Established 1968

New Zealand Freshwater Sciences Society

Sara Clarke

Ministry for the Environment

PO Box 10362

Wellington 6143

4 February 2015

Dear Ms Clarke,

FEEDBACK ON THE NPS FRESHWATER MANAGEMENT 2014: DRAFT FRESHWATER ACCOUNTING REPORT

NEW ZEALAND FRESHWATER SCIENCES SOCIETY

Introduction

1. The New Zealand Freshwater Sciences Society (NZFSS) was established in 1968 as the New Zealand Limnological Society. It is a constituent body of the Royal Society of New Zealand and has some 430 members. The Society's membership spans the breadth of academics and researchers to resource managers in the field of freshwater. NZFSS is the key professional society for practitioners in freshwater science and management in New Zealand. The Society aims to "establish effective liaison between

all persons interested in any aspect of fresh or brackish water research in New Zealand, and to encourage and promote these interests".

2. The NZFSS welcomes the opportunity to comment on the draft guide for freshwater accounting in relation the NPS Freshwater Management (2014), which is designed to assist Regional Councils in implementing the amended NPS-FM.

3. The NZFSS is concerned about the widespread decline in aquatic biodiversity and water quality in New Zealand[1]. A large proportion of the Society's membership is directly involved in resource management as experts at the local government, Environment Court and central government levels and a number of members are accredited as independent hearings commissioners through the 'Making Good Decisions' programme. These constituents have a wealth of science and resource management expertise to contribute to freshwater management processes. Additionally, many of the Society's members have been involved in the technical work underpinning the development of the National Objectives Framework (NOF), the Land and Water Forum (LAWF) and in the Environmental Monitoring and Reporting (EMaR) Programme in some capacity.

4. The NZFSS have provided feedback on the following matters:

a. General comments on the guidance provided in the draft,

b. Specific comments on most sections of the report, with a particular focus on Section5.

Comments on the guidance provided in the draft

5. The NZFSS supports the provision of guidance to assist Regional Councils in the establishment of freshwater accounting systems for water quality and quantity, as required under the NPS-FM.

Section 2

6. In considering relationships with other freshwater management instruments, there is no mention of the need to consider provisions under regional instruments such as Waikato-Tainui's Tai Tumu Tai Pari Tai Ao environmental plan.

7. Section 2.1 we would like to see the document also promote the accounting of trends, not just the status, of FMUs vis a vis their limits.

[1] http://freshwater.science.org.nz/index.php/news/media-statement-nzfss-key-closing-messages/

Section 3

8. We support the principles proposed and believe that, if adhered to, they provide the basis for a comprehensive freshwater accounting system.

9. We strongly support the risk-based approach to freshwater accounting that is articulated throughout the document, but we think the precautionary principle has not adequately been promoted in the document. For example, use of the precautionary principle should be promoted in limit setting where uncertainties are large (e.g., Section 5.3.6). Also the precautionary principle seems to applied to estimates in various places in the document (see case study 4.8). We believe it is more appropriate to apply the precautionary principle when setting limits, not to scientific measurements or estimates. The latter may have uncertainties, but the measurements, estimates and uncertainties must be respected and not modified subjectively. In terms of dealing with assumptions used in models, the appropriate way to deal with these is via sensitivity and uncertainty analyses. It could be useful to mention the precautionary principle in Section 4.7 at the bottom of page 28. See also between the the two case studies on p. 38, where the application of the precautionary principle (here referred to as “a cautious approach”) seems misconstrued.

10. We support partnerships with stakeholders and the community where this does not compromise the robustness and integrity of the data, accounting systems, or other technical information useful in the accounting process.

11. We support the guidance on uncertainties but we note that no uncertainties are indicated in any of the data shown in any of the case studies presented in this document. We suggest that better guidance could be given on the issue of accounting for uncertainties in sampling, modelling and decision making. Some examples should be given of how uncertainty has been appropriately dealt with. This is also relevant to section 4.7.

12. We accept that the accounting systems should be somewhat adaptable but the progressive changing of accounting systems and analytical methodologies can make it difficult to compare data over time. Probably, the same methodologies used to derive the limits by councils should continue to be used to prevent the potential for changes in these to affect the ability to determine status and detect trends. This is also relevant to the bottom of p. 25 of the document.

Section 4

13. We strongly support the comment that FMUs should be not just hydrologically coherent, but also socially, so that communities and iwi with common interests and values are contributing to common objectives.

14. In presenting information to your communities, in addition to the tips provided, we would suggest considering the use of a diversity of communication tools, such as video or other non-written media, to get across the message. Involving community in the reporting of the results in their FMU would also increase community engagement and participation . We would encourage the use of report cards as presented in Case Study 4.12 - there are many excellent examples and they have been shown to be an effective way of communicating scientific information to a broad knowledge base (e.g. Queensland Healthy Waterways programme[2]).

15. In Section 4.5, it is suggested that minimally impacted systems may not require as high sampling frequencies or as accurate estimates as more highly impacted "hotspots". We disagree with this assessment and believe that councils should be able to choose how to allocate their resources to FMUs based on the values attributed to the systems, not necessarily based on their degree of degradation. The advice given in the document could encourage councils to manage systems to the bottom line, rather than to the other management bands provided in the NOF.

16. Section 4.6 on modelling is based on one report and represents a small subset of opinion on the utility of models and how to apply them. We believe that a more balanced discussion of modelling approaches in this section would be more useful to regional councils.

17. In Section 4.7 it would be useful to provide some guidance and references on dealing with uncertainties in modelling.

Section 5

18. In Figure 5.1 it is not clear why the approach to accounting for water quantity contains a single step (which is very broad), whereas much more detail is given for water quality. We would suggest that the water quantity side of this figure include 1) define FMU, 2) establish current allowable allocations for each type of water use, 3) determine current level of use of allocations, 4) account for each type of take (M, E, M). Including these steps would make it more comparable with the level of detail provided for water quality in this figure. In terms of sources of contaminants we believe that internal loads should also be considered, especially in shallow lakes and in lakes with anoxic bottom waters.

19. Section 5.2.1 Consented takes: The list of fields that could be populated in an accounting database could be expanded to include details of consented and actual use (it's not clear whether the fields relate to both), as well as an indication of the

[2] http://healthywaterways.org/report-card

proportion that the consent has of the total allocable water take available from a catchment.

20. Section 5.2.2 Defining the FMU. While it is acknowledged that MfE are proposing separate guidelines on how to define FMU's it would seem prudent to include these in a final version of the freshwater accounting guidelines, so that this accounting document provides a "one-stop-shop" for councils (given that defining the FMU is a fundamental step in the accounting process).

21. In Section 5.3.1 (Regional Values) the case study (5.8) refers to studies undertaken to determine the effects of stormwater contaminants on the ecology of the Waitemata Harbour. Since these studies were undertaken, Hewitt and co (for ARC[3]) have developed the Benthic Health Model, which provides a tool for classifying intertidal sites within the region according to categories of relative ecosystem health, based on its community composition and predicted responses to storm-water contamination. The model is a multivariate analysis of macrobenthic community composition backed by information on sediment copper, lead and zinc concentrations. The model has been validated and would provide an excellent case study for how to derive ecosystem values for the estuary and its upstream catchments, as well as providing a basis for setting limits for key contaminants in urban waterways.

22. Also in this section, mention is made of the issue of naturally occurring contaminants such as mercury and it is stated that "the Bay of Plenty Regional Council can do nothing about" [the elevated mercury levels associated with geothermal activity]. We disagree with this statement. While the council cannot manage the source, it can encourage responsible behaviour by people (in terms of consumption) by providing education on the issue - there is in fact a health advisory on mercury in trout for the Rotorua lakes[4].

23. In Section 5.3.1 (Units of freshwater accounting), the loads are given as mass per year. While expressing loads in this way allows comparison at a specific site (FMU) over time, it does not provide for useful comparisons between sites or FMUs. For useful comparisons between FMUs, the loads must be scaled to catchment area or discharge (i.e., concentrations). Recording concentration as well as loads is also consistent with how Councils will be reporting in relation to the national values set in the NOF (which are all concentration based).

24. In Section 5.3.3., the document states that "it is not generally possible to measure water quality continuously". We suggest removal of this sentence because continuous measurement is becoming more widespread.

[3] Hewitt and Ellis (2010) Assessment of the Benthic Health Model. TR2010/034.

[4] http://www.foodsmart.govt.nz/whats-in-our-food/chemicals-nutrients-additives-toxins/specific-foods/mercury-in-fish/

25. In Section 5.3.3., the document states, "...any bias on this uncertainty (errors) can be minimised.." This sentence is confusing because bias and error are two different forms of uncertainty. We suggest the following wording, "... bias and extraneous sources of error can be minimised".

26. At the end of section 5.3.3., the concept of "reference load" is introduced. This needs defining.

27. In the last sentence on p. 50, it should read, "annual medians". Also, no duration has been specified in the sentence, only ">2 years".

28. At the top of p. 51, the document states that flow-triggered automatic samplers are not practical for routine monitoring. They may be practical for some councils under some circumstances. The sentence should be removed.

29. In the middle of p. 51, the document states that flow recorders are expensive to install and maintain. This sentence is not necessary as councils will decide whether they can provide good value for money under specific circumstances.

30. In the middle of p. 51, mention is made of the "desired precision of the flow estimate". What should the "desired precision" be?

31. Section 5.3.3., p. 54: Perhaps it should be mentioned that the CLUES model is not transparent, open source, or able to be calibrated or adjusted for specific conditions.

32. Section 5.3.4.: This is the first time that the document suggests that full contaminant budgets are required (including natural/reference loads). Full contaminant budgets are very onerous to construct and are not necessary for carrying out the goals of the accounting process as described in Section 2.1.

33. Page 56, Diffuse sources: The document states that it is impractical to measure diffuse sources routinely and that modelling provides a more effective management response than is possible by measurement. These statements are arguable. For example, in some systems, diffuse sources may be relatively easy to measure. Models are only as useful as their accuracy and can be misleading at times.

34. On p. 57 two methods are given for estimating diffuse contaminant loads. Perhaps this would be a good opportunity to show or discuss how uncertainty (error and bias) could affect modelled estimates.

35. On p. 57 both "background loads" and "reference loads" are referred to. A consistent term should be used (and defined) to avoid confusion.

36. On p.57 it is stated that “Perversely, the indirect estimation method is more accurate” when comparing direct and indirect methods for estimating rural diffuse contaminant loads, yet no evidence is presented to support this statement.

37. P.58, Rural modelling: The document states that, “it is important that transparency about the assumptions and limitations of OVERSEER® are acknowledged.” It should read, “...**lack of** transparency...”.

38. Pp. 59 and 60: “Sewerage” should read, “sewage”.

39. Case study 5.19: It is confusing to call it a “manageable load”, when it is then shown to be unsustainable in terms of protecting water quality.

40. Page 63, Attenuation: The document states that bulk attenuation factors are “probably adequate” for accounting purposes. But these bulk attenuation factors are then shown to be very crude and arbitrary, in the next few paragraphs.

41. Section 5.3.5: In reconciling measured and estimated loads, the document states that, “...each number (measured, estimated or modelled) will come with an associated estimate of uncertainty,...”. Why then do none of the case studies in the document show any data with associated errors or uncertainty?

42. Section 5.3.6 Bringing it all together: While Figure 5 identifies this as a common step in both freshwater quantity and quality accounting systems, there is no discussion as to the possibility of developing a system which integrates these two aspects of freshwater accounting for reporting purposes or for interrogation of links between these two aspects of water management.

43. Case study 5.2.2: Are “background contaminant levels” the same as “reference” and “natural” levels. If so, it would be less confusing to use one defined term consistently in the document. This same issue arises in Table 5.5.

44. Page 67, Systems to facilitate contaminant accounts: Perhaps it should be mentioned here that OVERSEER was not designed to estimate loads to water bodies and only estimates contaminant losses from the root zone.

45. Page 67, Dealing with uncertainty: The document doesn’t define the variables “x” and “y”.

46. Page 67, Dealing with uncertainty: Temporal variability has been left out here.

47. Page 67, Dealing with uncertainty: We support the statement that, “This uncertainty should be explicitly stated on contaminant accounts.” However, the uncertainty estimates should be robust and the specific sources of uncertainty that have been accounted for and been left out of the estimates should be clearly stated. Ideally, the

estimates with their uncertainties can then be compared to the limits which have been set using the precautionary principle to help account for the uncertainties.

Conclusion

48. The NZFSS recommends amending the accounting guide to include our feedback.

49. The NZFSS wishes to remain engaged in any future process in respect of the NPS-FM implementation (including further development of accounting systems) and be given the opportunity to be represented and heard in any discussion forum relating to freshwater management generally.

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