

Response to the Peer Review of the Benefits Analysis

7th April 2020

This note responds to the comments made by Dr Megan Star.

Her comments and suggestions are scattered through the document. Below I have summarised what I think are the main comments and have provided a response. I believe the only comment which requires a change is that regarding my Section 4 “Commercial and Reputational Value”; the first sentence include the words “water clarity” which should read “water quality”.

Detailed Comments

Inclusion of Recreational Fishing Value Benefits

Page 3: *“The travel cost analysis values that are specified for recreational fishing values could also be used in the monetary assessment through benefit transfer.”*

There are two reasons not to include these:

The first is the risk of double counting. The values used for the benefits analysis have relied on the results of a study by Tait et al. These were based on a revealed preference survey of the general population which generated values for improvements in freshwater quality relating to human health, water clarity and ecosystem health. The survey will have included recreational anglers amongst the general population surveyed. It is extremely likely that they will have stated a willingness to pay (WTP) partly on the basis of the benefits that will accrue to them as anglers, eg it is assumed their fishing experience will improve as a result of improvements in freshwater quality, even if they are not asked to state a WTP for improved fishing.

The second is that the main values for recreational fishing are values of a day spent fishing. We have no basis for estimating the change in the number of fishing days as a result of water quality improvements. In addition, as Williams points out in her study (and I refer to these comments in my report), where there are increases in recreational activity at a site, many will simply be shifts in activity from somewhere else so that most of the value at one site is offset by a reduction in value elsewhere.

Broader literature review

P3: *“The analysis would be much stronger if a broader literature review and meta-analysis for water quality outcomes, was first conducted, and the data then used for a benefit transfer. This would allow more capacity to extrapolate out the results in a more defensible manner. This is considered to be a large gap in the study.”*

There are large numbers of studies which are relevant to improvements in freshwater quality. These have been summarised in meta-analyses which include two I authored (Denne *et al* 2011; 2013) and one by Marsh and Mkwara (2013). On p18 I state “A few NZ studies have summarised

*the benefit valuation literature relating to freshwater quality and we do not repeat this here.” I have not repeated all of this work, largely because the studies are not that useful; they provide values for individual sites or for specific recreational activities. Previously I have used these results via benefits transfer, eg to value water quality improvements in Southland. This was criticised by Harris *et al* (2016), which I note on p19; their criticism is valid although the reason I had used the studies was because there were no better numbers and I believed using simple benefit transfer to obtain order of magnitude correct results was better than nothing (in contrast Marsh and Mkwara had concluded that the values could not be transferred so no benefit analysis could be undertaken).*

However, the more recent studies by Phillips (2014), Miller *et al* (2015) and Tait *et al* (2016) are much more suitable for transfer because they are using a better methodology (choice modelling) than most of the other studies and they are based on surveys of more general populations so they do not require estimates of whether there will be an increase in the number of recreational visits etc (a point I make in the text). I have described their results in more detail but relied on Tait *et al*, noting that he states his results are consistent with both Phillips and Miller *et al*.

My reliance on Tait *et al* is consistent with other recent studies including the National Stock Exclusion Study (Grinter and White 2016) and Landcare’s analysis of sediment policy (Neverman *et al* 2019).

Speed of Implementation

P3: “The linear nature of adoption may be ambitious in past water quality programs that have found it usually follows a more polynomial regression where adoption might occur quickly at the start and then slow over time. I don’t believe; however this impacts the overall outcome of the analysis significantly, however, some sensitivity testing would be useful. The assumption that the two programs together will have cumulative impacts may also be ambitious and some form of sensitivity testing would be useful.”

We have relied on implementation assumptions as provided by MfE.

Timeframes

P4: “The analysis timeframe is clear that it is 30 years, which subsequently is 2050. It might be useful to check the time range for the benefit transfer to ensure that all time frames are correctly aligned.”

They are.

Non-Market Valuation

P4: “... The Phillips study used one single river catchment to assess community values. The characteristics of these different swimming sites in the catchment need further attention and adjustments to values to extrapolate to all catchments and swimming sites across the country.”

I did not use the results of the Phillips study.

“Variations in the management policy. It is unclear what the policy mechanism is that has been framed for the different studies, in a couple it is noted that it is based off achieving the catchment target for water quality outcomes. However in the fencing off of animals on streams is less clear what

the policy mechanism is to achieve these outcomes. This needs to be clarified to ensure that the adjustment aligns to the regulation proposed."

The policy mechanism does not appear to be relevant. In the choice modelling exercises used by Tait et al, people were asked questions which derived their WTP for different outcomes (reduced health risks when swimming, improved water clarity, higher ecological health). These outcomes are relevant to the new study.

"Treatment of risk and uncertainty. Currently, it not clear if the choice models presented any attribute to the participants in terms of risk of achieving the outcomes. Even if there is 100% adoption of the management practices was the risk of not achieving the ecological outcomes framed as a potential risk to participants. In one respect the study tries to account for this in section 5.2 noting that there are lags in the system to achieve actual targets- was this type of information presented to the participants to consider in their Willingness To Pay estimate?"

This approach was not used in the WTP studies and we have no basis for assessing risk either.

Representative population

P4: "The three different studies that have been reviewed to complete the benefit transfer may have a different participant demographics to the overall population of New Zealand. A simple table comparing demographics of the studies to the overall NZ population would be useful to understand if these three studies are generally representative of the overall community. Therefore if representative the participants WTP values when transferred are also representative."

I only made use of the results of Tait et al. I note on p22 that "Tait et al (2016) undertook a national survey of a representative sample of people." Tait et al discuss how they ensured their survey was representative.

Quantification of Quality Improvements

P5: "I think that human health is well captured, using swimming as the proxy makes sense for this. However, I think water clarity is not an independent attribute as it is also embedded in safety and human health or it is embedded in ecosystem health. A part of the benefit that people value in water clarity is the capacity for aquatic plants to grow and with this brings fish and more general ecosystem health outcomes. Along with the capacity to swim it. The authors may have considered this and have thought through this further however this is not explained, and I think needs further analysis."

These things may well be related physically, but it does not matter. The choice modelling approach used hypothetical improvements in water quality in which these attribute values moved independently. They were thus able to derive separate values for the individual items.

"The authors report in the text and refer to table 19 that the higher range could be \$500 million however in the table the range of the 3% is reported at \$451 million. The results and the reporting need to be doubled checked. ... Some of the results derived here are also not reported correctly in the conclusions, and further changes would be required if the comments in this document are accepted."

I think this refers to an earlier draft of the report; this is all corrected in the 30th March version.

Commercial and reputational values

P5: *“The process of capturing the commercial and reputational values seem incongruent to the prior section and in the opening sentence it notes water clarity however the contamination and algal bloom are then described as been linked to nitrates, and nutrients.”*

This should have read “water quality” rather than “water clarity”. I will correct this.

“The contaminated drinking water of high nitrate concentrations in groundwater appears very site-specific (Canterbury and Waikato) but are then extrapolated across the whole NZ population without any links or reasoning. It also would appear that the majority of the actions described earlier are linked to poor water quality run-off and that is why there is end of catchment targets. Because of this these values don’t align with the costs or policy approaches highlighted in the previous report. Although I don’t deny it is an issue, I also don’t think this section is an outcome directly linked to the regulatory policy mechanism looking to be put in place.”

I’m confused by this statement as I do not extrapolate these across the NZ population. Rather I state (p32) “We have not quantified potential cost saving benefits as part of this study, because of the considerable uncertainties over the relationship between discharge reduction and groundwater concentrations.”

“The values of the recreational finishing have been reviewed as a travel cost approach which is essentially a non-market valuation approach, and then there is an assessment of the GDP contribution of recreational fishing. I suspect there would be further travel cost or choice modelling studies which could be considered for benefit transfer too and this would be a useful contribution to the amenity value of improved water quality.”

As noted above, there is a risk of double counting by including these values.

“The authors suggest that the damage to New Zealand’s’ brand and reputation is related to the dairy industry however they then go on to justify this statement with a study based on sheep meat. There is also a large tourism industry built on this image too, however, this is not considered. I think this section of the report does not robustly contribute to the report and therefore I would recommend either taking it out or looking more broadly at the industries that rely on water quality reputational attributes.”

This is confusing the cause of the reduction in water quality (which has been blamed on the dairy industry – hence the statement I make on p34) with the export markets which may be affected. A reduction in water quality because of dairy farming may result in reduced value of exports of some other product entirely, because of the damage to NZ’s reputation as having high environmental quality.

Review of community benefits in relation to water quality changes

Pa6: *“I think the reason for the large values obtained by the Māori population in Millers study indicates that environment and the cultural attribute were not independent. Meaning that the improvements in water quality outcomes have large positive impacts for culture. I would recommend that the authors explored this further.”*

I have partly left the analysis of Maori values to the separate piece of work on impacts on Maori. But there is also a risk of double counting. Maori are part of the population and will be part of

the population surveyed by Tait et al. This raises the separate issue of whether to separately identify the benefits to Maori versus counting the benefits to them as part of an overall assessment of the impacts on all New Zealanders. I have done the latter.

Derived conclusions from results

“The authors present a table at the end which captures the different categories of benefits, describes the values and then if a monetary value has been recorded, this is then reported. The authors report the values that they have derived from the completion of their benefit transfer over the 30 years and at a 3% discount rate. The ecosystem health value appears to be reported incorrectly as the results in the section 3.4.3 Ecosystem health is stated to be \$451 million not \$4,569 million. Also the range provided from water clarity does not match what the result is that is calculated on Table 19 of \$451 million.”

I think this is responding to an earlier version of the report.

References

- Denne T, Hoskins S, Webster G and Jowett I (2013) Non-Market Water Values in Southland. Report for the Ministry for the Environment. Covec Ltd.
- Denne T, Scarpa R and Beville S (2011) Gap analysis of freshwater valuation information. Report for the Ministry for the Environment. Covec Ltd.
- Grinter J and White J (2016) National Stock Exclusion Study: analysis of the costs and benefits of excluding stock from New Zealand waterways. MPI.
- Harris SR, Kerr GN and Doole GJ (2016) Economics of fresh waters. In Jellyman PG, Davie TJA, Pearson CP and Harding JS (Eds) *Advances in New Zealand Freshwater Science*. New Zealand: New Zealand Hydrological Society and New Zealand Limnological Society, pp. 639-662.
- Marsh D and Mkwara L (2013) Review of Freshwater Non-Market Value Studies. Department of Economics. University of Waikato.
- Miller S, Tait P and Saunders C (2015) Estimating indigenous cultural values of freshwater: A choice experiment approach to Māori values in New Zealand. *Ecological Economics* 118: (2015) 207–214.
- Neverman A, Djanibekov U, Soliman T, Walsh P, Spiekermann R and Basher L (2019) Impact testing of a proposed sediment attribute: identifying erosion and sediment control mitigations to meet proposed sediment attribute bottom lines and the costs and benefits of those mitigations. Landcare Research Contract Report: LC3574. Prepared for the Ministry for the Environment.
- Phillips Y (2014) Non-market values for fresh water in the Waikato region: a combined revealed and stated preference approach. Waikato Regional Council Technical Report 2014/17.
- Tait P, Miller S, Rutherford P and Abell W (2016) Non-market valuation of improvements in freshwater quality for New Zealand residents, from changes in stock exclusion policy. MPI Technical Paper No: 2017/08.