013-473

No.	Comments	Author's Response
1	Many researches have been focused on dissolved oxygen in natural rivers and reservoirs. Is there any connection between the dissolved oxygen and the total dissolved gas? The paper should give some reference citations in the section of 'Introduction'.	Dissolved oxygen (DO) is chosen as the subject in the early studies on the negative impact on fish caused by dam spilling. Afterwards, total dissolved gas (TDG) is studied as a new subject. According to the investigation of Ma published on Fresenius Environmental Bulletin in 2013, it's difficult to find a stable relationship between DO and TDG. In the authors' previous studies (Li, R., et al. 2013, Journal of Environmental Engineering, 139(3): 385-390), it was found that the TDG dissipation process is quantitatively different from the reaeration process of DO. Some biological studies also indicate that the supersaturated TDG is more harmful to the fishes than the supersaturated DO. For these reasons, it is appropriate to choose TDG as the key variable to study the eco-environmental regulations for mitigating the conflict between dam spilling and fish protect in the paper. We have added the explanations and reference citations in the section of 'Introduction', at Line 73. And the additional references are listed in 'Reference'.
2	Dam spill usually occurs in summer. In Section 2, the paper introduced that there are many endemic fishes in the river. What growth period are the fishes in during the summer? Or what activities of the fishes will be influenced by the dam spill? I suggest a description of the fish growth should be given in the text.	The breeding periods of the rare and protected fishes in Zumuzu River are mainly distributed in April to July, so the dam spill which usually occurs in the summer from June to September, influences the breeding and growth of the fishes. The clarification has been added in the text at Line 125.
3	Equation (5) is not clear. Please give the detained relationship between the density and temperature. The authors mentioned that "the ΦTDS and ΦISS are not incorporated in this simulation" (Line 8 in Page 7), thus ΦTDS and ΦISS should be removed from the equation and the context.	The variable of ΦTDS and ΦISS have been removed from the text. A clear relationship between the density and temperature is given in Line 147.

4	Equation (10) illustrated the mass transfer coefficient in terms of wind speed. What substance or gas was the research focused on? DO or TDG? Will it bring any significant difference to the simulated results of TDG?	The equation about the mass transfer coefficient is deducted by O'Connor in a theoretical way, and validated by laboratory and field data about reaeration of dissolved oxygen obtained by some researchers. For the lack of specific study on the transfer coefficient of TDG, we adopt the equation by O'Connor. The uncertainty of the equation needs to be investigated in the future.
5	The paper gave an in-depth analysis on the TDG variation in the reservoir under different regulation scenarios, but didn't discuss the TDG variation to the downstream through the power flow and the spill discharge. This should be mentioned or recommended for further study.	The paper focus on the TDG distributions in the reservoir. We agree that the effect of the regulation on the downstream river is also another important and sophisticate problem that needs to be addressed respectively in the future. We have discussed the prospect in Line 447.
6	Line 21 in Page 4: Insert "adjusting" before "the manner".	Fixed.
7	Line 6 in Page 5: Insert "time" before "cost".	Fixed.
8	Line 6 in Page 7: "the water surface" should be "the water surface elevation".	Fixed.
9	The first letters for the titles of longitudinal axes in Fig.4 should be capitalized.	Fig.4 and Fig. 5 have been modified.
10	The authors need to provide direct evidence to demonstrate if the water transport processes in the computational reservoir could be simplified into a vertical two dimensional numerical model.	According to the previous studies (*QU Lu. Field observation of total dissolved gas supersaturation of high-dams. Science in China, Series E: Technological Sciences, 2011. 54(1): 156-162.*), the lateral TDG is not uniform in the near region downstream of the dam because the TDG levels of the spilling and the tailrace are different. But the lateral TDG saturation will be almost uniform when the TDG is transported to the downstream of several kilometers awaydue to the actions of convection and diffusion. Also, acorroding to the observation, the vetical distribution of TDG in large and deep reservoir is significant and dominated(*FENG Jingjie. A laterally averaged two-dimensional simulation of unsteady*

		supersaturation total dissolved gas in deep reservoir. Journal of Hydrodynamics, 2013, 25(3):396-403). For such reasons, a laterally-averaged two dimensional model is suitable for a deep reservoir.
11	The authors should also provide more information about the model methods such as what water quality parameters are included in the water quality model.	The model used in this paper is modified basing on the code of CE-QUAL-W2. Tens water quality parameters can be simulated by CE-QUAL-W2, but in this paper, only water temperature and TDG are calculated by using this model.
12	More seriously, the model calibration and validation was lack of detailed information to show the performance of this model in the BalaReservior, so that the accuracy of model results was not clear.	The model for the prediction of TDG transportation and distribution in a reservoir is first proposed by the author in another paper (*FENG Jingjie. A laterally averaged two-dimensional simulation of unsteady supersaturation total dissolved gas in deep reservoir. Journal of Hydrodynamics, 2013, 25(3):396-403)*. The calibration and validation of the model are illustrated in the paper by using the observation data in Dachaoshan Reservoir in China. The simulated TDG variation of the water surface at four locations and the vertical TDG distribution in Dachaoshan Reservoir are both in great agreement with field observation results. It is indicated that the proposed model is available for the TDG prediction in reservoirs. Thus the details of the model calibration and validation are neglected in the discussed paper.
13	What's more, the relationship between TDG and environmental quality has not been described clearly enough to present what operational regulation scheme is the most eco-environmentally friendly.	Supersaturated TDG may cause gas bubble disease on fish, potentially increasing the mortality of fishes. The Environmental Protection Agency of USA limited the TDG saturation to be lower than 110% in rivers in the "Quality criteria for water (1986)".Although the limitation for TDG is not required in the national criteria of water quality in China，to diminish the supersaturation level and duration time of TDG as far as possible is eco-environmentally friendly in terms of the negative impact on fish. The criterion has been added in the text in Line 80.