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Comment on hess-2021-196

Anonymous Referee #2

Referee comment on "Macroinvertebrate habitat requirements in rivers: overestimation of environmental flow calculations in incised rivers" by Renata Kędzior et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-196-RC2, 2021

General comments

The authors used macroinvertebrate sampling, environmental measurements, and hydraulic habitat modelling to compare calculated environmental flow requirements between incised rivers of various types and rivers with sediment deposition. The topic is novel and interesting, but the methods are inadequately explained (please see detailed comments below) and sometimes appear inappropriate. In addition, parts of the manuscript are quite difficult to understand.

Areas of particular concern are:

(1) Insufficient background information, such as the nature and causes of the incision and sedimentation.

(2) The use of a pollution-oriented biotic index (BMWP) as a biotic response variable rather than a flow-oriented index such as LIFE (Lotic-invertebrate Index for Flow Evaluation).

(3) Reference to WUA (presumably weighted usable area) without explanation of which species and life-history stage it was calculated for and how.

(4) Incorporation of multiple statistical testing that is likely to increase type I error and does not seem necessary to address the stated study aims.

(5) Lack of discussion of limitations of the methods used.

Specific comments referenced by line number(s)

15-29. The abstract is quite poorly written and structured and often difficult to understand.

- Which measurable variable(s) does “water flow intensity” refer to? Discharge? Velocity? Stream power?

- There is no need to include “multispecies”. By definition, and ecological community comprises multiple species.

- The morphology of what?

- What is an “incision dam”?

- Perhaps “characteristics” rather than “values”.

56-57. Q should be defined and a citation should be provided for the use of discharge curves.

- The methods referred to have also been applied to other organisms, particularly fish.

76-77. I cannot find anything in the manuscript that considers macroinvertebrate habitat preferences. Habitat preference varies among species and their life-history stages, and the manuscript does not consider individual species and stages.

80-82. The intended meaning of “to identify a scale of e-flow overestimation” and “overestimation of e-flow calculations” is not clear to me.

- Why did you sample only mountain rivers when your objectives (line 78) refer to mountain and lowland rivers? Also, why did you select these particular river types and sites?

97-109. The river categories are variously referred to as classes, groups and types. It would be better to stick to a consistent term.

- Some detail about the incision in these rivers would be informative, for example the spatial extent and rates of incision and deposition and the extent to which these processes are natural or induced by anthropogenic changes in land cover, land use and flow regimes.

- Please explain what the substrate index measures and how it is calculated.

- I do not understand the reason for using the BMWP index because it is related to pollution rather than flow velocity. Why did you not use a flow-specific index such as LIFE (Lotic-invertebrate Index for Flow Evaluation)?

- KsiÄ Å¼ek et al. (2019) is in Polish and therefore will not be accessible to most potential international readers. You could perhaps refer to Gippel and Stewardson (1998, Regulated Rivers: Research and Management).

- How did you define low flow? What threshold was used and why?

- What procedure did you use to ensure the choice was random.

- For Fig. 2, please tell the reader what delta h and F represent and how they were calculated.

- For Fig. 3, please explain what the error bars represent.

- The acronym WUA (presumably referring to weighted usable area) needs to be explained.

- How did you calculate weighted usable area? It is normally defined with respect to a particular life-history stage of a particular species, and calculated from its preferences for velocity, depth and substratum.

- What thresholds were used to classify depth and velocity as low, medium and high, and on what basis were the thresholds chosen?

- Did you apply any transformation to raw abundance values before calculating the Bray-Curtis index?

219-229. Text in this paragraph is often hard to follow. In addition, there is statistical problem of multiple testing (32 separate tests in Table 2), which increases the type I error rate. Also, it is very well known that stream invertebrate assemblages vary according to velocity and depth, and unclear why all of these analyses are need to fulfil the study aims.

232-233. The fact that the relationship of the BMWP index to depth and velocity is so variable further indicates to me that it is not a suitable biological response variable for the purposes of this study.

- How was similarity calculated?

- Please explain what the various symbols (dots, lines, boxes) in Fig. 6 represent.

281-285. What do the percentages in Fig. 8 represent? Percentages of what?

302 and elsewhere. Habitat for what? Different species have different habitat requirements and what is suitable for one species at one life-history stage may be unsuitable for another species and life history stage, or even another life-history stage of the same species.

338-339. Because this conclusion seems rather paradoxical, I suggest that you should discuss the limitations of your method. Various types of habitat simulation methods have received significant evaluation and criticism (see for example Gan & MacMahon 1990, Regulated Rivers: Research and Management; Parasiewicz and Walker JD 2007, River Research and Applications; Railsback 2017, Fisheries; Yi et al. 2017, Renewable and

Sustainable Energy Reviews).