BEFORE THE INDEPENDENT COMMISSIONERS

IN THE MATTER of the Resource Management Act 1991

AND

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

---

REBUTTAL EVIDENCE OF DAN MARSH ON BEHALF OF NORTH CANTERBURY, NELSON/MARLBOROUGH AND CENTRAL SOUTH ISLAND FISH AND GAME COUNCILS

10 APRIL 2013

ANDERSON LLOYD
LAWYERS
DUNEDIN

Solicitor: Maree Baker-Galloway

Level 10, Otago House
Cnr Moray & Princes Street,
Private Bag 1959,
DUNEDIN 9054
Tel 03 477 3973
Fax 03 477 3184

QUALIFICATIONS AND EXPERIENCE

1. My name is Daniel Kenneth Vawdrey Marsh. My qualifications and evidence were set out in my Evidence in Chief, dated 2 April 2013.

2. In preparing this rebuttal evidence I have reviewed:

   a. The reports and statements of evidence of other experts giving evidence relevant to my area of expertise, including: Geoffrey Butcher, James Ryan, Antony Roberts, Benedict Curry, Douglas Edmeades, Mathew Cullen and Gerard Willis.

3. I have again prepared this evidence in compliance with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2011.

4. The particular points that I consider it useful for me to rebut are set our below.

STATEMENT OF GEOFFREY BUTCHER FOR GROUP TWO HEARING

5. Geoffrey Butcher on behalf of Dairy New Zealand and Fonterra discusses the economic impacts and benefits associated with changes in land use and in particular conversion to irrigated dairy farming. He concludes that conversion of an additional 1000 hectares of land to dairying per year, could after five years produce net benefits of $5-$8 million per year as well as additional jobs both on and off farm.

6. His assessment is based on farm budgets included as appendix 1 to his evidence, which he describes as “indicative only”. No details are given on how these budgets have been developed, nor is any evidence provided that they represent the actual income and expenses of a sample of representative Canterbury farmers.

7. Based on these indicative budgets we are told that "conversion of land from one use to another can generate significant financial benefits …[for example] conversion from dryland sheep to irrigated dairying generates a net benefit of $1220/ha/year".

8. Data sources and or assumptions are also not provided for other elements of Geoffrey Butcher's evidence. No source is provided for the on farm investment costs (Table 2). No details of methods or assumptions are provided to support the results summarised in Table 4. As such the conclusions drawn by Butcher cannot be validated.

9. Furthermore the results of work by Howard, Romera & Doole (2013) do not support the conclusions drawn by Butcher. Howard et al., carried out research for Dairy New Zealand in order to investigate the effect of different N leaching targets. They conducted interviews with key informants and other experts and a phone survey covering 80 of the approximately 200 dairy herds in the Selwyn District. This information was used for cluster analysis in order to create a set of simulated farms representing the main farm types in the district.

10. According to Table 8 of the above report (reproduced below) the mean return per hectare for dairy farms in the Selwyn district is negative at - $87/ha[1]. The mean return reported by DairyNZ differs from the measure of net benefit used by Butcher in that it includes dividend, tax and drawings. I contend that it is appropriate to include these items when estimating net benefits. For comparison purposes Table 19 of the above document shows the different components of mean return (included as Appendix 1).

[1] With drawings considered as a cost.

Table 8. Catchment and general dairy farm output for different levels of N restriction before the implementation of the CPW scheme. The equal allocation solution is profit-maximising solution with fully effective N trading and N restriction.

	Units	GMP baseline	Equal allocation with trading		
			0% N decrease	10% N decrease	20% N decrease
Median return[32]	$/ha	241	169	46	-53
Mean return[32]	$/ha	-87	-143	-255	-366
Total catchment profit	$m	273.06	273.06	270	263.78
% change	%	-	-	-1	-3
Total N leached in catchment	t N	4,695	4,695	4,225	3,756
% change	%	-	-	-10	-20
Dairy cows	Head	152,838	152,838	144,028	133,484
% change	%	-	-	-6	-13
Milk production	t MS	64,989	64,989	61,297	56,627
% change	%	-	-	-6	-13
N fertiliser	t	6,830	6,830	4,581	2,685
% change	%	-	-	-23	-61
Supplement	t	70,007	70,007	46,110	16,008
% change	%	-	-	-34	-77
Equal allocation	kg N/ha/y	-	24.4	21.96	19.52
N price in market	$/kg N	-	2.58	11.38	16.45

11. If the profitability of existing dairy farming is marginal as suggested by the above figures, then the benefits of further dairy conversion will be far lower than has been suggested by Geoffrey Butcher.

12. In paragraph 4.4 Butcher reports the "economic impacts of converting 1,000 Ha … to irrigated dairying would be to increase on farm employment by 24 jobs". As noted in my evidence in chief – the benefits of jobs in the Canterbury dairy sector should be considered in the context of the on-going shortage of dairy sector workers and the fact that 'new' jobs in the dairy sector displace jobs in existing farming systems. A significant proportion of jobs created would be filled by overseas workers – thus reducing direct benefits to current residents of New Zealand. This provides another source of upward bias in the economic impact assessment provided by Butcher.

USE OF OVERSEER TO ACHIEVE PCLWRP OBJECTIVES

13. Several experts provide evidence on the accuracy or otherwise of Overseer. Dr Alison Dewes addresses these points in her rebuttal

evidence. I believe that the evidence put forward by these experts somewhat 'misses the point'. The key question that I believe should be addressed is whether or not a regulatory regime making use of Overseer will be more effective and efficient [at achieving the objectives of pCLWRP] than one that does not use it.

14. To meet this test it is not necessary or expected that Overseer will provide a perfect assessment of the actual level of Nitrogen leaching from a farm that will enter a receiving water body. None of the models that I am familiar with provide perfect information. However, the test in regards to the efficiency and effectiveness of the approach will be met, provided implementation of the regulatory regime using Overseer, results in a reduction in N reaching water bodies and provided this is achieved without imposing undue costs on landowners.

15. The New Zealand system of property rates provides a useful analogy. It is not necessary or expected that the valuation used for rating purposes is exactly the same as the market value of a property (indeed differences between rateable value and market value are often well known). The system is used because if provides one of the most efficient and effective systems for local government to raise revenue based on the *estimated* value of assets owned by individuals and companies.

16. The effectiveness and efficiency of the approach proposed by the experts for Fish and Game is not reliant on the Overseer model perfectly measuring the precise level of N leaching from every farm. We assume however that Overseer is able to provide a consistent benchmark for the magnitude of current leaching, is able to provide a reasonable estimate of the reductions that can be achieved by changing management practices, and is able to provide a measure of relative change in leaching over time with changes in a farms management practices.

17. As such it is my position that the use of Overseer in the regulatory regime will be more effective and efficient compared to alternative policies as detailed below and in more detail in my evidence in chief.

INDUSTRY LED AUDITED SELF MANAGEMENT

18. I have reviewed the evidence provided by experts for Fonterra, Dairy New Zealand and the Fertilizer Association of New Zealand for the Group 2 hearings (Ryan, Cullen, Willis & Edmeades).

19. The area where I differ with the above experts is in regards to the requirement for a firm regulatory framework that provides a direct incentive for farmers to improve nutrient management.

20. Experts for Fonterra/DairyNZ, Ravensdown appear to have provided no evidence on the effectiveness or efficiency of their proposed approach in regards to the regionally significant freshwater resource in the Canterbury Region. No evidence has been provided in regards to the change in leaching that will be achieved by their respective approaches or the impact that this will have on water quality. Furthermore

21. While farmers may adopt good management practices this does not mean that this will be effective at achieving an objective, such as a water quality outcome in a catchment. In fact even with adoption of GMP nutrient leaching could increase due to increasing intensity of a farm operation or because of further land development or intensification of farming within a catchment.

22. I contend that a firm regulatory framework as proposed by Fish and Game is essential in order to successfully implement the industry led, audited self-management approach that has been proposed. My arguments are contained in my Evidence in Chief with details in Appendix One. I repeat the two key paragraphs (96-97) below.

23. At present, nutrient leaching is (using economics terminology) a 'negative externality'. It is a cost which is imposed on others (those who value the environment) but which is not borne by the decision maker (the land owner) and hence does not influence his or her actions.

24. The 'problem' (nutrient leaching) is caused by the fact that people do not have to take account of the cost of pollution that they impose on others. The most efficient and effective mechanism for dealing with this problem is through the use of an economic instrument in order to 'internalise the externality'. Use of an appropriate economic instrument (e.g. via a cap and trade system) puts a price on people's use of the natural environment and provides an incentive for land owners to act in the best interest of society as a whole by taking account of nutrient leaching in their management decisions.

25. Over time the NZ primary sector may reach the view that an appropriate regulatory structure provides an essential supporting framework to enable industry led audited self-management to be effective. This was one of the key findings from a major study of sustainable business published by KPMG International[2] in 2012: "*The business community needs clear global rules, powerful regulatory incentives and a level-playing field to support it in moving to sustainable growth*".

GOOD MANAGEMENT PRACTICES AND NITROGEN DISCHARGE ALLOWANCES

26. Experts for Fonterra, Dairy New Zealand and the Rangitata Diversion Race Limited support the S42 report's "*significant reliance on industry articulated good practice*". I contend that this approach may stifle innovation, foster bureaucracy and increase the cost of improving

[2] KPMG International (2012) Expect the Unexpected: Building business value in a changing world (page 12)

nutrient management (in addition to the lack of firm incentives detailed above).

27. It is well documented in the international literature that regulations that targets inputs (for example specific practices) are often far less cost effective than regulations that directly target the output variable of interest.

28. A directly relevant example of this literature is provided by Doole, Marsh & Ramilan (2013), see Table 2 below. They found that the cost of reducing nitrogen leaching was far higher using specified practices as compared to use of a cap or cap and trade mechanism. For example the cost (in the Karapiro catchment) of achieving an average leaching rate of 22 kg/ha was $404.91, $295.53 and $193.93 per hectare for the 'good' management practices of land retirement, reducing stocking rate and ceasing use of N fertiliser. In contrast the cost was $96.60 and $54.93 for a cap and for cap and trade.

29. These large differences arise from the fact that good management practices (and especially the appropriate combination of multiple practices) can vary greatly from farm to farm. The cost of reducing Nitrogen leaching can be greatly reduced when each land owner is given the freedom to achieve reductions using the practices which are most appropriate to their specific situation.

Table 2
Abatement cost for all simulated policies expressed per hectare. A complete ban on N fertiliser application achieves all goals simultaneously. A ban on N fertiliser application from 1 March to 31 July is ineffective at achieving any goal.

Policy	No CRMPs[a] Cost per hectare ($ ha^{-1})	CRMPs Cost per hectare ($ ha^{-1})
22 kg N ha^{-1}		
1. Cap cow no.	295.53	295.53
2. Ban N fert.	193.93	193.93
4. Cap emissions (no trade)	204.54	96.6
5. Cap emissions (trade)	115.83	54.39
6. Land retirement	404.91	404.91

30. Research to identify ‘good management practices’ is relevant to the attaining of the pCLWRP objectives, and reducing effects of agriculture generally, in my opinion, as long as individual land owners have sufficient freedom to identify the combination of practices which are most appropriate for their specific situation and which will enable environmental limits to be achieved.

31. There is also a danger that a programme of ‘good management practices’ may stifle innovation. This is because regulators and auditors may put too much focus on the good management practices which have been identified under the programme – to the exclusion of alternative practices which may be developed by innovative landowners. Having completed my PhD research on the topic of innovation, I am well aware of the importance of incentives in encouraging innovation.

32. Another danger of a programme of ‘good management practices’ is that it becomes bogged down in bureaucracy and box ticking, and therefore risks becoming ineffective and inefficient. Regulators and auditors may focus on whether or not certain practices are being followed and lose sight of whether environmental goals are being achieved. Farmers may become fed up with being told which practices they should follow and may simply ‘tick the box’ with no interest in whether the practices are having the intended effect. The advantage of a regulatory framework incorporating Overseer is that it directly focusses farmer effort on improving nutrient management.

CONCLUSION

33. Geoffrey Butcher concludes that conversion of an additional 1000 hectares of land to dairying per year, could after five years produce net benefits of $5-$8 million per year.

34. I contend that this estimate is based only on indicative budgets rather than surveys of profit levels actually achieved. If this estimate was based on recent DairyNZ analysis on the profitability of dairy farming in Selwyn District these benefits would be significantly alternative lower.

35. Regarding issues raised with respect to the accuracy of Overseer, this is addressed by Alison Dewes. In my opinion, if consistent input methodology is required (and enforced), the use of Overseer in the regulatory regime proposed by Fish and Game will be more effective and efficient compared to alternative policies.

36. DairyNZ and Fonterra are developing good management practice guidelines, encouraging uptake of farm environment plans, and have the programme to build industry capability in nutrient management through the Primary Growth Partnership. While these are areas that do need attention, I have significant concerns in regards to these approaches achieving environmental outcomes on their own. While farmers may adopt good management practices this does not mean that this will be effective at achieving an objective, such as a water quality outcome in a catchment. In fact even with adoption of GMP nutrient leaching could increase due to increasing intensity of a farm operation or because of further land development or intensification of farming within a catchment.

37. Furthermore a programme of 'good management practices' may stifle innovation because regulators may put too much focus on these practices to the exclusion of alternative practices which may be developed by innovative landowners.

38. Therefore, I contend that a firm regulatory framework based on output control along with minimum practice standards as proposed by Fish and Game, will be essential in order to address the regionally significant freshwater issues.

Daniel Kenneth Vawdrey Marsh

10 APRIL 2013

REFERENCES

Doole, G., Marsh, D., & Ramilan, T. (2013). Evaluation of agri-environmental policies for reducing nitrate pollution from New Zealand dairy farms accounting for firm heterogeneity. *Land Use Policy, 30*, 57-66.

Howard, S., Romera, A., & Doole, G. (2013). Selwyn-Waihora nitrogen loss reductions and allocation systems: DairyNZ.

Appendix One

Estimation of on-farm return

Table 19. Stratification of on-farm returns before the implementation of the CPW scheme for the median farm in each cluster. Farm surplus (gross farm revenue excluding dividend less farm working expenses), dividend, and sale of N permits are components of farm revenue. Purchase of N permits, depreciation, tax, interest, and drawings are components of farm cost. On-farm return is total revenue minus total cost.

Cluster	Farm size (ha)	Farm surplus ($ ha^{-1})	Dividend ($ ha^{-1})	Sale N permits ($ ha^{-1})	Buy N permits ($ ha^{-1})	Deprec. ($ ha^{-1})	Tax ($ ha^{-1})	Interest ($ ha^{-1})	Drawings ($ ha^{-1})	Return ($ ha^{-1})
					Baseline					
DFA	231	3,505	499	0	143	849	325	1,850	395	442
DFB	345	3,351	510	0	169	867	279	1,829	387	330
DFC	149	4,633	600	0	136	1,019	624	1,850	491	1,113
DFD	212	3,483	492	0	7	836	370	1,810	420	532
DFE	163	1,913	358	32	0	609	0	1,810	414	-530
DHA	106	1,754	287	24	0	487	0	1,944	402	-768
DHB	191	2,106	361	24	0	615	23	1,795	426	-368
DHC	238	3,211	416	0	172	708	210	1,997	373	167
DHD	231	3,505	499	0	143	849	325	1,850	395	442
DBD	345	3,351	510	0	169	867	279	1,829	387	330
Average	209	2,913	432	8	123	734	229	1,849	409	115
					20% restriction					
DFA	234	3,026	398	0	622	676	104	1,754	361	-93
DFB	223	1,918	315	0	534	536	0	1,852	371	-1,060
DFC	231	3,151	380	0	518	646	144	1,851	331	41
DFD	345	3,035	417	0	584	709	92	1,829	332	-94
DFE	149	To update	479	0	600	814	454	1,850	432	735
DHA	212	To update	499	0	8	849	342	1,810	424	456
DHB	163	1,901	279	173	0	474	19	1,810	362	-312
DHC	106	1,750	262	91	0	445	0	2,005	446	-793
DHD	191	2,106	340	91	0	578	43	1,806	410	-300
DBD	238	3,051	412	0	0	701	214	1,997	371	180
Average	209	2,773	378	36	287	643	141	1,849	384	-124

Reproduced from Howard, S., Romera, A., & Doole, G. (2013). Selwyn-Waihora nitrogen loss reductions and allocation systems: DairyNZ.