

EXPERT CONFERENCE — FRESHWATER QUALITY/ECOLOGY – ORARI-TEMUKA-OPIHI-PAREORA SUB-REGION

Submitters — 160, 381, 382, 385, 351

Topic: Proposed Plan Change 7 to the Canterbury Land and Water Regional Plan

Date of conference: 18 August 2020

Venue: Via Microsoft Teams


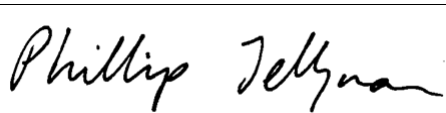

Facilitator: Bill Rainey




Recorder: Alanna Hollier

1. The Hearing Panel for Proposed Plan Change 7 to the Canterbury Land and Water Regional Plan (**PC7**) directed in its Minute 5 of 19 May 2020 that expert witness conferencing shall occur in respect of Freshwater quality/Ecology – Orari-Temuka-Opihi-Pareora Sub-Region in relation to submissions against PC7.

Attendees

2. Witnesses who participated and agreed to the content of this Joint Witness Statement (**JWS**):

Name	Employed or engaged by	Signature
Shirley Hayward	Canterbury Regional Council	
Dr Phillip Jellyman	NIWA – Canterbury Regional Council	
Dr Greg Ryder	Opihi Flow and Allocation Working Party, Adaptive Management Working Group, and Opuha Water Limited	

Mark Webb	Opihi Flow and Allocation Working Party, Adaptive Management Working Group, and Central South Island Fish & Game Council	
Richard Measures	Adaptive Management Working Group and Opuha Water Limited	
Dr Thomas Drinan	Department of Conservation	

Environment Court Practice Note

3. All participants confirm that they have read the Environment Court Consolidated Practice Note 2014 and in particular Section 7.1 (Code of Conduct, Duty to the Court and Evidence of an expert witness) and Appendix 3 - Protocol for Expert Witness Conferences and agree to abide by it.
4. Ms Hayward acknowledges that she is an employee of the Canterbury Regional Council. Notwithstanding that, Ms Hayward confirms that she prepared and will present her evidence as an independent expert and in compliance with the Code of Conduct.
5. Dr Jellyman acknowledges that he is employed by NIWA and engaged by the Canterbury Regional Council. Notwithstanding that, Dr Jellyman confirms that he prepared and will present his evidence as an independent expert and in compliance with the Code of Conduct.
6. Dr Ryder acknowledges he is engaged by the Opihi Flow and Allocation Working Party, Adaptive Management Working Group, and Opuha Water Limited. Notwithstanding that, Dr Ryder confirms that he prepared and will present his evidence as an independent expert and in compliance with the Code of Conduct.
7. Mr Webb acknowledges he is employed by Central South Island Fish & Game Council and that he was the Fish and Game representative on the Opihi Flow and Allocation Working Party and Adaptive Management Working Group. Notwithstanding that, Mr Webb confirms that he prepared and will present his evidence as an independent expert and in compliance with the Code of Conduct.
8. Mr Measures acknowledges he is engaged by the Adaptive Management Working Group and Opuha Water Limited. Notwithstanding that, Mr Measures confirms that he prepared

and will present his evidence as an independent expert and in compliance with the Code of Conduct.

9. Dr Drinan acknowledges he is employed by the Department of Conservation. Notwithstanding that, Dr Drinan confirms that he prepared and will present his evidence as an independent expert and in compliance with the Code of Conduct.

Experts' qualifications and experience

10. These are set out in each experts' evidence. For Ms Hayward of the Canterbury Regional Council, this is set out in Appendix A of the Plan Change 7 section 42a report. For Dr Jellyman, this is set out in Appendix 1 of the Joint Witness Statement.

Purpose of expert conference

11. The purpose of the conference is to assist the Hearing Panel by responding to a series of questions, agreed by the experts as the conference progressed, relating to Ecology and associated issues.
12. For each question, the experts state matters on which they agree and on which they do not agree, with reasons.
13. The experts note that Hydrology - Orari-Temuka-Opihi-Pareora Sub-Region is addressed in a separate JWS and the two need to be read together.

Proposed plan provisions relevant to this conference

14. The agenda drafted by the experts set out the following plan provisions which are stated as being relevant (at a high-level) to this conference.
 - a. Table 14(b), 14(e) and 14(f)
 - b. Policy 14.4.35(e)
 - c. Table 14(m) (North Opuha)
 - d. Tables 14(n) and 14(o) (South Opuha)
 - e. Tables 14(p) and 14(q) (Upper Opihi)
 - f. Tables 14(r) and 14(s) (Te Ana Wai)
 - g. Table 14(v) and 14(w) (Opuha/Opihi Mainstem)

Freshwater Outcomes/Limits for Lake Opuha

Dissolved oxygen attributes

15. Comments concerning dissolved oxygen attributes were discussed by Ms Hayward, Mr Measures and Dr Ryder. Dr Drinan and Mr Webb provided no comment concerning this matter. Dr Jellyman was not present for this section of caucusing.
16. The gazettal of the National Policy Statement for Freshwater Management 2020 (NPS FM) expresses dissolved oxygen as a concentration (mg/L) compared to saturation (%) used in Table 14(b) of Plan Change 7. Using dissolved oxygen concentration is agreed as appropriate within Table 14(b).
17. In terms of the NPS FM there are two ways of measuring dissolved oxygen attributes, one at the lake bottom (Table 18 Appendix 2B NPS FM) and the other at mid-hypolimnetic (Table 19 Appendix 2B NPS FM). Both points of measurement are valuable. A lake bottom limit is most relevant for water chemistry concerns (which is a particular concern in Lake Opuha) but more difficult to measure.
18. Setting an attribute state for dissolved oxygen within Band B of the NPS FM is a realistic measure for protecting ecological values within Lake Opuha. The experts disagreed where within Band B the limit should sit. Ms Hayward recommended the limit sits within the middle of Band B, as this provides a level of appropriate protection for Lake Opuha water quality. Mr Measures recommends that the lower end of Band B is set to prevent adverse outcomes, recognizing that this is a lower limit and the majority of the time dissolved oxygen will be well above the limit.
19. The experts agree that how the attribute is measured (in relation to frequency of measurement and averaging period) and assessed against the outcome is significant for interpretation of the results. The experts agree that an averaging period should be defined, but cannot provide an agreed calculation method at this stage.

Other attributes

20. The experts consider that all attributes are to be measured in accordance with scientific best practice available at the time.
21. For Table 14(b), the experts agree that it would be helpful in terms of assessing compliance with the attribute outcomes that the time period and exceedance criteria are clearly defined. The experts agree that Trophic Level Index (TLI) should be calculated from annual average measures of total nitrogen, total phosphorus, chlorophyll-a and lake clarity (where appropriate). Therefore, the metric in Table 14(b) should be referred to as

“TLI annual average”, and the numeric value expressed as less than or equal to (\leq) 4.0. The same approach would be helpful for other measures such as chlorophyll-a.

22. The experts agree that the visual quality attribute of colour should not apply to Lake Opuha, given that it is an artificial lake in which it is not possible to determine what its natural colour would be. The experts agree that the other attributes proposed for Lake Opuha adequately provide for the values that are intended to be protected.

Artificial Freshes

23. Comments concerning artificial freshes were discussed by Ms Hayward, Mr Measures, Dr Ryder, Dr Drinan and Mr Webb. Dr Jellyman was not present for this section of caucusing.
24. The experts agree that artificial freshes released from Lake Opuha can contribute to management of nuisance periphyton growth, with the greatest effectiveness in the Opuha River and reduced effectiveness further downstream in the Opihi River. Therefore, Mr Measures’ proposed rewording of Policy 14.4.35(e) in paragraph 7.6(a) of his statement of evidence is supported.
25. The experts agree that artificial freshes, in isolation, cannot be effective at opening the river mouth, but that freshes can have a role in refreshing the lagoon and river mouth and assisting with providing fish passage.

Partial restrictions

26. The experts agree that the setting of partial restrictions (e.g. pro-rata or step) ensure that the minimum flows are not breached through abstraction.

Individual river ecological flow provisions

27. Dr Jellyman was present for this section of caucusing. Comments concerning ecological flow provisions for the North Opuha River and Opuha/Opihi mainstem were discussed by Ms Hayward, Mr Measures, Dr Ryder, Dr Drinan, Mr Webb and Dr Jellyman.

Table 14(m) (North Opuha)

What is the current state of ecosystem health?

28. Generally, the North Opuha has good ecological health but the experts are concerned about the elevated nitrogen concentration in the lower river reach and consequential effects on periphyton taxa and biomass.

What ecological values (including for different key species) are relevant for each river?

29. The experts agree on the following ecological values: native fish (including naturally uncommon alpine galaxiids, and the longfin eel and Canterbury galaxiids), brown and rainbow trout spawning and nursery.

What flow ranges support those values (including minimum flows, seasonal flows and allocation)?

30. In-stream habitat assessments were unable to be undertaken, therefore there is a need to rely on other indicators such as fish species, ecological health and flow statistics to assess ecological flow needs.
31. Assessing these indicators, the experts agree that the level of abstraction and the minimum flow regime proposed under Table 14(m) is unlikely to adversely affect the identified ecological values.

What are the implications (ecologically & water quality) of the flow regimes proposed in PC7 and by submitters?

32. The experts agree that the setting of partial restrictions (e.g. pro-rata or step) ensure that the minimum flows are not breached through abstraction.

Table 14(v) and (w) (Opuha/Opihi Mainstem)

What is the current state of ecosystem health?

33. In relation to the Opuha River, the experts agree that it is in a degraded state, including from the effects of the commissioning of the Opuha Dam, initially cyanobacteria blooms, and then the effects of the incursion of didymo from 2008 onwards.
34. In relation to the lower Opihi River (downstream of the Opuha confluence), the experts agree the available data indicates moderate ecological health. Primarily, the experts are concerned with the degree of nitrogen enrichment (median ~0.5mg/L, with some seasonal peaks above 1mg/L). Phosphorus levels are in a moderate range of nutrient enrichment. The consequence of the degree of nutrient enrichment and the length of accrual periods is that periphyton growth, in particular benthic cyanobacteria can reach nuisance levels (benthic cyanobacteria is also an issue in the Opihi above the Opuha confluence).

35. The experts agree that the flow regime provided by the Opuha Dam has maintained connectivity in the lower Opihi River continuously since commissioning when previously it regularly dried. The flow regime has also helped maintain an open river mouth with less frequent, shorter duration closures.

What ecological values (including for different key species) are relevant for each river?

36. The experts agree on the following ecological values for the lower Opihi River: high diversity of native fish, brown trout, migratory native fish, taonga species, sea-run Chinook salmon, waterfowl, riverine birds, and long-tailed bat.
37. The experts agree on the following ecological values for the Opuha River: moderate diversity of native fish, brown trout, migratory native fish, taonga species, sea-run Chinook salmon spawning and rearing, waterfowl and riverine birds.

What flow ranges support those values (including minimum flows, seasonal flows and allocation)?

38. The experts agree that flows below 6000L/s at the river mouth increase the risk of mouth closure.
39. The habitat modelling indicates flows for the Opihi River at Saleyards Bridge in the range of 3500-4000L/s provides adequate habitat retention for the ecological values. The experts agree that in addition to providing adequate habitat retention and flushing flows, there are also other components of the flow regime that are important for supporting ecological values, such as low- to mid-range flow variability.

What are the implications (ecologically & water quality) of the flow regimes proposed in PC7 and by submitters?

40. The experts support the full allocation regime for the Opihi River at Saleyards Bridge proposed by the Adaptive Management Working Group. Proposed increase in flows, particularly for January and February, provide greater support for ecological values than those proposed in PC7.
41. The experts consider that the Adaptive Management Working Group level one regime provides adequate habitat retention for ecological values for the Opihi River below the Saleyards Bridge.
42. Ms Hayward, Dr Jellyman and Dr Drinan consider the Adaptive Management Working Group's level two regime year round is less than optimum and may risk loss of some

ecological values depending on the timing, duration and frequency of the level two regime.

43. Dr Ryder, Mr Measures and Mr Webb consider that the Adaptive Management Working Group's level two regime provides an acceptable compromise between preserving lake storage to maintain river connectivity in the future at the risk of losing some ecological values in the short term.

Tables 14(n) and (o) (South Opuha)

44. Comments concerning ecological flow provisions for the South Opuha River and the Te Ana Wai River were discussed by Ms Hayward, Dr Ryder, Mr Webb and Dr Jellyman. Dr Drinan and Mr Measures were not present for this section of caucusing.

What is the current state of ecosystem health?

45. Generally, the South Opuha has good ecological health and water quality but the experts acknowledge there is an apparent decline in invertebrate community health. The fish community of the South Opuha is similar to that of the North Opuha.

What ecological values (including for different key species) are relevant for each river?

46. The experts agree on the following ecological values: native fish (including naturally uncommon alpine galaxiids, and the longfin eel and Canterbury galaxiids), brown and rainbow trout nursery.

What flow ranges support those values (including minimum flows, seasonal flows and allocation)?

47. The experts agree that the minimum flow provisions in Table 14(n) of PC7 are an improvement in terms of habitat retention over the current regime (summertime flows) and that the increases proposed in Table 14(o) of PC7 provide incremental increases in habitat retention. The proposed flow regime in Table 14(n) for autumn through to spring (15 March to end of November) provides a substantial improvement in habitat retention.

What are the implications (ecologically & water quality) of the flow regimes proposed in PC7 and by submitters?

48. The experts consider that the change in the flow regime as proposed in Plan Change 7 would not result in a measurable improvement in water quality attributes based on the experts understanding that there is not large actual abstractor pressure in shoulder

seasons. Ms Hayward considers that the proposed summertime flows in Table 14(o) give more assurance that ecological values can be supported through different climatic conditions.

Tables 14(p) and (q) (Upper Opihi)

What is the current state of ecosystem health?

49. The experts agree that elevated nitrate concentrations and cyanobacteria blooms are key issues of concern for the upper Opihi River

What ecological values (including for different key species) are relevant for each river?

50. The experts agree on the following ecological values: native fish, brown trout and sea-run Chinook salmon spawning.

What flow ranges support those values (including minimum flows, seasonal flows and allocation)?

51. The experts agree that PC7 Table (p) and Table (q) provide incremental gains in habitat availability for mahinga kai species and for salmonids but acknowledge decreases in habitat availability for other native species. The experts agree that the PC7 flow regimes for April to September provide improved habitat availability for salmonid spawning, but less rearing habitat than current flow regime.

Tables 14(r) and 14(s) (Te Ana Wai)

What is the current state of ecosystem health?

52. The experts agree that the Te Ana Wai River has moderate water quality and at times develops nuisance periphyton, including benthic cyanobacteria exceeding recreational guidelines. Invertebrate community indicators are variable and can range from very good to very poor.

What ecological values (including for different key species) are relevant for each river?

53. The experts agree on the following ecological values: moderate diversity of native fish species, taonga species, brown trout fishery and salmonid spawning.

What flow ranges support those values (including minimum flows, seasonal flows and allocation)?

54. The experts agree that PC7 Table (r) and Table (s) provide incremental gains in habitat availability over summer time flows for native fish species, mahinga kai species and juvenile salmonids, but acknowledge that food producing habitat is limiting up to naturalized MALF. The experts agree that the PC7 and AMWP flow regimes for April to September provide substantially improved habitat availability for sea-run Chinook salmon spawning.

What are the implications (ecologically & water quality) of the flow regimes proposed in PC7 and by submitters?

55. The experts agree that the proposed summertime minimum flow of 450 L/s along with introduction of partial restrictions will provide flow connectivity throughout the lower Te Ana Wai River. Therefore, experts agree that the introduction of partial restrictions will reduce stress to fish and risk of fish stranding.

Appendix 1 Statement of qualifications and experience of Dr Jellyman

56. My name is Phillip Graeme Jellyman and I am employed by the National Institute of Water and Atmospheric Research Limited (NIWA) based in our Christchurch office. I was first employed with NIWA in 2005 and I have held my current position as a freshwater fisheries ecologist since January 2012. I also hold the position of Assistant Regional Manager, Christchurch. I hold the following qualifications:
- a. B.Sc in Biology, B.Sc (Hons 1st Class) in Ecology and a Ph.D in Ecology all from the University of Canterbury;
 - b. I am an executive committee member of the New Zealand Freshwater Sciences Society, a member of Society of Freshwater Science (USA) and the American Fisheries Society.
57. My involvement and knowledge of the instream values of the Opihi catchment commenced in 2006 through involvement with NIWA's 'flushing flow trials' on the Opuha River. I have also previously led work for Opuha Water Ltd in 2013 examining aquatic ecology considerations for the downstream weir. In 2017, NIWA was contracted by Environment Canterbury to undertake ecological flow assessments in the Opihi catchment. I led this work for NIWA and have made a presentation to the OTOP zone committee, public presentations and produced several reports outlining the results of this work. I have also provided all modelling files from this work to the Flow and Allocation Working Party and then the Adaptive Management Working Group via Dr Greg Ryder.
58. Although the statements above relate to my expertise for a Council hearing, I note that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2014.