In this paper, the authors use a system dynamics approach to estimate green water and hypothetical blue water consumption for various crops in different parts of the United States, which is an interesting topic to readers of JSWC. I agreed with two reviewers that the paper in its present form has serious flaws in writing. The manuscript need organized well and edited carefully. Therefore I recommend the paper be published in the JSWC after major revision.

Thank you for the provisional acceptance of our manuscript. We have addressed specific reviewer comments and we have edited and organized the document for resubmission.

Reviewer #1: I thoroughly enjoyed reading the paper which I found very insightful. However, I would recommend a good once-over by a good editor. There are numerous "typographical," spelling and grammatical mistakes that I decided not to point out but which a good editor will readily find. Certain sentences are absolutely impenetrable. Moreover, the paper can be shortened by eliminating repetitive treatments of some points. I also suggest adding one or two examples of how the tool should be used. Finally, I would recommend that you include in the paper caveats that a user should include with his or her results in using the model.

Thank you for your comments and compliments.

As suggested, this paper has received a once over by a professional editor. We have also reviewed the text for repetitive content. Also, as suggested we added examples of how the tool should be used on page 21 and 22 and caveats on using the results of the model in light of its limitations in the paragraphs starting on line 372, 384, and line 407.

Reviewer #2:

Reviewer Comments on JSWC-D-15-0010

The article entitled, “Estimating biofuel feedstock water footprints using a database and system dynamics approach,” provides a review of water footprint analyses and describes a model that integrates existing soil, climate and crop databases and uses a system dynamics approach to estimate green water and hypothetical blue water consumption for various crops in different parts of the United States. The topic is of interest to readers of JSWC, and I believe the model is based on sound principals. The authors describe limitations of the model and the database integration, which is important to readers. However, the article is not organized well within the JSWC research article format and the figures are not self-explanatory. Another concern I have is that the author(s) did not carefully edit the article before submitting it to JSWC. I assume the text (or at least a portion of the text) was copied from a thesis or dissertation, although it may have been copied from another publication. Several sentences refer to sections that don’t exist in the submitted article, and Figure 7 is also labeled Figure SI-1. More specific comments follow. Some are editorial.

Your comments and compliments are much appreciated. We have made several improvements to the papers in response to reviewer feedback.

* We reorganized the content to better fit within the JSWC research article format.
* We have also better integrated figures into the manuscript by further developing captions and expanding the text within the main paper to better explains the figures. For example, text starting on lines 288 now gives a complete walkthrough of Figure 1 (now Figure 2).
* We apologized for editing issues and incorrect internal references. This publication is adapted from a report internal to our organization and we should have been more meticulous in adapting the report for submission as a JSWC manuscript. We have since given the manuscript further review and sent passed the manuscript through an editor.

Our responses to specific comments are included below.

1. The first section should be the introduction, which provides a background and a reason for the research. The sub-heading entitled “Water Foot printing Definition” belongs in “Materials and Methods,” because it describes how these definitions are used in the model.

Response: As suggested, definitions have been moved to the beginning of the materials and methods section.

1. P. 2, line 24: “spatial” should be, “spatially”.

Response: We accepted the suggested change.

1. P. 2, line 25: Delete, “is used” from the sentence.

Response: We accepted the suggested change.

1. P. 2, line 30: SD and all acronyms should be spelled out the first time they are used.

Response: We accepted the suggested change.

1. P. 2, line 40: In this context, it is not clear to me what is meant by R&D pathways. Also, spell out R&D.

Response: We revised the sentence to clarify that we were referring to research and development with regards to potential biofuel pathways (i.e., feedstock production and conversion process to biofuel) that could be researched.

1. P. 4, lines 76-78: I’m not sure what is meant here. Does the sentence mean that more than a gallon of water is used to produce each gallon of crop-based transportation fuel? What is meant by “consume”? Are the authors only considering the water used in the biorefinery? More clarification is needed.

Response: We revised this sentence to more clearly convey that we were indicating the relative importance of water in biofuel production relative to gasoline and diesel production.

1. P. 4, line 88: Change, “on” to “to”.

Response: We accepted the suggested change.

1. P. 6, lines 128-132: The discussion of outstream vs. instream water is confusing. Is surface water considered outstream water if it is withdrawn by humans for industrial purposes? Is water drawn from aquifers considered instream water if it is applied as irrigation to be taken up and transpired by plants?

Response: We revised this paragraph to clarify the use of these terms. The terms used in the original version of the texted were corrected.

1. P. 8, line 178 and p. 9, line 197: It is dangerous to include web links in published papers, as they often change without notice.

Response: As suggested we have removed web links from the paper and replaced them with citations.

1. P. 9, line 183: Add, “with this model” to the end of the sentence.

Response: We accepted the suggested change.

1. P. 10: the first paragraph in this materials and methods section belongs in the introduction.

Response: As suggested, we moved this paragraph to the introduction.

1. P. 10, line 217: What is a “high” spatiotemporal database?

Response: We clarified that we were referring to the resolution of the datasets used in modeling.

1. P. 11, line 230: Should read, Soil Survey Staff 2013b

Response: We accepted the suggested change.

1. P. 11, line 231: Do you mean,” GitHub”?

Response: We accepted the suggested change.

1. P. 11, line 239: Delete, “for 2,648 stations across the United States”. It has already been stated in line 230 and is stated again in line 249.

Response: We accepted the suggested change and deleted this repeated text.

1. Figure 3: This figure is confusing and doesn’t add much to the paper. It would make more sense to explain in the text that the density of Cligen stations varies by State from 1-10 stations per million ha, but the majority of States have between 2 and 4 stations per million ha (if that is what the figure is intended to convey).

Response: We accepted the suggested change and deleted this figure.

1. P. 12, lines 251-257: This paragraph explains Figure 2, so I would refer to Figure 2 here, or, conversely, move this paragraph to the section that refers to Figure 2.

Response: As suggested we better integrated this figure into the text of the paper.

1. P. 13, line 271: There is no section 3.3 below.

Response: We accepted the suggested change.

1. P. 16, lines 343-344: There is no section 3.5.

Response: We accepted the suggested change.

1. P. 16, line 350: There is no section 1.3.

Response: We accepted the suggested change.

1. Results and Discussion: This section should ideally start with results rather than discussion.

Response: We accepted the suggested change and moved the discussion of results to the start of the Results and Discussion section.

1. P. 17, lines 379-380: This sentence could be rewritten, “Studies evaluating average county level water footprints in the US have only been published recently”.

Response: We accepted the suggested change.

1. P. 18, line 400: Spell out ANL.

Response: We accepted the suggested change.

1. P. 19, line 409: Insert, “that” between “efforts” and “consider”.

Response: We accepted the suggested change.

1. P. 20. “Discussion of Illustrative Results and Comparison to Other Studies”: These are the main results of the study. I would think this section belongs at the front of “Results and Discussion”.

Response: We accepted the suggested change and moved the discussion of results to the start of the Results and Discussion section.

1. P. 20, line 435: The statement, “As expected, green water footprints for both crops are greater in the western United States,” may not be appropriate. It could be clarified…”because evapotranspiration tends to increase as you move west,” for example. However, if groundwater is blue water and surface and vadose zone water is green water, I would expect blue water footprints to be greater in the Western US, where groundwater is used extensively for irrigation. Figure 6 shows only water footprints for the Eastern half of the US. Both blue and green water footprints appear higher in the western part of this range.

Response: The suggested revision to the text was implemented. In response to this comment we also added some discussion of blue water. Blue water requirements do also increase when moving west. However, as noted starting on line 377 blue water use shown in this paper is related to water requirements needed to achieve “full yields”. While climatic conditions in the west are indirectly linked to chosen farming irrigation practices, the results we show are not linked to data on actual irrigation practices such as the USDA irrigation survey.

1. P. 21, line 459: I think you mean to say, “blue water footprints” rather than “green water footprints” on this line.

Response: We accepted the suggested change.

1. P. 22, lines 476-487: I think this paragraph belongs in the “Conclusions” section.

Response: We accepted the suggested change.

1. Figures: Most of the figure descriptions are very limited. Is there a page of figure descriptions missing from the paper?

Response: We added additional explanation to captions in order to further clarify the symbols used and the interpretation of results. Additional figure descriptions are in the main text. The main text now includes further integration and use of the figures.

1. Figure 1: This figure is partially described in the text, but the figure should be referenced where this discussion occurs.

Response: As suggested we better integrated this figure into the text of the paper.

1. Figure 2: This figure needs some explanation before it is referenced. Also, the acronyms should be explained in the figure legend. I would also recommend adding another arrow to the top of the figure pointing to “Exogenous Inputs”.

Response: As suggested we better integrated this figure into the text of the paper. We also implemented the suggested figure revision.

1. Figure 3: As mentioned before, this figure is hard to understand. If you leave it in the paper I would recommend providing an explanation.

Response: As suggested we deleted this figure. Instead we described the implications of this figure in the body of the paper.

1. Figure 7: What are Frame A and Frame B? This figure also needs more explanation. What does Mg3/Mg refer to? Mg3H2O/Mg biomass? Where does Figure SI-1 fit in? Is it part of Figure 7 or a separate figure?

Response: Frames A and B refer to the corn and soybean figures comparing BioSpatial H2O and Wu et al. 2013 (now ANL 2013 to reflect ANL’s requested citation format) data. This should now be clearer with caption revisions. Units are now clarified in figure captions. Figure SI-1 mirrors Figure 6 except instead for blue water instead of green water.

1. Pp. 40-76: Most of the information in this appendix would not be useful to the typical reader of JSWC.

Response: On other prior journal papers we have often received conflicting preferences from peer reviewers about whether model equations should be included with manuscripts that involve model building. Equations were included in this manuscript to preempt those questions or comments, so thank you for clarifying that it is not appropriate for the audience of JSWC. We have removed this material from the manuscript.