Before Hearing Commissioners at Palmerston North

under: the Resource Management Act 1991

in the matter of: Submissions on Chapters 6, 13 and 15 of the Proposed One Plan

between: **Fonterra Co-operative Group Limited**
Submitter

and: **Manawatu-Wanganui Regional Council**
Respondent

Statement of evidence of Dr Terry Graham Parminter for Fonterra Co-operative Group Limited

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STATEMENT OF EVIDENCE OF DR TERRY GRAHAM PARMINTER

QUALIFICATIONS AND EXPERIENCE

1 My full name is Terry Graham Parminter.

2 I have a PhD in Management Systems (2008) from research into "An examination of the use of a human behaviour model for natural resource policy design and implementation by government (central and regional) agencies". The PhD was supervised by Jim Corner and John Buchanan, at the University of Waikato. My undergraduate degree is in Agricultural Science at Massey University.

3 I am currently self-employed as a research consultant in PACT Consulting Ltd and work part-time with Wellington Regional Council as an Environmental Policy Advisor.

4 Prior to working as a consultant, I was employed by AgResearch as Social Researcher in policy. Over the last 15 years I have been involved in studying voluntary policy methods in natural resource management in New Zealand and Australia. In 2005 I presented expert evidence on non-regulatory policy approaches to the Environment Court in the context of appeals on the proposed Waikato Regional Plan.

5 Since 1999 I have led programmes funded by the Foundation of Research Science and Technology into catchment management and more recently, biodiversity policy. I have carried out a number of studies into innovation and the adoption of new practices by farmers in primary industries. In the last 12 months I have had two books published on policy design:

- Parminter TG 2009: Natural resource policy management in New Zealand: three studies based upon the Theory of Planned Behaviour. VDM verlag, Saarbruchen, Germany;

- Parminter TG 2009: Environmental policy design: three different theoretical perspectives. Lambert Academic Publishing, Germany.

6 I have organised conferences in New Zealand on policy design (2004 and 2006) and in March this year I ran a series of Capability Building Courses for Local Authority managers wishing to develop their skills in planning policy implementation strategies.

7 I am a member of the New Zealand Institute of Primary Industry and a Certified Practicing Agriculturalist with the New Zealand Institute of Agricultural and Horticultural Sciences.

8 I have read the Environment Court's Code of Conduct for Expert Witnesses, and I agree to comply with it. My qualifications as an expert are set out above. I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state I am relying on what I have been told by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

9 I am familiar with the Proposed One Plan (*POP)* to which these proceedings relate.

SCOPE OF EVIDENCE

10 My evidence will deal with the following:

10.1 Policy interventions designed to encourage behaviour change and the adoption of environmental practices;

10.2 System effects of farmer decision making;

10.3 Land use change and farmer decision making;

10.4 Practice changes and farmer decision making;

10.5 Combining rules with non-regulatory methods of encouraging behaviour change;

10.6 Conclusions on the POP approach to the regulation of water quality in the Manawatu-Wanganui Region.

SUMMARY OF EVIDENCE

11 Designing and implementing interventions to achieve measurable water quality outcomes from human and social change in the Manawatu-Wanganui Region requires strategies based upon well researched principles from human and social research, as well as an understanding of farming systems and catchment management. Such principles are particularly relevant when considering chapters 6 and 13 of the POP. In these chapters the complexity of the interactions between human and social behaviour, the effects of human decisions on farming systems and desired catchment outcomes should not be under-estimated.

12 Behaviour change is the result of a mix of psychological changes influencing landowner decision making and their subconscious thinking. The particular mix of psychological determinants reflects each person's personality, experience and learning. Understanding these makes people's behaviour more understandable and predictable.

13 Any social group in the Region and in the dairy industry will include people at different stages with regard to change. Non-regulatory policy interventions need to be designed and implemented quite strategically if they are to encourage people at each stage of change. Policy activity that is not so guided is likely to be fragmented, inefficient and inadequate for social change.

14 Rules can have a valuable role in supporting non-regulatory or voluntary methods for human and social behaviour change. Well designed rules describe clearly what is considered to be unacceptable behaviours and minimise the number of freeloaders and holdouts present in all communities. Rules show that operating outside expected social norms is unacceptable, however they should not also penalise those already working within socially established boundaries.

15 Changes to farming systems can in practice produce unexpected results associated with two particular properties specific to systems and not possible to predict in closed experiments or component models. These are their emergent properties arising from complex interactions and autopoiesis, a kind of self-determination observed in some natural systems.

16 The catchment studies that have been carried out in New Zealand have tended to be cross-sectional studies comparing water quality results in one catchment with water quality results in another similar catchment during the same period of time, the two catchments differing mainly in landuse or natural resource management. Longitudinal studies are the preferred methodology for studying such differences, but they are not always possible. The consequence of having so many cross-sectional studies seems to be a significant under-estimation in the time required to go from behaviour change by farmers to water quality changes in catchments.

17 This evidence considers three parts of the POP that seem to conflict with the aim of improving water quality in catchments in the Manawatu-Wanganui Region.

18 The provisions of policy 6-7 make all individual landowners responsible for reaching water standards that relate to whole communities and their environments. This sends to farmers in the Region unintended messages because the policy is a blunt instrument penalising both the farmers that are performing well in addition to those that are not. If even environmentally progressive farmers have to bear the costs of compliance, it incentivises people to be freeloaders and holdouts on others in their communities.

19 Rule 13-1 requires landowners to achieve standardised nitrogen leaching and runoff values in a 1 to 20 year period. This does not

allow for between property differences in farming systems and historical precedent. More time is required in order for newly developed environmental practices to become normative on dairy farms in the Region. The rule as it is, does not allow farmers enough time to consecutively introduce best management practices to their properties and learn from each experience, so as to improve subsequent decision-making.

20 The provisions in Rule 13-1 are too prescriptive when they do not take into account whole farm system effects, and when many of the staff at Manawatu-Wanganui Regional Council lack sufficient farm management skills to understand their whole-of-farm implications. Previous research has identified the importance of including (whole-of-farm) advisory support for farmers when new and substantial environmental outputs are required[1]. The control provisions in 13-1 would do better at encouraging changes in farmer decision making if they were guiding the industry in the quality of the farming strategies required rather than prescribing their content.

POLICY INTERVENTIONS DESIGNED TO ENCOURAGE BEHAVIOUR CHANGE AND THE ADOPTION OF ENVIRONMENTAL PRACTICES

Determinants of behaviour change

21 Human behaviour reflects our subconscious habits and our conscious decision-making. An understanding and application of these principles makes predicting the human and social responses to policy interventions more reliable. The link between human thinking and behaviour has been explored in a number of psychology models. These models highlight the following factors are important[2]:

21.1 Instrumental attitudes. The material evaluation of a behaviour in terms of its desirable or undesirable consequences (like doing a cost benefit analysis);

21.2 Affective attitudes. The emotional evaluation of a behaviour in terms of whether or not it engendered favourable feelings towards it;

21.3 Subjective norms. Social pressures felt about the types and standards of behaviour expected by significant others in a person‘s life;

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[1] Parminter TG, Paine MS, Morriss S, Sheath GW and Wilkinson RL 1999. A workshop report on implementation of sustainable farming methods in the New Zealand dairy industry. AgResearch Client Report for the Ministry of Agriculture and Forestry

[2] Parminter TG 2009. Natural resource policy management in New Zealand: three studies based upon the Theory of Planned Behaviour. VDM verlag, Saarbruchen, Germany.

21.4 Self-efficacy. Perceptions about how easy or difficult it would be to perform a behaviour that was under a person's control;

21.5 Perceived behavioural control. Perceptions about the availability and accessibility of external resources critical to the performance of a behaviour;

21.6 Self-identity. The degree to which people saw themselves as fulfilling the role for a specific group in society;

21.7 Past behaviour. Previous conscious or subconscious expressions of a behaviour, that may be considered a habit; and

21.8 Resolution. The degrees of commitment that people make to implement their intentions.

22 Rules and compliance with rules do not replace these factors, but they can change their focus, so that instead of an outcome like "improving water quality", not being caught and avoiding punishment may become the driver determining behaviours. In such an example, compliance may apparently be achieved (when observed from a distance), but because the underlying psychological drivers for achieving water quality have not altered, any other behaviours will still not be focussed on improving water quality.

23 To take into account the effect of rules, a colleague at the University of Queensland, Barry Watson (2004) added to the list above some additional psychological drivers:

23.1 Relative attitudes towards alternative behaviours, so that the more practical options are considered the most positively;

23.2 History of avoiding enforcement, as this starts to habituate the socially undesirable behaviour; and

23.3 Previous convictions, as these tended to be associated with increased noncompliant behaviour due to reducing concerns about accumulating convictions.

24 Behaviour change and the adoption of new practices is sometimes thought of as being a single step process, i.e. that people go from an originally unaware state, to becoming aware and then implementers of the new practice. Beginning in the USA with the cessation of smoking, studies of behaviour change have shown that there are up to seven or so transitional steps that people go through during the process of change[3]. In the precontemplation stage,

[3] Prochaska JO, Velicer WF, DiClemente CC, Fava J. 1988. Measuring processes of change: applications to the cessation of smoking. J Consult Clin Psychol 56(4):520-8.

individuals are not involved in the behaviour and have no intention of changing in the foreseeable future. In the contemplation stage, individuals form an intention to possibly change but are still not performing the behaviour. In the preparation stage, individuals have taken some initial steps towards behaviour change. The action stage is when a behaviour has been changed towards the socially desired action. If the behaviour becomes ongoing, the behaviour is in the maintenance stage.

25 Using these variables, it is possible to survey people and develop models of human behaviour that enable policy makers to understand and even predict behaviour[4]. In this way and in a national survey of farmers' use of riparian practices[5] it was shown that the most critical motivators for farmers were (1) being able to start small and gradually increase their involvement and (2) the availability of resources for change, including time and skills[6].

26 The evidence prepared by Dr Monaghan in this hearing is reasonably consistent with these points, but he has only considered the behaviour change of individual farmers in non-regulatory policy contexts (paragraph 26). The following sections of my evidence will show how these principles can be applied at a catchment scale in the design of policy interventions to achieve social change across the Region.

Policy interventions to encourage voluntary change.

27 It is possible to combine an understanding of human behaviour described above with the range of policy interventions available, to develop strategies for purposeful and predictable behaviour change strategies in partnership with the dairy industry.

28 When information about the stages of behaviour change (from precontemplation to maintenance), are brought together with the psychological motivations for changing stage (from attitudes to resolution), they can be further linked to approaches guiding selection of the extension methods most appropriate for that stage and type of motivation for change (**Figure 1**). With respect to any practices there will be farmers at all the different stages of change. If any stage is not catered for in the extension mix it can be expected to become the most limiting stage. When the stages are all addressed farmers can personalise and commit themselves to the processes of change.

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[4] The behaviour model can be used to explain 50-75% of the variance in landowners' behaviour.

[5] Parminter TG 2009. : Natural resource policy management in New Zealand: three studies based upon the Theory of Planned Behaviour. VDM verlag, Saarbruchen, Germany.

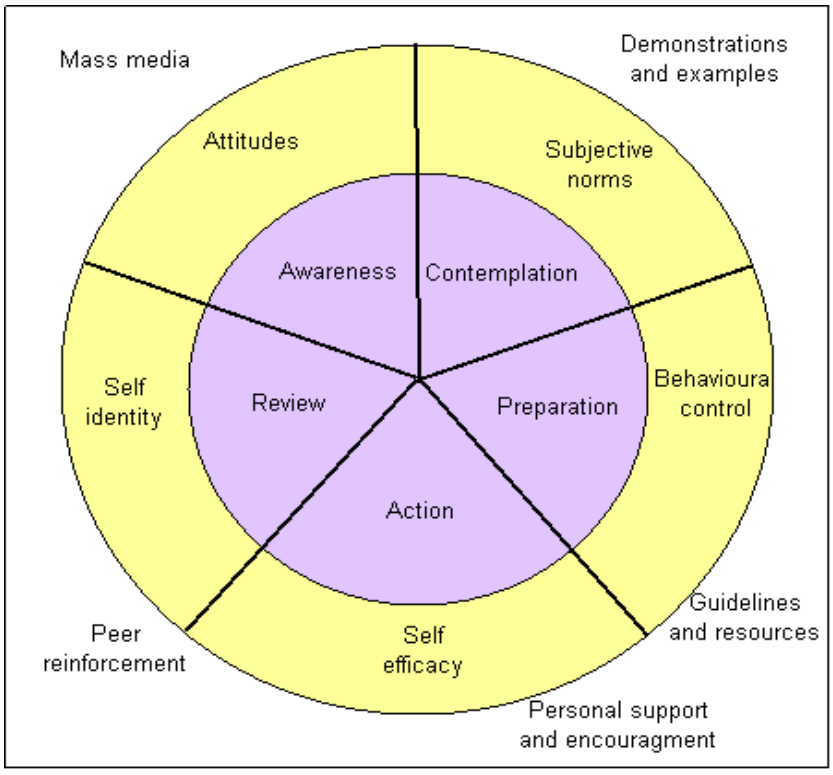
[6] The other significant variables were: instrumental attitudes, subjective norms and self-efficacy; R^2=67%.

29 In Figure 1, stage 1 is Awareness. Farmers at this stage become aware of a practice through mass media publicity. Publicity can be generated through industry magazines; newspapers etc and can encourage attitude changes so that farmers view new technologies and practices more positively.

30 Stage 2 is Contemplation. Farmers with positive attitudes are likely to attend demonstration farms and field days, observe examples of new technologies and practices, and consider how they might apply to people and farms like their own. At these events the support and encouragement for change from respected farmers and experts in their area is going to be important.

31 Stage 3 is Preparation. During this stage farmers go from having a general commitment to make changes to now making plans and commitments and setting timetables. Farmers will consider the resources that they have available and what they might need in order to make successful changes. Guidelines, check-sheets and other references can assist farmers with all that might be needed including any personal skills required. Discussion groups can assist farmers to use these references in their evaluation.

Figure 1. Stages of change and social marketing and extension approaches



32 Stage 4 is Action. Putting changes into place usually has some unexpected effects. Farmers need the energy and confidence to persevere and adapt their farming systems until the changes are

working properly. This may require external examples and mentors to be available through the extension programme to give the necessary encouragement and create confidence. Extensionists may provide individual mentoring or facilitate discussion groups in this role.

33 Stage 5 is Review. Farming systems are never static and change is a constant. As changes are put in place, farmers need to feel that each change is contributing to them realising their farming goals and adding to a more fulfilled life. If other farmers start to look to them to assist in making changes, it reinforces their feelings of being successful change-makers. An extensionist can assist farmers to network with each other and strengthen this self-identity.

34 All of these components: industry magazines, newspaper articles, demonstration events, field days, discussion groups, and networking can be effective in an integrated extension plan when they are combined in a deliberate and targeted way.

35 In his evidence, Dr Monaghan states (para 29) "behaviour change is a continual and long-term process". Research has shown that it requires time and avoiding of "prescriptive" approaches, for farmers "to develop and demonstrate skilled role performance", "allow for innovation", "learn through experience the connection between management skills and environmental outcomes", and for them to inter-connect environment and production[7]. I consider that in its present form, rule 13-1 is too prescriptive and too rushed to provide the time that the industry, farmers and catchment communities need for learning and adaptation.

SYSTEM EFFECTS OF FARMER DECISION MAKING

36 Changes to farming systems produce unexpected results in practice because of two particular properties of systems – emergent properties and autopoiesis.

37 Farming systems and emergent propertiesSystems are made up of a number of component parts such as soils, pastures, cows etc. Just managing a component of the system does not produce the same effect after all the interactions have been taken into account and the results of the whole system have been accounted for. This is known as the emergent properties of a system and means that systems

[7] Parminter TG, Waters C, Mortimer C 2006. Examples of extension and policy strategies developed using theories of human behaviour and social marketing http://www.regional.org.au/au/apen/2006/refereed/4/3034_parminter.htm#TopOfPage

produce more or less than the sum of all their parts and never exactly the same as the sum of their parts[8].

38 In loosely coupled social systems (i.e. where no formal accountabilities exist), individuals cannot be made responsible for outcomes resulting from the behaviour of other people independent of themselves. The application of this principle means that all the people on a beach are not made accountable for the life of the one person there that drowns, or all the drivers on a stretch of road are not responsible for the few people in their midst who may be speeding. In the same way, individual landowners cannot be held accountable for the performance of all the landowners within a catchment, some of whom may not be implementing environmental best practices.

39 In the POP, these principles particularly apply to Policy 6-7 that expects each landowner of an intensive farming land-use "to prepare a nutrient management plan for the purposes of" (a) enhancing water quality standards within the zone.

Farming systems and autopoiesis

40 Natural systems commonly display the attributes of autopoiesis. This is where they do not remain inert in apparent equilibrium only changing when they become subject to external influences. Actually most natural systems self-organise between external events and so change is continuous[9]. This means that although humans may attempt to reverse the effects of change by applying an external force to a system they can never recover the starting point in the same way. The application of this principle means that although it can be argued that water quality problems have been created by applying nitrogen fertiliser to pastoral farming systems, it is unlikely that we can simply regain the same standards of water quality by removing nitrogen fertilisers from those same farming systems – research in other complex systems has shown that the answers will be a lot more complex than that (ibid).

41 In situations where all the dairy farmers in a catchment apply all the known best management practices for water quality at the same instant, there is no certainty that the stated catchment water standards will be realised within short time frames such as 10 years[10]. The rule described in 13-1 implies that a similar set of best management practices can be applied by all the dairy farmers in a catchment (or subzone) to improve water quality.

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[8] Anderson PW 1972. More is different: Broken symmetry and the nature of the hierarchical structure of science. Science 177 (4047): 393–396..

[9] Maturana HR Varela FJ 1987. The tree of knowledge: The biological roots of human understanding. Boston. Shambhala Publications.

[10] See the Section 42A Report of Mr Carlyon.

42 Unless the staff at Manawatu-Wanganui Regional Council have qualifications in farm management, it is inappropriate for Regional Council staff to control the preparation and implementation of FARM Strategies separate from and independent of any understanding of how the listed "best management strategies" may interact with the rest of the farming system in question, both at that time and subsequently[11]. I suggest that not enough is currently known about the interactions between best management practices, between best management practices and farming systems, and between land uses within a catchment, to guarantee that a prescriptive approach to individual farm strategies will achieve the objectives desired by Manawatu-Wanganui Regional Council. Therefore the rule described in 13-1 should be made more flexible to allow farmers, industry and the Regional Council time to work together on an effective approach to incorporating environmental best practices in strategic plans for farms.

LAND USE CHANGE AND FARMER DECISION MAKING

43 Research on the actual impacts of land use change (within the biophysical, economic or social sustainability domains) in the context of catchment-scale projects is actually quite limited and more from cross-sectional studies than longitudinal research[12]. The limited research from studies that have been carried out are largely in-line with those from cross-sectional studies but "not necessarily in the time frames expected"[13]. The models that have been developed for predicting water-quality responses to land use change are mainly equilibrium models, rather than dynamic models, and the dynamic responses that occur in practice may differ from model results due to interactions that have not been included. The timescales required for achieving improvements in water quality are particularly likely to have been underestimated[14]. The timescales required for affecting normative change across social groups are also frequently underestimated[15]: "*Therefore, understanding [and addressing] differences in the adoption behaviour of decision-makers such as land managers is critical for building realistic expectations of uptake*".

44 Rule 13-1 applies to any landowners within the Region making land use changes towards more intensive enterprises. It is important for the economic viability of farming enterprises that the benefits of implementing best management practices are cumulative rather

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[11] Section 42A Report of Dr Monaghan, paragraph 6.

[12] Dodd MB, Wilcock R, and Parminter TG 2009. Review of recent rural catchment-based research in New Zealand. Client report for MAF Policy, AgResearch..

[13] ibid, p 17.

[14] ibid, p 18.

[15] Ibid, p 18.

than dissipated. This suggests that they should not all be implemented at one moment but introduced over time and assessed so that the benefits of each practice can be added to by the next.

PRACTICE CHANGES AND FARMER DECISION MAKING

45 The dairy industry has monitored selected catchments over the period 1995 to 2008 (13 years). The catchments have been monitored by a science team, and the landowners have had one-on-one contact with the scientists.

46 In these monitored catchments, there have been practice changes including:

- Improved effluent disposal;
- Improved effluent storage;
- Riparian fencing to exclude livestock;
- Riparian planting to shade streams;
- Targeted phosphate fertiliser applications;
- Reduced surface runoff and tile drains; and
- Reduced stocking rates.

47 Over the period from 1995 to 2008 the Toenepi catchment in the Waikato region "*showed marked reductions in total nitrogen (TN), total phosphorus (TP) and suspended sediment (SS), such that the stream loads in 2007 were 71%, 64% and 24% of their respective 1996 values. The reduced sediment loads are most likely due to improved stock exclusion (fencing) from stream banks, whereas the changes in N and P loads are attributable in part to fewer discharges of dairy shed effluent and more farmers using land irrigation*"[16]. Practice changes in catchments with less access to science inputs can be expected to be slower.

48 The dairy industry has been monitoring changes across New Zealand in the application by farmers of specific environmental practices each year since 2004[17]. The results show an increase in nutrient budgeting in the Manawatu from a low of 15% in 2004 to well over 95% in 2008. Over the same time period the number of farmers with 100% protected riparian areas grew from 36% to

[16] Dodd MB, Wilcock R, and Parminter TG 2009. Review of recent rural catchment-based research in New Zealand. Client report for MAF Policy, AgResearch, p 39.

[17] Rutherford, pers comm.

64%. This suggests that industry led voluntary change schemes can be successful.

49 Research has shown that farmers in catchments with nutrient caps (Taupo and Rotorua) were very much against making practice changes requiring large capital inputs in-case these investments proved to be inadequate in the long-run. This has occurred in the context of effluent management, where some farmers have spent over $250,000 on an effluent disposal scheme, only to find they were still non-compliant with regional plan rules.

50 The interactions between environmental practices and other parts of farm systems have been critical to their adoption (and non-adoption). For example, the use of riparian fences by dairy farmers has been more closely associated with reducing stock losses on farms than improving water quality in waterways[18]. The reasons for the adoption of environmental practices may not be important to the desired outcome (i.e. water quality improvement). However, it is critical to the adoption of environmental practices that all the factors motivating and demotivating farmers are known[19]. It has been found that farmers tend to under-estimate the environmental risks associated with their farming practices and so changes are slower than expected. They also tend to consider a wider range of farming system effects than technical experts[20].

51 Bewsell and Kain[21] refer to Curry's research in Britain that suggests "*new skills were needed for farmers to successfully operate in an environment that promotes "green" values and practices … this could be difficult, given that farmers have been given economic signals to maximise food production for many years*." Time is needed for farmers to assess and learn the new skills associated with environmental practices.

COMBINING RULES WITH NON-REGULATORY METHODS OF ENCOURAGING BEHAVIOUR CHANGE

52 Generally there are two approaches to the use of rules for encouraging behaviour change although the role of rules in behaviour change can be confusing[22]. One approach, based upon

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[18] Bewsell and Kain 2006. Adoption of environmental best practice amongst dairy farmers. Proceedings of the APEN International Conference, La Trobe University, Victoria.

[19] Parminter TG 2009. Natural resource policy management in New Zealand: three studies based upon the Theory of Planned Behaviour. VDM verlag, Saarbruchen, Germany.

[20] Bewsell pers Com.

[21] Bewsell and Kain 2006. Adoption of environmental best practice amongst dairy farmers. Proceedings of the APEN International Conference, La Trobe University, Victoria.

[22] See paragraph 32 of the Section 42A Report of Dr Monaghan.

deterrence theory, designs rules around catching and punishing as many people as possible that might be deviating away from desired behaviours. Rules constructed from deterrence theory make identifying non-compliant behaviour as easy as possible for the enforcer, the rules make no allowance for context or discretion, and identified non-compliance is made costly and punitive[23].

53 An alternative approach uses social learning theory to design rules[24]. In this approach, rules are used to provide clarity about risky practices and as an encouragement for learning. Enforcement is kept to the worst examples in a population (eg. less than 20%), to back up and support non-regulatory methods.

54 Water quality improvements from practice-changes by individual farmers may not be easily monitored. Therefore individual farmers and the industry cannot obtain feed-back about how effective (or not) they have been, except through whole-of-catchment monitoring which encourages free loading from people sharing in the benefits of changes made by others without contributing to paying their costs, and holdouts where people delay more than others to implement costly changes, until the costs of changing are minimised.

55 Rule 13-1 creates extra costs in farm planning and hiring external consultants for compliant and non-compliant farmers alike. It would be to the advantage of the Council and the industry if farmers already using best management practices could submit a less prescriptive form of industry strategy, so that the combined Council and industry resources could be concentrated upon the freeloaders and holdouts.

CONCLUSIONS ON THE PROPOSED ONE PLAN APPROACH TO THE REGULATION OF WATER QUALITY IN THE MANAWATU-WANGANUI REGION

56 The provisions in the POP for prioritising catchments of community value are known to be supported by farmers in a number of areas[25]. The rules encouraging farmers to strategically plan for increases in productivity within environmental constraints has also received a lot of support from farmers, industries, communities and scientists. However, in the POP not enough provision seems to have been made for working with the industry and communities to achieve change through non-regulatory mechanisms. There is evidence in industry monitoring that non-regulatory mechanisms are working. There is also evidence that if non-regulatory mechanisms are not currently working to the satisfaction of Council staff, that there are

23 Watson 2004.

24 ibid.

25 Parminter et al. 2007.

ways to improve the efficacy of non-regulatory intervention design and delivery, without having to move to a rule-based regime, affecting all dairy farmers in sensitive subzones.

57 A great deal of scientific uncertainty still exists over whether, when all the dairy farmers in the region adopt known best management practices there will be the expected improvement in water quality measures. Much of this uncertainty is due to the component nature of the scientific research carried out to date and the lack of longitudinal studies into catchment effects of changes in farming systems. There are difficulties in developing predictive models that include emergent properties and autopoiesis from system behaviour into their results. It is to be hoped that water quality will begin improving in the catchment subzones described in the POP, however the actual size of the improvement within particular timeframes may not be as predictable, (as the direction of likely changes) due to these uncertainties about effects at a catchment scale of system interactions.

58 To encourage social change, it is important that the compliance costs of farmers utilising industry best practices are minimised relative to farmers that might be freeloaders or holdouts. The guideline for rules that encourage social learning is that they should affect the activities of about 20% of the target population operating outside the new norm.

59 The submission by Fonterra and Fonterra's position (as described in the evidence of Sean Newland) contain a number of points which this evidence supports:

59.1 In Rule 13-1, remove the requirement for farmers to work to prescriptive farm plans dealing only with components of their farming business and instead recognise industry instruments for recording, managing and monitoring areas of environmental risk on individual farms.

59.2 The revision of the policies in Chapter 6 so that individual property owners are clearly not being made accountable for the community's collective responsibility to achieve desired water quality standards;

59.3 Greater recognition within the POP generally is needed of the role to be played by non-regulatory approaches in encouraging behaviour changes, building resilience through reinforcing new social norms, and supporting compliance with regulations. Chapter 5 of the POP in 5-1 describes how "*a non-regulatory approach has been adopted to encourage the use and uptake … to achieve sustainable land use on Highly Erodible Land.*" And (from methods on erosion control) "*… [social marketing], publicity, education, information,*

incentives, … will be used to encourage the landowner/occupier to change to more sustainable farming practices." The non-regulatory provisions in Chapter 5 shows that in some circumstances, the Council is confident in the efficacy of its methods to encourage voluntary changes in farmer behaviour and it is possible that this same approach could be adapted to suit the practice changes needed to improve water quality in the Region.

Terry Parminter
30 October 2009