BEFORE THE WAIKATO REGIONAL COUNCIL HEARINGS PANEL

UNDER	the Resource Management Act 1991
IN THE MATTER OF	Proposed Plan Change 1 to the Waikato Regional Plan and Variation 1 to that Proposed Plan Change: Waikato and Waipā River Catchments

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HELEN MARIE MARR

Primary Evidence on behalf of **THE AUCKLAND/WAIKATO & EASTERN REGION FISH AND GAME COUNCILS ("FISH & GAME")**

SUBMITTER ID: 74985
HEARING BLOCK 1

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Counsel instructed

Sarah Ongley
Barrister
PO Box 8213
New Plymouth
Telephone: 06 769 9400
Email: sarah@ongley.co.nz

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INTRODUCTION

Qualifications and experience

1. My name is Helen Marie Marr. I am a planning consultant at Perception Planning Limited, of which I am also a Director.

2. I have a Bachelor of Resource and Environmental Planning (specialising in Environmental Science) with Honours from Massey University. I am also a qualified RMA decision-maker under the 'Making Good Decisions' programme.

3. I have nineteen years' experience in resource management and planning. My particular areas of expertise are in policy and plan development and natural resource management, particularly issues relating to biodiversity and fresh water management.

4. Since 2010 I have worked as a planning consultant for Perception Planning Limited, a specialist planning consultancy, of which I am also a Director. My role involves working with a range of clients, including councils, special interest groups, and developers, to assist them in creating or working with council planning documents. For example, I have recently worked with Palmerston North City Council on a review of their district plan relating to wind farms and outstanding landscapes, and with Taupō District Council scoping their district plan review.

5. I am currently engaged by the New Zealand Planning Institute to deliver full day training courses on fresh water management planning under the RMA, including implementation of the National Policy Statement for Freshwater Management (NPSFM) .

6. In have presented evidence to the Environment Court numerous times, on behalf of a number of different clients, on topics relating to the sustainable management of freshwater resources and implementation of the NPSFM, including the protection of wetlands in the Hawkes Bay Region, and the management of hydroelectricity takes in the central North Island.

7. In 2014 I presented evidence on behalf of Eastern and Hawkes Bay Fish and Game Councils to the Board of Inquiry into the Ruataniwha Water Storage Scheme and Plan Change 6. My evidence focused on the implementation of the NPSFM and appropriate

management of nutrients from farming following implementation of a large water storage and irrigation scheme.

8. Prior to joining Perception Planning I worked as One Plan Manager for Horizons Regional Council. I was involved in the final stages of the consultative process prior to notification of the One Plan, managed the One Plan through the formal RMA First Schedule process, and worked with other planners, technical experts, and consultants to assess the One Plan in response to submissions.

9. I presented expert planning evidence to the Environment Court on appeals to the One Plan, on the topics of biodiversity and water quality, including on the provisions relating to the control of farming activities.

10. I have also worked for the Ministry for the Environment (MfE) in the RMA Policy team. In this role I worked on recommendations to the Select Committee on the 2005 RMA Amendments and on the early stages of development of a number of national policy statements and national environmental standards.

Code of Conduct for Expert Witnesses

11. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note. This evidence has been prepared in accordance with it and I agree to comply with it with the obligations stated in that code to the Court being applied to the Council hearing panel in this instance. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I have specified where my opinion is based on limited or partial information and identified any assumptions I have made in forming my opinions.

Scope of evidence

12. I have been asked by Auckland/Waikato & Eastern Region Fish and Game Councils (**Fish & Game**) to prepare evidence in relation to their submissions on Plan Change 1 (**PC1**) for Hearing Block 1.

13. This evidence addresses submissions on the following areas:

    - Implementing the National Policy Statement for Freshwater Management (**NPSFM**)

- Values and uses of the Waikato and Waipā catchments
- Freshwater objectives
- Freshwater management units
- Targets, limits and attributes in Table 3.11-1
- Appropriate management of wetlands and lakes in the above provisions of PC1

SUMMARY

14. PC1 is part of Waikato Regional Council's Progressive Implementation Programme (**PIP**) setting out the time limited stages for giving effect to the National Policy Statement for Freshwater Management (**NPSFM**). That PIP sets out six defined stages. PC1 is the only stage in that programme that is focussed on plan '…to set limits and targets and manage diffuse and point source discharges for the Waikato and Waipā catchments.' This means that PC1 should form a largely complete NPSFM implementation package for the catchment. This is also signalled and required by the Waikato Regional Policy Statement (**WRPS**). Giving effect to the NPSFM and the WRPS is consistent with achieving and giving effect to the Vision and Strategy for the Waikato River (**Vision and Strategy**).

15. In my opinion it is difficult to understand whether and how well PC1 gives effect to the NPSFM. This is because PC1 does not clearly set out which parts of PC1 implement particular requirements of the NPSFM (for example what the freshwater objectives are) and it uses NPSFM defined language inconsistently (for example its uses the word 'targets' but does not define a timeframe for achieving that target as required by the NPSFM). As a first step this lack of clarity and consistency needs to be addressed and I have made recommendations in my evidence and in the recommended provisions in Appendix 1 to address this.

16. The process of implementing the NPSFM begins with defining Freshwater Management Units (**FMU**). These are the fundamental building blocks for freshwater management and monitoring. The way that FMU's have been defined in PC1 does not assist the sustainable management of lakes and Whangamarino Wetland. The categorisation of lakes into four geomorphological types is not sophisticated enough to be able to tailor management and numeric freshwater attributes to lakes in a way that is likely to properly manage lakes, particularly those with relatively good water quality. Whangamarino Wetland needs fundamentally different management and numeric attributes than the Lower Waikato FMU

that it is currently bundled into. I recommend that Whangamarino wetland is separated out into its own FMU, and that lakes are recategorised into more appropriate FMU classes.

17. The next step in the process set out in the NPSFM is to define the values for each freshwater management unit. PC1 does this in a very broad brush way – it identifies values and applies them to the entirety of all FMU's. In my opinion best practice is to apply values only to the FMU's they are relevant to, or more appropriately, to identify specific waterbodies or locations that the value applies to. This is necessary to ensure the freshwater objective setting process and subsequent management of freshwater appropriately provides for those values in appropriate locations. The broad brush approach to value identification has also resulted in values that do not adequately recognise some values, including trout fishery values. The ecosystem health value could be interpreted to specifically exclude the habitat requirements of trout, and it is not clear that it is appropriate or intended for the mahinga kai to address trout fishing outside a Māori cultural construct. These problems could rectified by including trout more explicitly in the ecosystem health value, and amending mahinga kai to specifically include fishing. Alternatively (and my preference) is to include specific trout fishing and trout spawning values in appropriate locations. This later approach is widely used in other regional plans and can allow the values to be geographically specific if needed.

18. Following the identification of values, the NPSFM requires councils to set freshwater objectives. It is unclear exactly what the freshwater objectives in PC1 actually are. I recommend that best practice is combined narrative and numeric freshwater objectives. I recommend that the objectives of PC1 are clearly labelled freshwater objectives, and that they clearly cross reference the attributes in Table 3.11-1 (which are already clearly labelled as attributes) as part of those freshwater objectives.

19. In my opinion the objectives of PC1 have an inappropriately narrow focus on just four contaminants – nitrogen, phosphorus, sediment and microbial pathogens. In order to give effect to the NPSFM, the WRPS and achieve the Vision and Strategy, ecosystem health in a more comprehensive sense must be addressed and this means more attributes must be managed.

20. I recommend changes to the objectives, particularly Objectives 2 and 4 (if it remains) to better connect the objectives with the identified values. In my opinion it is best practice to make the implicit connection between values, objectives and attributes perfectly clear.

21. I believe the plan should provide guidance on desired environmental outcomes for longer than 10 years. The plan will have influence for more than 10 years, either as a result of longer plan making processes or through resource consents that are granted for longer than 10 years. PC1 needs to provide guidance to decision makers so that decisions can be made that are consistent with medium term goals set in the plan. For this reason 20 year goals are necessary and I recommend they be included in the plan, particularly in Objective 3.

22. The NPSFM requires that the significant values of wetlands and outstanding waterbodies be protected. Protection of wetlands is also required by the WRPS and the RMA and is consistent with the Vision and Strategy. In my opinion the current Waikato Regional Plan (**WRP**) does not appropriately provide for wetlands, and there is evidence that wetland decline is continuing under the current provisions. More focus on wetlands in PC1 would help address this, and this begins with setting clear intended outcomes in the objectives and freshwater objectives.

23. Whangamarino Wetland is a special case, it is internationally recognised and outstanding. The plan should recognise this. Its required by NPSFM and WRPS to do so. Objective 6 should recognise Whangamarino Wetland as an outstanding waterbody and require management to protect its significant values.

24. Hydrology and contaminant management are inextricably linked for wetlands (and lakes) and so acknowledgement of the role hydrology plays in managing contaminant loads is necessary to manage water quality in wetlands. Objective 6 should recognise this.

25. PC1 must contain limits and targets to achieve the freshwater objectives. Table 3.11-1 currently contains attributes, limits and targets – and in my opinion it should continue to do so, although changes are needed to make this clearer.

26. Table 3.11-1 does not contain all the compulsory attributes required by the NPSFM. For example it does not contain periphyton attributes for tributraries. This needs to be rectified. Table 3.11-1 also needs to contain all the attributes needed to provide for ecosystem health. These need to be set at a level that safeguards ecosystem health. Amendments and additions are needed to Table 3.11-1 to achieve these requirements. This includes making some attributes more stringent than the level they are currently set at. The arguments for not doing so have no planning merit in my opinion.

27. Attribute tables for wetlands, for the Whangamarino FMU and amended tables for Lake FMU's are also required.

IMPLEMENTING THE NATIONAL POLICY STATEMENT FOR FRESHWATER MANAGEMENT (NPSFM)

28. PC 1 must give effect to all national policy statements[1], most relevant to my evidence is the NPSFM. I discuss the NZCPS in the next section. 'Give effect to' means to positively implement[2]. In the case of the NPSFM, that policy statement allows councils to implement the policy in a series of 'defined time-limited stages'[3]. Each council has prepared and notified a 'progressive implementation programme' (PIP) which sets out those time limited stages and is required to report on progress.

29. The PIP for Waikato Regional Council can be found on their website[4]. It sets out a catchment based approach, where each of the major catchments is reviewed consecutively. The approach for Waikato-Waipā is summarised as:

> "Joint working party agreements with iwi; stakeholder consultation; develop policy and methods to set limits and targets and manage diffuse and point source discharges in the Waikato and Waipa River catchments" (emphasis added).

30. Following the three catchment based plan reviews there is scheduled to be a review of the plan as a whole. The summary implying that this will be a for matters not covered in the catchment based plan changes, for example integration of infrastructure requirements.

31. The WRPS is part of the PIP. The WRPS directs plans to define values, set objectives, limits and targets.

32. My interpretation of this PIP is that the Regional Council (Council) plans to implement the NPSFM fully for each catchment in turn. The final review of the plan in 2030 will be to 'mop up' any matters not covered, or to integrate matters between catchments. It is not my understanding from reading this PIP that the Council intends to cover more substantive topics at the end, such as wetlands, outstanding waterbodies and contaminants other than those from farming.

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[1] S67(3)(a).
[2] See for example *Environmental Defence Society Inc v The New Zealand King Salmon Company Ltd* [2014] [2014] NZSC 38 at [77] .
[3] NPSFM Policy E1(c).
[4] https://www.waikatoregion.govt.nz/council/policy-and-plans/plans-under-development/npsfm-implementation-programme/

33. That understanding is informed by the WRPS and its place in the PIP. The PC1 (and all plan changes following) must give effect to the RPS. The WRPS sets a direction consistent with full implementation of the NPSFM on a catchment by catchment basis.

New Zealand Coastal Policy Statement

34. The NZCPS has been operative, unamended, since 2010. Regional Plans must give effect to the NZCPS 'as soon as practicable'. Given the length of time the NZCPS has been in effect and the fact that the plan change has been underway since 2013, I can see no reason why it would not be 'practicable' to give full effect to the NZCPS (to the extent it is within the scope of PC1).

35. The NZCPS applies to the coastal environment, not just the coastal marine area. The NZCPS also has application to areas outside the coastal environment, that influence the coastal environment. For example Policies 21 and 22 require management by regional plans (not just coastal plans) to address water quality and sedimentation in the coastal environment.

36. The NZCPS contains several provisions relevant to managing water quality in the coastal environment. Objective 1 seeks "to safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries dune and land, by […]

> *"maintaining coastal water quality, and enhancing it where it has deteriorated from what would otherwise be its natural condition, with significant adverse effects on ecology and habitat, because of discharges associated with human activity".*

37. Policy 21 further reiterates this direction through prioritising the need to improve deteriorated coastal water quality where it is having a significant adverse effect on ecosystems, natural habitats, or water based recreational activities or where it is restricting existing uses including aquaculture, shellfish gathering and cultural activities.

38. Sedimentation is a matter specifically addressed in the NZCPS. Policy 22 requires that the impacts of sedimentation levels on the coastal environment be monitored and ensure that there are no significant increases in sedimentation in the CMA as a result of activities including subdivision, vegetation removal.

39. The NZCPS also contains provisions dealing with biodiversity, and requires avoidance of adverse effects on certain habitats[5], and avoidance, remediation or mitigation of adverse effects on other habitats[6]. This is particularly relevant to the management of wetlands and lakes in the coastal environment which can provide habitat to threatened and at risk species[7]. Policy 11 of the NZCPS is also relevant to managing water quality that may affect coastal ecosystems in the coastal marine area (CMA).

VALUES AND USES

40. Section 3.11.1 of PC1 sets out the values and uses for the Waikato and Waipā Rivers. This section is dealt with in section B.2 of the s42A report.

41. Fish and Game made several submissions and further submissions on the identified values in PC1, which I discuss in more detail in the following sections of my evidence.

42. The NPSFM requires councils to identify the values for each Freshwater Management Unit (FMU). The identification of values is central to the identification of freshwater objectives. In my opinion the NPSFM is a values driven policy statement. Values play a central role in the document, right from the Preamble, which discusses the importance of providing for the 'values that are important to New Zealanders'. The NPSFM recognises Te Mana o Te Wai, which incorporates the values of tangata whenua and the wider community[8], and those values must inform the setting of freshwater objectives and limits[9]. The process required for setting freshwater objectives begins with identifying values for each FMU and setting freshwater objectives that provide for the values, including that the values be no worse off when compared to existing water quality[10] and that the most sensitive value is provided for[11]. Monitoring is required, this includes monitoring of the extent to which the values identified are being provided for[12]. If monitoring shows that values will not be provided for the regional council must take action[13].

[5] NZCPS Policy 11(a).
[6] NZCPS Policy 11(b).
[7] Covered by NZCPS Policy 11(a).
[8] NPSFM national significance statement page 7.
[9] NPSFM Policy AA1(b).
[10] NPSFM Policy CA(e)(iia)(B).
[11] NPSFM Policy CA(e)(iii).
[12] NPSFM Policy CB1(aa).
[13] NPSFM Policy CB2.

43. Identifying values is not an administrative routine, or disconnected from the rest of the planning process. It is the foundation upon which objectives, limits and targets are derived and against which monitoring and the success (or failure) of methods is measured.

44. An FMU is a waterbody or collection of waterbodies that are identified as the appropriate scale for setting freshwater objectives[14]. The NPSFM requirement is to identify the values of *each* FMU – which is my opinion points the process towards looking at each FMU individually. Further, in my opinion it is best practice to define the spatial location of a value within an FMU. For example, to state a particular river or a particular reach of a river that has the particular value. The Horizons Regional Council One Plan does this with a high degree of detail, setting out detailed tables and maps of where each value is applied. While not necessarily called 'values' many other regional plans specifically list areas with particular characteristics or uses, which is analogous to the NPSFM 'values' concept. For example, the Greater Wellington Regional Council Proposed Natural Resources Plan also sets out schedules of particular values of waterbodies in the region, for example important trout fishery and spawning waters are set out in Schedule 1 and shown on Map 22. The Canterbury Land and Water Regional Plan also contains schedules of rivers with particular values, for example high naturalness water bodies and freshwater bathing areas. Different rules apply for activities within or upstream of those locations (for example stock access to water rules are more stringent upstream of swimming spots).

45. In contrast to the requirements of the NPSFM and good practice planning around the country, PC1 groups all FMUs together; upper river FMUs with lowland FMUs and lake FMUs with river FMUs and applies all the values to the entirety of every FMU. The consequence of this is that the definition of values is broad brush and rather imprecise. A further consequence of this is that site specific values or quite 'specialist' values are not well represented. Because the identification of values is a fundamental building block to identifying freshwater objectives and limits, these specific values are not well provided for in the plan framework that follows.

46. An example of this is the treatment of wetlands. Wetlands are not even mentioned in the values in the notified version of PC1. As a consequence, there are no attributes specific to wetlands in Table 3.11.1 and no particular focus on the restoration of wetlands in the policies and rules that follow. The specific provisions that do or do not address wetlands will be the subject of a future hearing block. Leaving that particular debate to one side for

[14] Definition of Freshwater management unit in the NPSFM.

the time being, it is my opinion that the values of wetlands must be clearly identified in the values so they can be properly protected as required by the NPSFM, WRPS, RMA and the Vision and Strategy.

47. The s42A report recommends adding references to lakes and wetlands in several places within the values tables. I support this recommendation, and also recommend adding references to lakes and wetlands to values where it has not been recommended by officers.

48. Other examples of where specific values are poorly identified or provided for are addressed under the title of the relevant value.

Intrinsic values – Ecosystem health

49. Ecosystem health is a compulsory national value set out in the NPSFM which must be included. Fish and Game supported the submission of the Director-General to include greater specificity to the bullet points of this value to better recognise the value of and aspirations for wetlands and lakes[15]. The detail of these submissions is covered in the evidence of Ms Kissick for the Director-General and I agree with her analysis and recommend the changes be made to the value.

50. Fish and Game also sought specific recognition of trout spawning and trout migration in the values[16]. The evidence of Adam Daniel sets out the specific requirements of trout fisheries that need to be provided for. These include the need to migrate up and downstream at different stages of the life cycle, to feed, spawn and escape high summer water temperatures.

51. Fisheries are specifically included in the Vision and Strategy. Objective (i) is:

> "The protection and enhancement of significant sites, fisheries, flora and fauna" (emphasis added).

52. Objective (k) which is well traversed in the s42A report includes the taking of fish for food:

> "The restoration of water quality within the Waikato River so that it is safe for people to swim in and take food from over its entire length".

[15] FSPC1-384.
[16] V1PC1-204

53. The Vision and Strategy does not differentiate between native and introduced fisheries, and it does not differentiate between taking food which is native species or introduced species. In my opinion in order to give effect to the Vision and Strategy, PC1 must provide for both native and introduced fishery values.

54. Providing for fisheries requires not just providing for healthy adult populations, but also providing for specific feeding areas, and spawning areas which are in different areas than adult populations. Without feeding and spawning, populations will decline, so providing for those feeding and spawning areas and migration to those areas is necessary to safeguard ecosystem health. Adam Daniel identifies and describes those spawning and feeding areas and the migration of trout between those areas in his evidence.

55. The current ecosystem health value does not clearly provide for trout populations, their spawning or migration. The first column refers to resilient freshwater ecosystems (of which trout are a part). However, the bullet points do not include trout. The first bullet point of the value only refers to "native aquatic species". The second bullet point refers to native fish and birds and "introduced game species". Game species are "Wild mammals or birds hunted for sport or food"[17] and so this descriptor within the value does include introduced game birds, but does not include trout. As currently worded the bullet points within the ecosystem health value *specifically excludes* trout.

56. Trout are a valued part of the ecosystem, sometimes as a mahinga kai species and sometimes as a recreational resource. They require a healthy ecosystem to thrive, as shown by Dr Daniel in his evidence, and are often used as an indicator of overall ecosystem health. The current description only recognises macroinvertebrates provide food for trout (if the reference to game is amended to include trout) (bullet point 2), it doesn't adequately recognise trout as part of the ecosystem, and their need for clean fresh water for their own needs.

57. In my opinion the ecosystem health value needs to be amended so that it is explicitly inclusive of valued introduced species such as trout.

58. Fish and Game also submitted that the value needs to be amended to provide for spawning and migration as well as adult populations.

[17] Oxford dictionary

59. The reporting officers consider the current wording of the value provides for these matters in a generic way, and consider specificity is not needed, and that high-level positive intent is all that is required[18].

60. In my opinion the current wording of the ecosystem health value does not make clear the different requirements over the life-cycle of species. Migration may arguably be covered under the fifth bullet point. However, specific mention of spawning is needed to properly provide for the habitat of trout. This is also necessary in my opinion for native species, as requested by the Director-General.

61. While the specific values sought by Fish and Game (and the Director-General) could arguably be captured by the generic 'ecosystem health' value it is not perfectly clear and it is arguable. Addition of specificity would add clarity and reduce arguments when the values are used on a case by case basis, for example in consent decision making.

62. There doesn't appear to be any planning harm caused by being more specific about values. I note that there are five specific economic uses provided for with individual values in PC1. Using the s42A officers' logic these could all be combined into one overall 'economic use' value. They haven't (and I am not suggesting they should be) because there is merit in being more precise about specific values. In my opinion the same merit applies to separating out, or at least being more specific about, ecosystem health.

63. It may be possible to include the "Fishing" value within the current mahinga kai value, with some amendments, and I discuss this in a later section of this evidence.

Recommendation

64. Amend ecosystem health value to read:

The Waikato and Waipa catchments support resilient freshwater ecosystems and healthy freshwater populations of indigenous plants and animals and valued introduced species.	▪ Clean fresh water restores and protects aquatic native vegetation to provide habitat and food for native aquatic species, trout and for human activities or needs, including swimming and drinking. ▪ Clean fresh water restores and protects macroinvertebrate communities for their intrinsic value and as a food source for native fish, trout, native birds and introduced game species. ▪ Clean fresh water supports native freshwater fish species. ▪ Wetlands are healthy and functioning including having ecological and hydrological integrity supported by good water quality and their extent is maintained and improved. ▪ Clean fresh water supports healthy populations trout and their habitats in appropriate locations, including spawning and migration habitats.

[18] Section 42A Report Part A and Part B para 193.

	▪ Wetlands and floodplains provide water purification, refuge, feeding and breeding habitat for aquatic species, habitat for water fowl and other ecosystem services such as flood attenuation. ▪ Fresh water contributes to unique habitats including peat lakes, shallow riverine lakes and karst formations which all support unique biodiversity. ▪ Rivers and adjacent riparian margins have value as ecological corridors.

65. Additionally/alternatively provide for fishing and spawning values

Trout fishery

The Waikato and Waipā catchments support resilient freshwater ecosystems and healthy populations of rainbow and brown trout.	▪ The rivers provide clean water that supports healthy populations of trout ▪ Clean fresh water supports healthy populations trout and their habitats in appropriate locations from headwaters and tributaries to the sea, including spawning and migration habitats. ▪ Trout populations exhibit individuals in good condition, across a rage of sizes. ▪ Trout are suitable for human consumption and their numbers support fishing activities. ▪ People are able to safely enjoy fishing and the outdoor experience it gives them; it contributes to their health and wellbeing. ▪ Trout are able to move been appropriate habitat at all stages of their life.

Trout spawning

The appropriate tributaries of the Waikato and Waipā catchments provide appropriate habitat for trout spawning.	▪ The tributaries provide habitat for spawning which supports healthy populations of trout. ▪ The tributaries provide clean, cool and clear water for spawning. ▪ The tributaries provide an appropriate gravel substrate for spawning beds, egg and juvenile survival.

Natural form and character

66. Fish and Game made submissions seeking the inclusion of the appearance of water (colour and clarity)[19] and the wilderness experience of wetlands into this value[20]. Fish and Game also supported the Director-General's submission that natural elements and processes be included in this value[21].

67. Natural form and character is an optional national value set out in the NPSFM. Preservation of the natural character of rivers, lakes, wetlands and the coastal environment is a matter of national importance in the RMA[22].

[19] PC1-10768.
[20] V1PC1-215.
[21] FSPC1-386.
[22] RMA s6(a).

68. The natural form and character value of PC1 only refers to rivers. I support the recommendation in the s42A report to refer to lakes and wetlands as well.

69. The NPSFM sets out a number of factors that contribute to natural form and character and are valued by the community. The bullet points in the natural form and character value in PC1 do not include all these factors. Of particular relevance to this evidence are the factors referring to the 'colour of the water' and 'the clarity of the water[23,24], and 'the natural movement of water and sediment including hydrological and fluvial processes[25,26].

70. The value as currently expressed in PC1, particularly bullet point 1, focuses on the amenity and naturalness values. Natural character is not the same as naturalness, and a focus on naturalness tends to undervalue the contribution of biophysical, geomorphological and morphological aspects of natural character. Including references to the colour and clarity of the water, and to the natural movement of water and sediment and hydrological and fluvial processes goes some way to addressing this gap. I recommend these matters be included in the value.

Recommendations

71. Amend the natural form and character value to read:

Natural form and character

Retain the integrity of ~~the~~ lakes, rivers and wetlands within the landscape and its aesthetic features and natural qualities for people to enjoy.	▪ ~~The~~ Lakes, rivers and wetlands have amenity and naturalness values, including native vegetation, undeveloped stretches, and significant sites. ▪ Matters contributing to natural form and character include the natural movement of water and sediment including hydrological and fluvial process, the colour of the water and the clarity of the water. ▪ People are able to enjoy the natural environment; it contributes to their health and wellbeing. ▪ The rivers are an ecological and cultural corridor. ▪ The lakes, rivers and wetlands as a whole living entity.

Mahinga kai

72. Mahinga kai is an optional national value in the NPSFM. Fish and Game sought in their submissions that the mahinga kai value be amended to better provide for brown and rainbow trout[27].

[23] point vi and vii of the natural form and character value in the NPSFM.
[24] which Fish and Game sought inclusion of in their submission .
[25] point ii of the natural form and character value in the NPSFM.
[26] which the Director-General sought inclusion of and Fish and Game supported in their further submission .
[27] PC1-10770.

73. The s42A report states that the inclusion of 'freshwater game and introduced kai species' is sufficient to demonstrate appropriate regard to s7(h) and provide for the fishery value of trout. It is not perfectly clear that 'introduced kai species' includes the full value of a trout fishery[28].

74. As I have discussed above in regard to ecosystem health, the value of a trout fishery is not simply reliant on the presence or absence of catchable adult trout. It depends on having appropriate spawning and feeding areas and access through waterways to migrate to those places.

75. The value of a trout fishery is also its recreational value. The sport of fishing is not simply about being able to catch a fish to eat. It has a sporting aspect (catch and release and competition) and the enjoyment of being able to spend time in the outdoors. Trout fishing is the second most popular recreational activity in the catchment[29]. PC1 as notified potentially provided for this in its inclusion of 'recreation needs and for social wellbeing' in the eighth (last) bullet point.

76. For this reason, I do not agree with the s42A report recommendation to delete the last bullet point of the mahinga kai value entirely from PC1. It is the only recognition in PC1 of the recreational value of fishing.

77. I acknowledge that trout are a mahinga kai species for some iwi where those trout are taken by Māori, to support their physical and spiritual way of life, for example, providing trout as kai at the marae.

78. However, I am not sure that mahinga kai is the appropriate value to recognise trout fishing and its recreational value.

79. Most definitions of mahinga kai refer to food or other resources and the places they are found and the act of gathering them. Many definitions emphasise the cultural or traditional aspects of this, including the Waikato Regional Council report on non-market values, which separates collecting mahinga kai from fishing[30]. This implies that mahinga kai is a cultural practice which is distinct from the more generic value of fishing.

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[28] and I have discussed above in the ecosystem health section that 'game' species does not include trout.
[29] As highlighted in the evidence of Dr. Daniel citing Phillips, Y., 2014. *Non-market values for fresh water in the Waikato region: a combined revealed and stated preference approach*, Available at: http://www.waikatoregion.govt.nz/PageFiles/35075/TR201417 p 11.
[30] Phillips 2014 P 11: *Swimming or paddling was the most popular activity in the water (48 per cent of users), followed by fishing (37 per cent). Boating was the most popular on-the-water activity (33 per cent). A smaller*

80. The NPSFM certainly differentiates between the two values of 'mahinga kai' and 'fishing' with mahinga kai having an emphasis on indigenous species and traditional use. The fishing value in the NPSFM is described in more generic terms and refers to both indigenous and introduced species.

81. This distinction between mahinga kai (a traditional Māori practice) and fishing (a recreational or food gathering activity undertaken outside a Māori construct) appears to have been recognised in the early stages of the development of PC1. The values tables identified this value as "Mahinga kai and fishing" in November 2015[31] – PC1 was notified in October 2016 – I have not been able to pinpoint exactly when and why the change was made to only refer to mahinga kai.

82. At a minimum it is unclear which fisheries and introduced kai species are covered by the value. Potentially, the value does not cover the recreational aspects of fishing at all. It is potentially totally inappropriate to try and include a fishing value as part of mahinga kai. It certainly, in my view, is not necessary to have so much lack of clarity and potential argument about how a popular recreational activity is addressed by PC1. This can be avoided by simply being clear about recognising the trout fishery explicitly.

83. In my opinion the best way to provide for trout specific values is to provide for a specific "Fishing" value and a specific "trout spawning" value. Fishing is a value specifically identified as an "Other National Value" in the NPSFM to be applied at the discretion of the regional council. It is a pragmatic way to appropriately implement the Council's section 7(c) obligations to have particular regard to the habitat of trout and salmon. Recognition of the value of the trout fishery and spawning areas is very common practice in other regional plans.

84. I acknowledge it may not be desirable to apply a value of trout spawning or trout fishing throughout the entire Waikato and Waipā catchments. The current structure of PC1 applies all values to the entire catchment. A trout fishing and trout spawning value is an example of the shortcomings of this approach that I discussed earlier in my evidence. These trout fishing and spawning values need not apply to the whole of the Waikato and Waipā catchments, as the specific locations of values can be identified by Fish and Game. If the

proportion of people reported doing traditional cultural activities such as collecting mahinga kai (8 per cent), ceremonial use (3 per cent) and customary activities (8 per cent).

[31] Waikato Regional Council 2015. Values and Uses for the Waikato and Waipā Rivers. Document 3166221.

hearing panel is considering moving to a more geographically specific identification of values, I recommend that trout fishing and trout spawning values be defined in this way.

85. I recommend that trout fishery be made an explicit value in the plan. This would best recognise the non-traditional fishing and recreational aspects of the activity. The mahinga kai value should continue to recognise non-indigneous fish as these are an important kai resource for some iwi.

86. If the hearing panel does not decide to provide for a specific trout fishing and trout spawning values, then the mahinga kai value should be amended to specifically including 'fishing' and 'trout' in the value to make it clear that trout fishing is recognised and provided for in the values.

Recommendation

87. Add 'fishing' to the title of the value, add trout to the 2nd bullet point and keep the last bullet point.

Mahinga kai and fishing

The ability to access the Waikato and Waipa Rivers, lakes, and wetlands and their tributaries to gather sufficient quantities of kai (food) that is safe to eat and meets the social and spiritual needs of their stakeholders.	▪ ~~The~~ Lakes, rivers and wetlands provide for freshwater native species, native vegetation, and habitat for native animals. ▪ ~~The~~ Lakes, rivers and wetlands provide for freshwater game and introduced kai species, incuding trout. ▪ ~~The~~ Lakes, rivers and wetlands provide for cultural wellbeing, knowledge transfer, intergenerational harvest, obligations of manaakitanga (to give hospitality to, respect, generosity and care for others) and cultural opportunities, particularly at significant sites. ▪ The rivers should be safe to take food from, both fisheries and kai. ▪ ~~The~~ Lakes, rivers and wetlands support aquatic life, healthy biodiversity, ecosystem services, flora and fauna and biodiversity benefits for all. ▪ The rivers are a corridor. ▪ ~~The~~ Lakes, rivers and wetlands provide resources available for use which could be managed in a sustainable way. ▪ The rivers provide for recreation needs and for social wellbeing.

88. And/or add a new trout fishing value as set out above in the discussion on ecosystem health.

Human health for recreation

89. Fish and Game's submission sought explicit recognition of the use of rivers, lakes and wetlands for recreational hunting and angling[32].

[32] PC1-10787.

90. The s42A report does not recommend referring to hunting and angling specifically, because officers consider including specific reference could portray that these pursuits are more important than others that are not mentioned.

91. However, other specific recreational activities are mentioned in the value. Swimming is mentioned twice. Other values mention specific uses, boating has its own value (Taranga waka), and there are four separate extractive use values. Fishing for trout and hunting waterfowl are popular recreational activities[33]. However, while game bird species are recognised in the ecosystem health value, the activity of hunting them is not recognised at all in the values. I see no planning harm that can occur from specifically recognising fishing and hunting in the values. This could occur in the 'human health for recreation' value, the 'mahinga kai' value or in a separate 'hunting' or 'fishing and hunting' value.

92. If the hearing panel accepts the officers' argument that fishing and hunting values should not be specifically recognised in the 'human health for recreation' value, and that they are inherently part of the value, then in my opinion the value should at least recognise the recreational value of wetlands. This is where the majority of waterfowl hunting occurs, and recognising this would recognise the recreational value of wetlands.

Recommendations

93. Add fishing, hunting and wetlands into the human health for recreation value.

Human health for recreation

~~The~~ Lakes and rivers are a place to swim and undertake recreation activities in an environment that poses minimal risk to health.	▪ ~~The~~ Lakes, ~~and~~ rivers and wetlands provide for recreational use, social needs and social wellbeing, are widely used by the community, and are a place to relax, play, exercise and have an active lifestyle. ▪ An important value for the lakes, ~~and~~ rivers and wetlands is cleanliness; the lakes, ~~and~~ rivers and wetlands should be safe for people to swim in. ▪ The lakes, ~~and~~ rivers and wetlands provide resources available for use (including for hunting and fishing) which could be managed in a sustainable way.

OBJECTIVES

94. Section 3.11.2 sets out the Objectives for PC1. This section is dealt with in section B.4 of the s42A report.

[33] For example David Klee sets out in his evidence that Fish and Game sells approximately than 7000 game bird shooting licences every year. Dr Daniel states that the Waikato and Waipā rivers supports 17,230 angler days annually.

95. Fish and Game made several submissions[34] and further submissions[35] on the Objectives in PC1, which I discuss in more detail in the following sections of my evidence.

Freshwater objectives

96. The NPSFM requires regional councils to include freshwater objectives in the regional plan[36]. As PC1 is part of the Council's plan to give effect to the NPSFM for the Waikato and Waipā catchments, I would expect to see freshwater objectives set in PC1.

97. From the outset I would like to say that it is not perfectly clear what the freshwater objectives of PC1 are, and whether or not the objectives of PC1 form part of the freshwater objectives required by the NPSFM. There is nothing in the plan change labelled "freshwater objectives". The numeric states in Table 3.11-1 are labelled 'attributes' in the table – which is language used in the NPSFM in relation to freshwater objectives, but the heading of the table is "Short term and long term numerical water quality targets…" which is language used in relation to limits. This is confusing.

98. In my opinion this lack of clarity is a planning problem, for the following reasons:

    a) because a lack of clarity leads to arguments which are costly and time consuming;

    b) because freshwater objectives are a compulsory requirement of the NPSFM, so we need to know what they are in order to assess whether or not PC1 gives effect to the NPSFM;

    c) because limits and targets must "allow a freshwater objective to be achieved"[37]. If we don't know what a freshwater objective is, then we will not know whether the limits and targets are appropriate; and

    d) lastly, because freshwater objectives go directly to the definition of 'over-allocation. The definition of over-allocation has two prongs, the first is whether a limit has been exceeded, the second is "*the situation where the resource … is being used to a point where a freshwater objective is no longer being met".* Over-allocation must be avoided, and where it occurs the regional plan must specify

[34] PC1-11007 (wetlands and Whangamarino Wetland); PC1-10790 (New wetlands); PC1-10806 (Objective 1); PC1-10809 (Objective 3); V1PC1-223 (Objective 6).
[35] FSPC1-393 (wetlands, estuary objectives); FSPC1-395 (Objective 2); FSPC1-397 (Objective 4); FSPC1-398 (Objective 5).
[36] NPSFM Policy A1.
[37] definition of limit NPSFM, definition of target refers to 'limit' with a timeframe.

methods to improve freshwater quality. If it is unclear what the freshwater objectives are then the council and community cannot effectively implement the NPSFM.

99. A freshwater objective is defined in the NPSFM:

"describes an intended environmental outcome in a freshwater management unit".

100. The NPSFM sets out a specific process for developing freshwater objectives[38]. This process creates a direct link between the values identified in the FMU and attributes appropriate to provide for those values.

101. The NPSFM sets out a preference for numeric attributes, and provides tables of numeric attribute states for some attributes applicable to the compulsory national values. The NPSFM also allows for narrative freshwater objectives. In summary, the NPSFM states that:

a) the intended environmental outcome must be defined;

b) that outcome must provide for the identified values;

c) those outcomes to be stated in numeric terms where possible, and

d) the outcome may be stated using narrative objectives if numeric terms are not practicable.

102. In my experience, freshwater objectives that are a mix of narrative statements with references to numeric attribute tables are common, and I consider them to be best practice. For example, Plan Change 6 for the Tukituki Catchment in Hawkes Bay (which I discuss in more detail later in this evidence), and the Canterbury Land and Water Regional Plan have freshwater objectives that are a mix of narrative objectives and policies and numeric attributes cross referenced to a table[39].

103. The main advantage of including an element of narrative in freshwater objectives is that they can provide a clear statement of intended outcome even where there are not yet adequate scientific measures that relate to a value – setting an intended outcome and measuring progress towards it need not wait until the science catches up in these

[38] NPSFM, in the CA suite of policies.
[39] Canterbury Land and Water Regional Plan Section 2.4, Section 3 and Table 4.1.

instances. This is particularly important for wetlands, as I will discuss in more detail later in this evidence.

104. A narrative freshwater objective is also a good way of communicating goals (and progress towards them) with the community. Relying solely on numeric freshwater attributes as objectives means the progress towards the objective and its achievement is purely a scientific matter that everyday people cannot readily engage with.

105. In my view the objective of the Vision and Strategy to restore the river to be swimmable and safe to gather kai throughout its entire length is a good example of what a good narrative freshwater objective looks like.

106. In my opinion PC1 needs to be amended to make it perfectly clear what the freshwater objectives are. I consider this to be one of those areas of 'mis-alignment' with the NPSFM that the s42A report refers to[40] that needs exploration through the hearing process.

107. The attribute states in Table 3.11-1 must form part of the freshwater objectives and ought to be labelled as such. I support in part the officers' recommendation in the s42A report to change references in the objectives to 'water quality attribute targets' to 'water quality attribute states' as this is more consistent with the NPSFM. I say I only support those changes in part, because that change deletes all reference to targets and limits in the objectives and their reasons, which raises other issues, which I will discuss later in this evidence in relation to Table 3.11-1.

108. I also consider that the objectives of PC1 (except Objective 4) are appropriate as freshwater objectives as well as being plan objectives and should be labelled as freshwater objectives.

Objectives general

109. I agree with the s42A report recommendation to remove the headings of the objectives and to delete the 'reasons for adopting'. In some cases the reasons for adopting and titles are somewhat different from the objectives themselves which adds to confusion.

[40] Section 42A report para 167.

Objective 1

110. Fish and Game's submission supported the intent and 80 year time frame set out in Objective 1[41]. The majority of Fish and Game's original submission on this objective relates to Table 3.11-1, which, following the format of the s42A report, I will discuss later in this evidence.

111. Fish and Game supported in further submissions the submission of the Director-General seeking that Objective 1 be reworded to focus on the restoration and protection of water quality, rather than on the discharge of contaminants[42].

112. Objective 1 refers to discharges resulting in achievement of the restoration and protection of the water quality attributes. This seems to put the focus in the wrong places. The Vision and Strategy requires restoration and protection of the health and wellbeing of the Waikato River – the water quality attributes are one way of describing and measuring healthy waterbodies, but not a thing to be protected in and of themselves. The objective talks about discharges resulting in the goal – but discharges are just one thing that needs to be managed to achieve the goal, land use (such as stock access to water) also needs to be managed. The objective also only mentions four contaminants, when many more contaminants must be managed to achieve the goal of restoration and protection. This will be discussed further in this evidence relating to the attributes.

Recommendation

113. In my opinion a clearer and more accurate objective, which would also be suitable as a freshwater objective (as it clearly states the environmental outcome sought) would be:

"To restore and protect the health and wellbeing of the Waikato and Waipā catchments so that the values are provided for and the 80 year water quality attribute states in Table 3.11-1 to 3.11-1C are achieved by 2096."

Objective 2

114. Fish and Game did not make a submission on Objective 2, but they did make a further submission supporting the Director-General's submission on this provision[43]. The Director-

[41] PC1-10806.
[42] FSPC1-394.
[43] FSPC1-395.

General sought changes to recognise the environmental benefits of the restoration and protection of the river, and deletion of the word 'continue'.

115. The restoration of water quality in the Waikato and Waipā catchments will not just benefit communities and the economy, it will benefit the environment and its intrinsic values also. I agree with the Director-General's submission that the objective should recognise the benefits to the environment of the restoration of the water quality of the Waikato and Waipā catchments. A generic reference to 'environment' would add little to the objective. However, a reference to the identified values would be more specific. It would also explicitly incorporate the values into the objectives.

116. At the moment the values are not well connected in any explicit way to the objectives or water quality attribute states. I am sure connection is intended by PC1, and the s42A report states many times that there is a clear link between the values, objectives and states. It would be consistent with the NPSFM to have this linkage between values and freshwater objectives perfectly clear. Including reference to the values in Objective 2 would also provide for the only explicit recognition of the values in the plan if Objective 4 is deleted as suggested by the s42A report (a recommendation I support and discuss further below).

117. I agree with the submission from the Director-General that the objective would be improved by removing the word 'continue'. Continue means that something remains or carries on[44] and implies that things are the same in the future as they currently are. The goal of PC1 is that some things improve over their current state – many cultural and environmental values should be in a better state in the future if PC1 is successful.

Recommendation

118. Amend Objective 2 to read:

~~Waikato and Waipa communities and their economy benefit from t~~The restoration and protection of water quality in the Waikato and Waipā River catchments, and achievement of the water quality attribute states in Table 3.11-1 to 3.11-1C provides for the values and uses identified in section 3.11.1 while ~~which~~ enable~~s~~ing the people and communities to continue to provide for their social, economic and cultural wellbeing.

Objective 3

[44] Oxford dictionaries.

119. Fish and Game sought that a 20 year target be put in Objective 3 in addition to the 10 year target. They sought that the 20 year target be 30% of the required change toward the 2096 goal[45].

120. The s42A report does not recommend including additional time bound targets such as that sought by Fish and Game. The current aim of Objective 3 is to implement actions over the next 10 years. Those actions should work towards the short-term targets in Table 3.11-1 (these represent approximately 10% of the change required to achieve the 80 year targets). Officers state in the s42A report that because the life of the plan is 10 years, it is sufficient to signal actions over only 10 years.

121. I disagree with the s42A report on this matter. Plans typically have a life longer than 10 years. A review of the plan is required within 10 years of it becoming operative. Assuming PC1 takes a further 2 years to go through the decisions and Environment Court appeals process, PC1 will not be operative until 2021. A review would not be required until 2031. If that review resulted in recommendations for changes, a plan change process might take 3 to 7 years to become operative. This means the current plan framework may be in place until 2034 or 2037. In these circumstances it is prudent for PC1 to take a longer term view, so that the plan provides guidance for activities for its entire life – which could be much longer than 2026.

122. Even if a plan review is completed and a plan change operative before 2026, resource consents granted under rules in PC1, will likely last for more than 10 years. A resource consent granted for farming activities granted under this plan may conceivably have a life of 20 to 30 years. This means the resource consent will need to have appropriate conditions to manage the activity until 2039 or 2049. A long term consent needs to have long term goals and management requirements put in place as conditions of the resource consent. If not, the conditions of the consent will be out of step with changes required to activities by permitted activities or consents granted under a new plan (under an early plan change scenario).

123. The conditions of a resource consent can, in theory, be reviewed in certain circumstances. Section 128 allows the council to review a consent if a plan is made operative with "rules relating to …minimum standards of water quality". Under this section of the RMA, a review could only be carried out if the plan was changed to include a rule that required compliance with a water quality standards. In the context of regulating

[45] PC1-10809.

farming, this type of rule would be very unusual[46] – it is more common to set discharge maximums (eg kg/n/ha/year) or land use standards (e.g. restrictions on grazing or cultivating near streams) than to relate the rule to directly to an instream standard.

124. Even if s128 could be used to trigger a consent review, in my opinion you cannot rely on reviews carried out under s128 to meet new requirements on discharges from land. While they are technically allowed, in practice they are seldom undertaken. In relation to consents that authorise farming, I think there are very real questions about whether a consent that authorises a certain type of farming on a piece of land, or has been granted allowing a certain stocking rate for example, can have its conditions changed in such a way to reduce nitrogen leaching rates, if the only way to achieve those nitrogen leaching rates is to fundamentally change the farming system. In my opinion these risks mean it is more prudent to set the long terms goals in the consent from the outset. The only way to do this in an equitable way is to set those goals in the plan from the outset.

125. A twenty year goal seems an appropriate intermediary step between the 10 year goal and the typical length of a resource consent. I recommend that PC1 include 20 year numeric goals.

126. It is problematic that PC1 does not put a timeframe in place for the 'short term' goals in Table 3.11-1. Objective 3 states the actions must be put in place by 2026, to work towards the short term goals, but it does not state that the goals should be achieved by 2026. The short term goals in Table 3.11-1 are called targets, and presumably are meant to operate as targets to give effect to the NPSFM. 'Target' as defined in the NPSFM is essentially a limit with a deadline[47]. In sub-catchments which already meet the long term goals, this is not necessary – the short term numbers can be called limits and do not need a timeframe. In sub-catchments that do not meet the long term or short term goals, a timeframe for the short term goals is necessary.

127. I accept that for contaminants such as nitrogen that have complex groundwater journeys where some nitrogen is attenuated before it reaches the river many years later, it is difficult to say exactly when the benefits of changes on the land will be seen in the river. Estimates of lag time for nitrogen vary, as set out in Dr Canning's evidence. Most of the sub-catchments in Dr Canning's Table A2 and A3 have a short to moderately short lag time. A

[46] I can think of only one Regional Plan that does this, the Otago Regional Plan PC6 introduces nirogen concentration standards as well as kg/n/ha/year limits.
[47] NPSFM defintiion: Target is a limit which must be met at a defined time in the future. This meaning only applies in the context of over-allocation.

date for of 2035 for meeting nitrogen targets should certainly be achievable for most sub-catchments.

128. While the situation for nitrogen is complicated by attenuation and lag, many other contaminants, including most of the sediment, microbial pathogens, and phosphorus entering rivers, travel there by overland flow or erosion of river banks. Attenuation or lag is not such a significant issue for these contaminants[48]. Changes on the land to reduce these contaminants will improve water quality much more quickly. It is possible to set a realistic short term target date of 2030 for these contaminants.

129. For all contaminants it is possible to set a medium term goal, of say 20 years, and I believe it is necessary for the plan to provide this guidance in order for resource consents to set appropriate conditions in an equitable way.

130. I accept a short or medium term instream target does pose problems for consent applicants to know what their particular contribution to a 10 or 20 year goal is, if that goal is expressed as an instream concentration. It is difficult for an individual to understand what their contribution to the total is without some sort of understanding of what the whole catchment is doing, and at a minimum an understanding of the total catchment load allowed that insures an instream goal is met.

131. The NPSFM addresses this issue and requires councils to set out the 'maximum amount of resource use allowed while allowing a freshwater objective to be met' – a limit. If that limit is to be met at some time in the future it is a called a target, and must include the date by which that occurs. Limits do not have to be calculated loads, and I am aware of many plans which use instream concentrations as limits. This is not inherently wrong. However, PC1 must choose a method which is effective and efficient at achieving the objective.

132. Nitrogen is allocated on a property by property basis in PC1 (through both permitted activities and resource consents) on a kg/ha/year basis, because this is what Overseer calculates. The only way to understand if the total of all those kg/ha will result in the desired instream outcome is to calculate a load. Without this the Council will never be able to understand if the resource consents they are granting are making sufficient progress towards the objectives.

133. Many submitters are aware of this, and have sought in submissions that PC1 include catchment loads for contaminants, particularly nitrogen. This would allow all contributors

[48] This is acknowledged in PC1 in the last paragraph of 3.11.6.

to that load (including point source) to understand the goal and their contribution towards achieving it. It will allow the Council to understand progress towards the goal and measure all the contributors to that load.

134. The s42A report argues that calculating loads for nitrogen is not possible. Adam Canning discusses in his evidence how calculating loads is possible and provides his calculations. Dr Robertson includes calculated loads for suspended sediment entering Whangamarino Wetland via Pungarehu Canal. I am of the opinion that calculating loads (at least for nitrogen) is a necessary part of PC1, and is vital if Council is going to be allocating nitrogen through resource consents (which PC1 provides for and I understand the Council has already begun doing).

135. As discussed earlier in this evidence, restoring health to the Waikato and Waipā waterways will require effort in more than nitrogen, phosphorus, sediment and microbial pathogens. The attributes in Table 3.11-1 should include more than these four measures, which I discuss later in this evidence in relation to that table, and so the reference to this narrow set of parameters should be removed from Objective 3.

Recommendation

136. Amend Objective 3 to read:

Actions put in place and implemented by 2026 to reduce diffuse and point source discharges of contaminants ~~nitrogen, phosphorus, sediment and microbial pathogens~~, are sufficient to achieve the short-term water quality attribute states in Table 3.11-1 by 2030 (for contaminants other than nitrogen) or 2035 (for nitrogen). ~~ten percent of the required change between current water quality and the 80-year water quality attribute targets in Table 3.11-1. A ten percent change towards the long term water quality improvements is indicated by the short term water quality attribute targets in Table 3.11-1.~~

Actions put in place and implemented by 2036 to reduce diffuse and point source discharges of contaminants, are sufficient to achieve the medium-term water quality attribute states in Table 3.11-1 by 2040(for contaminants other than nitrogen) or 2045 (for nitrogen).

Objective 4

137. Fish and Game did not make an original submission on Objective 4 but did support in further submissions the submissions of the Director-General to amend the objective to provide for intrinsic values, and remove uncertainty in the wording[49].

138. The s42A report recommends deleting Objective 4 as it is not worded as an objective or 'outcome statement' and that the matters it does cover are more appropriately provided for in policies or rules. I agree with the s42A report that Objective 4 should be deleted.

139. In the event that the hearing panel decides Objective 4 should remain in the plan, in my opinion some key changes would need to be made to the objective.

140. The first is in relation to the word 'continues' in the first sentence. As I have discussed earlier in this evidence, 'continue' implies things continue in the same way or the same rate that they do currently. That is the opposite of the intention of PC1. Removing the word 'continue' still allows for the Objective to reflect social, cultural and economic wellbeing. However, I do note that the idea of the community providing for their wellbeing is already provided for in Objective 2, and so this reference in Objective 4 is unnecessary and could be deleted entirely.

141. Clause (a) of the objective refers to both the values and uses of the Waikato and Waipā Rivers, and the attributes in Table 3.11-1. If a reference to values and uses is to remain in the objective, in my opinion simply 'considering' those values and uses is not sufficient to properly give effect to the NPSFM and the RMA. As I have discussed earlier in this evidence, the NPSFM sets out a clear linkage between the values and any freshwater objectives – the freshwater objectives are there for the purpose of providing for the values[50]. Several of the values are matters of national importance under section 6 of the RMA. Simply 'considering' these values is inadequate. The values ought to be provided for. I have recommended changes to Objective 2 to refer to providing for the values, if that recommendation is adopted clause (a) of Objective 4 is not required. If it is to remain it should refer to 'providing for' the values and uses.

Recommendation

142. Delete Objective 4.

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[49] FSPC1-397.
[50] NPSFM Policy CA2(c), (e)(iia) (B) and ((iii).

143. Alternatively, if the hearing panel wishes Objective 4 to remain, amend Objective 4 to read:

A staged approach to reducing contaminant losses ~~change~~ enables people and communities to ~~undertake adaptive management to~~ ~~continue~~ ~~to~~ provide for their social, economic and cultural wellbeing in the short term while:

a. ~~considering~~ Providing for the values and uses when taking action to achieve the attribute^ ~~targets^~~ states for the Waikato and Waipa Rivers in Table 3.11-1; and

b. recognising that further contaminant reductions will be required by subsequent regional plans ~~and signalling anticipated future management approaches that will be needed~~ in order to meet Objective 1.

Objective 5

144. Fish and Game did not make a submission on Objective 5. Fish and Game did support the submission of the Director-General to ensure that intrinsic values are not considered 'impediments' to use of ancestral lands[51]. In my opinion if the values and uses are 'provided for' in other objectives as I have recommended in this evidence, I support the officers' recommendation that Objective 5 remain unchanged.

Objective 6

145. Fish and Game sought that all remaining wetland habitats, particularly the Whangamarino Wetland are recognised as significant and maintained, enhanced or protected from further degradation and loss[52]. Fish and Game also sought that Whangamarino be recognised as an outstanding waterbody[53].

[51] FSPC1-398.
[52] PC1-11007; V1PC1-223 ; PC1-10790. These submission points are a general submission, a submission in relation to Objective 6 and a submission in relation to including a new objective relating to wetlands respectively.
[53] PC1-11007; FSPC1-446. These submission points are a submission on particular recognition of the significance of Whangamarino Wetland and a further submission on the Director-General's submission that Whangamarino Wetland should be recognised as an outstanding water body respectively.

146. This relief is connected to relief sought by Fish and Game that a FMU is created for the Whangamarino Wetland[54]. This is discussed later in the FMU section of my evidence.

147. The RMA requires that the natural character of wetlands is recognised and provided for[55]. Wetlands are significant habitats of indigenous fauna, and their protection must be provided for[56] by PC1. In addition to this, Objectives A2(b) and B4 of the NPSFM require that the significant values of wetlands be protected. PC1 must appropriately provide for these matters.

148. The evidence of Mr Klee for Fish and Game and Dr Robertson for the Director-General explain in detail the significant values of wetlands generally and Whangamarino specifically, and the threats wetlands face. In particular, Dr Robertson notes that wetlands in the region meet Criteria 4 of the ecological significance criteria in the WRPS, because less than 10% of the original extent of wetlands remains in the region. Mr Klee and Dr Robertson are of the opinion that active protection and management of wetlands is required to prevent further loss and decline in condition of wetlands.

149. From the outset I should say that I disagree with the conclusion in the s42A report that Objective 6 should be deleted because it is the same as Objectives 1 and 3. This is incorrect for three main reasons.

150. First, Objective 1 and 3 refer only to the water quality attributes in Table 3.11-1. These are attributes for rivers and lakes. They are not appropriate attributes to achieve ecosystem health in the Whangamarino Wetland complex. Wetland specific attributes are needed. Even if they are added, there are still other problems with the Objectives that means they do not adequately cover Objective 6 matters.

151. Secondly, Objective 6 refers to managing total loads of contaminants. Objectives 1 and 3 refer only to Table 3.11-1 which has concentration (and visibility) based standards. Wetlands (and lakes) are sinks for contaminants, they do not flush contaminants away like rivers do, so all contaminants they have received tend to stay in the system and be recycled. While some contaminants, such as nitrogen, may be 'treated' and ultimately removed in a healthy wetland, other contaminants, such as sediment, do not, and so remain in the wetland system. Dr Robertson gives an example of importance of both deposited and suspended sediment on Whangamarino Wetland, and the necessity of

[54] V1PC1-201.
[55] RMA s6(a).
[56] RMA s6(c).

including both water clarity and sediment load. The total load arriving that the wetland has to absorb is just as important as the concentration of a contaminant[57] and it must be within the wetlands ability to treat or absorb that load and remain healthy and functioning.

152. Thirdly, Objective 6 refers to managing the 'catchment' of Whangamarino Wetland to make progress towards restoration. While it is possibly inherent in Objectives 1 and 3, the idea of total catchment management to achieve goals is not explicitly stated. It is a particularly necessary aspect of the restoration of Whangamarino Wetland.

153. In addition, Dr Robertson also notes that Objectives 1 and 3 do not provide for a level of protection for Whangamarino Wetland that is consistent with its internationally significant values.

154. In my opinion, Objective 6 as notified is not simply a repetition of Objectives 1 and 3 and should not be deleted as recommended in the s42A report. I recommend it be retained, and changed to better recognise the importance of Whangamarino Wetland and give effect to the NPSFM and achieve the purpose of the RMA.

Wording of Objective 6

155. Fish and Game's submission sought changes to the objective to include a clause (c) that recognises the importance of managing the hydrological regime in addition to the water quality[58]. The s42A report states that this is essentially beyond the scope of PC1 as it is not closely related to the management of diffuse discharges of the four contaminants[59].

156. Fish and Game will be making legal submissions on the scope of PC1 and whether or not it is as narrow as simply diffuse discharges of the four contaminants mentioned in Objective 1 and 3. Even if the hearing panel finds that the scope is as narrow as the s42A report suggests, I disagree with the statement in that report that the management of hydrology is not connected to management of contaminants. The amount of water entering Whangamarino Wetland and the times it enters are directly linked to the total load of contaminants that the wetland receives. The s42A report recognises that "The altered hydrology of Whangamarino Wetland…has resulted in nutrient enrichment of bog wetland types within the wider wetland complex."[60] Managing hydrology is an integral component

[57] loads, particularly of nitrogen, are an important management tool for managing contaminants entering rivers, but it does not directly drive ecosystem health in rivers as it does in wetlands and lakes.
[58] V1PC1-223.
[59] Section 42A report, para 452.
[60] Section 42A report, para 456.

of managing the health of Whangamarino, including for managing the inflow of contaminants. The NPSFM recognises the importance of this type of integrated management, and requires regional councils to manage freshwater and land use in catchments in an integrated and sustainable way. The interaction between hydrology and contaminant management should not be ignored. In my view this should form part of Objective 6.

Better recognition of wetlands

157. As I have stated, the RMA and NPSFM both require protection of wetlands, including those that provide significant habitat, and the protection of the other significant values of wetlands.

158. The WRPS has an objective to " … safeguard the significant values of wetlands…."[61] And to maintain and enhance certain values, including water quality, biodiversity and wetland quality and extent[62]. The WRPS requires the plan to "identify … the significant values of wetlands."[63] and protect those significant values[64] so that the "significant values of wetlands are protected and where appropriate enhanced."[65].

159. In my opinion, the NPSFM and the WRPS set clear and explicit direction to identify the significant values of wetlands and to provide for their protection. PC1 must give effect to that direction for the Waikato and Waipā catchments. The s42A report considers that there is sufficient guidance in existing plan documents and that specific policy in PC1 is not required. I have reviewed the provisions of the regional plan and I disagree.

160. Other than the WRPS directions to the regional plan, there little policy guidance in the current operative plan to give effect to these directions. Objective 3.1.2 and Policy 1 of the plan focus on the natural character of wetlands and an increase in the extent and quality of the region's wetlands. Natural character is one of the significant values of wetlands, but the provisions do not identify others significant values, or require their protection as is required to give effect to the WRPS and NPSFM.

161. Wetlands are different from riverine systems and require different management to protect their significant values. They also require different freshwater objectives and

[61] WRPS Objective 3.14.
[62] WRPS Objective 3.16(b).
[63] WRPS Method 8.2.1.
[64] WRPS Method 8.2.2.
[65] WRPS Policy 8.2.

attributes. Freshwater objectives do not have to be numeric, and can be narrative if that is appropriate. I discuss this more in the section of my evidence relating to Table 3.11-1,and in relation to a wetland specific objective, this should refer to wetland specific attribute goals.

162. Much of the work of protecting wetlands and their significant values will be done in the policies and rules of PC1, however in my opinion there ought to be a clear objective from which those provisions flow. I recommend that Objective 6 be amended to provide for the protection of the significant values of all wetlands, as well as contain specific provisions relating to Whangamarino Wetland. Alternatively, a separate objective relating to wetlands generally could be provided in addition to a specific objective for Whangamarino Wetland.

Recognition of Whangamarino Wetland as an outstanding waterbody

163. Fish and Game's submission also sought that Whangamarino Wetland be recognised as a significant waterbody, and supported the submission of the Director-General that it be recognised as an outstanding waterbody[66].

164. The NPSFM requires the Council to protect the significant values of outstanding waterbodies. Outstanding waterbodies are those identified as such in the plan or RPS. The WRPS requires the regional plan to identify outstanding freshwater bodies[67] and to protect the values of that freshwater body that result in it being identified as outstanding[68]. PC1 must give effect to the WRPS and the NPSFM. In order to give effect to the WRPS and the NPSFM, as is the intention of the council set out in the PIP, PC1 must identify the outstanding waterbodies in the Waikato-Waipā catchments and protect their significant values.

165. David Klee (for Fish and Game) and Hugh Robertson (for the Director-General) have provided evidence on the significant values of Whangamarino Wetland that contribute to it being considered an outstanding waterbody. In summary, Dr Robertson sets out the three main reasons for considering Whangamarino Wetland nationally and internationally outstanding:

[66] FSPC1-446.
[67] WRPS Method 8.2.1 RPS.
[68] WRPS Policy 8.2 RPS.

a) If the natural character or ecosystem heath of Whangamarino Wetland were diminished, this would represent a decline in significant wetland values at a national and international scales, which is likely to be irreversible.

b) The wetland is an internationally significant site for the protection of nationally critical threatened species, such as the Australasian Bittern.

c) Large areas of the sensitive raised bog remain in relatively pristine condition (good water quality, indigenous dominance, natural ecological processes) and it is one of best global examples of a restiad raised bog.

166. When the Whangamarino Wetland is recognised as outstanding, PC1 must contain provisions that protect its significant values. Changes to Objective 6 are part of that. Other changes required will be discussed in future hearings, as the relevant topics and provisions are heard.

Recommendation

Objective 6:

The significant values and uses of wetlands identified in 3.11.1 and their ecosystems and hydrological functioning are protected and the extent and condition of wetlands is maintained and improved so that the water quality attribute states in Table 3.11-1B are achieved by 2096.

Whangamarino Wetland is recognised as an outstanding waterbody and its significant values, including habitat for threatened species and sensitive raised bog ecosystem, are protected, including by ensuring that:

a. ~~Nitrogen, phosphorus, sediment and microbial pathogen~~ Contaminant loads in the catchment of Whangamarino Wetland are reduced in the short term, to make progress towards the long-term restoration of Whangamarino Wetland; and

b. The management of contaminant loads entering Whangamarino Wetland is consistent with the achievement of the water quality attribute^state~~targets~~^ in Table 3.11-1B and Table 3.11-1C.

c. An integrated approach is taken so that the hydrological regime of the Whangamarino wetland is actively managed to ensure the short, medium and long term water quality attribute states in Table 3.11-1B and Table 3.11-1C can be achieved.

FRESHWATER MANAGEMENT UNITS

167. The s42A report begins its analysis (in section B5.2.2) of FMU submissions by setting out the officers' view on the purpose of FMUs. The s42A report states correctly that FMUs are required, and that the NPSFM does not prescribe a spatial scale for FMUs and allows regional councils discretion. However, I disagree with the statement in the report that the purpose of an FMU is "to monitor progress towards achieving water quality limits and targets". While monitoring and accounting is required at sites representative for each FMU[69], limiting the application of FMU setting to only monitoring and accounting in my opinion under-represents the importance of FMUs in the management of waterbodies.

168. The NPSFM sets out the definition of FMU as:

> "is the water body, multiple water bodies, or any part of a water body determined by the regional council as **the appropriate spatial scale for setting freshwater objectives and limits** and for freshwater accounting **and management purposes**." (emphasis added)

169. FMUs are the fundamental spatial building block of freshwater management. They are the scale at which values are identified, freshwater objectives set, and progress towards goals is assessed. FMUs are a **management** tool – in my opinion they need to be set at a scale commensurate with the scale of resource use, resource pressure, or to be able to spatially manage particular values or pressures.

Whangamarino Wetland FMU

170. Fish and Game sought an additional FMU be created for the Whangamarino Wetland[70]. The Director-General also sought this change.

171. Based on my evidence above about the requirements of and purpose of FMUs, in my opinion the question to ask is: will keeping Whangamarino in the Lower Waikato FMU assist in appropriate management of the wetland complex? Or, would a separate Whangamarino Wetland FMU provide for the management of the values of Whangamarino Wetland better?

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[69] NPSFM Policy CB (b) and Policy CC1(b).
[70] V1PC1-201.

172. As it currently stands, keeping Whangamarino Wetland in the Lower Waikato FMU means that the numeric freshwater objectives set for lower Waikato *River* apply to the Whangamarino *Wetland*. The point at which success or failure of the management regime of PC1 is measured will be the FMU monitoring point in the mainstem of the Waikato River Dr Robertson sets out in his evidence the different water quality attribute goals that are appropriate for Whangamarino Wetland that are different to those of the Lower Waikato River. David Klee sets out in his evidence that wetlands, especially sensitive bog habitats require specific management regimes that are different to other freshwater systems, such as rivers. I think it unlikely that setting and monitoring water quality goals in the River will be successful in driving the required management of Whangamarino Wetland.

173. Officers refer in their s42A report to the absence of both guidance on wetland attributes, and water quality monitoring data as reasons for not delineating a separate Whangamarino Wetland FMU[71]. In contrast, Dr Robertson states in his evidence that Whangamarino Wetland is well studied including the state of the environment monitoring of the major contributing tributraries, and that there is a good understanding of the current over allocated state of Whangamarino Wetland. Even if the evidence of Dr Robertson is accepted, I do not think it is a requirement to have current data in order to specify an FMU. Certainly it helps fulfil the requirement to set freshwater quality attributes at or higher than current state, but if the overall goal is restoration it is logical that the goal will be set higher than current state, so this requirement should be practical to fulfill. I will also address this argument in relation to rivers in the following section of my evidence.

174. Dr Robertson provides evidence on appropriate freshwater objectives for a Whangamarino Wetland FMU. He also provides evidence on the sub-catchments in PC1 that provide surface flows to Whangamarino Wetland and that should be included in a Whangamarino Wetland FMU. I believe the approach put forward by Dr Robertson is appropriate and necessary to fulfil the requirements of the NPSFM for freshwater objectives.

175. The s42A report rejects the inclusion of specific water quality attributes for Whangamarino Wetland because it rejects the inclusion of a Whangamarino Wetland FMU[72]. In my opinion the two requests can be considered separately. Even if Whangamarino Wetland remains within the Lower Waikato FMU, PC1 can include a table of attributes that are specific to the Whangamarino Wetland within that FMU. This is similar

[71] Section 42A report para 489.
[72] Section 42A report para 629.

to my recommendation earlier in this evidence that wetland specific attributes be applied to all other wetlands within the FMUs. Riverine attributes are simply not appropriate for wetlands, and will not result in the protection of wetlands, including Whangamarino Wetland.

176. Dr Robertson and Mr Klee both provide evidence on the outstanding values of Whangamarino Wetland. These values cannot be appropriately protected by lumping this wetland in with the rest of the lower Waikato River. It is more appropriate to acknowledge these values and more effective to manage them within a separate FMU.

Lake FMUs

177. Mr Klee and Dr Ngaire Phillips (for the Director-General) both discuss the way Lake FMUs have been derived in their evidence. My understanding of that evidence is that the separation of lakes into four FMUs based on geological formation is inadequate to capture the range of different lake types and condition in the Waikato and Waipā catchments.

178. The risk of the simplistic approach in PC1 is that it groups lakes with different management needs together, and risks setting freshwater objectives that are inappropriately low for some lakes.

179. Both Mr Klee and Dr Phillips provide alternative approaches to categorising lakes that would more appropriately group 'like with like' and provide for more appropriate freshwater objectives to be set for the FMUs. In my opinion an approach like the ones they have suggested is necessary to properly manage lakes and give effect to the higher order policy documents.

Recommendations

180. Create a new FMU for the Whangamarino Wetland.

181. Include a new table of numerical values for the Whangamarino Wetland to act as numeric freshwater objective attribute states, limits and targets. This should be done even if a Whangamarino Wetland FMU is not created.

182. Categorise lake FMUs in accordance with a more appropriate methodology as suggested in the evidence of Mr Klee and Dr Phillips.

TARGETS AND LIMITS (TABLE 3.11-1)

183. Fish and Game made extensive submissions on Table 3.11-1[73], and supported in further submissions the submissions of the Director-General (and others). In summary, these submissions and further submissions state that Table 3.11-1:

a) does not contain appropriate attributes, targets or sites to recognise the values of the plan[74], give effect to the Vision and Strategy[75] or accurately characterise ecosystem health[76], and specifically that it;

b) should include an attribute for MCI[77], that the targets for total phosphorus and nitrate should be lower than those in PC1[78], and that additional targets for DRP[79], periphyton, dissolved oxygen, toxicants, temperature, pH[80], deposited[81] and suspended sediment[82] be included;

c) should set a time limit for the short term target[83];

d) should set a medium term target of 30% of the required change in 20 years[84]; and

e) should set short term targets for lakes.[85]

What are the numerics in Table 3.11-1?

184. Before going into detail on the specific numerics sought in submissions, it is important to be clear on what the numerics in Table 3.11-1 actually are. Are they attributes (as part of a freshwater objective), a target, a limit or, something else?

185. PC1 is not perfectly clear on this at the moment – it uses all three terms in its introduction to Table 3.11-1 but it only uses the term 'attribute' in the headings in the table.

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[73] PC1-11007 (general); PC1-10806 (Objective 1); PC1-10809 (Objective 3); PC1-11004 (Table 3.11-1); V1PC1-287 (Table 3.11-1); V1PC1-298 (Table 3.11-1); V1PC1-292 (Table 3.11-1); V1PC1-293 (Table 3.11-1); V1PC1-299 (Table 3.11-1); V1PC1-278 (Table 3.11-1); V1PC1-282 (Table 3.11-1).
[74] PC1-11007.
[75] PC1-11004.
[76] PC1-11007.
[77] PC1-11007.
[78] PC1-10806; V1PC-289.
[79] V1PC1-299; FSPC1-374; FSPC1-446.
[80] FSPC1-374; FSPC1-446.
[81] V1PC1-299; FSPC1-374; FSPC1-446.
[82] FSPC1-374; FSPC1-446.
[83] FSPC1-396 (Objective 3).
[84] PC1-10809 (Objective 3).
[85] PC1-10922 (3.11.4.4).

186. The s42A report adds to this proliferation of terminology by recommending a new term in the objectives of 'water quality attribute states', and two new terms in the Table 3.11-1; 'water quality limits and targets' for short term targets and 'desired water quality states' for long term targets.

187. As I have discussed earlier in this evidence, the numerics in Table 3.11-1 must form part of freshwater objectives, as freshwater objectives and numeric attribute states are a compulsory aspect of plans set out in the NPSFM. Therefore the numbers in Table 3.11-1 must be attributes.

188. A regional plan that gives effect to the NPSFM must contain limits, and where a FMU does not meet the freshwater objective, the plan must specify targets. A limit is:

"the amount of resource use available that allows a freshwater objective to be met."

189. Targets must include a timeframe by which they are achieved. Methods must also be set out in the plan to achieve those limits, targets and freshwater objectives, and I will discuss appropriate methods in later hearing streams.

190. In my experience regional plans use a variety of tools to define limits. Sometimes defined, desirable, numeric water quality states are used in plans as limits. And sometimes specific restrictions on resource use in rules are defined as limits.

191. PC1 contains methods (such as rules controlling farming) to assist in achieving the goal of improved water quality. However, those methods do not achieve the objectives of PC1. They are not designed to – PC1 sets a timeframe of 80 years to achieve that goal, and the methods of PC1 only address the first step on that journey. Because the rules and other methods of PC1 do not achieve the freshwater objectives of PC1, they do not meet the definition of limit in the NPSFM and cannot be considered limits.

192. PC1 as notified (and largely as recommended by s42A officers) stated that the numerics in Table 3.11-1 are limits and targets. I agree that that should remain the case.

193. This has two implications. First that the numerics in Table 3.11-1 have two or three functions depending on the numeric. All those that describe an 'intended environmental outcome[86]' are freshwater objective attributes. All those that are intended to describe a maximum or minimum constraint on resource use are limits. In catchments where those

[86] definition of freshwater objective NPSFM.

limits or freshwater objectives are not met, the numbers are targets and should have a date attached to them.

194. This sounds confusing, but it is relatively easy to set up the table to describe those different roles. For example, Plan Change 6 for the Tukituki catchment in Hawkes Bay Region, sets out numerics for periphyton, DRP and nitrogen[87]. These are described in the table headings as 'limits and targets'. An explanatory footnote to the table heading states that the numbers "are to be treated as limits at location where existing water quality is better than the relevant numerical value and as 'targets' at locations where the existing water quality is worse than the relevant numerical value'". The date for meeting targets (2030) is set in the freshwater objectives and policies of the plan.

195. Plan Change 6 was prepared under the NPSFM, but before the 2014 amendment that required freshwater objectives to contain numeric attributes. However, Plan Change 6 does incorporate the numerics into the freshwater objectives, and contain numerics that are not limits or targets but are 'indicators' of achieving the freshwater objectives.

196. In my opinion a similar approach could be adopted for PC1. Table 3.11-1 should clearly state that the numerics are freshwater objective attributes, and should be cross referenced in the objectives (as I have recommended in relation to Objective 1). Many[88] of those freshwater objective numerics are also appropriate limits, and should be identified as such. They may also form targets (in locations where they are currently exceeded) and text accompanying the table should make this clear. The date for achievement of the targets could be set out in the Table, or as I have recommended in Objectives 1 and 3.

197. I have recommended wording for this in Appendix 1.

198. Some attributes are not suitable as limits and targets. These are the attributes that are good indicators of environmental outcome, but are not well suited to making a direct connection between resource use and the measured numeric as a limit must do. This is not an exact science, but I have recommended some logical differentiations in my recommended Table 3.11-1. Some examples of this are MCI, periphyton and Fish IBI: they are appropriate freshwater objective attributes but not appropriate limits. Nitrogen and phosphorus are appropriate as both attributes and limits.

[87] Table 5.9.1B set out in Appendix 2.
[88] I will set out later in this evidence which are not appropriate limits.

199. This differentiation helps make it clear the role numerics play in PC1. It also assists us in ensuring that some numerics that are difficult to relate directly to a land use or discharge activity but are vital and meaningful measures of ecosystem health (like the Index of Biotic Integrity) can form a measurable indicator of success of PC1.

Particular numerics

200. In this section of the evidence I discuss and make recommendations on the submissions and evidence relating to specific numerics. However, I will first make some overall statements about numerics that form part of freshwater objective attributes.

201. The NPSFM requires certain attributes to be included for the compulsory national values of ecosystem health and human health for recreation. Both the values and the attributes are compulsory. The NPSFM does not provide a process by which these attributes may be 'opted out' of. If PC1 is to give effect to the NPSFM it must include these attributes.

202. The s42A report appears to acknowledge this[89], and yet, makes several arguments about why they are not included. These arguments include:

- there is not enough current data to determine current state,
- there is a poor connection between land use and the attribute, or
- it is difficult to model impacts or economic implications.

203. The attributes in PC1 have been developed through the Collaborative Stakeholder Group (CSG) process, receiving advice from a Technical Leaders Group (TLG). I acknowledge the large amount of time and resource that went into developing that approach. The CSG and TLG set themselves some criteria for deciding when a measure would be an appropriate attribute to include in PC1. None of those criteria are set in the NPSFM or the Vision and Strategy – they are self imposed. The only criteria in the NPSFM are those I have set out earlier in my evidence:

a) that the attribute describe the intended environmental outcome,

b) that it achieves the objectives of the NPSFM,

[89] Section 42A report, para 532.

c) that it includes all the compulsory attributes set out in the NPSFM, and

d) for other attributes a numeric measure is used where it is practicable to use one.

204. All other criteria were imposed by the CSG/TLG. In my opinion, those self-imposed criteria place inappropriate constraints on the development of attributes and muddle the difference between setting an outcome and describing the management required to achieve that outcome. This has led to the current situation where attributes that are quite clearly compulsory are not included in PC1 and other widely acknowledged and scientifically robust indicators of environmental outcome and ecosystem health have been excluded from consideration.

205. Dr Canning discusses the scientific merits of the TLG criteria in his evidence. I will now discuss the arguments used in the s42A report for excluding attributes that have been sought in submissions.

206. I agree with the s42A report that the current state of water quality is a relevant consideration for setting a freshwater objective; the freshwater objective must be set at a level at or better than the current state. However, poor information is not an excuse to not set an objective. The objective must be set at a level that safeguards, restores and protects ecosystem health. We should use the best information we have to set attributes at a level that achieves this. Dr Canning discusses in his evidence how current state can be modelled if insufficient monitoring data is available, and he uses this as a basis for some of his recommendations on appropriate attribute states for the plan.

207. If we subsequently find that the existing water quality is higher than the objective set in the plan, we can and should adjust the objective upwards. The RMA provides for environmental management to be adaptive in nature, it allows plans to be reviewed and changed over time.

208. The alternative approach, and the approach taken in PC1 and the s42A report, is to do nothing – to not set an environmental objective for key attributes at all. The risk of doing nothing must be specifically considered when completing a s32 or s32AA assessment. In this case, the risk of doing nothing, of not setting an environmental objective for key environmentally relevant attributes, is that water quality for those attributes declines because it is not measured and it is not managed. This would lead to a worsening environmental state. In this scenario doing nothing may lead to further harm and will have a worse outcome than in advertently setting the bar too low. This would be inconsistent with the RMA, NPSFM and Vision and Strategy. The Vision and Strategy in particular has

a specific Objective (f) that requires the adoption of a precautionary approach where significant adverse effects may result. In my view setting the environmental outcome based on best available knowledge, amending that outcome when more knowledge becomes available, and using policy to require that water quality is at least maintained, is the most appropriate way forward.

209. When setting an 'intended environmental outcome' I do not believe it is necessary to make a direct connection between a resource use activity and the outcome. As Dr Canning points out in his evidence, ecosystems are complex webs of interactions, there is seldom a single lever or pressure that causes an effect – it more usual for multiple actions or stressors to be in play. Excluding attributes that describe ecosystem outcomes on the basis that they are complex will lead us to having a poor understanding and consequently poor management of ecosystem health. I note that periphyton is a compulsory attribute in the NPSFM and it is famously the result of multiple factors (including temperature, nutrients, light, water flow). This complexity did not exclude it from becoming a compulsory national attribute describing intended environmental outcome. I do not think other attributes should be excluded simply because they are complex.

210. I acknowledge that if you use the numerics for purposes other than setting desired outcomes, for example measuring compliance or as a resource limit, it becomes more difficult. But that is why the distinction I have recommended between numerics that are freshwater objectives and numerics that are limits is useful, and why I recommend that approach be used here.

211. Modelling is a useful tool to understand how particular management actions will influence instream outcomes. However, being able to model an outcome is not a requirement before a numeric is considered for inclusion as a freshwater objective, limit or target. Models can be expensive and time consuming to build. Despite this, Dr Canning describes in his evidence how relatively straight forward Bayesian belief network models can be put together for attributes such as Q-MCI. If we wait for complex and perfect modelling to be available before taking action, experience tells us we are likely to see a degradation in water quality and a loss of biodiversity. We do have a lot of information about indicators of ecosystem health, about key drivers of that health, and about management actions that can be taken to influence those drivers and outcomes. It is more appropriate to do the best with the information we have, than to do nothing until we have perfect information.

212. The s42A report also dismisses new attributes, or higher requirements for existing attributes if the submitters have not provided detailed economic modelling of the impacts of achieving those attributes. Decision makers are required to have regard to the efficiency, including costs and benefits of plan provisions and understanding economic implications is an important part of that analysis. Decision makers are also required to choose provisions that are effective at achieving the objectives of the plan and that give effect to higher order documents, such as the NPSFM and Vision and Strategy. The s42A report gives this need to be effective at protecting and restoring ecosystem health as a reason for not lowering the 80 year water quality goals as sought by some submitters.

213. In my opinion it is more important to choose attributes that are effective at achieving the objectives of the NPSFM, achieving the Vision and Strategy and achieving the purpose of the Act than it is to only choose objectives where economic modelling has been completed. Economic modelling is a useful tool, but it should not be the sole driver of resource management decision making.

214. Mr Denne discusses the strengths and weaknesses of the economic modelling that was completed in his evidence. In his opinion the analysis completed does not fully cover the full breadth of costs and benefits that must considered under s32 RMA and it overestimates the costs and underestimates the benefits of improved ecosystem health in the Waikato and Waipā catchments. Mr Denne also notes that the analysis does not show a significant change in the cost curve of achieving 10% of the change required, or 25% of the change required. Mr Denne also presents evidence that 6 to 12 years is adequate time for significant change in land use to occur if it is necessary.

Periphyton

215. Periphyton (measured as chlorophyll-a) is a compulsory attribute for rivers in the NPSFM. That means it needs to apply to all rivers, or at least to all hard bottomed rivers as discussed in the evidence of Kate McArthur and Adam Canning. While the s42A report accepts this, it does not recommend applying periphyton attributes to all rivers, including that it does not recommend applying the periphyton attribute to upstream hard bottomed tributary rivers and streams. I have dealt with the reasons given for not making that change in an earlier section of this evidence, and I disagree with the s42A report's reasoning.

216. The s42A report also states that even if periphyton is included, the methods set out in PC1 to achieve water quality targets will unlikely change. I disagree with this reasoning. Acceptable periphyton levels to sustain ecosystem health are a compulsory measure of

the 'intended environmental outcome'. If periphyton is measured above those acceptable levels, the Council is required by the NPSFM to review their plan to include methods that will lead to their achievement[90]. If periphyton is not an attribute in tributaries it may never be monitored and measured. If it is not measured the Council will miss valuable opportunities to review and fine tune the methods of the plan to ensure it is managed at a level consistent with ecosystem health

217. In my opinion while periphyton must be included as an attribute for hard bottomed rivers, it is not as suitable for a limit or target in PC1, as it is responsive to complex drivers. I have reflected this in my recommended changes to the Table.

Dissolved Oxygen

218. Dissolved oxygen (DO) is a compulsory attribute for rivers, downstream of point source discharges. It must be included as an attribute for rivers and apply downstream of point sources. Dr Canning also sets out in his evidence why it is a key attribute to measure and a driver of ecosystem health, and in his opinion it should apply to all locations on a river, not just downstream of point source discharges.

219. The s42A report argues that DO is not directly relevant to the four contaminants managed by PC1[91]. Fish and Game will be making legal submission about the scope of PC1 and whether it is as narrow as the four contaminants. Even if it is, DO is directly influenced by nitrogen and phosphorus. Dr Canning explains how nutrients contribute to periphyton to growth in rivers, that periphyton releases oxygen during the day, and uses it up during the night, and that can cause dramatic and lethal reductions in DO. In my opinion this means that DO is directly related to the four contaminants, and the management of land use. Managing the discharge of nutrients is a key method to manage DO levels.

220. I recommend DO be added to Table 3.11-1 as a freshwater objective attribute.

MCI and Fish IBI

221. The NPSFM requires councils to monitor MCI and to take action if it ever drops below 80[92]. Dr Canning explains in his evidence that MCI is a widely used, scientifically rigorous and ecologically meaningful measure of ecological health. Ecosystem health is the goal

[90] Policy CB2, Policy A2 NPSFM.
[91] Section 42A report para 534.
[92] NPSFM Policy CB3.

of the NPSFM, Vision and Strategy and RMA. Including a direct measure of ecosystem health in PC1 is consistent with those higher order documents, and directly assists in measuring the 'intended environmental outcome'. The Council will be monitoring MCI as a requirement of the NPSFM. In my opinion it is a necessary and appropriate freshwater attribute and should be included in Table 3.11-1

222. Fish IBI is a measure of the health of fish populations. Dr Canning explains in his evidence that the Fish IBI scores a site based of the number and type of fish present at a site relative to what should be there under reference conditions. He sets out that it is an appropriate attribute to include in addition to MCI because it directly measures the diversity of fish species which respond to different drivers than invertebrates. Including an IBI objective relates directly to the 'intended environmental outcome' of the NPSFM and Vision and Strategy by measuring the health of indigenous fish populations. I recommend that IBI be included in Table 3.11-1 as a freshwater objective attribute.

Nitrate nitrogen and phosphorus

223. Both nitrogen and phosphorus attributes are required under the NPSFM. Nitrate toxicity is a compulsory attribute for rivers to support the ecosystem health value. In addition, the note to the nitrate toxicity attribute table requires dissolved inorganic nitrogen (DIN) and dissolved reactive phosphorus (DRP) attributes to be developed and included in regional plans[93] to manage periphyton.

224. Dr Canning explains in his evidence the importance of nitrogen and phosphorus attributes and their relationship to ecosystem health, both through their influence on periphyton growth and their significance for ecosystem health more generally.

225. PC1 sets the nitrate goals at a more stringent level than is required by the NPSFM. This is because the nitrate attributes in the NPSFM are aimed at avoiding toxicity – the nitrate objectives in PC1 are, and must be, focussed on ecosystem health. Dr Canning explains the direct link between nitrogen and ecosystem health in his evidence. He also explains why he thinks the nitrogen attributes should be more stringent in some cases than those in PC1. He presents evidence that more stringent numbers are required to safeguard life supporting capacity and protect ecosystem health.

[93] The note to nitrate toxicity table in Appendix 2 of the NPSFM states that "To achieve a freshwater objectives for periphyton within a freshwater management unit, regional councils must at least set appropriate instream concentrations and exceedance criteria or dissolved inorganic nitrogen (DIN) and dissolved reactive phosphorus (DRP)".

226. PC1 includes attributes for total phosphorus (TP) in the mainstem of the Waikato River. It does not have phosphorus attributes for the Waipā or any tributaries. It is compulsory to include a phosphorus attribute for rivers to manage periphyton as I have set out earlier in this evidence. I understand that TP is an appropriate (and compulsory) attribute for lakes and has been adopted for the Waikato mainstem because of the number of large hydro-electricity dam lakes on the Waikato River. However, TP is not an appropriate attribute for rivers and streams including tributaries of the Waikato River. This seems to be the key reason that the s42A report recommends against including a phosphorus attribute for tributary rivers. However, it is not a good reason for failing to include a phosphorus attribute for tributary rivers at all. DRP is an appropriate phosphorus attribute for rivers, and Dr Canning recommends that dissolved reactive phosphorus (DRP) is used as an attribute for the Waipā catchment and Waikato tributaries. It is the plant available form of phosphorus and so is more appropriate to flow rivers and streams. It is consistent with the NPSFM and the evidence that Dr Canning provides on the ecological relevance of nutrients.

227. The s42A report states that it cannot support more stringent numbers for nutrients because the impacts of these have not been modelled. It also states elsewhere that less stringent numbers cannot be supported because they would not support ecosystem health and give effect to the Vision and Strategy. I agree with the officers that the numerics **must** achieve the Vision and Strategy and **must** safeguard ecosystem health. Under s32, the first test of a provision in a plan is whether or not it is effective at achieving the objectives. In my opinion, if a particular attribute is not set at a level that supports ecosystem health it does not achieve the objectives of the plan and is not appropriate, and a different numeric must be used. Therefore, if the attributes in PC1 are found to be set at a level that is lower than that required to safeguard ecosystem health, they must be replaced with attributes set at a higher level, as recommended by Dr Canning.

228. The economic modelling done to support PC1 concludes that achieving the nutrient attributes in PC1 as having significant costs. Mr Denne is of the opinion those costs are overstated and benefits have not been accounted for at all. Setting that aside, a high estimate of cost has been considered appropriate by decision makers to date because it is necessary to achieve the objective. This same logic can be applied to the more stringent 80 year attributes sought by Fish and Game and others. The cost may be high, but the benefits are also high, and the costs are necessary to achieve the required outcome.

229. Nutrient numerics for nitrogen and DRP should apply as both freshwater objectives and limits and targets. This is the current approach in the notified version of PC1. Nitrogen

and phosphorus attributes are directly related to resource use activity and discharges and so it is appropriate for them to also be limits and targets.

Clarity

230. Water clarity is a key driver of ecosystem health and the suitability of a waterbody for contact recreation. Adam Daniel describes in his evidence the importance of good water clarity to support good fish populations and good fishing. Dr Daniel also refers to the MfE contact recreation guidelines which identify that being able to see the bottom of the river when a swimmer is standing in the river (a visual clarity of 1.6m) is a key indicator of a river that is suitable for swimming. However, trout require better water clarity of a minimum of 1.8 metres, and 2.0 metres or more in upland tributaries is required to sustain healthy trout populations.

231. Dr Daniel sets out the visual clarity standards that are appropriate to protect the values of the Waikato and Waipā catchments, and I recommend these be included in Table 3.11—1 as freshwater objective attributes and limits and targets.

232. Deposited sediment

233. Deposited sediment can have profound effects on ecosystem health, by smothering animals, and filling interstitial spaces between rocks where animals live or seek refuge in extreme conditions[94]. In order to safeguard ecosystem health, Dr Canning recommends that deposited fine sediment should not exceed 20% cover of the river bed. Dr Canning's evidence is that this is a well developed attribute, that is easy and inexpensive to measure. Lack of current state data should not be a reason why a deposited sediment attribute is ruled out, as there is a clear threshold that is required to be maintained in order to maintain ecosystem health.

234. I recommend that deposited sediment be included in Table 3.11-1 as a freshwater objective attribute and as a limit and target.

Attributes for wetlands

235. Dr Robertson provides evidence on appropriate freshwater objectives for wetlands. He considers it technically unsound to rely on river attributes to protect wetlands. Dr Robertson's narrative freshwater objectives attributes set out a description of wetland

[94] Dr Canning evidence Appendix A.

types, and narrative descriptions for appropriate levels of contaminants and hydrological regime. Freshwater objectives do not have to be numeric, and can be narrative if that is appropriate. I believe the approach put forward by Dr Robertson is appropriate to fulfil the requirements of the NPSFM for freshwater objectives.

SUB-CATCHMENT PRIORITIES

236. The issue of the priority for implementation of plan methods is dealt with last in the s42A report (section B5.4.5).

237. Fish and Game supported the submission of the Director-General that lake sub-catchments be given Priority 1.

238. David Klee gives evidence on the significant values of lakes in the region. He discusses how some lakes that are a high priority for protection or restoration in other management strategies are given a low priority in PC1. He also notes that there are very few lakes with good water quality left, so it is important to prioritise management of their catchments so that they remain in good condition.

239. The s42A report agrees in part with the Director-General's submission on this point, and recommends some lake sub-catchments be elevated to priority 1. I agree with this recommendation. However, Mr Klee points out that the there are problems with the changes that the officers have recommended, including that it does not use the most up to date data. As a result some lakes which should be priority 1 remain priority 3, including two dune lakes.

240. For these reasons Mr Klee supports the prioritisation put forward in evidence by Dr Phillips. Re-prioritising those sub-catchments to priority 1 is a more appropriate way to ensure that lakes with good water quality have that water quality maintained, as is required by the NPSFM and RMA. I also recommend sub-catchments 22 and 5 be changed to priority one in Table 3.11-2.

Helen Marr

DATED this 15th day of February 2019

APPENDIX 1 – PLAN PROVISIONS AS RECOMMENDED IN EVIDENCE

Table 5.9.1B: Surface Water Quality Limits, Targets[27] and Indicators for the Tukituki River Catchment – Zone Specific.

The Water Management Zones referred to in Table 5.9.1B are mapped in Schedule XV.
The key to Table 5.9.1B is provided below Table 5.9.1C.

Water Management Zone	Mainstems/ Tributaries[28]	Periphyton Limits and Targets				DRP Limits and Targets	Nitrate-nitrogen Limits and Targets		DIN Limits and Targets	Indicators	
		(a)	(b)	(c)	(d)		(a)	(b)		Water Clarity	MCI
Zone 1 Lower Tukituki and Waipawa Rivers and Tributaries (excluding Papanui Stream catchment)	Mainstems	120	30	60	50	0.010	2.4	3.5	n/a0.8	2.8	100
	Tributaries					0.015				1.6	100
Zone 2 Middle Waipawa River and Tributaries above SH2	Waipawa River	120	30	60	50	0.010	3.8	5.6	n/a0.8	3.0	120
	Mangaonuku Stream									4.0	
	Tributaries					0.015				1.6	100

[27] The numerical values in Table 5.9.1B are to be treated as "limits" at locations where the existing water quality is better than the relevant numerical value and as "targets" at locations where the existing water quality is worse than the relevant numerical value.

[28] Mainstems include the following rivers:
- Zone 1 mainstem of the Tukituki River
- Zone 3 mainstems of the Tukituki and Tukipo rivers, and the Maharakeke, Porangahau, Makaretu and Kahahakuri streams.