Dear Dr Vermeij,

Please find attached the second revision of the manuscript CORE-D-15-00336 *“Environmental factors limiting fertilisation and larval success in corals.”* We greatly appreciated the constructive criticism of both Reviewer 1 and yourself. We have addressed and corrected for each of the concerns as outlined below.

The most substantial changes are to the major concerns as outlines by Reviewer 1 in that we have provided the values of the water quality parameters measures in an additional table as well as created an equation for further use and explanation of our analysis.

In addition, we have rewritten parts of the paper to provide more clarity as well as addressed the minor concerns raised (please see specific alterations outlined below).

We hope you agree that the manuscript is much improved. We look forward to your response.

Sincerely,

Rachael Woods

**Reviewer #1:**

The authors have substantially revised their manuscript and it is much improved as a result. I particularly appreciate that the authors experimentally tested the outputs of their model, as this helps to confirm their model's accuracy and usefulness. Despite the improvements, I have some concerns listed below related to the writing and statistics. Most broadly, I feel the manuscript could be further improved by:

(1) providing more details of the results of their experiment, particularly in terms of how their measured water quality parameters and larval responses compared to the model outputs (i.e., strength of fit to model predictions)

We have further explained our methods and results as well as included a table of the water parameters measured within our examples sites (Table 5). While it was suggested that we model the outputs of our example findings onto our model outputs, we are unable to do this are the modeled outputs on include a single variable and out sample results include all those within the final model for each life history stage.

(2) coming up with a more user-friendly way for their model to be used by readers. The applicability of their model in real-world settings was a major selling point the authors used for this study, but they fall short of providing a substantive way for readers to apply their model. I would be happy to review a revision of this  
manuscript.

We have now created 3 equations located in the supplementary material that further explain our models as well as can be used to model real-world settings. We have also further explained the use of Github and our final manuscript will link to our analysis for ease of use.

**Second review of Woods et al. CORE-D-15-00336-R1**

**Major comments:**

- Page 8 line 47: There are a couple of potential issues here. First, the authors state that they calculated the standard error then state that they calculated the 95% CI for (what reads to me as) the same data. Which estimation of variance was estimated and reported? Secondly, when propagating the error across two metrics confidence bounds of the resulting estimates should not be generated from bootstrapped data. When this is done, as the authors seem to have done here, the number of iterations largely determines the size of the bounds (i.e., if you iterate enough times the bounds of noisy data will become quite small). For a broader description of this issue see Wilson White et al. (Oikos 123: 385-388, 2014). Alternatively, to compare between sites or model estimates the authors could generate bootstrapped values for the difference between A and B, then see whether the distribution of differences in bootstrapped values overlaps zero (i.e., are different).

We agree with the Reviewer that the final paragraph of the methods was unclear and confusing and so we have rewritten this section to better explain our process (Page 8, Line 202).

- Throughout the Results section the authors need to report values/percentages for how much variance in the model was described by the factors they mention. Using terms such as “most,” “the highest,” and “minimal” with respect to amounts of variance is much too vague for the Results section.

We have been more explicit with the results of our variance analysis and reported actual values within the text (Page 8, Line 212).

- I very much appreciate that the authors tested their model in a real-world setting. This is an extremely useful and rigorous approach. With that, I feel the authors need to more explicitly describe these experiments in the Results and Discussion. Specifically, please state the *a prior* expectations, the actual values measured for the water quality parameters (mentioned in the Methods), and describe how these values compare to the modeled values (both in terms of water quality and larval metrics). Perhaps the authors could even place their measured values on the model outputs (Figs 1 and 2) using a different shape and color so that the reader can see where the water quality, fertilization success, and larval survival fall out relative to all the data that went into the models.

We have further explained our real-world results by further explaining why each location was selected (Page 6, Line 160), as well as included a table with the results of the water parameters tested for each site (Table 5). Please also refer to Response 1 for further explanation.

- I feel that the authors have not gone far enough to make their results useful to readers and in particular reef managers who are trying to apply the model. I would not usually belabor this point, but the authors suggest that much of the value of their study/model comes from the fact that it will be useful for setting pollution limits. I would like to see a more useful/user-friendly/accessible way that readers can apply the model. Perhaps this could be as simple as a series of equations in the supplemental in which users could input their own environmental parameters to generate an estimation of how much fertilization or larval survivorship decreases relative to when those pollutants are absent. Furthermore, I don’t see (but perhaps missed) any references to the Github repository of data that the authors reference in their response to my previous review.

Please refer to Response 2.

**Minor comments**

- Page 3 lines 11-25: These sentences are awkwardly phrased and unnecessarily vague. Please be more direct about cause and effect and clearer about the topic (remind the reader what species you’re talking about).

This section has been rewritten to give more detail and understanding to the paragraph (Page 3, Line 81 onwards).

- Page 4 first sentence: The reference to environmental cues is much too vague to be informative to the reader. What are these cues? What do the cues initiate during the pre-settlement stages? Either elaborate or remove this sentence.

This sentence has been give more detail to further explain to the reader the use of ues (Page 3 and 4).

- Page 4 line 33: Again, describing the cause and effect between climate change and runoff would be useful, rather than vagaries such as “linked to.”

This section has been rewritten to give more detail (Page 3, second paragraph).

- Page 4 line 52: If you use phrases such as “specifically shown to negatively affect…” you need some references, even though you go into more detail (with refs) in the following sentences.

Added references to this sentence (Page 4, Line 104).

- Page 9 line 12: Copper is incorrectly capitalized.

This change has been made.

- Page 9 line 12: Please report how much of the variance in the fertilization model (as a %) was explained by salinity and copper. The lack of concrete values is a recurring issue throughout the Results.

Exact values have been given throughout the results section.

- Page 9 line 22: The sentence starting with “Whereas…” is not a complete sentence.

This sentence has been re-written (Page 8, Line 221).

- Page 9: State for the reader why success was expected to be worse in water from these two locations relative to the third.

This has been further explain in the methods section (Page 6, Line 160 to 169).

- Page 10 line 56: The sentence starting with “Anthropogenic impacts..” is awkward and vague, please be more explicit.

This sentence has been rewritten for clarity (Page 10, Line 258).

- Page 12 line 6: The use of “significant” here is inappropriate.

This word has been changed.

- Page 13 first sentence: This sentence is very hard to follow. Please re-phrase.

This sentence has been re-phrased.