

BEFORE THE HEARING PANEL

AT HAMILTON

IN THE MATTER

of the Resource
Management Act 1991

AND

IN THE MATTER

of the Proposed Waikato
Regional Plan Change 1
Waikato and Waipā River
Catchments

AND

IN THE MATTER

of Variation 1 to the
Proposed Waikato
Regional Plan Change 1
Waikato and Waipā River
Catchments

**STATEMENT OF EVIDENCE IN CHIEF OF HELEN ANNE KETTLES FOR THE
DIRECTOR-GENERAL OF CONSERVATION**

TOPICS: B2, B5

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Introduction

1. My full name is Helen Anne Kettles. I am a Technical Advisor – Marine Ecosystems in the National Office of the Department of Conservation (the Department). I hold the degrees of Bachelor of Science (1998), and a Masters in Science with First class Honours (2000), both in the Biological Sciences from the University of Waikato.
2. A particular area of my expertise is nearshore and estuarine ecology. My Masters thesis was on factors influencing the success of cockle restoration in Raglan Harbour largely focusing on the effects of sedimentation. I have been involved in research and monitoring in a range of coastal studies around New Zealand in relation to estuaries, shellfish, seagrass and sediments.
3. I provide technical advice to the Department on marine ecological issues and have worked for the Department since November 2000. I was secretary of the New Zealand Marine Sciences Society for 3 years, and on the Council of the Society for 5 years, and have presented several papers at their conferences. I am the author and co-author of relevant scientific reports and papers.
4. Since 2012 I have had a national overview role in the Department for estuarine ecosystems with much focus on spatial protection, active restoration, species of conservation interest, and the impacts of sedimentation and climate change.

Code of Conduct

5. I have read the Environment Court “Code of conduct for expert witnesses”, and I agree to abide by it. I have prepared this Statement in accordance with that Code. I confirm that my evidence is within my area of expertise. I have not omitted to consider any material facts known to me that alter or detract from the opinions I express in this Statement. I have acknowledged the material used or relied on in forming my opinions and in the preparation of this Statement.

Executive Summary

6. My evidence addresses the need for Plan Change 1 (PC1) to improve integration of freshwater and coastal management in order to reduce risk to, and enhance, the health of the Waikato River Estuary (river mouth and delta). The key focus of my evidence is on seagrass and the impacts of sedimentation on this species.
7. Estuaries are valuable ecological assets in terms of productivity, the ecosystem services they provide for humans, and biodiversity. The Waikato River Estuary is home to a range of species of conservation interest. One of these species, seagrass, is sensitive to sedimentation and therefore a good indicator of the health of estuaries.
8. Historical monitoring of the Waikato River Estuary has shown unsatisfactory levels of suspended sediment and a decline in seagrass extent. Current monitoring is not sufficient to enable informed decisions about freshwater management to deliver estuary outcomes. The process for setting limits for freshwater discharges of sediment needs to take into account the Waikato River Estuary receiving environment in order to ensure estuarine values persist into the future.
9. The PC1 does not provide the framework that enables integrated management of freshwater resources and outcomes occurring within the coastal receiving environment. Specifically, it needs to provide for this in limit setting, monitoring and reporting.

Material Considered

10. In preparing my evidence I have considered the following:
 - a. Evidence prepared by Kate McArthur and Hugh Robertson.
 - b. Section 42A Report – Proposed Waikato Regional PC1 – Waikato and Waipā River Catchments.

Scope of Evidence

11. My evidence will deal with the following:
 - a. Ecological values of estuaries generally and the Waikato River Estuary.
 - b. Avoiding, remedying and mitigating adverse effects of upstream activities on the Waikato River Estuary.
 - c. Conclusions and recommendations.

Ecological Values of Estuaries Generally and the Waikato River Estuary

12. The focus of my evidence is the integration of freshwater and coastal management in order to reduce risk to, and enhance, the health of the Waikato River Estuary (river mouth and delta).
13. Estuaries are identified as nationally rare systems and are also classified as 'nationally threatened' uncommon ecosystems by Holdaway et al. (2012). All waterways in the catchment of the proposed PC1 exit to the sea at the Waikato River Estuary.
14. Estuaries rate among the world's most important ecological assets. The services of ecological systems and the capital stocks that produce them are critical for the Earth's life-supporting systems. They contribute to human welfare either directly or indirectly. In 1997 the value of all the world's different biomes (major habitat types) was estimated and reported on in the internationally prestigious scientific journal Nature (Costanza et al. 1997). Estuaries, although amounting to only 0.35% of the surface of the world, contribute 12.4% of the ecosystem services e.g. nutrient cycling, fisheries and recreation.

15. Estuaries are one of the most productive ecosystems on earth. They are four times more productive in plant matter than rye grass pasture and 20 times more productive than the open sea (Knox, 1980). They are extremely rich in organic matter and nutrients which provide food to sustain a network of people, birds, fish, crabs, bivalves, snails, and amphipods.
16. Estuaries are unique environments with special animals and plants adapted to the conditions where sea and freshwater meet. The Waikato River Estuary has a diversity of habitats including saltmarsh, seagrass and sandflats. I refer to Kate McArthur's evidence regarding native fish species present in the estuary and catchment. Some other significant marine biodiversity values of the Waikato River Estuary are:
 - a. A range of bird species which use the area as habitat and for feeding e.g. pied shag (Threatened - Nationally vulnerable), pied stilt (At Risk – Declining), royal spoonbill, little black shag (At Risk – Naturally Uncommon), variable oystercatcher (At Risk – Recovering), and Caspian tern (Threatened - Nationally vulnerable) (Bouma 2015 and EBird).
 - b. Seagrass (At Risk – Declining, de Lange et al. 2017) is the only flowering species of plant that lives in the marine environment globally. The beds they form are diverse, and productive ecosystems, and provide food and habitat for a wide variety of species and are hotspots for biodiversity (Morrison et al. 2014a). They also provide numerous ecosystem services including nutrient cycling, sediment stabilisation and fish nursery habitat (Costanza et al. 1997, Turner & Schwarz 2006). Seagrass also has high values for climate change mitigation and adaptation (Hejnowicz et al. 2015). Graeme (2005) describes seagrass as the most ecologically significant estuarine vegetation at Port Waikato.

- c. I note that the Waikato River Estuary is recognised as being of high ecological significance in a number of documents. The Waikato Conservation Management Strategy (CMS) describes Kawhia, Aotea Harbours and the lower Waikato River mouth as being internationally significant sites for shorebirds. The CMS also describes Port Waikato as a significant wading, shore and wetland bird habitat and part of the migratory corridor for internally migrating waders. In the Waikato Regional Coastal Plan the Waikato river mouth and estuary is designated as an ASCV (Area of Significant Conservation Value, in Appendix IV) and described as wildlife habitat of high value, with a nationally significant whitebait and native fishery.

Avoiding, Remedying and Mitigating Adverse Effects of Upstream

Activities on the Waikato River Estuary

The State of the Waikato River Estuary

17. The ultimate receiving environment for water from the entire Waikato and Waipā River catchments is the estuary and wider coastal environment at Port Waikato. I will focus my evidence on seagrass and the impacts of sedimentation on this species.
18. The health of the Waikato River Estuary was historically assessed at 5-year intervals by the Waikato Regional Council and included mapping the distribution of estuarine vegetation types. The available data¹ indicates that seagrass declined from 1.8 to 0.8 hectares between 2002 and 2007 (Appendix A). No further survey has been undertaken to my knowledge.

¹ <https://www.doc.govt.nz/nature/habitats/estuaries/our-estuaries/seagrass-and-mangrove-extent/>

19. Sedimentation is a known issue at the Waikato River Estuary. Sediment plumes out to sea are visible from aerial images at Port Waikato. The Waikato Region State of the Environment Report information available on the Council's website in 2017² concluded that there was "unsatisfactory" turbidity "about 75% of the time", where "unsatisfactory" is defined as > 5 NTU (turbidity measurement scale)³. Turbidity monitoring reflects the amount of suspended sediments in the water. This estuary was also reported to be the worst out of the seven sites that were sampled around the Waikato Region at that time. Data loggers deployed in the estuary in 2013 recorded a rapid increase in turbidity, coinciding with an increase in river flow (Jones and Hamilton 2014).
20. Currently monitoring at the Waikato River Estuary is limited to measuring faecal indicator bacteria to assess coastal recreational water quality⁴.
21. Seagrass is a good indicator species for impacts from upstream activities on the health of estuaries. Results of turbidity monitoring and reductions in the extent of seagrass in the Waikato River Estuary indicate values are being impacted by sedimentation. Burial of seagrass resulting in die-offs can also occur after big storm events when sediment is washed into estuaries. Sedimentation (settlement of suspended sediment on the seagrass blades) and increased turbidity (reduced light levels) can affect the ability of seagrass to photosynthesise. These impacts are chronic in nature and can have long term implications on ecological functioning (Erftemeijer and Lewis 2006, Morrison et al. 2009).

Limits and target setting

22. In order to avoid, remedy or mitigate adverse effects of sediment on the Waikato River Estuary, consideration will need to be given to the capacity of the estuary to receive sediment loads and to reduce these when exceeded. A reduction in sediment entering the Waikato River Estuary

² The website link is no longer working and data is not publicly available at this time.

<https://www.waikatoregion.govt.nz/Environment/Natural-resources/coast/How-healthy-are-our-estuaries/Estuarine-water-quality-monitoring-map/Port-Waikato/>

³ <https://www.waikatoregion.govt.nz/environment/natural-resources/water/rivers/healthyrivers/how-we-measure-quality/>

⁴ <https://www.waikatoregion.govt.nz/environment/natural-resources/coast/coastal-water-quality/coastal-recreational-water-quality/>

would reduce turbidity from its present unsatisfactory level. This would enable seagrass recovery and increase overall habitat values for native species.

23. I support the limits and targets proposed in Kate McArthur's evidence and I also recommend that targets for seagrass extent and sediment related parameters e.g. estuary turbidity could be set for either "satisfactory" (2-5 NTU), or "excellent" (<2 NTU), whichever is required to enable the recovery of seagrass. More information will need to be gathered to make informed decisions.
24. The monitoring carried out at the Waikato River Estuary is currently inadequate to measure any sediment related impacts on the values present. A monitoring programme (Robertson et al. 2002) for seagrass extent, sedimentation (settlement of suspected sediment) and turbidity will allow adaptive management to be applied to the freshwater targets.
25. Information and guidance for regional councils to ensure estuary values can be taken into account in freshwater management, are being developed and these will help with adaptive management. The Ministry for the Environment "Managing Upstream: Estuaries State and Values" project aims to inform management decisions made when establishing freshwater objectives under the National Policy Statement-Freshwater Management. It is anticipated that the information provided will enable decisions to be made in a manner that better accounts for impacts on estuarine values (Cornelisen et al. 2017, Zaiko et al. 2018).
26. The "Managing Upstream: Estuaries State and Values" includes the identification and review of data likely to be useful for identifying critical attribute thresholds, and for providing baseline and reference information for state variables for three key estuary values: ecosystem health, human health and mahinga kai. Further work is planned, in Stage 2, to develop more detailed variables for attributes such as sediment deposition rate, water nutrients and total suspended solids. PC1 should be amended to enable targets for the Waikato and Waipā River catchments to be developed with consideration of estuary values.

27. Currently freshwater and estuarine monitoring in the Waikato Region are reported on separately. This reporting would need to be integrated to be more meaningful for adaptative management.

CONCLUSIONS AND RECOMMENDATIONS

28. The Waikato River Estuary ecosystem is already showing signs of degradation from freshwater inputs and would benefit from a target setting process that took into account estuarine values.
29. PC1 requires specific objectives to address the 'mountains to sea' nature of catchments and to recognise the interdependency of freshwater and coastal ecosystems. This Plan needs to ensure there is an integrated approach to developing targets, plus monitoring and reporting.

A handwritten signature in blue ink that reads "HAKettles". The signature is written in a cursive style with a period at the end.

Helen Anne Kettles

15 February 2019

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Appendix A. Known survey data on seagrass extent at Waikato River Estuary

