

**BEFORE THE ENVIRONMENT COURT
I MUA I TE KOOTI TAIAO O AOTEAROA**

UNDER The Resource Management Act 1991
(RMA)

IN THE MATTER Appeals under clause 14(1) of the First
Schedule of the Act in relation to the
Proposed Southland Water and Land Plan

BETWEEN **MERIDIAN ENERGY LIMITED**
Appellants

AND **SOUTHLAND REGIONAL COUNCIL**
Respondent

STATEMENT OF EVIDENCE OF MARK RICHARD JAMES

FOR

MERIDIAN ENERGY LIMITED

15 March 2019

Judicial Officers: Judge Borthwick and Judge Hassan

Solicitor acting:

Humphrey Tapper
In-house counsel
287–293 Durham St North
Christchurch Central
Christchurch 8013
humphrey.tapper@meridianenergy.co.nz

Counsel acting:

Stephen Christensen
Project Barrister
PO Box 1251, Dunedin Metro 9054
P 027 448 2325
stephen@projectbarrister.nz

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(ENV-2018-CHC-47)

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(ENV-2018-CHC-48)

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ROYAL FOREST AND BIRD PROTECTION SOCIETY OF NZ INC
(ENV-2018-CHC-50)

Appellants

AND

SOUTHLAND REGIONAL COUNCIL

Respondent

INTRODUCTION

- 1 My full name is Mark Richard James.

QUALIFICATIONS AND EXPERIENCE

- 2 I am an aquatic ecologist holding the following degrees, BSc Victoria University, Wellington; BSc (Hons) Victoria University, Wellington and PhD (Aquatic Biology), University of Otago, Dunedin.
- 3 I have a background in basic and applied research in marine and freshwater ecology and biology with over 40 years' experience including research, consulting and management of science organisations.
- 4 Following two years with the Institute of Nuclear Sciences, Department of Scientific & Industrial Research (DSIR) I was employed in 1982 by the Taupo Research Laboratory, DSIR, then moved to Christchurch in 1992 as a scientist with the National Institute of Water & Atmospheric Research (NIWA). In 1994 I was appointed as a Project Director and led large multi-disciplinary Foundation for Research, Science & Technology (FRST) funded programmes including "Lake Ecosystems" and "Sustainability of coastal ecosystems". In 2000 I moved to Hamilton to take up the position of Regional Manager with NIWA and in 2002 was appointed as NIWA's Director Operations. In 2008 I retired from this position taking up a brief position as Chief Scientist for Environmental Information before leaving NIWA in late 2008 and setting up as an independent environmental consultant and ecotour operator.
- 5 Since 1982 I have been involved in research on the ecology of freshwater and marine systems. These studies aimed to gain a better understanding of ecological processes in lakes, rivers, coastal and open ocean systems. I have worked in New Zealand, Finland, Denmark, Australia and in Antarctica. My research has been published in over 45 papers in scientific journals and books. These publications have included scientific papers in international journals and book chapters on the ecology of freshwater and marine invertebrates, freshwater management, coastal sustainability as well as the effects of sediments, lake level management, and other anthropogenic activities on aquatic ecosystems.
- 6 During my 40 years' experience I have been involved with Regional Councils, government departments and industry in establishing guidelines

for ecological assessments, providing descriptions of freshwater and marine communities and assessments of potential ecological effects for a wide range of projects throughout New Zealand.

- 7 I have been involved in lakes, rivers and coastal systems throughout New Zealand since the 1980s. My specific experience with the Manapouri Catchment started in the late 1990s when I led government funded programmes on understanding the ecological processes in the lakes. I have been providing advice to Meridian Energy Ltd on aquatic issues associated with hydroelectric development since 2010 and prior to that to MFE on lake management and to other hydroelectric companies for a number of other hydro-development schemes.

CODE OF CONDUCT

- 8 I confirm that I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Environment Court Consolidated Practice Note (2014). I have complied with the code when preparing my written statement of evidence and I agree to comply with it when presenting evidence. My qualifications as an expert are set out above. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

- 9 I have been asked by Meridian Energy Ltd to provide evidence in relation to the SWLP appeals. My evidence addresses the evidence in chief of Mr Ben Farrell and Professor Russell Death prepared on behalf of Southland Fish & Game Council and concerns Objective 7, Policy 45, and Policy 47.
- 10 I am instructed by counsel that detailed consideration of the Appendix E Water Quality Standards to apply pending the establishment of freshwater objectives and limits under the Freshwater Management Unit processes, including any additional or changed parameters, will occur as part of the Topic B hearing and related processes rather than as part of the Topic A hearing.
- 11 However, the Topic A evidence of Professor Death proposes some numeric values for several water quality parameters relating to 'ecosystem health', and at the time of writing this evidence it is unclear whether the

Court will be considering Professor Death's suggested values as part of Topic A. For that reason the purpose of my evidence is to alert the Court to some limitations or difficulties with the numeric values Professor Death proposes.

12 In preparing my evidence I have reviewed:

- Proposed amendments to the NPS-FM 2017
- The decisions version of the SWLP
- The notice of appeal of Southland Fish & Game Council
- Evidence prepared on behalf of Southland Fish & Game Council by Ben Farrell and Russell Death, for Royal Forest and Bird Protection Society of New Zealand by Kathryn McCarthur, and the section 274 evidence for the Director General of Conservation by Linda Kirk
- Evidence prepared for Meridian Energy Limited by Jane Whyte.

OBJECTIVE 7

13 Southland Fish & Game Council's notice of appeal seeks that Objective 7 should be amended to read (change shown in **bold**):

Objective 7

*Any further over-allocation of freshwater (water quality and quantity) is avoided and any existing over-allocation is phased out in accordance with freshwater objectives, freshwater quality limits and timeframes established under Freshwater Management Unit processes **or earlier when considering relevant consent applications.***

14 Mr Farrell does not support the wording of the Fish & Game appeal and instead recommends that Objective 7 be amended to read (changes shown in **bold**)¹:

Objective 7

Any further over-allocation of freshwater (water quality and quantity) is avoided and any existing over-allocation is phased out in accordance with freshwater objectives, freshwater quality limits and timeframes established under Freshwater Management Unit

¹ Ben Farrell EIC dated 17 February 2019, paragraphs 95-96

processes or earlier where the resource is being used to a point where a region-wide freshwater numeric outcome(s) are no longer being met.

- 15 If the amendment Mr Farrell suggests was made to Objective 7 it would be important to ensure that the numeric outcomes to which the Objective refers are appropriate throughout the Southland freshwater bodies to which they apply².
- 16 Professor Death in his evidence provides a description of ecosystem health based on the provisions of the current NPS-FM and SWLP and proposes a set of metrics that he considers would protect ecosystem health in the streams and rivers of Southland.
- 17 Professor Death provides a comprehensive and useful background to the setting of numeric states including defining ecosystem health, and setting out what he considers to be the critical parameters to manage ecosystem health. Professor Death then provides a set of water quality numerics for those key parameters. The key parameters for which numeric states are suggested are deposited sediment, Macroinvertebrate Community Index (MCI), Quantitative Macroinvertebrate Community Index (QMCI), nitrate and dissolved reactive phosphorus (DRP).
- 18 While the evidence and basis for the attributes and numeric metrics is comprehensive and will be useful when setting numerics I consider there are some important omissions or limitations with what Professor Death proposes.
- 19 While I agree with Professor Death that there are a number of inadequacies in Appendix E, I have concerns about some of the numerics he has proposed for Southland rivers. One of the key numerics which is omitted in Dr Death's evidence is periphyton³ (which is acknowledged). However, this is a key driver of other numerics such as MCI and QMCI. The NPS-FM also requires the setting of instream concentrations and exceedance criteria for dissolved inorganic nitrogen (DIN) and DRP that will achieve the periphyton objectives for the FMU. Thus most of the metrics proposed are related to, and in my opinion cannot be considered without also considering

² The decision version of Appendix E contains exceptions for compliance with interim numeric standards where these are unable to be met because of natural causes or due to the effects of the operation of the Manapouri hydro-electric generation scheme

³ Periphyton is the algal/organic matrix found on rocks and other hard substrates

periphyton. On this basis I consider the development of freshwater numerics needs to occur in an integrated way, and parts of Appendix E should not be considered in isolation ahead of the more detailed considerations that will occur as part of Topic B and in more detail as part of the FMU process, anticipated as part of the Plan making process. These processes will enable a more robust and appropriate consideration for setting limits in their respective context.

- 20 I support in principle the development of numerics for DIN and DRP to achieve the objectives of the NPS-FM which were added as a requirement in the 2017 amendment. However, the numerics developed by Professor Death for MCI and QMCI, as well as the nutrient numerics he suggests do not account for the special case of didymo in some Southland rivers.
- 21 The invasive *Didymosphenia geminata* (didymo) was first discovered in New Zealand in the Mararoa/Manapouri Catchment in 2004 and has been spread by fishers and other water users. Unlike other nuisance periphyton, growth and high biomass of didymo occurs in cooler, low-nutrient waters and can also be associated with lake-fed rivers such as the Mararoa and Waiau Rivers.
- 22 The presence of nuisance levels of didymo does not reflect normal understandings of poor water quality or naturally productive systems. The presence of didymo can also result in quite different macroinvertebrate communities from those that would occur without didymo. The consequence of this is that the MCI and QMCI scores in didymo-affected waters can be significantly lower than would otherwise be the case and thus numerics for these attributes must be set after full consideration, including whether they are at all realistic for a didymo-dominated system.
- 23 The presence of didymo in Southland rivers, and in particular the Waiau and Mararoa catchments relevant to Meridian and the operation of the Manapouri Power Station, is not accounted for in Professor Death's evidence and will need to be considered when Appendix E is discussed as part of Topic B and through the FMU process as anticipated by the Plan.

POLICIES 45 AND 47

- 24 Policies 45 and 47 relate to FMU objective and limit setting processes, and their relationship with the region-wide provisions of the SWLP.
- 25 The Fish & Game notice of appeal seeks to amend Policy 45 to read (changes in strikeout and **bold**):

Policy 45 – Priority of FMU values, objectives, policies and rules

*In response to Ngāi Tahu and community aspirations and local water quality and quantity issues, FMU sections may include additional catchment-specific values, objectives, policies, attributes, rules and limits which will be read and considered together with the Region-wide Objectives and Regionwide Policies. Any provision on the same subject matter in the relevant FMU section of this Plan prevails over the relevant provision within the Region-wide Objectives and Region-wide Policy sections, unless ~~is explicitly stated to the contrary~~. **the provision in the relevant FMU Section of this plan is not more lenient or less protective of water quality, quantity or aquatic ecology than the Region-wide Objectives and Region-wide Policies.***

As the FMU sections of this Plan are developed in a specific geographical area, FMU sections will not make any changes to the Region-wide Objectives or Region-wide Policies.

~~***Note:** It would be unfair if changes are made to Region-wide objectives and policies, which apply in other parts of Southland, without the involvement of those wider communities.*~~

- 26 Mr Farrell does not support the relief in Fish & Games appeal and instead recommends Policy 45 be amended to read (changes in strikeout and **bold**)⁴:

Policy 45 – Priority of FMU values, objectives, policies and rules

In response to Ngāi Tahu and community aspirations and local water quality and quantity issues, FMU sections may include additional catchment-specific values, objectives, policies, attributes, rules and limits which will be read and considered together with the Region-wide Objectives and Regionwide Policies. Any provision on the same

⁴ Ben Farrell EIC, paragraph 175

*subject matter in the relevant FMU section of this Plan prevails over the relevant provision within the Region-wide Objectives and Region-wide Policy sections, unless it is explicitly stated to the contrary. **the provision in the relevant FMU Section of this plan is less protective of water quality, quantity or aquatic ecology than the Region-wide Objectives and Region-wide Policies.***

As the FMU sections of this Plan are developed in a specific geographical area, FMU sections will not make any changes to the Region-wide Objectives or Region-wide Policies.

Note: *It would be unfair if changes are made to Region-wide objectives and policies, which apply in other parts of Southland, without the involvement of those wider communities.*

- 27 As explained above the numerics developed by Professor Death on behalf of Southland Fish & Game do not take into account the special properties of *didymo*.
- 28 Similarly, the Fish & Game appeal seeks amendments to Policy 47 so that it reads (additions underlined) “The FMU sections will support the implementation of region wide objectives by 1. Identifying values and establishing specific freshwater objectives for each Freshwater Management Unit...”.
- 29 If I understand the intent of the proposed changes correctly it would mean that in the case of the Waiau FMU, which is *didymo*-affected, there would be no ability to set FMU-specific numerics that were ‘less protective’ of aquatic ecology than the region-wide numerics contained in Appendix E. Depending on what is meant by ‘less protective’ that may create some challenges. While Appendix E contains an exception where numerics are not met because of the operation of the Manapouri Power Scheme, the effects that *didymo* has in the Waiau and Mararoa catchments are not caused by the power scheme. Rather, *didymo* exists in the system because it was introduced by fishers or other water users, and it now forms a part of the environment, and the operator of the hydro scheme finds itself in the position of being asked to assist in the management of the problem.
- 30 In my opinion, if no provision is made in the SWLP to allow for the setting of specific objectives and limits for *didymo*-affected waterbodies that may depart from (and potentially be seen as being less stringent than) region-

wide objectives and limits, then it is important that the region-wide numerics that are set as part of the consideration of Appendix E take into account the confounding presence of didymo. The opportunity to do this is as part of the Topic B hearing. The numerics proposed at this early stage by Professor Death do not take this issue into account.

SUMMARY

31 In summary I agree that it is important to establish numeric indicators of ecosystem health. Professor Death provides a comprehensive background and has developed some new attribute states. However, it is premature and problematic to consider some of the water quality standards for Appendix E now, in isolation from the consideration of all the interim freshwater standards that will occur as part of a subsequent process. The presence of didymo in the Waiau/Mararoa system creates a special case which will need to be addressed as part of that process.



Dr Mark James

Director, Aquatic Environmental Sciences Ltd

15 March 2019