

IN THE MATTER of the Resource Management Act
1991

AND

IN THE MATTER of the Proposed Canterbury Land
and Water Regional Plan

**MEMORANDUM OF COUNSEL FOR FONTERRA CO-OPERATIVE GROUP
LIMITED AND DAIRYNZ RESPONDING TO QUESTIONS FROM THE GROUP 1
HEARING**

1. INTRODUCTION

- 1.1 During the Group 1 hearing members of the Hearing Committee occasionally afforded Fonterra or DairyNZ witnesses an opportunity to respond to particular questions at a later stage. This memorandum contains the answers to those questions.
- 1.2 In the course of discussions between Mr Butcher and Dr Marsh it has also become apparent that a page was inadvertently omitted from Appendix 1 of Mr Butcher's evidence for the Group 1 hearing. A copy of the omitted table (titled "Farm Budget for Irrigation Dairy and Arable") is attached as **Appendix 1** to this memorandum. It should be page 16a to Mr Butcher's Group 1 evidence.

2. TABLES 1A, 1B AND 1C

- 2.1 Commissioner van Voorthuysen questioned Ms Hayward about her view of the criticisms other witnesses had made in relation to the way the values in Tables 1a, 1b and 1c are expressed. Commissioner van Voorthuysen then continued:

"What I put to some of the science witnesses who appeared before us last week when they raised this issue, of these numbers being absolute numbers and their advice to us was they should not be framed like that, they should instead be framed as medians or percentiles, and all of these issues like flow regime and median flow, whatever, be addressed. I asked them and they undertook to give some more thought to that and to

amend those tables based on what they thought they should look like to give effect to their concerns. Are you able to do a similar thing for us?"

- 2.2 A supplementary statement of evidence from Ms Hayward's, containing her response, can be found in **Appendix 2** to this memorandum.
- 2.3 The Committee also questioned whether it had jurisdiction under any of the submissions on the LWRP to make the amendments described by Ms Hayward at the end of paragraph 3.8 of her evidence. The amendments promoted by Ms Hayward would provide for additional groundwater classes to be addressed discreetly.
- 2.4 Having reviewed the submissions and further submissions, the best source of jurisdiction appears to be submission number 320.17, from pages 13-14 of the submission made by Combined Canterbury Provinces, Federated farmers of New Zealand. Under the heading "*Tables 1a, 1b and 1c*", the submission requests the following relief: (emphasis added)

"1. Delete Tables 1a, 1b and 1c; or

*2. **Review and revise the values/objectives in Tables 1a, 1b and 1c so that they are appropriate for an inhabited working landscape, appropriate for the water bodies concerned and consistently applied.**"*

- 2.5 The only further submission on this submission appears to be that of the NZ Pork Industry Board in support (number F614.266).

3. CONTAMINANT CONTRIBUTION FROM SMALL AND INTERMITTENT STREAMS

- 3.1 Commissioner van Voorthuysen asked Mr Cullen:

"Does Fonterra have any understanding, in terms of microbial or nutrient or sediment contamination of rivers and streams, how much of that arises from streams on-farm that are not covered by the Accord, namely smaller streams or the ones that don't flow permanently?"

- 3.2 **Appendix 3** to this memorandum includes a supplementary statement of evidence containing Mr Cullen's response.

4. CONCLUSION

- 4.1 If the Hearing Committee has any further questions, the witnesses of Fonterra and DairyNZ are happy to respond.

APPENDIX 1

Farm Budget for Irrigation Dairy and Arable

IRRIGATED DAIRY				IRRIGATED ARABLE				
			\$/ Ha	Total			\$/ Ha	Total
REVENUE	kg MS / Ha	per kgMS			REVENUE			
Milk solids	1572.73	P	6.38	10,040	Crop		3,024	3,024
Cattle net of Purchases			0.35	550	Sheep		721	721
Other			0.02	31	Grazing		153	153
				-	Other		121	121
GROSS FARM REVENUE				10,622	GROSS FARM REVENUE		4,019	803,833
				2,124,361				
Irrigated FARM WORKING EXPENSES					FARM WORKING EXPENSES			
Feed Purchased	Livestock Purchases		0.02	31	Livestock Purchases		383	383
2450.00	Wages		0.77	1,211	Wages		168	168
222.73	Animal Health		0.24	377	Animal Health		14	14
	Breeding		0.12	189	Breeding		-	-
	Shed Expenses		0.05	79	Shed Expenses		-	-
	Electricity		0.24	377	Electricity		99	99
	Feed		1.41	2,218	Feed		51	51
	Fertiliser		0.51	802	Fertiliser		395	395
	Freight		0.02	31	Freight		75	75
	Seeds		0.04	63	Seeds		112	112
	Shearing		-	-	Shearing		15	15
	Weed and Pest		0.02	31	Weed and Pest		317	317
	Fuel		0.08	126	Fuel		122	122
	Vehicle		0.08	126	Vehicle		93	93
	Repairs & Maint		0.32	503	Repairs & Maint		123	123
	Rates			68	Rates		40	40
	Communication			24	Communication		14	14
	Insurance			56	Insurance		32	32
	Acct, Legal, Cons			49	Acct, Legal, Cons		16	16
	Administration			53	Administration		28	28
	Other			50	Other		80	80
	Irrigation	Off Farm		-	Irrigation	Excluded		-
		On Farm		75	On Farm			
Irrigated CASH FARM EXPENDITURE				6,540	CASH FARM EXPENDITURE		2,177	435,367
				1,308,018				
Irrigated CASH FARM SURPLUS				4,082	816,343	CASH FARM SURPLUS		
Drawings / Ha			\$	279	Drawings / Ha		\$	319
FTEs (self-employed: per Ha)				0.0035	FTEs (self-employed: per Ha)			0.0048
FTEs (employee: per Ha)	wages per FTE			0.0269	FTEs (employee: per Ha)	wages per FTE \$	45,000	0.0037
Total FTEs / Ha				0.0305	Total FTEs / Ha			0.0085
Total household gross income			\$	1,490	Total household gross income		\$	487
Depreciation			\$	115	Depreciation		\$	235
Surplus after drawings & Depreciation				3,688	Surplus after drawings & Depreciation			1,288

APPENDIX 2

Supplementary Statement of Evidence of Ms Hayward

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**SUPPLEMENTARY EVIDENCE OF SHIRLEY ANN HAYWARD
RESPONDING TO QUESTIONS FROM THE GROUP 1 HEARING**

1. INTRODUCTION

- 1.1 My name is Shirley Ann Hayward and I have the qualifications and experience described in my Evidence in Chief dated 4 February 2013. I repeat the confirmation given in that statement that I have read and agree to comply with the Code of Conduct for Expert Witnesses.
- 1.2 I have prepared this supplementary evidence in response to questions asked by the Hearing Commissioners in relation to my evidence in chief for the Group 1 hearing. Specifically the question related to interpretation of the criteria in tables 1a, b and c.
- 1.3 The question of interpretation of the criteria provided in tables 1a, b and c, in my view, depends on the intended use of the tables. As I understand the Plan, there are two main applications of the water quality outcome tables. Firstly, they are used determine whether a zone is at, under, or over-allocated with regard to the nutrient-related criteria in tables 1a, b and c. Secondly, they form part of the assessment of the effect of a proposed activity (e.g., land use consent application to change a farming activity or a discharge of stormwater consent application), where an analysis would be undertaken to determine whether that activity would compromise the ability of the zone to achieve the relevant criteria of tables 1a, b and c (e.g., Rule 5.43 – Matters of discretion 3 and 4). A further application of the water quality outcome tables may be by the Regional Council as a reporting tool to assess plan effectiveness.

1.4 Given that the Plan will have established the nutrient allocation zone status through this hearing process, the remaining purpose of the water quality outcome tables will be as part of an assessment of the effect of a proposed activity. Therefore, I have only considered the use of tables 1a, b and c for the purpose of assessing the potential effects of a proposed activity.

2. TABLE 1A AND B CRITERIA (RIVERS AND LAKES)

2.1 I agree with Dr Young's recommendations in his evidence in chief for the Group 1 hearing (paragraph 97) to use a rolling 3-year average of QMCI data per site to determine compliance with the QMCI criteria. I consider this an appropriately pragmatic interpretation of this indicator for which only limited data may be available (e.g., annual sampling) and which can be naturally quite variable. However, in situations where fewer data points are available, interpretation of the data would need to be assessed cautiously on a case by case basis.

2.2 As discussed by Dr Young and Associate Professor Death, dissolved oxygen and water temperature are indicators that can have immediate effects on aquatic fauna (stress and/or fatalities) if conditions are severe enough and cover extensive reaches from which sensitive species cannot move away. Dr Young recommends using the 95th percentile of both daily minimum dissolved oxygen saturation values and daily maximum water temperature values to assess compliance with tables 1a and b. This approach accepts that occasional and short duration exceedences may occur. I agree with this recommended interpretation of these criteria, where this type of data is available (i.e., where continuous measurements of dissolved oxygen and temperature using data loggers have been recorded).

2.3 However, for much of Canterbury's rivers and lakes, the only data available will be daytime spot measurements (monthly or quarterly). These data are useful for assessing the likely range of daytime temperatures and dissolved oxygen values. However, these data are of limited use in assessing compliance with tables 1a and b because they do not record the frequency or duration of extreme values. This data can really only be used to infer the likelihood of compliance with dissolved oxygen and temperature criteria.

2.4 Criteria relating to the occurrence of nuisance aquatic plants in rivers (% cover of filamentous algae and macrophytes) refers to maximum values, which I

would normally interpret as annual maximums. This is because the frequency and duration of these nuisance growths is determined by a combination of nutrient enrichment status and the annual pattern of hydrological/climatic conditions (e.g., duration and extent of summer low flows, frequency of floods, temperature). One of the key issues is whether these nuisance growths occur regularly, or only in response to occasional periods of dry weather. Therefore, Table 1a criteria could be usefully assessed based on a frequency of compliance of annual maximum values such as:

- (a) *'the annual maximum % cover does not exceed the value in more than 1 out of 5 years'.*

2.5 My reasons for this recommendation include:

- (a) A measure such as frequency of annual compliance is easily understood by river users, such that they can understand that most years they can expect their river to comply.
- (b) It is less dependent on the frequency of sampling and allows for targeted monitoring of waterways at times of greatest risk, thus allowing for strategic use of limited monitoring budgets. It also allows for monitoring during times when the full reach of rivers can be assessed i.e., not limited by access due to high or turbid flows.
- (c) It allows utilisation of a variety of datasets such as Environment Canterbury's contact recreational monitoring programmes which monitors microbial quality and records observations of stream condition (e.g. observations of stream periphyton and macrophytes) at popular recreational sites on a weekly basis during the summer months. This dataset could be used to assess compliance with Table 1a by assuming that annual maximum plant cover will generally occur during the summer period. This data could not be used to assess compliance on a percentile basis of annual data because the data is biased towards the more productive times of the year.
- (d) There are limited datasets available in Canterbury of monthly monitoring of stream condition as most of Environment Canterbury's state of the environment data is collected on a quarterly basis. There are only a few rivers where monthly monitoring is undertaken.

- 2.6 Dr Young recommended compliance criteria as a 95th percentile of monthly data. I do not disagree with this approach in terms of the degree of risk it represents of non compliance with the criteria, which is a similar level of risk to my recommendation of 4 out of 5 years annual maximum compliance. However the monitoring implications of Dr Young's recommendation means that sites need to be monitoring monthly throughout the year, decisions need to be made on how to deal with missing data when measurements or observations cannot be made (because of high or turbid flows), and how to interpret data that may represent assessments of different proportions of the river reach. For example, in large rivers during moderate to high winter/spring flows, periphyton assessment may only be able to be made near the water's edge, while at times of base flows, assessments of the full river width can usually be made. These data are not directly comparable. These issues reflect the practical limitations of stream observational data, and therefore pose a constraint on interpreting criteria in the tables.
- 2.7 The criterion for total periphyton biomass (chlorophyll a) is similarly affected by nutrient enrichment and annual climatic conditions. Ideally, monitoring would involve a regular monthly sampling regime, in which case the recommendation by Dr Young of assessing compliance based on a 95th percentile of monthly data would be an appropriate means of assessing compliance. However, if less frequent or more targeting monitoring is undertaken, such as only monitoring during low flow periods, then comparison of the frequency of annual maximum values is more appropriate.
- 2.8 The criterion for contact recreation is the 'suitability for recreation grade' which is a risk-based grading criterion specified in the *Microbiological guidelines for marine and freshwater recreational areas* (MoH and MfE, 2003)¹. This grading criterion incorporates an acceptable level of compliance, defined as the 95th percentile of summertime weekly data for a five year period, which is combined with a site risk assessment to give an overall 'suitability for recreation grade'. Environment Canterbury reports these gradings for their contact recreational monitoring sites annually (e.g., Stevenson 2012²). It therefore should not

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1. Ministry for the Environment and Ministry of Health, 2003. *Microbiological water quality guidelines for marine and freshwater recreational areas*. Ministry for the Environment, Wellington.
 2. Stevenson, M. 2012: Freshwater quality monitoring for contact recreation: Annual summary report 2011-12. Environment Canterbury summary report, June 2012.

require any further interpretation. I recommend this indicator is treated as an absolute criterion for individual sites in tables 1a and 1b.

- 2.9 The trophic level index (TLI) for lakes is usually calculated as the annual average of monthly data following the protocol of Burns et al (2000)³. However, monthly data is not always available in which case is it still considered acceptable to calculate an average TLI (generally annual average) based on a less frequent dataset (e.g., Verburg et al 2010⁴). I recommend compliance with Table 1b TLI criteria be based on annual average TLI values.
- 2.10 The Lake SPI indicator utilises a grading system categorising lake ecological condition based on the composition of native and exotic plant species. Where data is available in Canterbury, compliance with this indicator in Table 1b should be assessed on a case by case basis but generally it could be considered as an absolute criterion.
- 2.11 I have no view on determining compliance with the visual colour criteria, other than to say such an indicator that uses 'change' as the criteria does not fit easily into the general water quality outcomes table framework.

3. TABLE 1C CRITERIA

- 3.1 In my evidence in chief for the Group 2 hearings I described the approach I took to interpret the groundwater nitrate criteria in Table 1c (paragraphs 6.7 – 6.12). I recommend this approach is used to define interpretation of these criteria.

4. SPATIAL SCALE

- 4.1 The scale of a proposed activity will determine the spatial scale its assessment of effects might cover and can vary from a very specific site location on a river, lake or a well, up to a river reach, or even whole of catchment or aquifer zone. The water quality outcomes tables generally do not specifically describe the spatial scale at which they should be applied.
- 4.2 In most cases, assessing compliance with the water quality outcomes tables 1a and b (rivers and lakes) will involve comparison of data from a specific site that

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3. Burns N, Bryers G, Bowman E. 2000. Protocol for Monitoring Trophic Levels of New Zealand Lakes and Reservoirs. Prepared for the Ministry for the Environment.
4. Verburg, P., Hamill, K., Unwin, M., Abell, J. 2010: Lake water quality in New Zealand 2010: status and trends. NIWA report for the Ministry for the Environment.

represents a river reach or lake (generally whole of lake). In some cases, data from multiple sites may be available which then creates the question of how to use data from those multiple sites. It is not generally appropriate to merge data from separate sites; rather I would anticipate an approach of assessing each site against relevant criteria then applying an overall assessment of the river, lake and/or aquifer represented by the sites. Furthermore, at the catchment/zone scale, assessment of multiple waterbodies will be needed (e.g. whole of river and aquifer zones). It is these issues that were contemplated by myself and Mr Willis in our recommendations in our evidence in chief for the Group 1 hearings regarding consideration of 'overall average' states. (We never anticipated a strict mathematical averaging be applied as was assumed by other witnesses, including in particular Associate Professor Death).

- 4.3 The recommendations in Sections 2 above apply to the interpretation of compliance with individual indicators and address, amongst other things, the temporal issues associated with interpreting monitoring data. For the reasons set out in paragraph 4.2 above and to prevent further misunderstanding, I also recommend the following refinement and clarifications to the advisory note recommended by Mr Willis to address the spatial issues. That is, to more specifically refer to situations where assessment of compliance with tables 1a, b and c involve multiple sites, reaches, and waterbodies.

"In determining whether a river meets the outcomes of this Table, consideration of available monitoring/modelling data across multiple sites/reaches will be based on an approach using expert opinion to evaluate the overall condition of the catchment.

In determining whether a lake meets the outcomes of this Table, consideration of available monitoring/modelling data across multiples sites/lakes will be based on an approach using apply expert opinion to evaluate the overall condition of the catchment."

1 May 2013

APPENDIX 3

Supplementary Statement of Evidence of Mr Cullen

IN THE MATTER of the Resource Management Act
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**SUPPLEMENTARY EVIDENCE OF MATHEW JOHN CULLEN
RESPONDING TO QUESTIONS FROM THE GROUP 1 HEARING**

1. INTRODUCTION

- 1.1 My name is Mathew John Cullen and I hold the position and possess the qualifications and experience described in section 1 of my Evidence in Chief for the Group 1 Hearing.
- 1.2 I have prepared this supplementary evidence to answer a question asked by the Hearing Commissioner van Voorthuysen in relation to my evidence in chief for the Group 1 hearing. Specifically the question related to the contribution to contamination made by small streams not covered by the Dairying and Clean Streams Accord (“the Accord”).
- 1.3 I am authorised to give this evidence on behalf of Fonterra Co-operative Group Limited.

2. CONTAMINATION FROM SMALL STREAMS NOT COVERED BY THE ACCORD

- 2.1 I am not aware of any research that quantifies the level of contamination from waterways not covered by the Accord. However, I am able to predict that the contribution from such waterways will decrease. The new Sustainable Dairying: Water Accord excludes stock from a broader group of water bodies than the old Clean Streams Accord (CSA). It sets a new minimum industry standard in five ways:

- (a) The Sustainable Dairying: Water Accord applies to all waterways, which are defined as:

“A lake, spring, river or stream (including streams that have been artificially straightened but excluding drains) that permanently contains water and any significant wetland. For the avoidance of doubt, this definition does not include ephemeral watercourses that flow during or immediately following extreme weather events.”

- (b) The Sustainable Dairying: Water Accord covers all dairy farms whereas the CSA only applied to Fonterra farms.
- (c) The Sustainable Dairying: Water Accord commits to stock exclusion from 100% of the length of waterways wider than 1 m and deeper than 30 cm and drains present on dairy farms by 31 May 2017 whereas the CSA never committed to 100% exclusion.
- (d) Temporary fences were considered adequate exclusion under the CSA. Permanent fencing is now required.
- (e) The Sustainable Dairying: Water Accord now places expectations on dairy farmers with respect to riparian planting along waterways from which stock has been excluded, whereas the CSA did not address riparian planting. The Accord expects that 50% of all dairy farms will need to have a riparian planting plan by June 2015. These farms will need to have completed half their planting by 2020 and all of it by 2030. All farms must have a riparian planting plan by 2020.

- 2.2 The Sustainable Dairying: Water Accord recognises that, in some instances, regional councils may need to develop regulation that moves beyond the new industry minimum standards. The Accord states:

“The commitments made in the Accord, while attempting to reflect expectations of good practice dairying, may not as a result of the application of the NPSFM, be regarded by regional councils as an adequate response to some, or all, dairying and environment issues faced in all or parts of their regions. Accordingly, regional councils must reserve the right to exercise their statutory functions, duties and rights as they consider appropriate in the regional context.” (p.3)

2.3 The Sustainable Dairying: Water Accord also states:

“Stock exclusion from streams smaller than one metre in width and 30cm in depth may be negotiated as part of regional programmes of action where necessary to maintain or enhance particular freshwater values and interests in specific localities.”(p.5)

2.4 Stock exclusion under the Accord captures artificial waterways not regulated by the stock exclusion rules of the Plan. Thus the only waterways that are not targeted for stock exclusion by either the Plan or the Accord are artificial waterways that do not permanently contain water, less than 1 m wide and 30 cm deep.

30 April 2013