The effect of physical water quality and water level changes on the occurrence and density of *Anopheles* mosquito larvae around the shoreline of the Koka reservoir, Central Ethiopia.

Authors' response to reviewers comments

We would like to thank both anonymous referees for their invaluable comments. We have carefully considered and addressed all of the comments and suggestions provided. The following table summarizes comments and shows our response to each. Where we have indicated changes, these have been incorporated in the final version of the paper. In addition we have made other minor corrections and editing to the paper.

Authors' Response to comments by Referee #1	
Comment	**The way comment is addressed**
1. Consider merging figures 4 and 5	Done as recommended • On page 6047 and 6048, Figures 4 and 5 are merged, see new Figure 3
2. Consider the relevance of figures 3 and 6 to the publication	Done as recommended • On page 6046, Figure 3 removed from text (since information in Figure 3 is already included as part of Figure 6). • On page 6049, Figure 6 changed to Figure 4
3. Photographs do not add value to the manuscript	• Plates 1, 2, 5 and 6 from pages 6050, 6051, 6054 and 6055 are removed from the manuscript as suggested by the referee • Plates 3 and 4 are retained in the manuscript as Plates 1 and 2. The authors strongly believe that the photographs represent typical larval breeding sites formed by the recessing water along the shoreline of the reservoir and hence add value to the paper.
Authors' response to comments by Referee #2	
1. How the research questions are addressed should be indicated	How the research questions are addressed is presented in the materials and methods section of the manuscript (pages 6028- 6031). We believe that details described in this section discuss the methodology used, the parameters measured and the methods of data analysis employed to address the research questions.
2. Look at the way Anopheles is addressed	Done as commented Inconsistencies in the way Anopheles is written in the manuscript have been corrected. The generic name *Anopheles* is italicized and the abbreviation *An.* is used instead of *A.* consistently throughout the paper.

3. Abstract should be punchier ---	We revised the abstract. The following changes have been made to strengthen the abstract: • *Page 6026 line 1 the word 'mosquito' is added and reads 'mosquito larval breeding--' to better describe what exactly is under investigation.* • *Page 6026 line 3 'and on the spatial and temporal formation of larval breeding habitats' is deleted since we believe that this added no value to the abstract.* • *Page 6026* line 15 and 16; line 19 and 20; line 21 and 22; and line 24 *Statistical values* (F, p and r values) are deleted respectively since we believe that these values are better presented in the results section. • *Page 6026 line 5 'in central Ethiopia' is added and reads 'at Koka reservoir in central Ethiopia between ---' to better describe the study area.* • *Page 6026 line 26 the word 'total Anopheles larval count' is deleted and changed to 'larval abundance' since we believe that this better describes the results.* • *Page 6026 line 27 the word 'in the vicinity' is deleted since we believe that it is a repetition of the word 'in the area' in the statement that follows.* • *Page 2027 line 2-5 the statement 'Further investigations on species diversity –--' is deleted since it does not add value to the abstract.*
4. a. -- why this study is undertaken/why is the topic important--- and – b. what questions are addressed/what is the specific gap that this paper is filling;	Done as suggested: • Page 6028 lines 8-12 we have modified this paragraph to accommodate the justification, research gap and the questions addressed indicated below. *Few previous studies undertaken in Ethiopia have investigated the impact of source reduction activities on malaria transmission (Yohannes et al., 2005). No study to date has specifically investigated the impact of physical water characteristics on species composition and the abundance of Anopheles mosquitoes in association with reservoir water level changes. Understanding the impact of these parameters will lead to better decision making in relation to control activities, since where and how to make interventions will be clearly indicated. Therefore, this study aimed to determine how physical water characteristics, water level changes and other environmental variables affected the species composition and abundance of Anopheles larvae both close to and at a distance from the reservoir shoreline.*
5. What is the bigger picture implications of the finding/major lessons learned ---	On page 6033, before line 22, a paragraph on major findings of the study is added as follows. *The major finding of this study is that both species diversity and abundance are significantly greater in the village located close to the reservoir than they are in the village further away. The larvae of the two major malaria vectors in the area were found in much greater numbers in the reservoir village than in the control village. Both the physical water quality of the breeding habitat and the surrounding environmental factors (especially minimum and maximum daily atmospheric temperature) impact the breeding of malaria mosquitoes.* • On page 6036, before line 25 the following paragraph is added to describe major lessons learned from the study.

	In this study, physical water quality was found to be an important factor in variation in the abundance and species composition of Anopheles larvae. Reservoir water level changes were the main reason for the creation of potential breeding habitats (i.e. shore line puddles) in the reservoir village. However, both water and atmospheric temperature fluctuations were also found to be important sources of differences in larval density over time.
6. --- the Yohannes paper actually cites the Ghebreyesus paper, so there is no need to --- and cite both	The studies of Ghebreyesus *et al*., (1999) and Yohannes et al. (2005) are independent temporally and different in terms of their parasitological and entomological findings. Therefore, citing both papers separately (Page 6027 line 20-24) will be appropriate and no changes are made in this respect.
7. --- "**r**" rather than "**r^2**" is commonly used. ---- **r^2** should be used, or --- why authors ---- use **r** and not **r^2**.	Changed as recommended r is removed and r^2 is used instead throughout the manuscript . The authors believe that either r or r^2 can be used to describe the strength of the association between two variables. However, coefficient of determination or r^2 describes the strength of the relationship between the two variables and infers a cause-and-effect relationship indicated in our findings (McDonald, J.H. 2009. *Handbook of Biological Statistics* (2nd ed.). Sparky House Publishing, Baltimore, Maryland. pp. 207-220.
8. masl not correct	The reservoir water level (depth) is measured in meters above a local datum • *Page 6033, line 2 and 3 masl is Changed to m.*
Other corrections made to the paper to address the concern that it was sloppy	
Location of change	**Changes made**
Title page on page 6025	Title revised as follows: 'The effect of physical water quality and water level changes on the occurrence and density of *Anopheles* mosquitoes around the shoreline of the Koka reservoir, central Ethiopia'.
2.1. Study area on page 6029 line 3	The word 'and' is deleted since we believe that it is unnecessary conjunction.
2.1. Study area on page 6029 line 5-8	Statement modified as 'The control village is located five km from Ejersa and is always at least 7 km away from the reservoir, even when at its maximum extent. Both villages are located at similar elevation (i.e. 1,950 m.a.s.l.)
2.1. Study area on page 6029 line 11-12	Statement modified as ' Farmers in the area produce vegetables and cereals'
3.1 Larval species composition page 6031	A new paragraph is added that was formerly in the discussion section (page 6034 line 11-14) moved to 1st paragraph of the results section. The paragraph moved to the results section is as follows: *The number of positive sites encountered throughout the sampling period was 97 for the reservoir village and 22 for the non reservoir village. At Ejersa 66 (i.e. 68% of the breeding habitat was shoreline puddles. In contrast, rain pools dominated (i.e. 83.3%) at Kuma.*
3.1. Larval species composition page 6031 line 17-19	Statement is modified to: '*An. pharoensis* Theobald, *An. gambiae s.l.* Giles (presumably *An. arabiensis* Patton (Abose et.al., 1998)), *An. coustani* Laveran, and *An. squamosus* Theobald constitute the anopheline fauna of the study area

	(Table 1).
4. Discussion page 6034 line 9	The word ‘swamps, where the main larval habitat ‘is deleted and replaced by ‘areas’
4.Discussion, page 6035, line 7	The word ‘aquatic habitats’ is deleted and replaced with ‘conditions’.
4.discussion, page 6035, line 14	The word ‘types’ is deleted and replaced with ‘species’
4.Discussion, page 6035, line 18	The word ‘in the area’ is deleted since redundant.
4.Discussion, page 6035, line 26	The word ‘the’ is deleted since we believe that it is grammatically wrong.
4.Discussion, page 6036, line 1	The word ‘reach’ is changed to ‘reaches’ since we believe that the first one is grammatically wrong.