# Comment on bg-2021-302

Anonymous Referee #1

---

Referee comment on "Species richness and functional attributes of fish assemblages across a large-scale salinity gradient in shallow coastal areas" by Birgit Koehler et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-302-RC1, 2021

---

General comments:

The manuscript Species richness and functional attributes of fish assemblages across a large-scale salinity gradient in shallow coastal areas, by Koehler et al. uses a large data set (from a 45-year period) of fish species incidences covering most of the Swedish coast to study differences in species richness in distinct sea areas using rarefaction and extrapolation methods. Overall, the manuscript is of good quality, and the novelty of the study, owing to the large data set and geographical coverage, is that it uses standardized species richness to estimate "true" and comparable SRs. The manuscript addresses relevant scientific questions as salinity, a tested potential driver of SR differences, likely will change due to climate change, which will affect SR and management.

However, I would strongly argue that the manuscript should use data only from shallow coastal areas and exclude offshore areas from the study for several reasons, such as there is an unbalance in data availability with most data originating from coastal areas, there is a bias towards more saline regions for offshore areas, only one offshore area is statistically tested and compared, and shallow offshore areas are discussed basically only over three lines in the discussion, contributing very little to the manuscript.

Specific comments:

The presentation of the study is clear and well-structured, and the language is fluent and precise with some errors (see technical corrections). However, the title implies that the study only includes shallow coastal areas and not offshore areas (but see comment above). The abstract provides a concise and complete summary of the study.

The manuscript has well-balanced parts (text, figures, tables), but several tables need to be clarified (see below).

The study focuses on the impact of salinity on SR (and, for comparison, temperature). While salinity likely is a key driver across this geographic range in the Baltic Sea, it is not clear why temperature was selected as the only secondary factor, i.e why other variables such as nutrients (eutrophication) were not considered. The selection and backround of factors should be better elaborated in the introduction.

The scientific methods are mostly valid and clearly outlined. However, in section 2.3 Analysis of species richness data, the part outlining calculations of Hill numbers (starting at L158) is confusing and needs both elaboration and clarification. For example, L158 and L165 both refer to Chao richness, but these are likely not identical in their meaning and a clearer separation between the two is needed to avoid confusion.

L164, the used coverage-based rarefaction and extrapolation methods need to be elaborated to better explain the methodology and analyses.

L169, the terms Inventory (sample) completeness (IC) and Sample coverage both need to be elaborated as they are central to the study, especially in relation to sample size.

The Result section is sufficient to support the interpretations and conclusions.

Discussion:

The role of IC is very well elaborated in the discussion. Also, the use of different fishing methods is justified at a good level. Salinity (and temperature) is discussed in detail. However, there is an unbalance towards the end of the discussion with the functional aspects discussed in less detail compared to the other sections of the discussion. The manuscript could benefit from a more detailed discussion on the found differences in e.g., habitat preference and feeding habits.

The conclusions are well in line with the results and discussion.

The authors clearly indicate their own contribution to the manuscript. The number and quality of references supplementary material are appropriate, but see comment below (L395-397).

Technical corrections:

L48 add "in the Baltic Sea" after species.

L56 Delete: that has been studied for various organism groups

L57-61 Change the sentences so present tense (is) is used (as other sentences use this tense)

L103-104. Write out Latin names for fish species.

L113. No space between < 30.

L113-114. "with some margin to the photic depth in the concerned coastal habitat types". It is not fully clear what this means. Why is a margin to photic depth important?

L131 (and elsewhere) The Quark, The Sound should be "the Quark" not Capital The.

L155. Error: theirincidence

L168. Change to: in Chao et al. (2020).

L168-169 (and elsewhere). Change - to – (for intervals) and delete space between number and –.

L216. Error: speciescoastal -> species in coastal

L268. Error: areasuggests

L295. Avoid starting a sentence with a numeral.

L311-313. This sentence doesn't read well: A similar result was noted for catadromous or anadromous fish species, with SRstd between 2 and 6 in each sub-basin that was not related to salinity.

L371. "a 2008 assessment" change to "an assessment from year 2008 of… (or similar)

L374. See previous comment.

L395-397. Is it neseccary to have 11! references to this statement?

L424. L450. Delete with

L595. Finish, change to "Finnish"

L597. S., change to "Sci.,"

L605. Error in doi

L659. . 2021. Change to ", 2021."

Table 1 & 2. Move Size of area <30 m (km2) from table 2 to table 1 (for better use of space)

Table 2. Delete "and statistics" in table text.

Table 3. Explain what the * stands for in Åland Sea. Error in text: samplingsShD

Table 4. Statistical indicators for the correlations between fish species richness... Change to: Linear regression between fish species...

Table 5 (text). Write out what statistical test this is based on, i.e. linear regression. Also, Make it clearer which attributes in second column are connected to which attribute in first column, e.g., by separating by lines.

Table S2. Table is very difficult to read as such. To improve readability, e.g., put all identical values on the same row so that n=xx are always on the same row.

Table S3-S6. The functional attribute D P should be DP (no space between)