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Peer Review File

Floating Wetlands beyond Retention Ponds: Estimating Nitrogen Cycling and Removal in Tidal Waters

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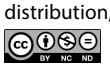

Associate Editor's Review Summary:

The reviews of the manuscript generally agree on the suitability of the manuscript for the journal. The three reviewers generally praised the study for being well-conducted and the manuscript for being well-written, having implemented improvement recommended in prior reviews. One reviewer highlighted the clear effort put into the work and offered minor suggestions, mainly related to clarity in specific sections, grammar, and transitions between ideas. Another reviewer was appreciative of the revisions made, particularly in the Results section, and suggested a few additions and changes to improve the clarity and structure of the content. The final reviewer provided more detailed feedback, pointing out specific issues with many of the components, including the title, abstract, introduction, and methodology. These issues, such as missing justifications, significant figure errors, and lack of clarity in some explanations, are not overly diminishing to the quality of the work, and are generally able to be addressed directly by the manuscript authors. All three reviews offered constructive criticism to refine the manuscript further that this editor generally agrees with. Based on the sum aspect of the reviews, this editor recommends the manuscript be returned for revision for minor changes.

We thank the reviewers and the Associate Editor for their thoughtful consideration of the manuscript.

Reviewer Comments:

Reviewer 1

Thanks to the authors for a well-done study, and well-written paper. It's clear that a lot of effort went into this experiment, and it will provide some helpful insights on an emerging new BMP. I did not review the prior version of this paper, but it does appear like the authors did a thorough job of addressing prior comments. I have a few relatively minor thoughts/points that came up as I read through the paper.

Abstract

-It doesn't feel very meaningful to report mass removal in the abstract when there's no context of size of mesocosms or amount of water treated

We agree with the reviewer, and other reviewers made the same suggestion. We have removed these values from the abstract on lines 23-24 of the revised manuscript.

-It was a bit surprising to have back-to-back statements about nitrate/nitrite increasing, but then in the next sentence talk about high denitrification rates. Maybe you could add in a better transition there to address this that alludes to the fact that high rates of nitrification helped fuel denitrification but there was still net nitrate production, or something to that effect.

We agree, and have added a sentence combined with editing the following sentence to make this association. See lines 25-29 of the revised manuscript.

Lines 104-106- this was a bit confusing to talk about the summer 2019 experiment measuring 'nitrogen removal and transformations' while the spring 2021 experiment measured' nitrogen transformation and removal.' Is there any meaning in the fact that these statements are the same words but reversed order? I know there was a slight difference in what you measured in the two experiments, but why not just say that nitrogen removal and transformations were measured in both experiments.

We have fixed this, as the order of the two words should have been the same. See lines 108 and 110 of the revised manuscript.

Line 217-219- grammar issue here

We have fixed this sentence on line 229 of the revised manuscript.

Line 315- fix misspelling

We have fixed this.

Line 401- add be before supported

We have fixed this.

Line 417- correct Arctic spelling

We have fixed this.

Line 484-485- be a bit more explicit here about the numbers that support this. Like would be good to reference the masses to make the case that plant assimilation is far outweighed by these other N removal paths.

This is a helpful suggestion. We have added these values in a sentence on lines 501-502 of the revised manuscript.

Reviewer 2

The authors have done a great job revising this manuscript and addressing all comments by the reviewers. In particular, the tightening of the results section and the discussion of future directions are changes that substantially enhance the suitability for publication. I have only very minor comments to suggest:

Lines 24-26. Are these removals presented as grams per unit time, or grams over the course of the entire experiment? Maybe say 'total'. Is the 2019 result also an average?

Other reviewers raised questions about the nature and context of these values in the abstract. Based on all of those comments, we have removed these values from the abstract on lines 23-24 of the revised manuscript.

Figure 3. This might just be an issue with how the figure is rendered, but I don't see any asterisks though they are mentioned in the caption.

We have replaced Figure 3 with a version that clearly has the asterisks.

I suggest revising your Results section numbers and titles. I suggest the following (or something similar):
3.1 Nutrient removal
3.2 Nutrient transformations and oxygen consumption
3.3 Plant and periphyton nutrient assimilation OR Biomass nutrient assimilation

We have followed these suggestions on lines 260, 322, and 386 of the revised manuscript.

Line 387. Should this read "N-species specific"?

Yes, we agree, and have made this change.

Line 453. Should this say "of the same order of magnitude as the denitrification rate"?

Yes, we agree, and have made this change.

Reviewer 3

Title:
Perhaps take out "understanding" in the title. Also, the typo "s" in retention

We think this is a reasonable change to make, and we have done it, as well as removing the "s"

Keywords:
Add "Constructed Floating Wetland" to your keywords as this is a common term elsewhere on the globe.

We agree and have added this.

Abstract:
Take out the last sentence and add on a note that concerns the major findings of your work.

This is a good suggestion, and we have removed the last sentence of the abstract and replaced it with a sentence with the major findings, see lines 34-36 of the revised manuscript.

Remove a "watershed" from the first line

We have done this.

Overall, there is too much data presented, and not explained more broadly, in the abstract.

We appreciate this comment, and all reviewers raised issues with this. We have removed the removal values from the abstract, but kept the denitrification values because we think people can interpret these without context. But we did reduce the number of times we included the denitrification units, to clarify the text.

Introduction:
Line 40: Venture a stronger opening line.

We have done this on lines 40-42 of the revised manuscript.

Line 41 change and to but.

We have done this.

Since the microbial community is an important factor in your results, it could be beneficial to include some background here.

We appreciate this comment, and we have added a sentence referring to the microbial processes most relevant to this study on lines 46-49 of the revised manuscript.

Line 58: Watch your significant figures: 210.31 is nuts. There is no way that is accurate to that degree. Check throughout your paper. The problem with significant figures was noted in the earlier review but not well addressed. This should be fixed.

We have reduced the number of significant figures here, in Table 3, and throughout the manuscript.
Lines 60-64: Run on sentence. Consider splitting the sentence at line 63 after the Choi et al., 2020 citation. Begin the next sentence with "However, issues of cost..."

We have done this on lines 67-68 of the revised manuscript.

A part of the design I was curious about was the choice of Spartina patens for the planted mesocosms. I would like to see one or two more sentences justifying this choice. The Landaverde et al paper might help support the choice.

We have edited and expanded this section to more clearly articulate the choice of S. patens, including a reference to the Landaverde paper, please see lines 160-164 of the revised manuscript.

Methods:
Line 129-130: Reader needs to be directed to supplemental materials for the conditions of the tank.

We assume that by *conditions* you mean water temperature, pH, dissolved oxygen, etc. measured daily in the tanks. We now provide text in the manuscript that directly reference those data in the supplemental material on line 137 of the revised manuscript.

Line 130: Mentions measurements for water temperature, dissolved oxygen, salinity, specific conductivity, pH and chlorophyll were monitored on a daily basis. Was this done at the same time each day?

Yes, these measurements were made around the same time every day (Between noon and 3 pm). We added this information on line 135-136 of the revised manuscript.

Line 148 An explanation of why the FTW media covers the entire surface area could be helpful.

We clarified the rationale for doing this on lines 154-156 of the revised manuscript. The floating wetland covered the entire surface of the tank to minimize mesocosm artifacts such as water column photosynthesis.

Line 154: Add a reference for this statement and add the values for the range of salinity that the high-marsh grass can withstand.

We did this on lines 162 of the revised manuscript.

Line 157: Why was it decided that 2 weeks is appropriate before the first readings were taken?

We wanted to allow the tanks to stabilize and the plants to have time to establish themselves under the planting conditions, but we also did not want to allow mesocosm artifacts to establish such as epiphytic communities. We added this decision rationale to the methods on lines 164 to 167 of the revised manuscript.

Lines 116-118: Re-word these sentences to read more as, "The first experiment was performed from June 21 to September 19, 2019..." Then, start a new sentence at the end of line 117 by saying, "The second experiment was performed from April 16 to July 22, 2021..."

We did this on lines 122-123 of the revised manuscript.

Further explanation required as to why S. patens was the only plant tested for nutrient uptake when there are other key plants found in estuarine systems.

These were laborious experiments that took months to execute and months to process, thus we were limited in how many experiments we could do to test different species, especially considering budget constraints. We appreciate that different species might results in different nitrogen uptake rates and future work could investigate that. Our conclusions now encourage future experiments with additional plant species on lines 542-545 of the revised manuscript.

Line 195: Shorten this line as it is repetitive to "Above-ground and below-ground biomass was collected following Kreeger (2014a;2014b) respectively"

We did this.

Line 135: When did these three measurements occur? Be specific.
Nice added photo!

We did this.

Line 179-180 doesn't make sense.

We expanded the sentence on line 192 of the revised manuscript to indicate no significant differences between the inflow pipes, justifying the assumption that one inflow value represents the inflowing concentrations of nitrogen.

Line 208 and 214: Did a person or computer program pick these random squares or locations?

A person did. We did not edit the manuscript in response to this comment.

Line 221-222: Why were denitrification rates only measured in spring 2021? Clarify this. Statistical methods used should be included in the methods section.

We clarified this sentence on lines 223-225of the revised manuscript. Denitrification was measured both in 2019 and 2021. Nutrient fluxes (NH4 and NO3) were only measured in 2021.

Results/Discussion:
Line 255-257: Add a sentence to clarify the mesocosms being sources of TN. Why?

We added a sentence to clarify what is meant by the mesocosms being a source of TN during those two weeks on lines 268-269 of the revised manuscript.

Line 336: "Basically zero" is not something scientists say. Essentially nil? \

We edited this to say "close to zero".

Lines 362-365: This sentence doesn't make sense.

Agreed, we edited lines 374-376 of the revised manuscript to clarify this.

Line 380: Spaces are in the wrong spot: 1% N compared to 2-3% N

We made sure there were spaced between the numbers and the %, and between the % and N.
You should use contrasting patterns in your bar graphs to help colorblind readers (and all readers really) see your findings more easily.

We were considerate of this when selecting color palettes and we used commands in R that automatically select color blind friendly palettes. If the journal would like us to change our palettes, we would be happy to consider other options, but it is unclear how we could address this better.

Figure 7: NH4 and NO2+3 at the top of the graph should be reformatted as subscripts.

We have fixed this.

In the caption either rewrite it to where the left panel (NH4) is talked about first or swap the panels in the actual figure. Check all figures/text for errors like this.

We have fixed this.

Section 4.4 should reference the literature more, like the Landaverde et al. (2024) paper (which has Spartina patens data in very similar mesocosms)

We have fixed this.

Line 426: Subject-verb disagreement

We have fixed this.

Table 3: As noted previously, far too many significant figures.
We reduced significant figures in this table.

Line 333: You are confident to 4 significant figures on these data? I wouldn't be.

We reduced significant figures throughout the manuscript.

Conclusions:
Line 508: Capitalize "Work" and be consistent with your headings and capitalization

We have fixed this.

Consider a sentence or two covering the limitations of this study like the lack of temporal variability (no study performed in winter months) and the gap between the two experiments, etc. New literature should not generally be introduced in the Conclusions.

We removed the reference and expanded on the limitations of this study on lines 537 to 545 of the revised manuscript.