UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo

DEPARTMENT OF ZOOLOGY

Review of Appendix J, Franklin et al. 2019 – Gerry Closs

General Comments

My review of this document is based on reading selected parts of Depree et al. 2019, particularly Appendices DD and EE, and selected parts of Franklin et al. 2019, particularly the Appendix J, Executive Summary and relevant sections of most chapters.

My expertise relates to knowledge of the data sets on which the analyses are based, and a general understanding of the methods used to conduct biomonitoring. However, I am not a statistician - whilst I have a general understanding of the various statistical and modelling approaches used to derive the fine sediment attribute thresholds, I do not have the expertise to fully assess the appropriateness of the specific statistical/modelling approaches methods used.

Overall, as a theoretical exercise in determining relationships between landscape, sediment and community, the analysis clearly represents a methodologically cutting-edge approach to defining landscape-specific thresholds for detecting community-level responses to fine sediment inputs in streams.

However, the strongest community-level responses to sediment inputs mostly occur at relatively low levels of sediment input – presumably due to the loss of highly sensitive EPT taxa. In practice, this means that for many landscape classes, the range of sediment values from reference to the C/D threshold is relatively narrow. It is difficult to see how each A/B, B/C and C/D threshold could be accurately assessed across such a narrow range of values.

To sum up (and to play Devil's Advocate to some degree), the complex and rigorous analysis more or less supports what we already know – that highly sensitive EPT taxa are lost at relatively low inputs of sediment, with other elements of the community being less responsive to further inputs. I can see how the methodology could be used to set a National Bottom Line threshold – for most landscape classes, the difference between the reference and C/D threshold is sufficiently wide to be measurable using current sampling protocols. However, setting and assessing intermediate thresholds would be challenging in many areas.

Further, the lack of information on uncertainty in the models also means the uncertainty around the proposed thresholds is poorly understood. Whilst that may not be a problem for comparing reference with C/D thresholds, this again presents a problem in setting finer scale intermediate thresholds, particularly where the difference between the reference and C/D threshold is relatively narrow.

It may be just simpler to accept the wider message of the modelling – that at ~20% deposited fine sediment coverage (or equivalent turbidity or visual clarity value), sensitive taxa are lost from stony streams. In theory, the detail can be modelled, but in the messy real world of field sampling, assessing community responses to small changes in sediment input will be far more challenging.

Specific Comments

The first part of Appendix J assesses the availability and quality of suitable datasets. As far as I am aware, the authors have accessed and made appropriate use of available relevant datasets. Overall, clear understanding of the data sets is demonstrated, and the strengths and limitations of each data set are clearly explained. Clearly problems exist with respect to the complementarity of the various data sets,

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particularly NZFFD data in relation to various measurements of sediment. The visual clarity and turbidity data have been 'in-filled' using modelled data – it is hard to assess the overall accuracy of this approach, although I accept it represents the best available option at present. The use of NZFFD sediment data would also seem to be the best available approach, although I would query the accuracy/consistency of the deposited sediment data in the NZFFD – at 'coarse scales', I would be confident in the data, but would query its consistency at finer scales given the wide range of expertise of the people recording data.

Selection of taxa contributing to the Community Deviation Method seems logical and appropriate. Understanding of the cofactors contributing to distribution also seems logical.

Whilst I do not have the expertise to comment on the specific details of the methods used to assess community change resulting from changes in the ESV state, the approach seems logical as far as I can follow it. I do not have sufficient expertise to suggest alternate approaches. The results that flow from this analysis intuitively correspond with the taxa-specific responses that I would expect to see.

The selection of a 20% deviation from reference community integrity values is appropriate, representing what would seem to be a fairly significant deviation from the reference condition. That said, I suspect that the 20% deviation in most communities is driven by the loss of EPT taxa, which would likely limit the responsiveness of communities to further change (see subsequent comments).

I note in Chapter 4, statements such as:

p. 56: However, it is noted that approximately 70% of the data used to build the model occur in the range of 0% to 25% deposited sediment cover.

p. 57: Data are again unevenly distributed across the deposited sediment gradient (as indicated by percentile rug plots on the x-axis) with approximately 70% of data below 30% cover in class L2.2

Does this suggest that rapid and substantial community responses to increased sediment occur at relatively low levels of sediment input, with relatively limited changes as further inputs occur?

This also suggests that if changes in community are occurring across a relatively narrow band of sediment input, then deriving A/B, B/C, C/D thresholds within that narrow band will be difficult.

Tables J2-J4, which present potential band thresholds for the SSC classes would appear to support the previous statement – the spread of values from the reference to C/D threshold can, in some cases, be quite narrow. It is hard to see how intermediate thresholds within the narrow range of many SSC classes could be reliably be assessed.

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