

**BEFORE THE ENVIRONMENT COURT  
AT WELLINGTON**

**IN THE MATTER**

of appeals under clause 14 of the First Schedule to the Resource Management Act 1991 (the Act) concerning the proposed One Plan for the Manawatu-Wanganui Region

**BETWEEN**

**FEDERATED FARMERS OF NEW ZEALAND**

ENV-2010-WLG-000148

**AND**

**MINISTER OF CONSERVATION**

ENV-2010-WLG-000150

**AND**

**HORTICULTURE NEW ZEALAND**

ENV-2010-WLG-000155

**WELLINGTON FISH & GAME COUNCIL**

ENV-2010-WLG-000157

**Appellants**

**AND**

**MANAWATU-WANGANUI REGIONAL  
COUNCIL**

**Respondent**

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**STATEMENT OF EVIDENCE OF CHRISTOPHER MARTIN KEENAN IN RELATION TO  
THE APPEALS ON THE PROPOSED ONE PLAN FOR MANAWATU WANGANUI  
REGIONAL COUNCIL ON SURFACE WATER QUALITY**

**DATE 15 MARCH 2012**

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## QUALIFICATIONS AND EXPERIENCE

1. My name is Christopher Martin Keenan. I am the Manager, Natural Resources and Environment with Horticulture New Zealand. I have been managing water and resource management matters on behalf of Horticulture New Zealand since early 2007.
2. Prior to that I was Senior Advisor at the Ministry for the Environment, working in the "Sustainable Water Programme of Action". My areas of work included iwi and primary sector engagement. I have held officer positions in enforcement and compliance at Greater Wellington Regional Council and environmental research positions in freshwater and marine science at the then Auckland Regional Council now the Auckland Council.
3. I have conjoint qualifications in resource management and science from Lincoln University (BRS/BSc). I have 12 years experience in resource management practice. I am currently a member of the small group on the Government's Land and Water Forum, a foundation member of the Primary Sector Water Partnership and am currently involved in water related policy and planning processes in 11 Regional Council jurisdictions.
4. Recently I was involved as expert planning witness for Horticulture New Zealand in Environment Waikato's Variation 6 on water allocation. The matters in contention included competition between competing land use activities including between primary sector and domestic / municipal interests. Matters raised also included the status of existing use and first in first served, the National Policy Statement on Freshwater Management and transfer of water within and outside of catchments.
5. In preparation of the recently published first report of the Land and Water Forum I was a member of the three subcommittees (standards, audited self-management, allocation) that prepared recommendations for consideration by all stakeholders and partners to the Crown that were involved. I am a current member of the Land and Water Forum's Small Group in round 2 of the Forum's work, and an active member of the allocation working group looking at managing allocation within limits.

6. I am also a member of the water measuring device implementation taskforce and was closely involved with preparation and review of the new regulation promulgated under section 360 of the Resource Management Act 1991 to mandate water meters on consented takes.
7. For the last two years I have been a member of the Governance Group for Environment Canterbury's (Canterbury Regional Council) collaborative land use and water quality project, developing processes jointly with Council, iwi and other stakeholders to set water quality limits in the Hurunui catchment. I am a member of the Policy Advisory Group developing planning instruments to establish water quality limits for the Canterbury region in the next generation plan. I also lead Horticulture New Zealand's shared work program with Environment Canterbury to establish benchmarks for nutrient use in rotational cropping systems.
8. In my role at Horticulture New Zealand I am responsible for managing Horticulture New Zealand's wider resource management programme including over 45 current local, regional and central government Resource Management Act – related processes in the 2011 - 2012 financial year.
9. Since notification of the Manawatu Wanganui region Proposed One Plan (“POP”) Horticulture New Zealand has actively participated in the various hearings at first instance, appeal related matters, including mediations and witness caucusing, that have taken place. This included five of the initial hearings where I presented oral evidence, assisted by experts and growers.
10. As a result of this role, my qualifications and previous experience I have considerable factual knowledge and expertise in the area of resource management, and particularly water policy. I acknowledge that my role for Horticulture New Zealand requires me at times to be an advocate for horticulture interests. However, I have given some limited opinions in this evidence (primarily in support of the opinions expressed by others) and in doing so I have done my utmost to put that consideration to one side and to give my honest expert opinion in an attempt to assist the court in understanding the complex and specialised issues regarding land and water resource management and primary production.
11. With that in mind I confirm that I have read the Environment Court's Code of Conduct for expert witnesses. However I

reiterate that this evidence has been primarily provided as a statement of fact, rather than expert opinion. I am authorised to give this evidence on behalf of Horticulture New Zealand.

12. In preparing this evidence I have reviewed the relevant statements of evidence and material from the Technical Expert Bundle.

### **SCOPE OF EVIDENCE**

13. In this evidence I outline:
  - (a) The scope of the Horticulture NZ interest in the appeals;
  - (b) A general overview of Horticulture NZ's involvement with the development of the POP over time;
  - (c) An overview of Horticulture New Zealand and horticulture in the Manawatu Wanganui region;
  - (d) Research Projects contributing to an understanding of Horticulture and the effects of horticulture on water quality;
  - (e) Collaborative projects;
  - (f) Food production and Schedule AB values;
  - (g) Horticulture NZ's support for the approach of the Council regarding the water quality rule suite, and the preferences we have for the development of objectives policies and methods;
  - (h) Links between the Land chapter, and the Water chapter;
  - (i) What Horticulture NZ seeks and what we would like to see as a decision.

### **SCOPE OF THE HORTICULTURE NEW ZEALAND INTEREST IN APPEALS**

14. Horticulture NZ was a submitter and further submitter to the POP. Horticulture New Zealand is also an appellant and a section 274 interest to the appeals of Andrew Day, the New Zealand Pork Industry Board, Fish And Game Council Of Wellington, Department of Conservation, Osflo Spreading Industry's, Wanganui District Council, WECA and Federated Farmers. We appealed decisions on the Surface Water Quality Chapter regarding a range of issues and were able to resolve many appeal points in mediation with other parties.

15. The key remaining interests are outlined below, along with our support for Horizons Regional Council's defence of the decisions relating to regulation of horticulture in the rule suite in Chapter 13.

#### **HORTICULTURE NEW ZEALAND'S INVOLVEMENT WITH THE DEVELOPMENT OF THE POP**

16. Horticulture New Zealand is the levy body for the fruit and vegetable industry, including around 110 crops specified in part three of the Commodity Levies (Fruit and Vegetables) Order 2007. All of the crops specified are growing as food for human consumption. The levy body represents the interests of 6000 commercial vegetable and fruit growers throughout New Zealand, including many located in the Horizons region.
17. Horticulture New Zealand made substantial submissions and further submissions on the POP of the importance of the region for horticultural production. We had been involved in early consultation with the development of the Plan but were not included in the latter stages when the POP was coming into being.
18. Parts of the approach in the POP have the ability to severely curtail some horticultural activities in the region. The horticultural sector is under considerable regulatory, and subsequent economic pressures throughout the country. In particular, activities involving cultivation and preparation of vegetables for domestic consumption have been under significant pressure from biosecurity incursions (potatoes) agrichemical reassessments and other costs of production. The price of these commodities has been rising over time, although often costs must be absorbed by growers as price takers for the primary customers (in the main, supermarket chains).
19. During the process of hearing the submissions on the POP Horticulture New Zealand used a combination of expert evidence including planning evidence and statements of fact from growers to explain the extent of the impediments and present alternative solutions that provide a way forward to address the issues that Council is seeking to address.
20. Essentially our approach was to use NZGAP, one of our quality assurance systems (or audited self management systems) to develop water quality and land management modules, that could be incorporated into a permitted activity framework for growers. I discuss this further in paragraphs 53 and 54 below. In my opinion Council officers, Horticulture New Zealand and

growers were accepting and supportive of the developed modules. However there was still significant disagreement regarding the targets or limits set, the use of the Land Use Class system, and the ability of our current knowledge to adequately measure the effects of horticultural land use activities on water quality.

21. The evidence was presented to the Commissioners. Commissioners determined that horticultural activities should be regulated through the permitted activity rule suite and remove from proposed Rule 13 – 1. We were pleased that changes were made to address the significant concerns raised.

## **AN OVERVIEW OF HORTICULTURE NZ AND HORTICULTURE IN THE REGION**

22. This section is designed to provide some background to Horticulture New Zealand and horticultural operations in the Manawatu Wanganui region.

### **Horticulture NZ**

23. Horticulture New Zealand was established on 1 December 2005, combining the New Zealand Vegetable and Potato Growers' and New Zealand Fruitgrowers' and New Zealand Berryfruit Growers Federations.
24. Horticulture New Zealand manages issues that cover and affect the whole horticulture industry, on behalf of all its grower members. Horticulture New Zealand is currently active in about 37 plan processes throughout the country, from initial submissions through to appeals before the Environment Court. Many of the issues are common between plans, so Horticulture New Zealand also provides input to policy at the national level focussing currently on matters such as water management, biosecurity, seasonal labour, climate change, hazardous substance management, energy policy, waste management, contaminated land, soil conservation, subdivision, land use change and other resource management issues.
25. Affiliated to Horticulture New Zealand there are 21 product groups that represent and address product specific issues: e.g. Process vegetables, Potato, Tomato, Fresh Vegetables, Export Squash, Asparagus, Pipfruit, Kiwifruit, Avocados and Summerfruit.

26. There are also the district grower associations that represent growers at a local level and with whom Horticulture New Zealand works in conjunction on resource management issues.
27. At the time the POP was notified the district associations in the Region were: the Horowhenua Fruitgrowers Association, Horowhenua District Growers Incorporated, Manawatu Potato & Opiki Growers Assn Incorporated, the Ohakune Growers Association, the Otaki District Commercial Gardeners Society Incorporated, the Rangitikei Potato Growers Association, the Wanganui Vegetable & Produce Growers Association Incorporated and the Wanganui Fruitgrowers Association. Four of these associations have since amalgamated to form the Tararua Growers Association.

### **Horticulture in the Manawatu - Wanganui Region**

28. Horticulture is, and has been, for many years, a significant contributor to the Manawatu-Wanganui economy.
29. In the Region there are approximately 380 levy paying growers, growing on 5,007 hectares of land<sup>1</sup> (0.2% of the region's land area). The Region, which includes Ohakune, Wanganui and Horowhenua, production hectares include 1578 ha of potatoes, 319 ha of onions, 841 ha of squash, 34 ha of sweetcorn corn, 4ha of peas and beans, 870 ha of brassicas, 247 ha of carrots, 245 ha of asparagus, 214 ha of lettuce and over 655 ha of other non-specific vegetables that will include parsnips and brussels sprouts. It is notable that most of this produce is bound for the domestic market.
30. The commercial horticulture enterprises range from small family business to quite large scale growing operations that can use a wide variety of production systems, both outdoor and indoor.
31. As noted above the range of horticultural activities in the Manawatu-Wanganui Region reflects the diversity of the sector:
  - (a) Commercial vegetable growers, many in Horowhenua, Ohakune, Palmerston North, Rangitikei, Opiki and Wanganui. Key produce includes:
    - i. Yams in Rangitikei

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<sup>1</sup> Plant and Food – “Fresh Facts” (2010)

- ii. Potato and onion growers in Opiki, Ohakune, Rangitikei and Horowhenua
  - iii. Carrots, parsnips, brussel spouts and swedes in Ohakune
  - iv. Kabocha (squash) in Lower Manawatu, Rangitikei and Tararua
  - v. Fresh vegetables - such as brassicas, leafy green vegetables, Brussels sprouts and salad vegetables throughout the region – but predominantly in Horowhenua and Palmerston North
- (b) Asparagus growers in Wanganui, Palmerston North, Bulls, Mangaweka, Levin, Feilding
  - (c) Fruit and berry growers in Levin, Wanganui, Mangaweka, and Ohakune
  - (d) Process vegetable growers in Tararua
  - (e) Seed potatoes in Lower Manawatu and Rangitikei.
32. The range of crops and areas within the region mean it is not possible to treat all horticultural businesses within the same framework because of the range of systems, operations and growing conditions. However, cultivation and the ancillary activities associated with it are essential parts of the production process.
33. Within these groupings there are significant variations in size of properties and scale of operations and also different operational systems because of the range of factors. The existence of the traditional 'market garden' growing a wide range of crops has in some places been exchanged for commercial vegetable growing businesses growing only two or three crops, often with operations in many areas (linked production nodes) throughout NZ to ensure full retail supply is achieved throughout the year.
34. Because of this, horticultural production in the nodes of Ohakune and Horowhenua (and in the Rangitikei) have an importance with respect to the continuity of domestic food supply, particularly for the Auckland market but also for other markets.
35. While vegetable growers own land they also lease considerable areas so that they can achieve suitable rotations for their particular crops. There is also an emerging trend



amongst some growers to swap land for crop rotation purposes. Rotation is critical to the sustainability of horticulture, for reasons like maintenance of good soil health and to suppress soil borne diseases. This means that the areas being cropped can vary considerably between seasons. Land is swapped or leased between or from a variety of land owners; it is not just growers swapping land with other growers.

36. There is a small amount of fruit grown in the region, mainly pears, kiwifruit and stone fruit, as well as some avocado and berry operations.
37. There is a range of ethnicities amongst the growers in the region, in particular Asian cultures. Some are recent migrants. Others have been here for a number of generations. These communities add to the cultural diversity and economic success of the region considerably, and are part of the fabric of the horizons region. This cultural diversity can create particular challenges and provide new opportunities. Some of the challenges include consideration of communication and extension activities with growers where English is not the primary language.
38. The economic and social benefits to the region from horticulture are significant. The value of the horticulture industry in the region is in the order of \$40 million in Ohakune and at least \$25 million in Horowhenua. A value for Rangitikei/ Opiki is more difficult because commercial vegetable production is very much part of the mixed farming operations in those districts. Potatoes, with an annual production volume of approx 50,000 tonnes, (including approximately 2,000 tonnes of seed potatoes in Norsewood), is just one example of the significance of particular crops to the region. Potato prices vary from year to year and across the season, between \$450 per tonne to \$1100 per tonne. Carrots in Ohakune are another example. Growers estimate carrot production in Ohakune accounts for half of the domestic table carrot production or New Zealand. Farm gate gross revenue is estimated at around \$300 a tonne. With an added value component of \$300 per tonne after processing and washing.

#### **Future of Horticulture in the Manawatu – Wanganui Region**

39. The climate, soils and availability of water are all factors which contribute to the continued use of land in the Manawatu – Wanganui Region for horticultural activities. However, these are by no way the full range of production factors required, and

this is part of the reason why vegetable growing only occurs in specific locations.

40. Some growers and sections of the industry have come under pressure in recent years with the closure of the McCains processing plant in Feilding, leading to a shift in the areas where process crops are grown and also requiring those growers to change or diversify crops grown. Many of these growers, including some who traditionally were potato growers in Opiki are now growing feed crops for the dairy industry.
41. For growers there are some key issues and requirements to enable horticulture to be undertaken sustainably and economically. These include:
  - (a) Flexible rural land use, to provide for the sharing and leasing of land
  - (b) A cost-effective regulatory system to maintain profitability
  - (c) Access to water for irrigation
  - (d) Access to water for washing and packing operations
  - (e) Ability to apply fertilisers and agrichemicals
  - (f) Ability to cultivate soil and harvest crops
  - (g) Access to a relevant workforce
  - (h) Access to road transport and the established distribution and supply chain.

#### **RESEARCH PROJECTS CONTRIBUTING TO AN UNDERSTANDING OF HORTICULTURE AND THE EFFECTS OF HORTICULTURE ON WATER QUALITY**

42. Through the commodity levy, FORST and Sustainable Farming Fund funding Horticulture NZ, along with several of its vegetable and fruit product groups, have undertaken a range of research projects. A number of these are relevant to the approach in the POP.
43. One such project is Nitrogen Managers for Environmental Accountability (NMEA).
44. The objective of this 3-year MAF SFF project was to develop a system that will provide accountability with regard to nitrogen inputs and resulting nitrate leaching losses across a range of production scenarios within the arable and horticulture industries. The ultimate aim of developing this tool is to provide

a robust way of measuring nutrient inputs and outputs to the satisfaction of regional councils and growers. The three years of research has been incorporated into OVERSEER® version 5.4.9 initially, that was made operative two weeks prior to the water hearings for the POP.

45. OVERSEER® version 5.4.9 proved almost impossible to use for growers given that the pastoral models, arable models and vegetable models were separate within the OVERSEER® framework. There were many other software and science issues that compounded these problems. Dr Lindsay Fung refers to this in his evidence (paragraphs 25 to 29).
46. Complete farm systems could not be modelled without considerable expert assistance. Additionally, with the funding available some key crops could not be modelled and you can appreciate with 110 crops that potentially need to be modelled, it was efficient to focus on prominent crops that experts considered had comparatively greater risks or nutrient input demands.
47. OVERSEER® version 6.0 is near final but has not yet been released. Like OVERSEER® version 5.4.9 there have been significant delays as to when the projected release date is to be from the OVERSEER® Owners Committee, made up of the Ministry of Agriculture and Forestry, Agresearch, and FertResearch. In many ways the new version is reported to be significantly improved, allowing for mixed output farming systems. We are yet to see if this is the case, though.
48. Even with the release of the latest version there is still significant science work to be accomplished. This year Horticulture New Zealand, in conjunction with Environment Canterbury and other parties including Plant and Food Research Ltd, are developing new carrot and onion yield models and validating OVERSEER® results in an extensive program in the Canterbury region. This work is being conducted collaboratively to develop transparent and agreed benchmarks of current practice. Further work is programmed to develop an understanding of the range of good management practices that underpin a programme of continuous improvement in nutrient management.
49. Our objective is to develop a system that allows growers to demonstrate responsible use of nitrogen inputs and thereby satisfy Regional Councils that activities are consistent with the requirements of Regional Plans.

50. Also of relevance is our work over the last 12 years developing soil conservation and water quality management techniques, and good management practice for vegetable growing. Our work program traces back to 1992 with development of good management practice systems for agrichemicals. Since then it has extended through New Zealand growing areas with each subsequent development focusing on a new variety of topics as issues have emerged.
51. Horticulture New Zealand has found that the most pressing task is development of a range of tools growers can use that meet the local conditions and factors associated with soil conservation and water quality. With this in mind. Horticulture New Zealand developed the industry code of practice for the Horizons region referred to in the decisions version of rule 12 – 3 of the land chapter. I refer to this in more detail in paragraphs 66 to 72 below.
52. In addition, Horticulture New Zealand has continued to develop new commitments and achieve existing commitments made as members of the Primary Sector Water Partnership. These commitments we referred to in my original oral evidence on a number of chapters of the POP including the evidence for the land chapter, and the water quality chapters. As a way of updating our commitments and achievements I have attached as Appendix 1 the final draft (for proofing purposes) of the Primary Sector Water Partnership Annual Report 2010-2011 that indicates our progress across a range of initiatives.
53. In hearings on the water chapters of the POP Peter Ensor gave evidence to Commissioners regarding the NZGAP and related quality assurance programs. For completeness I have attached as Appendix 2 excerpts from his original evidence that explains NZGAP more completely.
54. Growers are already committed to ensuring that best practice is met through compliance with such programmes. It is sought that Regional Plans recognise such programmes to avoid duplication in compliance requirements.

#### **COLLABORATIVE PROJECTS**

55. The horticultural industry is taking active steps to ensure that best management practices are known and adopted by growers. The research programme and commitments are evidence of the extent to which this is being undertaken.

56. Horticulture New Zealand seeks to ensure that growers only have to comply with one set of regulatory requirements. Growers are already meeting the requirements of NZGAP – the Fresh Produce Approved Supplier Programme which growers need to be able to supply supermarkets and export markets. Compliance with NZS 8409:2004 Management of Agrichemicals, the Fertiliser Code of Practice and Spreadmark are part of the NZGAP requirements. In addition resource consents for water takes and discharges have requirements that need to be met.
57. Since 2009 Horticulture New Zealand has led more than 57 interventions at the regional and district plan level. While these interventions have saved significant compliance costs (approximately \$50 million) our estimates are that regional, district and national processes related to resource management have cost the industry in excess of \$500 million since 2009.
58. Because of this, the industry organisation has been significantly incentivised to examine how we interact with Council organisations and government. In many instances, we have found that regional councils and government have adopted a similar approach.
59. Many of these approaches are taking place alongside a national process known as The Land and Water Forum. This is a multi-faceted think tank seeking to develop better management systems for freshwater in New Zealand. Stage one of The Land and Water Forum culminated in the completion of the National Policy Statement for Freshwater Management after 12 years of stalemate in policy development, firstly through the Sustainable Water Program of Action, then through the Fresh Start for Freshwater Program.
60. The key difference between previous efforts to develop policy was the collaborative approach between stakeholders, iwi, regional councils and the Crown to develop a consensus.
61. Similar approaches in Canterbury have resulted in production of the Canterbury Water Strategy, new methods to set limits for catchments and to develop good management practice, and to benchmark performance of industry.
62. Many other regions are working on similar approaches. For example, a Rural Advisory Panel now works directly with senior officers and councillors in the development of Auckland policy and planning. A multi-stakeholder Freshwater Advisory Group is

now working on developing Gisborne District's first generation water plan.

63. In my opinion and experience steady and tangible progress has been made by developing processes and involving the full range of interests in early discussion to resolve or highlight differences. This has also been fundamental in developing a greater understanding of the views and positions of the community.
64. This is Horticulture New Zealand's experience around the country. For example, our work with the Auckland Regional Council (Auckland Council) over the last four years has focused on:
  - (a) A commitment to establishing durable relationships with rural compliance officers through regular monthly meetings between the rural compliance team for Auckland Council and the Pukekohe Vegetable Growers Association.
  - (b) Mutual information exchange about good management practice and instances of sediment discharge and the effects on water quality.
  - (c) A whole of catchment approach to management of stormwater and drainage water to ensure that different systems are working in support of each other.
  - (d) Development of an extension program and new regulatory tools to update existing programs.
65. Our experience has led us to seek certainty that Horizons Regional Council will utilise collaborative methods to develop the regulatory program to manage the effects of land use on water quality.

#### **DEVELOPMENT OF THE CODE OF PRACTICE**

66. Roughly 20 months prior to hearings commencing for the POP, Horticulture New Zealand hosted meetings between Council officers, growers and experts to agree a work programme to manage Council's concerns regarding horticultural land use activity practices. Council officers indicated that the key areas of concern related to sediment and nutrient loss from cultivated land, in particular. As a result Horticulture New Zealand agreed to fund the preparation of the Code of practice that is referred to in rule 12 – 3 of the decisions version of the land chapter.

67. Notably, growers responded very cautiously to the new tool that had been developed to measure nutrient use. Our response was to provide a series of workshops in Ohakune and Horowhenua for growers to develop an understanding of the tool.
68. Growers did not respond well to the tool after experiencing the limitations described by Dr Fung in detail, particularly when the tool showed significant nitrogen leaching after growers had entered a range of fertilisers without any nitrogen.
69. Despite this, the industry and growers persevered with the tool and accepted the production of a "Fictitious Farm Strategy" for the Ohakune region. This was funded by the Council and was produced by Mr Lachlan Grant at the first instance hearing.
70. Following on from this, Horticulture New Zealand worked with growers to establish a range of input models to try and describe as many farm systems as possible. These are included in Part 2 of the Code of Practice, however they were not accepted as being useful by Commissioners and therefore this part of the Code has remained a draft.
71. Horticulture New Zealand responded to Council concerns in good faith by developing the Code, and have continued to support adherence to, and uptake of the Code among growers in the region through extension work mentioned by Dr Lindsay Fung.
72. Horticulture New Zealand are also committed to continuously improving Part 2 of the Code to develop the nutrient management tools and knowledge of management practice to be able to develop sound standards and limits for nutrient management. This will be a priority for the industry over the next five years.

#### **DEVELOPMENT OF SCHEDULE AB VALUES FOR DOMESTIC FOOD SECURITY**

73. As explained in paragraph 34 above, the horticultural production nodes located in the Horizons region are significant with respect to their linked production nodes in other regions. Horticulture New Zealand appeals sought to have these areas recognised in Schedule AB.
74. Horizons Regional Council have recognised these significant values by signing a memorandum with Horticulture New Zealand agreeing to the inclusion of a value for Domestic Food

Supply in particular Water Management Zones. This memorandum is attached as Appendix 3. At the time of writing this evidence feedback from the other parties to the appeals on the Memorandum is being sought and will be the subject of expert witness caucusing and rebuttal evidence.

75. Horticulture New Zealand is seeking, as part of its appeal, that the relief provided for in this memorandum be accepted by the Court.

#### **RELATIONSHIP OF THE LAND CHAPTER TO THE WATER QUALITY CHAPTER**

76. Cultivation rules in the Land Chapter are also under appeal. These rules are not just constructed to deal with a land-use effect, they are also focused on the effects of land use activities on water quality.
77. The actions taken by the industry, and the regulatory requirements for the industry in the Manawatu Wanganui Region that relate to surface water quality are found in both chapters.
78. It is my opinion that the contents of both chapters need to be considered together in the development of a regulatory framework for horticultural land use.

#### **CONCLUSION**

79. Horticulture New Zealand supports the position of the Regional Council regarding the decisions made to regulate horticulture through permitted activity rules in chapter 13 and other chapters and other chapters.
80. Horticulture New Zealand also supports development of policy that indicates how horticultural land use is managed and monitored if significant effects are demonstrated from horticultural production systems.
81. Horticulture New Zealand also supports development of collaborative methods, including all stakeholders, iwi and council agencies (including both regional and district councils) to address water quality issues in Lakes Horowhenua and Papaitonga.

**Chris Keenan**

**15 March 2012**



**APPENDIX 1**

**FINAL DRAFT PRIMARY SECTOR WATER PARTNERSHIP ANNUAL  
REPORT 2010 – 2011**

## APPENDIX 2

### EXCERPTS FROM THE EVIDENCE OF PETER DOUGLAS ENSOR PRESENTED TO THE HEARINGS PANEL 19 FEBRUARY 2010

- 9 New Zealand GAP is a robust assurance programme that has been developed to meet a range of regulatory and market requirements, including environmental matters.
- 10 New Zealand GAP sets out requirements in a Manual and growers are audited and need to meet these requirements to achieve compliance with New Zealand GAP.
- 11 Where a Regional Plan requires compliance with New Zealand GAP for nutrient management a Nutrient Management Plan developed in accordance with the Code of Practice for Nutrient Management (FertResearch) or Council approved Codes of Practice shall demonstrate that the Regional Plan requirements are met.

#### **Development of New Zealand GAP**

- 12 New Zealand GAP has been developed to the point where it is the assurance programme of choice for New Zealand growers who market their produce domestically. New Zealand GAP is a condition of supply for major retailers and wholesalers and is recognised by the New Zealand Food Safety Authority. Therefore, most of the produce grown and marketed in the Horizons Region is certified under New Zealand GAP.
- 13 New Zealand GAP is also used as a basis for access into many international markets, such as Asia, Australia and USA. GLOBALGAP is a similar programme that is used internationally. For international markets where retailers accept systems equivalent to GLOBALGAP additional features are included in New Zealand GAP. This is known as New Zealand GAP (GLOBALGAP equivalent) and requires meeting all the New

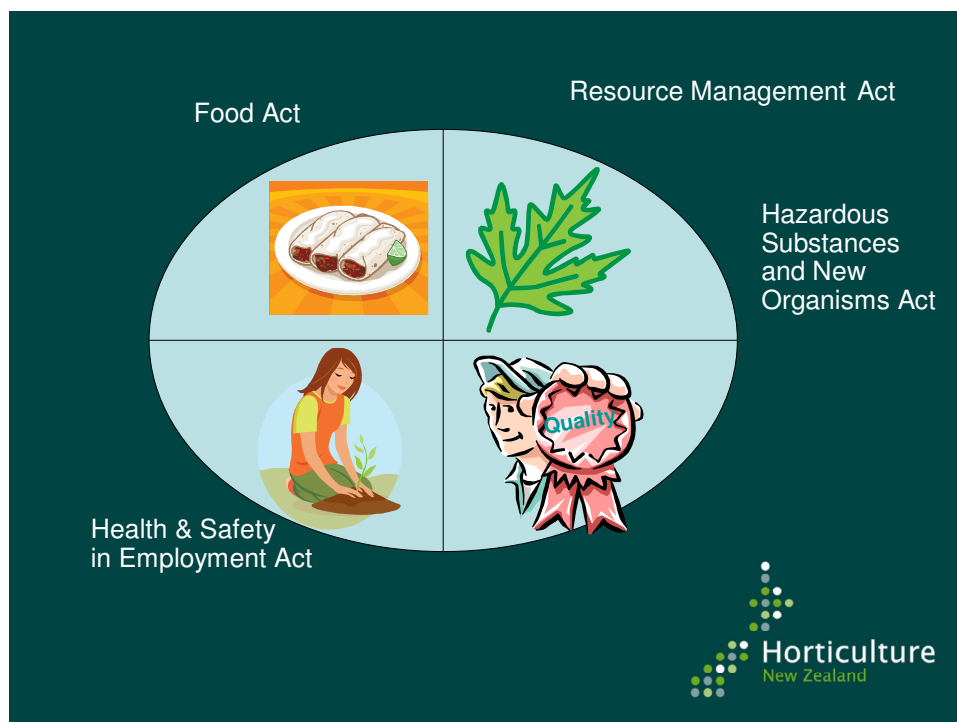
Zealand GAP requirements, as well as additional components and annual auditing to meet the GLOBALGAP equivalent. (Where I refer to New Zealand GAP in this evidence I am including New Zealand GAP (GLOBALGAP equivalent) within the use of the term.)

- 14 Of relevance for the future uptake of New Zealand GAP is the change to the Food Act which will require all horticulture producers to be part of a “national programme”. ...
- 15 New Zealand GAP was launched in 1999 in response to a change in the Food Act allowing for retailers and food service providers to adopt their own audited food safety programmes. To make these work, suppliers needed to be audited and approved to a set of food safety criteria.
- 16 An initial name for the programme was The New Zealand Fresh Produce Approved Supplier Programme. This was changed to New Zealand GAP in 2006 to better reflect the industry commitment to Good Agricultural Practice and to be more aligned with the family of GAP standards around the world.
- 17 From the start, the food safety criteria included the requirements to prevent chemical, biological and physical contamination.
- 18 Food safety was not the only criteria considered because the first version also aimed to boost the levels of professionalism across the horticulture industry. Environmental management, worker safety and quality were also included.
- 19 Amongst other things, a series of decision diagrams for the critical evaluations growers need to undertake are included as guidance for suppliers so they can comply with the requirements of New Zealand GAP and adopt good practice.

- 20 Recent versions and most importantly the new version 5.0 November 2009 strengthens the requirements and guidance for environmental management in the areas of:
- 20.1 Production site management (which includes soil conservation)
  - 20.2 Nutrient management
  - 20.3 Water management

**How is New Zealand GAP used to give environmental assurances?**

- 21 New Zealand GAP draws on the best known practices applicable to New Zealand conditions. It is able to enforce their adoption through third party audit, because without certification, growers may be excluded from the market as they won't meet the conditions of supply.
- 22 Approved suppliers use New Zealand GAP to satisfy many regulatory and commercial requirements (see Diagram 1). New Zealand GAP is integrated into the growers' business unit. It is a central system for managing these different pressures. A key focus for the system is to reduce compliance duplication, so the system is designed to account for cross over.

23 Diagram 1

This diagram describes the scope of New Zealand GAP – food safety, environmental management, worker welfare and quality.

New Zealand GAP may form the basis of the growers' business management system where they have to contend with many pieces of legislation and practices affecting their business and could sit in the middle of this diagram.

For instance, putting training and machinery maintenance systems in place help to address the requirements of the Health and Safety in Employment Act, as well as being good practice for managing worker welfare.

24 Relevant to the matter before the Hearings Panel is the use of nutrients. On the one hand it is good practice to manage the nutrient inputs and outputs of a crop and on the other it can have adverse environmental effects that are, in this case, a

focus for regulators. There is a single outcome sought, but there are multiple drivers.

- 25 New Zealand GAP draws on the best practice guidelines developed by FertResearch, requiring growers to develop their own nutrient management plan according to the Code of Practice for Nutrient Management. Then the programme sets out the process where there are specific requirements in regional plans that need to be met as part of New Zealand GAP. The relevant pages are attached to this evidence. I will describe the requirements and guidance as set out in the New Zealand GAP manual and assessment checklist.

### **How New Zealand GAP works and is audited**

- 26 The New Zealand GAP manual sets out the requirements for the range of matters addressed through the programme. Production site management includes soil conservation and is relevant in terms of reducing risk of sediment loss from production systems. The section on Nutrient Management includes nutrient management plans and compliance with regional council plan requirements. These matters are included in the Assessment Checklists, which are the basis of the New Zealand GAP audit.
- 27 Growers are required to provide evidence that they have complied with New Zealand GAP to the audit agency. In the New Zealand GAP system there are three levels of requirement for components of the system: Critical, Major and Recommended. The tests and penalties associated with the levels of requirement are commensurate with the emphasis that is required in any aspect of a grower's business system. I will now draw your attention to the audit category penalties for non-compliance.

- 28 New Zealand GAP is audited by two independent third party agencies: AsureQuality and SGS (NZ) Ltd. The third party agencies conduct initial assessments and then has a system of scheduled and random assessments to ensure there is auditing rigour.
- 29 It is likely that audit agencies will need to have a level of understanding of the new requirements referred to in paragraph 26 above. Auditors will not need to know the fundamental concepts of nutrient management, nor will they be required to regularly review all components of the environmental management system.
- 30 But auditors will need to understand the importance of compliance with these new management indicators, particularly if these modules are being used to give assurance to regional councils that New Zealand GAP can meet the regulatory requirements they are seeking. They will need to be able to trace grower compliance through the documentation that growers keep to illustrate that they have addressed the performance standards.
- 31 It is appropriate, therefore, that there be some transitional period to ensure that all growers and auditors are aware of the new system. I am aware that a five year period has been suggested for a range of reasons and this would be adequate for implementation of the system.

**APPENDIX 3**

**MEMORANDUM BETWEEN MANAWATU WANGANUI REGIONAL  
COUNCIL AND HORTICULTURE NEW ZEALAND DATED 13  
FEBRUARY 2012**





# PRIMARY SECTOR WATER PARTNERSHIP

Annual Report 2011

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# FOREWORD

I am please to be able to present to you the PSWP annual report for the 2010-2011 year. 2010-2011 has been a year of significant achievements for all of the sectors involved in the PSWP. Many of these achievements are outlined in this report. PSWP members have continued to foster closer relationships with regional councils to address local water management issues. Members have also been at the forefront of national debates on issues such as the setting and managing to catchment limits. Several PSWP members have been actively involved with the Land and Water Forum process providing a valuable primary sector perspective to these discussions. PSWP members recognise their responsibility to improving the management of New Zealand's water resources. In 2008, members signed up to a series of targets to improve water management. PSWP members remain totally committed to the achievement of these targets.

I believe that there are some exciting opportunities ahead for New Zealand's primary sector industries. For example, advances in technology and in precision agriculture provide new possibilities for increasing production that only a few years ago we would have just dreamed about. The potential for further irrigation is significant particularly in regions like Canterbury. New water not only brings with it opportunities for more development but also opportunities to improve aquatic ecosystems. However, with these opportunities there come challenges. PSWP members recognise that to realise the opportunities they must address issues associated with land use and water quality. Then there are issues of equity and allocation of both water and nutrients. For many of the challenges we face going forward, there aren't easy answers. It is clear though that the primary sector can't afford to ignore the challenges. For many this will require a paradigm shift in the way things are done.

This year the PSWP undertook a review of where it was at and the direction it should take for the future. Members resolved to continue with individual sector efforts to meet the targets as set out within the PSWP Leadership document. The PSWP also reaffirmed its existing commitments to the Balfour catchment, the Canterbury LUWQ, the Upper Waikato and to the Hoteo programmes. Over and above these commitments, members are committed to providing high quality cross-sector input through forums such as the Land and Water Forum, (LaWF), into the resolution of key water management issues such as, setting of nutrient limits and managing to these limits, integrated catchment management water and nutrient allocation, nutrient management plans, and audited self management.

Members of the PSWP look forward to playing their part towards the resolution of key water management issues, and to making a significant contribution towards an improvement in the management of New Zealand's water resources.

**Hugh Ritchie**  
Chairman PSWP



## INTRODUCTION

The Primary Sector Water Partnership (PSWP) is a group of major primary sector organisations who are committed to ensuring the sustainable use of freshwater resources in the primary sector. The PSWP was established under the umbrella of the Central Government initiated Sustainable Water Programme of Action (SWPoA). In June 2008, the PSWP released a discussion document entitled, 'Primary Sector Water Partnership Leadership Document.' The document is a collective action plan that builds on the individual environmental management programmes of the various partners. The PSWP is committed to a work programme, which includes engagement with regional and central government and other stakeholders that will deliver on the targets as set out within the Leadership Document.

This annual report provides an overview of PSWP activities and achievements for the period 1 July 2010 to 30 June 2011. It also sets out individual sector and the overall Partnership's areas of focus for the future.

## OUR PROMISES

Our goals are:

- To maintain and/or enhance water quality from primary production land, with demonstrable and accelerated progress on the resolution of water quality issues from agricultural land within five years.
- To demonstrate improvements in water use efficiency by the primary sector within five years.

## PSWP targets

Our targets for action are:

### Leadership

- Engage with regional councils individually and collectively to ensure collective responses to water management.
- Complete national and regional 'at risk' water body prioritisation by November 2008 with a complete plan of action by 2010.
- Commence at least ten new catchment based community initiatives each year from 2008 to 2013 that address local water quality issues originating from productive land use.

During the 2010-2011 year, the members of the PSWP have continued both individually and collectively to engage with regional councils. These meetings have resulted in an improved awareness of each other's activities and a strengthening of links between the sectors and councils. They have also resulted in a number of initiatives with different councils involving one or more sectors.

For example, DairyNZ and Fonterra have worked in partnership with regional councils to develop catchment management strategies around Lake Rotorua, the Waituna Lagoon, Hurunui, Lake Brunner, Taharua, Te Waihora/Lake Ellesmere and Mangatainoka.

Horticulture NZ together Federated Farmers has led the development of Auckland Council's new pan sector Rural Advisory Panel. In addition, Horticulture NZ has been a partner in Gisborne District's Freshwater Advisory Group, Tasman's "Valuing our Waters" initiative and continues to participate in Hawke's Bay's water strategy development.

Irrigation NZ has worked closely with a number of regional councils to develop the Irrigation Design Code of Practice and Standards including design, installation and evaluation. Pathways to incentivise the implementation of these industry performance standards are now being actively developed to ensure irrigators can achieve and demonstrate 'Good Management Practice' with regard to water use efficiency.

Irrigation NZ is also working with a number of regional council's, notably Greater Wellington, Hawke's Bay and Canterbury, to support and drive the establishment of 'irrigator' water user groups. The formation of such entities is an essential step for achieving better resource management, as they allow for better 'stakeholder' engagement, and also allow appropriate resource management.

As well as the above a number of sectors including Beef and Lamb NZ, Foundation for Arable Research (FAR), HortNZ, DairyNZ, Irrigation NZ, and Fert Research continue to be active participants in Environment Canterbury's Land Use and Water Quality programme.

### Nutrient Management.

- 80% of nutrients applied to land, managed through quality assured nutrient budgets and nutrient management plans by 2013.
- It is estimated that approximately 63% of nutrients (N,

P, and K) applied to land nationally are now managed through quality assured nutrient budgets and about 30% through quality assured nutrient management plans.<sup>1</sup> This represents approximately 5400 nutrient management plans.

- By 2016, 1.7 million ha of intensively farmed land will have implemented nutrient management plans.

It is estimated that the area of intensively farmed land that now has a nutrient management plan is about 930,000 ha.

Within the dairy industry, 99% of Fonterra farms have a nutrient budget. The industry is now making a shift towards the use of full nutrient management plans. The key constraint in this remains the ability to access the required numbers of trained and experienced nutrient advisors able to work with farmers to develop these plans. The dairy sector is continuing to work closely with the fertiliser industry to address this issue.

Within the arable industry, there has been an increased use of crop models, improved understanding of soil carbon, and better understanding of nutrient availability following different land uses. A draft nutrient management plan for the arable industry has been prepared for testing with farmers through workshops.

<sup>1</sup> Land with dairy, arable and horticultural operations

Within the horticulture industry, there has also been a shift towards the use of nutrient budgets and nutrient management plans. For example, all growers using irrigation in the Waikato Region are now required to have a nutrient management plan as a condition of consent.

Within the sheep and beef sector, Beef and Lamb NZ have continued to promote the use of their Land and Environment Plans (LEPs) which include a nutrient management component.

### Water Efficiency.

- 80% of extracted water used by the sectors will be under self management approach to meet benchmarks of water efficiency by 2016.

Fonterra is carrying out work to benchmark on-farm water use. Similarly, work is underway within the horticulture sector to benchmark water use. As an example, approximately 7000 hectares of kiwifruit production has been benchmarked as a "highly efficient rural production activity" through Plant and Food Research's water footprint process.

Beef and Lamb New Zealand is engaged in developing a water footprint for the sheep and beef sector. This project will measure the impact of sheep and beef farming on waterways including water quality effects.





This in turn will identify where the sector should target its efforts to make the most rapid progress towards reducing its footprint. The footprint will also act as a benchmark against which the sector can measure future performance.

Irrigation NZ has work underway with the Rakaia-Selwyn project in Canterbury to establish benchmarks of water use efficiency in the zone for a range of land uses. The first benchmarks will be produced winter 2012. More importantly, a system to enable individuals to assess where they fit in relation to their peers is now under development.

### Sediment and Microbial Management

- By 2010 all forestry land, and by 2016 1.7 million ha of intensively farmed land will have implemented a management programme to minimise microbial and sediment deposition in waterways.

In the sediment and microbial reduction area, the main initiatives have been through the forestry sector. The forestry industry has been working with the Ministry of the Environment to develop a national environmental standard (NES) for forestry. In addition the forestry industry continues to actively promote its updated environmental code of practice (ECOP) which was released in 2009. A survey of forest owners in the 2009-2010 year showed that 78% of respondents undertook a documented assessment of environmental effects, including a process to assess the risk that a particular operation might pose. Ninety-eight percent of contractors who undertook earthworks, harvesting or mechanical land preparation operations in that same year, undertook post-operation environmental audits using the industry agreed voluntary rules.

The dairy industry has continued to work towards the exclusion of all dairy stock from waterways. Stock exclusion is seen as a significant way of reducing microbial and nutrient contamination of waterways and is considered a top priority for the dairy industry.

### Capability building, research and extension

- Capability building. Develop the required capability to achieve the sector specific targets by 2011.
- Research and extension increase alignment of sector and public research investment to deliver the knowledge required to achieve

the desired outcomes in priority water body catchments.

The PSWP recognises that building capability is crucial to the sectors delivering on the targets as set out in the Leadership document.

Through the 2010-2011 year, Beef and Lamb New Zealand has added resources to its national and regional networks to better coordinate research, transfer and policy activity.

The dairy sector was successful in obtaining Primary Growth Partnership (PGP) funding to, amongst other things build capability across the whole water management area. Through this programme, the dairy industry is working with Fert Research to further develop training, accreditation and auditing programmes in support of the delivery of high quality nutrient management plans to dairy farmers by fertiliser industry field representatives.

Fonterra has increased to 13 the number of Sustainable Dairying Specialists actively working in the field to support farmers across the country. This group is further supported by an enlarged policy and programme development team.

Research investment, through both the PGP and Pastoral 21 (II) programmes, is aligned to deliver practical tools for reducing the environmental footprint of pastoral industries in an economically sustainable way. The Pastoral 21 (II) programme has a goal to reduce nutrient losses from land use activities by 50% by 2030. This will be achieved through:

- Providing the industry access to tested and proven next generation farming systems for dairying and mixed farming that are easily adoptable (i.e. low risk and easy to run) and increase productivity and profitability with a reduced environmental footprint
- Testing and developing innovative concepts and technologies for reversing the current relationship between production and environmental footprint.

Horticulture NZ has been involved with a number of research projects including; the FRST "Ecosystem Services for Multiple Outcomes project, the development of economic efficiency benchmarks for some fruit and vegetable crops, and contributions to SFF Water User Group project led by Irrigation NZ However, the main extension work undertaken



by Horticulture NZ has been through contributions to the SFF funded "Holding it Together" project, and related projects around advanced farming systems and controlled traffic farming. These projects included trials and field days presenting new vehicle technology to reduce compaction and increase the precision of cropping. Covercrops and new soil management techniques were trialled and demonstrated in the Horowhenua, Pukekohe and other key regions. The process of conducting visual soil assessments was demonstrated.

Irrigation NZ has an active leadership role in a number of research projects including, Sustainable Farming Fund (SFF), fish screen performance investigations and SFF good irrigation practice in hill country. In partnership with the AgITO and Water IT, Irrigation NZ has also dedicated much time and resources into the review and development of a package (design through to operation) of irrigation training resources and qualification's.

### Sector specific targets

Achieving the targets outlined above requires action from each of the partners. Key sector achievements for the 2010-2011 year are summarised below. More detail on progress against the specific sector targets is provided in Appendix 1.

#### DairyNZ and Fonterra

- High level of achievement in relation to the Dairy and Clean Streams Accord targets.
- Progression of work to establish nutrient use efficiency and water use efficiency benchmarks for dairy farms

- Industry participation in a number of catchment based programmes.
- Significant investment in research and development designed to reduce the dairy footprint on the environment.

#### Foundation for Arable Research

- Development of training modules for arable and horticulture Overseer users
- High rate of uptake of reduced tillage techniques by growers resulting in average savings of \$12600 per farm in tillage costs.
- AquaTrac, the Whole Farm Irrigation Model for arable farms launched for trial use by farmers in the 2010/11 growing season.
- Workshops run with Dairy NZ and Irrigation NZ to encourage farmers to improve irrigation use efficiency.

#### Horticulture NZ

- Water use efficiency work has been undertaken in the Waikato and Gisborne Districts on a range of economic and technical projects.
- Improvements to the Horticulture module of Overseer have been completed and incorporated into version 5.4.9 of the model.
- Significant work undertaken on NZGAP in anticipation of a 2012 review of the programme.
- Work commenced to update nutrient use benchmarking knowledge and better define management practice and development



of practical responses to the effects of horticulture land use on water quality.

### Beef and Lamb NZ

- The Red Meat Sector Strategy has a strong focus on environment issues as a critical issue in the future of the industry.
- Beef and Lamb NZ was a major sponsor of the Farm Environment Awards for 2011.
- Beef and Lamb NZ continues to place significant emphasis on environmental issues through its Monitor Farm programme.
- In 2012, Beef and Lamb NZ will be reviewing its current Land Environment Planning toolkit to incorporate the outcomes of the latest research and to modularise some components to assist in enhancing uptake.

### NZ Farm Forestry Association and NZ Forest Owners Association

- The forestry industry has begun research to reduce the amount of herbicides used. Ultimately this work should lead to a reduction in the amount active chemical being released into the environment.
- NZFOA supported Brazil in proposing a motion to the Forest Stewardship Council (FSC) General Assembly that the FSC community becomes better informed on the risks and benefits of genetic engineering in plantation forests.
- The forest industry continues to evaluate and where suitable adopt national spatial databases, such as MfE's new Erosion Susceptibility Mapping, NIWA's River Environments Classification, to make better risk based management decisions.
- Forestry continues to lobby for legislation and regulation that is equitable across all land uses while encouraging good environmental outcomes. The industry believes that there needs to be ongoing promotion of the benefits modern forest management practices can bring to erosion prone areas.

### Fertiliser Manufacture's Research Association (FMRA)

- The development of a major new version of

the OVERSEER Nutrient Budget model was completed this year (OVERSEER 6). It will be formally released in the first quarter of 2012.

- A review of current nutrient management practices and protocols was undertaken this year which has led to the development of a set of recommendations for formalising an accreditation programme for nutrient management advisors
- Fert Research commissioned an independent external audit of the quality of nutrient management plans (NMPs) delivered by member companies through their more than 130 field representatives. It was found that NMPs are being delivered to the standard required by the fertiliser industry's Code of Practice for Nutrient Management.
- Fert Research has worked closely with DairyNZ to produce regional benchmarks for nitrogen use efficiency, nitrogen leaching and phosphorus loss on dairy farms.

### Irrigation NZ

- Over 30 designers are working through the NZQA irrigation system design qualification assessments with another intake scheduled for 2011-2012.
- The draft installation code of practice has been released and work is underway to identify and develop the required NZQA linked training.
- Over 20 people have now successfully completed the NZQA evaluation qualification (registered evaluators) and another 30 are in the process of completing the assessments
- Audited Self Management (ASM) has now become a nationally preferred pathway for achieving community water management objectives. Irrigation NZ continues to play a lead role in developing and promoting the concept.

### Federated Farmers

- Federated Farmers members, officers and staff have actively engaged with regional initiatives in a number of regions to develop more effective models for collaborative planning and action on the ground partnerships.



- As a member of the Dairy and Environment Leadership Group, Federated Farmers continues to work closely with other primary sector partners to support industry-led initiatives and targets around nutrient efficiency and water efficiency.
- Federated Farmers was a founding member of the NZ Landcare Trust; and continues an active involvement on the Board of the Trust.
- Federated Farmers has been actively involved with new community catchment models in Canterbury and other regions. A priority in the coming year will be exploring ways to more effectively support the growing network of catchment farmer leaders in collaboration with other members of the Partnership.

### Sector commitments

During the 2010/2011 year, the sector partners committed approximately \$45,000 between them to the operation of the Partnership. Individually each sector continues to make a significant financial contribution towards addressing the water management issue associated with their sector. The extent of this commitment is reflected in the progress made towards the achievement of the sector targets.

## REGIONAL INITIATIVES

The PSWP has been actively involved with initiatives in a number of regions

### Auckland region - Hoteo catchment

The Hoteo is the Auckland region's largest river with a catchment of 405 km<sup>2</sup>. This river drains into the Kaipara Harbour which is thought to be the largest estuary in the Southern Hemisphere. It is recognised as an area of international importance for coastal birds, has a high

diversity of marine organisms, and contains ecologically significant marine communities that provide a wide variety of functions and services. The ecosystems of the harbour, and in particular the sea grass beds, have been identified as being highly significant in supporting the snapper populations, both within the harbour and the open coast. Specifically, significant issues have been identified around sediment and phosphorus. The PSWP has partnered with the Auckland Council, and a number of local groups in a programme, with an initial focus on sediment reduction.

In the 2010-2011 year work has continued on the drafting of an erosion and sediment control plan that will identify priority areas and actions. Links to NIWA (research around where sediment goes in harbour) and Agresearch (beginning research into key sediment generating areas) programmes have been strengthened to ensure actions are guided by better science and research.

Also, during the year a successful application was made to Fonterra's Catchment Care programme to provide 30 volunteer days to support works on the ground. In addition, \$40,000 was received from the Auckland Council's stormwater unit to fund riparian fencing and planting and further erosion control methods research.

### Waikato region - Upper Waikato catchment

Upper Waikato farmers are facing a changing regulatory environment as the Waikato Regional Council initiates statutory reviews of its regional policy statement and plans, and as co-management initiatives start being implemented. New policies are likely to be focused on setting limits to achieve agreed water quality outcomes.

The Council, in association with the PSWP recognise the importance of preparing farmers for these changes. The partners see an opportunity to improve the coordination of their extension activities and resources through a number of joint programmes.

The Council and the PSWP have agreed to work together to support and enable farmers to make the necessary transition to practices that improve nutrient management performance in the catchment. The following objectives have been agreed upon for the programme;

- To improve the nutrient management performance of the Upper Waikato farmers.
- To improve the working relationships between the parties in relation to nutrient management extension activities and resources.
- To coordinate nutrient management extension activities and resources of the parties, to provide the greatest benefit for farmers.
- To demonstrate improvements in nutrient management performance to the parties, respective organisations.

### Canterbury region – Land use and water quality project

For the past two years PSWP members have been actively involved in the Canterbury land use and water quality project to develop a Preferred Approach for the management of the cumulative impacts of land use on water quality in the Canterbury region. The Preferred Approach is, a process for agreeing on a catchment-by-catchment response rather than an inflexible blueprint of specific actions and regional plan provisions.

The Preferred Approach and the various methodological steps inherent in it, is based on a number of core principles that recognise the fundamental importance of a collaborative approach, of the consideration of environmental, economic, social, and cultural considerations and of the need for adaptive management and a learning approach given the uncertainties and complexities inherent in managing the cumulative effects of land use on water quality.

The Preferred Approach comprises two processes, a process for the setting of catchment limits and a process for managing to these limits. Both are underpinned by a regulatory framework and a regional partnership agreement. It is expected that PSWP members will continue to be actively involved in the roll out of the Preferred Approach throughout the Canterbury region.

### Southland region - Balfour catchment

The Balfour Groundwater Quality Project is a collaborative project between Environment Southland, local landowners and the Primary Sector Water Partnership. The Balfour Groundwater Quality Project developed in response to consistently elevated nitrate levels in bores south-west of the Balfour township. Several of these bores contained nitrate concentrations which were up to twice the maximum acceptable level in the Drinking Water Standards for New Zealand (DWSNZ). A collaborative programme between the PSWP and Environment Southland was established in the Balfour catchment in 2009.

The project aims to better define the nitrate levels in the water, identify any possible causes of high nitrate levels and to develop nutrient management practices within the catchment to reduce the nitrate levels in the future. Since early 2009, Environment Southland, the PSWP and local farmers have been working together to try and improve the understanding of the cause and impact of the elevated groundwater nitrate levels and to formulate a collaborative response to address the issue.

The high levels of nitrate appear to reflect diffuse discharges from the intensive nature of land use in the catchment and the historical use of farm management practices not specifically designed to minimise nitrate losses to groundwater. It is apparent that the hydrogeological setting in the Balfour area is particularly vulnerable to the impacts of human activities on water quality. Normal land use activities and farm management practices that would have minor effects on groundwater quality in other areas, appear to have more significant effects in this location, and potentially in other locations like it.

To minimise further contamination of groundwater within the catchment, a range of farm management practices adjustments and on-going monitoring on a regular basis needs to be undertaken. The use of nutrient management plans on farms in the catchment should help to identify and minimise the risks of both point source and diffuse contamination of the groundwater.

## CHANGES TO THE PARTNERSHIP

During the year, the NZ Forest Owners Association and the NZ Farm Forestry Association resigned from the PSWP. Both organisations have been members of the Partnership since its formation. In the past 18 months the forestry industry has been actively pursuing the development of a National Environmental Standard (NES) for forestry. Both organisations have decided that this is where most of their effort should be directed into the future.

Also, during the year Pork NZ expressed an interest in joining the Partnership. The PSWP looks forward to Pork NZ involvement in the Partnership.

## THE FUTURE

The PSWP will continue to build on the progress made and lessons learnt over the past year. Members of the Partnership will be working to strengthen existing partnerships between the sectors and at the same time will be looking for new opportunities for greater cross sector collaboration.

PSWP actions in the next 12 months will concentrate on three areas of activity;

1. A continuation of individual sector efforts to meet the targets as set out within the PSWP Leadership document. PSWP members are totally committed to achieving these targets.

2. Maintenance of PSWP existing commitments to the Balfour catchment, the Canterbury LUWQ, the Upper Waikato and to the Hoteo programmes.
3. Providing high quality cross-sector input through forums such as the Land and Water Forum, (LaWF), into the resolution of key water management issues such as, setting of nutrient limits and managing to these limits, integrated catchment management water and nutrient allocation, nutrient management plans, and audited self management.

In addition to the above, the PSWP hopes to build on its already good relationships with regional councils. The sector partners will be working with a number of councils on a range of initiatives over the next 12 months. The partners will continue to work with councils in both a proactive and responsive mode. In the proactive area, the partners are keen to discuss with councils issues of common interest and, where appropriate, develop joint responses. Alternatively, where 'pressing' issues arise, the individual sectors will play their part to resolve these issues.

Through its efforts, the PSWP hopes to continue to make a significant contribution towards an improvement in the management of New Zealand's water resources.





## APPENDIX

### Progress against individual sector targets

This section outlines the targets, and actions that individual sectors and organisations have committed to in order to achieve the collective targets as set out within the Leadership document. It also sets out the achievements for the 2010-2011 year

#### DairyNZ and Fonterra

The dairy industry is committed to sound environmental management. The industry is actively working with researchers and farmers to develop and implement effective solutions to the environmental issues faced by the industry. The industry has also been active in promoting and developing collaborative arrangements with regional councils. A number of the initiatives listed below involve a number of PSWP partners as well as the dairy sector. These include initiatives aimed at improved water use efficiency and the adoption of nutrient management planning as standard practice on dairy farms.

COMMITMENTS	2010-2011 ACHIEVEMENTS
<p><i>Full adoption of the Dairying and Clean Streams Accord:</i></p> <ul style="list-style-type: none"> <li>- Dairy cattle excluded from 50% of streams, rivers and lakes by 2007; 90% by 2012;</li> <li>- Half of regular crossing points to have bridges or culverts by 2007; 90% by 2012;</li> <li>- All farm dairy effluent discharges to comply with resource consents and regional plans;</li> <li>- All dairy farms to have systems in place to manage their nutrient inputs and outputs by 2007;</li> <li>- Half of regionally significant wetlands on farms to be fenced by 2005; 90% by 2007.</li> </ul>	<p>Performance against targets for the last season was as follows:</p> <ul style="list-style-type: none"> <li>- stock exclusion – 85% (80%);</li> <li>- regular crossings – 99% (98%);</li> <li>- effluent compliance – 65% (60%);</li> <li>- nutrient management systems – 99% (99%);</li> <li>- wetlands – 9 Councils have now defined and identified the regionally significant wetlands. 2 have met the 50% target, while one (Taranaki) has met the 90% target. Difficulties remain in that many regional councils lack data on how many of the wetlands are fenced.</li> </ul>
<p><i>Nutrient management – provide programmes to have 50% of dairy farms implementing a nutrient management plan by 2012 and 100% by 2016.</i></p>	<p>DairyNZ has rolled out a number of initiatives promoting the benefits of nutrient use efficiency in face-to-face events and discussion groups. Extension has been focused on building capability in nutrient and effluent management and communicating the industry's growing expectations for farmer environmental performance. Currently 46% of farms that supply Fonterra have a nutrient management plan.</p>
<p><i>Set benchmarks and targets for increasing resource use efficiency by 2010.</i></p>	<p>DairyNZ has worked in partnership with FertResearch and commissioned a report on nutrient use efficiency. Analysis is based on data from throughout New Zealand, broken down by region and incorporating farm-level factors. These benchmarks are being incorporated into OVERSEER and will be used by the fertiliser and dairy industries in programmes to drive farmer uptake of nutrient management plans.</p> <p>A benchmarking project is now underway for farm dairy water use efficiency.</p>

COMMITMENTS	2009-2010 ACHIEVEMENTS
<p><i>Demonstrate by 2016 a significant reduction (30% as an interim stretch target) in nutrient losses at catchment scale in areas where water quality is identified as being at risk.</i></p>	<p>Significant progress has been made towards meeting this target. Catchment-scale projects for managing nutrients more efficiently and with lower total losses are now underway in Rotorua, Waituna, Hurunui, Lake Brunner, Taharua, Lake Ellesmere and Mangatainoka. Through these programmes a range of mitigation and governance options have been tested. For example, in the Taharua catchment, modelling indicates that dairy farms have already reduced Nitrogen yields from 50 to 35 kgN/ha/year, representing a reduction of 30%.</p>
<p><i>Commission research that progressively delivers by 2016 tools, technologies and management practices capable of delivering:</i></p> <ul style="list-style-type: none"> <li><i>Off farm losses – 50% less nitrogen, 50-80% less phosphorus, microbial levels at contact recreational standard;</i></li> <li><i>Efficiency use gains, 40% increase in water use efficiency by development of improved pasture and forage species;</i></li> <li><i>Irrigation use efficiency. In partnership with Irrigation NZ, development of tools and encouragement of uptake so that 80% of water in dairy industry will be under self management to meet industry good practice benchmarks.</i></li> </ul>	<p>The pastoral industries now have a number of innovative research programmes underway through Pastoral 21(II), with the goal that in five years, the programme has placed the pastoral sector on a trajectory to increase profit by \$5B and reduce nutrient losses by 50% by 2030. This will be achieved through:</p> <ul style="list-style-type: none"> <li>• Providing the industry access to tested and proven next generation farming systems for dairying and mixed farming that are:</li> <li>• easily adoptable (i.e. low risk and easy to run);</li> <li>• increase productivity and profitability with a reduced environmental footprint;</li> <li>• Testing and developing innovative concepts and technologies for reversing the current relationship between production and environmental footprint.</li> </ul> <p>In 2010, DairyNZ piloted Smart Water Use in the Waikato, a farm kit geared to help dairy farmers use water more efficiently and reduce water loss through fine-tuning their system on-farm. The programme is now in the process of being extended nationwide.</p> <p>Financial and communications support has been provided by Fonterra to Irrigation NZ to support a series of irrigation efficiency workshops throughout the country.</p>

### Significant activities not covered under commitments

#### Farm Dairy Effluent Code of Practice

It has been identified that many farm systems for effluent irrigation are not fit-for-purpose, with inadequate infrastructure being a key cause of negative environmental effects. DairyNZ has worked in collaboration with Irrigation New Zealand and the New Zealand Milking and Pumping Trade Association to develop a Farm Dairy Effluent Design Code of Practice and Standards which has now been released nationwide.

#### IPENZ Pond Construction Practice Note

To complement the Farm Dairy Effluent Code of Practice and Standards, an Institute of Professional Engineers New Zealand (IPENZ) Practice Note has been drafted to provide advice to practising engineers on the design and construction of effluent storage ponds. This will make a significant contribution to ensuring storage facilities are fit for purpose and prevent negative environmental effects.

#### Every Farm Every Year

At the time the 2010 farm dairy inspections were carried out, Fonterra undertook assessments of all 10 000+ of their suppliers' dairy effluent systems ability to be compliant with regional council requirements 365 days of the year. 1380 suppliers were identified as having effluent systems that could be at risk of non-compliance. These have all been visited by a Sustainable Dairying Advisor who has helped each supplier develop a remedial plan. 763 of these remedial plans have already been completed. Fonterra believes that this approach, in conjunction with the other activities being undertaken to raise the level of effluent infrastructure and management, will result in much improved levels of compliance in future years.

## Looking ahead

### Enabling Behavioural Change

Having introduced a number of best-management-practice initiatives in 2011, the focus for the dairy sector is now shifting to enabling greater resource use efficiency. This will be delivered through the development of a Sustainable Milk Production Plan that can be used by farmers to integrate their environmental and production goals, enabling the production of more milk, from a smaller environmental footprint.

DairyNZ has a significant programme underway through the Primary Growth Partnership to deliver on sector capability targets. This programme's objective is to work with farmers, industry bodies and regulators to:

- Ensure the dairy industry has a robust yet cost-effective, audited self-management system for resource use that can be implemented where required to facilitate and demonstrate farmer change.
- Develop and drive adoption of effective planning tools and associated resources that support farmers through practice changes, aimed at meeting resource use efficiency benchmarks or agreed partnership targets.
- Aid development of catchment and regional scale policy frameworks and associated targets that enable communities to meet their environmental, social, cultural and economic goals, while also providing clear pathways for industry growth.

### Promoting Behavioural Change

2011 saw the rollout of the Farm Dairy Effluent Code of Practice and Design Standards, with workshops for suppliers held nationwide. These standards will be supported by an accreditation system for suppliers of effluent systems that will drive uptake of fit-for-purpose systems and remove significant environmental effects. Courses in effluent systems design are now provided through Massey University, have had rapid uptake and are fully subscribed for the next year. This shift in how systems are supplied will drive changes in the choices that farmers make about effluent management.

### Driving Behavioural Change

Fonterra's Every Farm Every Year programme has seen three times the expected number of referrals. More than 1200 Effluent Improvement Plans are now in place, over 1500 farm visits have been conducted by sustainable dairying specialists this season, and over 700 plans have already been implemented fully on farm. Approximately one-third of referrals to Sustainable Dairying Specialists have in fact been self-referrals, which provides clear evidence of the changing culture among farmers towards environmental management.

## Arable

The arable industry has continued to work towards, and generally made good progress to, achieving the commitments made. As well as that the industry has had significant involvement in a number of other projects in conjunction with other sectors. The increased cross sector activity has been particularly apparent in the Canterbury area in the Land Use and Water Quality project and also in Southland in the Balfour Water Quality project.

COMMITMENTS	2010-2011 ACHIEVEMENTS
<p><i>Nitrogen Managers for Environmental Accountability (NMEA) completed by January 2009:</i></p> <ul style="list-style-type: none"> <li>- <i>By end 2009 arable industry recognition of nutrient budgeting for high risk activities;</i></li> <li>- <i>NMEA developed into Overseer by February 2009.</i></li> </ul>	<p>The arable and horticulture industries have been working with trainers at Massey University to develop training modules for Overseer for arable and horticulture.</p> <p>There have been delays in developing the latest version of Overseer so the farmer / consultant workshops have been delayed until late 2011.</p>
<p><i>Increased use of FAR crop management guidelines:</i></p> <ul style="list-style-type: none"> <li>- <i>Increase use of wheat calculator or principles of the wheat calculator from 60 -80% by 2010;</i></li> <li>- <i>Expand principles of wheat calculator to barley and achieve 15% uptake by 2015;</i></li> <li>- <i>Release the new maize calculator for widespread use in 2008 and 5% uptake in 2009.</i></li> </ul>	<p>On going efforts are being made to expand the principles of the wheat calculator to cover barley. The initial stages of this are to improve the soil model by using the APSIM model. Plant &amp; Food Research are working with CSIRO to access the model. It is expected the APSIM capability will be included in the models by late 2011.</p> <p>Calculator use during the last season has been reviewed. A few issues have been identified in relation to the model which have influenced the rate of uptake. The cost benefit of using the model has been highlighted to farmers using a couple of scenarios and it is planned to do more ground truthing of the model to give farmers greater confidence in the results.</p>
<p><i>Clear guidelines provided to growers on how and when to use reduced or no-tillage techniques by 2012.</i></p>	<p>A survey of farmer uptake of reduced tillage practices has been completed and is currently being analysed. The rate of uptake has been high over recent years and farmers are saving on average \$12600 per farm in tillage costs. Recent work on this project has indicated significant N is becoming available to the crop as farmers go from grass to crop. In many cases a crop has the potential to reach optimum yield with no additional N. This will reduce N losses to the environment.</p>
<p><i>Improve irrigation efficiency and plant water use efficiency by:</i></p> <ul style="list-style-type: none"> <li>- <i>Extension of irrigation use efficiency with 80% new irrigators on arable farms tested prior to commissioning in 2010 and 15% of existing irrigators tested prior to 2010;</i></li> <li>- <i>Soil moisture monitoring and best management practices for irrigation management used on 15% of irrigated area by 2010;</i></li> <li>- <i>Irrigation use efficiency – In partnership with Irrigation NZ development of tools, encouragement of uptake so 80% of water used in arable industry will be under self management.</i></li> </ul>	<p>The uptake of irrigator efficiency testing is still not as great as expected. The reasons for this are unclear but one factor is likely to be is that it is difficult for farmers to make significant improvements when problems are identified.</p> <p>AquaTrac, the Whole Farm Irrigation Model for arable farms was launched for trial use by farmers in the 2010/11 growing season. Generally it performed to expectations. A post season survey has highlighted the issues that need to be improved before a broader release next year.</p> <p>A number of workshops have been run with Dairy NZ and Irrigation NZ to encourage farmers to improve irrigation use efficiency. Attendance at these workshops has generally been above expectations. Workshops on Audited Self Management will be run in conjunction with other sectors.</p> <p>Trials of VRI have been undertaken on two arable farms. VRI has shown significant potential to save water.</p>
<p><i>Continue to promote the uptake of GROWSAFE.</i></p>	<p>FAR has continued to run Growsafe refresher courses for arable farmers through the 2010-2011.</p>





## Significant activities not covered under commitments

The arable industry has been actively involved in a number of cross sector activities often in conjunction with regional councils.

The key projects have been:

- Canterbury Land use and Water Quality Project with ECAN. This project aims to develop new consultative approach to water management. Work to date has primarily been in the Hurunui catchment but it is planned to extend this work to other zones in Canterbury;
- Lysimeter project with ECan has seen lysimeters installed on two farms (pastoral and arable) in mid Canterbury to measure water and nutrient losses in commercial farms;
- The Balfour water quality project aims to better understand the reasons for elevated nitrate levels in ground water and assist land managers to implement changes in land management which will help reduce the problem. To date a report has been prepared which outline the scope of the issue. A field day for farmers in the catchment is planned for later in 2011;
- Dairy shed effluent project to help determine how dairy farmers can best use effluent to grow maize crops. This joint arable/dairy sector project has demonstrated that with most crops there is no need for additional N fertiliser if dairy shed effluent is applied at suitable rates.

## Looking forward

FAR has just released a revised strategy document. This document has a clear sustainable farming systems focus within one of the four research goal:

- Water efficiency by better understanding and delivering water to meet plant needs;
- Crop establishment practices to improve soil quality;
- Use of improved cropping practise to improve soil carbon;
- Optimising nutrient use through developing self management plans for efficient nutrient use.

## Horticulture New Zealand

The key achievement, for 2010 – 2011 has been development of new soil conservation methods, the completion and publication of a series of reports on new soil conservation techniques and a body of science indicating the effectiveness of different techniques. The reports are the culmination of four years of Sustainable Farming Fund research with growers, regional councils, and fertiliser companies.

Horticulture NZ has played a significant role in the development of Auckland Council's new pan sector Rural Advisory Panel, and has been a partner in the Environment Canterbury led Land Use and Water Quality project, Gisborne District's Freshwater Advisory Group, Tasman's "Valuing our Waters" initiative and continues to participate in Hawke's Bay's water strategy development. Horticulture New Zealand also is a member of the "Small Group" of the Land and Water Forum.

COMMITMENTS	2010-2011 ACHIEVEMENT
<i>Achieve the objectives of the MAF SFF / Horticulture &amp; Arable Industries / Regional Government Project: Nitrogen Managers for Environmental Accountability (NMEA) by January 2009.</i>	Completed: however completion has identified a range of gaps in the knowledge and research area. Extension of Overseer, and measurement of uptake remains a key issue.
<i>By end-2009 Hort Industry product group recognition of nutrient budgeting for all high risk activities; i.e. leaching from certain crops on different soil types.</i>	Complete – tables developed for light, medium, heavy soil and differing crops by region. Some data for some crops still not available. Product Groups aware.
<i>February 2009 – NMEA developed 'Overseer (Hort)', based on HortResearch's SPASMO and Crop &amp; Food's Soil and Plant Growth Models (ex LUCI), completed and rolled out.</i>	Partially complete – Overseer Hort developed and incorporated into Version 5.4.9. Compatibility issues with pasture models of Overseer and other technical constraints currently being addressed (to be released with Version 6).
<i>2009 onwards – advocate with regional councils for the voluntary uptake of 'Overseer (Hort)' by growers to be recognised in land and water plans, through permitted activity rules for fertiliser application via nutrient budgeting.</i>	Fertiliser Rule 13-2 (permitted activity) in Horizons One Plan now requires nutrient budgeting as part of standards and terms for applications → 60 kg/N/ha/yr. Nutrient Management Plans are now required for irrigated horticulture in the Waikato Region.
<i>March 2009 – Commence six months extension work with Overseer (Hort).</i>	Not complete – scheduled and budgeted to follow release of Overseer Version 6 (was July 2011 date, now expected early 2012).
<i>Late 2009 – 'Overseer (Hort)' incorporated into New Zealand GAP.</i>	Completed – now incorporated as part of the Nutrient Management Module (C3.2). This module is now under review as part of the process of general review that will lead to a new release of NZGAP in 2012.
<i>April 2010 – 25% uptake of Overseer (Hort) by vegetable and relevant fruit growers, By April 2012 – 50% uptake and by April 2014 – 75% uptake.</i>	Not complete - uptake of Overseer was hindered by progression of the Horizons One Plan (2009 - 2011). An industry working group was established in April 2011 with FAR to promote the use of Overseer and nutrient management plans in the vegetable industry. A Massey course for vegetable cropping NMP's has been developed with the Fertiliser industry and is awaiting release of the new version of Overseer for trialling. Money has been made available to trial the new course and version – initially a group of 5 trainers followed by a leadership group of approximately 20 growers covering most crops and regions and a range of scales. Following this, the programme will develop to chart adoption of nutrient management planning for those crops / rotations with an elevated risk of nutrient leaching. The solution is likely to be contained within the NZGAP framework.

## Significant activities not covered under commitments

**Water use efficiency:** water use efficiency work has been undertaken in the Waikato on a range of economic and technical projects. In collaboration with Aqualinc and Environment Waikato, a water balance model has been created with guidelines for efficient allocation and rotational practice typical of the Waikato Region. Water use modelling is in year 3 of 3 years programmed research, with significant interest in the project from the grower community. This work has resulted in an additional piece of work done by Aqualinc for Gisborne District, working with growers and Council Officers there. Economic efficiency of water use has also been measured in the Waikato.

**Water Quality & Best Management Practice:** Significant work is currently being undertaken on NZGAP in anticipation of a 2012 review of the programme. The Franklin Sustainability Project Manuals for soil management are currently in revision with Auckland Council and a significant extension budget has been developed to continue the improvement of practice as a result of the initial codes launched in 1998. Horticulture NZ has planned and contracted work on updating nutrient use benchmarking knowledge and defining management good practice. The work which will initially focus on the Canterbury region, will aim to develop practical responses to the effects of land use on water quality.

## Looking forward

Soil management has been highlighted as an area of environmental risk by stakeholders and the horticulture industry has responded with a comprehensive review of soil management practice, development of new tools and extension projects. Future targets for the horticulture industry would reflect this area of continuous improvement.

Water use efficiency and the efficiency of allocation has also been a key focus given growing requirements to develop an understanding of efficient allocation and efficient use of both water and nutrients. Benchmarking industry performance within efficiency parameters, and defining industry good management practice are key steps in the coming years, and work has been commenced.

The kiwifruit industry has completed a water footprint. The potato industry has commenced work on a water footprint.

## Beef & Lamb

Beef and Lamb NZ (B+LNZ) recognises the growing importance of appropriate water and nutrient management and recognises the need to do more to increase sheep and beef farmers' awareness of the importance of improved water management. Along with other primary sector organisations, B+LNZ have been active participants in national forums, such as the Land and Water Forum, and continue to play an active part in a number of initiatives around the country.

COMMITMENTS	2010-2011 ACHIEVEMENT
<i>To work with the fertiliser industry to encourage the uptake of nutrient budgeting through the use of Overseer by sheep and beef farmers - all B+LNZ Monitor Farms to be operating Overseer based nutrient budgets by the end of the 07/08 year.</i>	Nutrient budgets are mandatory for B+LNZ Monitor Farms.
<i>For sheep and beef farmers to be given an opportunity to obtain a copy of Level 1, Level 2 &amp; Level 3 Land Environmental Plans in the 07/08 year. Goal to achieve 3000 requests from farmers for these during the 07/08 year.</i>	We have continued to see increased uptake of Land Environment Plans by sheep and beef farmers. The toolkit is due to be further improved over the 2011-2012 year. The intention is to modularise the components to allow more flexibility in its implementation.
<i>To work with the Fertiliser Industry to increase the uptake and use of the "Fertiliser Code of Practice".</i>	

## Significant activities not covered under commitments

This year Beef and Lamb NZ commissioned a report on the effects of sheep and beef farming on waterways. This report has identified some of the complexities associated with measuring effects on different land and soil types, with different topography, under different fertiliser and management regimes.

## Looking forward

For 2010-2011 Beef and Lamb NZ will see the continuation of efforts to increase the uptake of LEPS. It will also put in place new initiatives aimed at providing a better knowledge base from which to more accurately target effective measures. To further support the uptake of LEPS there will be a minimum of seven regional workshops designed to give farmers an insight into their use and to discover how a Land Environment Plan can not only improve the environment, but also help more efficient use of resources. In order to also raise awareness of the importance of water quality and to add further to the database of farmer knowledge, water quality monitoring will now also be made mandatory on our B+LNZ Monitor Farms. There will also be two projects aimed at looking at the macro and micro effects of sheep and beef farming on water quality. The first will be an analysis of water quality data that has been collected in predominantly sheep and beef farming areas. On the micro level, B+LNZ will initiate a water life cycle analysis for an average sheep and beef farm.

## NZ Forest Owners Association & NZ Farm Forestry Association

During the period March 2010 to March 2011, the harvest has increased from 21.9 million m<sup>3</sup> to 25.5 million m<sup>3</sup>. This represents a harvest area of over 45,000 ha. This area will almost entirely be replanted in the coming planting season illustrating one of the key sustainability credentials of the NZ plantation forest resource.

The NZ Forest Sector has been actively investigating and jointly developing a National Environmental Standard for Plantation forest operations. Development has been in conjunction with forest managers, government departments, environmental groups and research providers. A key objective of this initiative is to give the sector consistent, outcome based rules that apply throughout NZ, while protecting sensitive/fragile environments.

COMMITMENTS	2010 - 2011 ACHIEVEMENTS
<i>NZ Forest Owners Association members will, within one year (December 2008), ensure that all forestry contractors operating on members' land have a field copy of the relevant Best Environmental Management Practices section of NZFOA Environmental Code of Practice (Part 1, 2007), and be cognoscente of the Compulsory Rules defined therein.</i>	Over a period of three years the NZ Forest Owners Association, with input from its members, developed the "NZFOA Environmental Code of Practice", which replaced the NZ Forestry Code of Practice. The Code is a key environmental management reference tool for forest managers. A field guide containing the best environmental practices (BEPs) has been designed for operational practitioners. In 2008, the NZFOA undertook a survey of members to ascertain the uptake of the Code. The results of this survey were reported in the 2008-2009 annual report
<i>NZ Forest Owners Association members will, within two years (December 2009), ensure that all forestry contractors operating on members' land are in compliance with all the compulsory rules defined in Part 1 of the NZFOA Environmental Code of Practice (2007).</i>	A survey of Forest Owners members was undertaken in the 2009-2010 year. An excellent response from Forest Owner members' to the survey was received with responses covering over 70% of New Zealand's plantation forest estate and nearly 100% of Forest Owner Association members land, or land they manage. Survey results indicate that forest operations for the majority of operations are undertaken in a manner that utilises operational methods that minimise microbial and sediment deposition in waterways. A summary of the survey results are set out in the 2009-2010 annual report.
<i>Forest Owners will support Universities, research consortiums and CRIs to undertake field trials of risks, costs &amp; benefits of incorporating environmental impact mitigation methods and techniques into common agricultural systems.</i>	No progress in this area
<i>Forest Owners will assist MfE to develop, within two years (December 2009), a National Environmental Standard (NES) under the RMA for a defined list of plantation forestry activities relating to protection and maintenance of water quality. The NES will aim to establish Permitted Activities conditions designed to protect water quality</i>	Members of the NZFOA commenced discussions with the Ministry of Environment on the development of an NES in March 2009. A stakeholder group was convened in June 2009. This group included representatives of three forestry companies, the NZ Institute of Forestry, Iwi, Fish & Game, three Regional Councils, MAF & MfE. A draft version of the NES was prepared and distributed for consultation and feedback during the 2010-2011 year.

## Significant activities not covered under commitments

### Herbicide Usage:

Future Forests Research manages a research programme testing herbicides for the control of major weeds of plantation forests. By optimising the amount of active ingredient used, combined with limited use over the 30 year growing cycle, the research is expected to quantify and reduce the amount of active chemical being released into ecosystems. Additionally, there are many herbicides used overseas that are not yet approved for use in New Zealand with lower eco-toxicity than existing options. The opportunity is to continue research testing the available herbicides, but also to bring in knowledge from overseas that may be applied in a New Zealand forestry situation.

### Genetic Engineering:

NZFOA supported Brazil in proposing a motion to the Forest Stewardship Council (FSC) General Assembly that the FSC community becomes better informed on the risks and benefits of Genetic Engineering in plantation forests. GE in the NZ context could result in the development of glyphosate resistant conifers, eliminating the use of triazine & other persistent agrichemicals, which are detectable in some ground water systems. The motion requested the FSC General Assembly to start an open and participatory process through a Working Group. The group to be charged with getting to know, collect and review information about current advances in biotechnology, including genetically modified organisms (GMOs), their potential benefits and risks, biosafety measures, controls and conditions for safe use; as well as for ensuring that the FSC community is kept up to date on advances in technology and the forest sector. Ultimately, the Working Group should develop a science-based position on forest biotechnology for presentation to the wider FSC community.

### Looking forward

The forest industry continues to evaluate and where suitable adopt national spatial databases to make better risk based management decisions, commencing with MfE's new Erosion Susceptibility mapping, NIWA's River Environments Classification and DoC's Fresh Water Environments Classification. Forestry continues to lobby for legislation and regulation that is equitable across all land uses while encouraging good environmental outcomes.

In addition to nutrient and chemical discharges, land use needs to take account of erosion and sedimentation effects on waterways and downstream land impacts. There needs to be ongoing promotion of the benefits modern forest management practices can bring to erosion prone areas. New forest products such as carbon and energy are changing the economics of forestry, allowing sustainable forest practices to be applied to a wider range of environments.

## Fertiliser Manufacturers Research Association

Fert Research continues to work on and invest in further development and upgrading of the OVERSEER® Nutrient Budgets Model. This work is being done in collaboration with MAF and AgResearch. A key achievement this year has been the completion of the development of a major new release of the OVERSEER Model – OVERSEER 6. OVERSEER 6 is an entirely redesigned model that incorporates the latest science and provides much enhanced user interface and maintenance and user support systems. Improvements in the new version include updated nitrogen leaching and nitrification inhibitor sub-models, as well as improved cropping models.

Together with its partners (Fonterra, DairyNZ and MAF), Fert Research maintained its ongoing involvement and investment in research trials to optimise the on-farm use of nitrification inhibitors to reduce nitrate leaching, nitrous oxide emissions and enhance pasture growth.

In collaboration with DairyNZ, Fert Research initiated a study examining nutrient use efficiency for dairy farming in different regions throughout New Zealand. This work has incorporated data collected by fertiliser company field representatives from over 3300 dairy farms and is being used to derive benchmarks for nutrient use efficiency across the country. This will ultimately lead to the identification of practical means to improve the efficiency of nutrient use on farms.

COMMITMENTS	2009-2010 ACHIEVEMENTS
<p><i>Contribute to the on-going development, upgrading and implementation of the Overseer Nutrient Budget Model including:</i></p> <ul style="list-style-type: none"> <li>– <i>Incorporation of a nitrification inhibitor component by Dec 2008.</i></li> <li>– <i>Incorporation of wetlands and riparian margins by December 2008.</i></li> <li>– <i>Review Overseer in light of the recently announced climate change policy.</i></li> <li>– <i>Incorporate priority components into the next version of Overseer for release by December 2008.</i></li> </ul>	<p>The development of a major new version of the OVERSEER Nutrient Budgets model was completed this year (OVERSEER 6). It will be formally released in the first quarter of 2012. This is an entirely redesigned model that incorporates the latest science and an enhanced user interface. Major new features have been added including:</p> <ul style="list-style-type: none"> <li>• A provision for monthly inputs that allows for management systems to be better captured and thus more scope for evaluating the effectiveness of mitigation practices</li> <li>• Integration of cropping and pastoral models so that a wider range of farm systems can be modelled</li> <li>• Introduction of a cut and carry block</li> <li>• Revision of the nitrogen leaching model</li> <li>• Addition of a dairy goat farming model</li> <li>• Revised nitrification inhibitor (DCD) model</li> <li>• Addition of a Life Cycle Assessment (LCA) carbon footprinting capability.</li> </ul>
<p><i>Develop and implement an accreditation scheme for nutrient management advisors by July 2008.</i></p>	<p>A review of current nutrient management practices and protocols was undertaken this year. This has led to the development of a set of recommendations for formalising an accreditation programme for nutrient management advisors. The recommendations which cover a training and accreditation pathway for nutrient management advisors, as well as a mechanism for managing the accreditation process are being considered by the Fert Industry. The goal is to have an accreditation programme in place by the end of 2012.</p>
<p><i>Implement an independent external audit process of internal company procedures for auditing nutrient budgets by December 2007.</i></p> <p><i>Implement a comprehensive audit process for nutrient budgets by July 2008.</i></p>	<p>Fert Research commissioned an independent external audit of the quality of nutrient management plans (NMPs) delivered by member companies through their more than 130 field representatives. It was found that these plans are being delivered to the standard required by the fertiliser industry's Code of Practice for Nutrient Management. The industry is now working closely with DairyNZ to further improve the delivery of NMPs to dairy farmers and to develop a formal accreditation process for nutrient management advisors.</p>
<p><i>Review, update and promote the Code of Practice for Nutrient Management This will include:</i></p> <ul style="list-style-type: none"> <li>– <i>Linking the Code to Overseer by December 2008.</i></li> <li>– <i>Customising the Code template according to member company requirements by July 2008.</i></li> </ul>	<p>Completed</p>

## Significant activities not covered under commitments

Fert Research member companies (Ballance Agri-Nutrients and Ravensdown Fertiliser Co-operative) have nutrient management plans for more than 5,000 dairy farms over the course of the past two years. This means that approximately 46% of all dairy farms in the country are operating under a NMP.

## Looking forward

Fert Research will continue to invest in further developments of the OVERSEER® Nutrient Budgets Model. A major focus for 2011-12 is likely to be the development of a Best Practice Management Toolbox combined with a scenario analysis tool. Together these tools will provide improved ability for farmers to assess the cost-effectiveness of mitigation practices.

Fert Research will continue to work closely with the dairy industry to develop nutrient benchmarks for dairy farms and identify practical means to improve the efficiency of nutrient use on farms.

Fert Research will also be working in partnership with the dairy industry to further develop training, accreditation and auditing programmes in support of the delivery of high quality nutrient management plans to dairy farmers. The development of a formal accreditation programme for nutrient advisers is likely to be a key area of focus.

Fert Research will continue to commission independent external audits of the quality of nutrient management plans delivered by member companies.

Fert Research will continue its involvement in 2011-12 in research trials to optimise the on-farm use of nitrification inhibitors to reduce nitrate leaching, nitrous oxide emissions and enhance pasture growth.



## Irrigation NZ

INZ's focus for 2010/2011 has been two fold –

1. The successful implementation of the water measurement and reporting regulations 2010. This has included development of relevant training for installation and verification, and an industry led 'Blue Tick' accreditation programme. Nationwide there are now over ninety 'Blue Tick' accredited service providers subject to the programmes criteria. The programme has been undertaken in collaboration with government agencies (MAF & MfE), regional councils/unitary authorities and industry to ensure practical and workable outcomes. The accreditation programme is in the process of integrating with regulatory compliance to provide better industry-regulator communication and more efficient compliance pathways.
2. Completing the irrigation 'resource package' to better enable uptake of 'Good Management Practice'. This package provides guidelines, codes of practice and standards, training and resources, and an accreditation system for irrigation design, installation, operation and evaluation. It is on-track for completion by mid 2012

COMMITMENTS	2010-2011 ACHIEVEMENTS
<p><i>INZ – Design Code of Practice</i></p> <ul style="list-style-type: none"> <li>– User guide to the design code aimed at accelerated adoption within the industry, irrigators, regional councils and irrigation suppliers, November 2008.</li> <li>– Launch the Design Code of Practice nationally over the period September to November 2007.</li> <li>– Development of NZQA accredited training for designer certification, mid-2008.</li> <li>– Implement an industry audit process for assessing the Code of Practice, uptake by 2010.</li> <li>– Review the Design Code of Practice by 2010.</li> </ul>	<p>Work has focused on uptake of the Design Code and training qualifications by irrigation service industries. Over 30 designers are working through the NZQA design qualification assessments with another intake scheduled for 2011-2012.</p> <p>A successful accreditation programme ('Blue Tick') has been developed for water measurement in collaboration with regional councils, government and industry. This will be extended to irrigation design once a 'critical mass' of irrigation designers having completed the training.</p> <p>The draft Installation Code of Practice has been released and work is underway to identify and develop the required NZQA linked training.</p>
<p><i>INZ Evaluation Code of Practice.</i></p> <ul style="list-style-type: none"> <li>– Undertake an education programme to encourage evaluation of existing systems to meet KPI's, January to November 2008.</li> <li>– Establish and maintain a register that records number of accredited evaluators and evaluations completed, March 2008.</li> <li>– Review the Evaluation Code of Practice by 2010.</li> </ul>	<p>Work has focused on the on-going education programme, including the 'Making Irrigation Pay' irrigator workshops that touched base with over 300 irrigators.</p> <p>A register of evaluators has been established (available on INZ website) and another evaluation training course was well-attended. Over 20 people have now successfully completed the NZQA evaluation qualification (registered evaluators) and another 30 are in the process of completing the assessments</p>
<p><i>Irrigation Scheme Self Management Systems.</i></p> <ul style="list-style-type: none"> <li>– Complete the study of self management systems for irrigation schemes that reflects requirements of regulators, schemes and members, environmental NGOs, iwi and community.</li> <li>– Publish and promulgate findings over period July to November 2008.</li> <li>– Industry plan in place to release Self Management Systems completed by 2010 (subject to results).</li> </ul>	<p>The Land and Water Forum report has recognised the importance of industry Audited Self Management (ASM) systems for water resource management, as has the Land Use &amp; Water Quality project in Canterbury. A number of irrigation schemes have or are currently in the process of implementing ASM systems, most notably the North Otago Irrigation Company and Morven-Glenavy-Ikawai.</p> <p>However, recently the scope of future ASM programmes has evolved to become all encompassing (quantity and quality). The development of comprehensive ASM systems is now a complex cross-sector challenge. INZ is working within other members of the PSWP to proactively drive a pan-sector plan for the future development of ASM.</p>

### COMMITMENTS

#### *Irrigation Efficiency<sup>2</sup>*

- Develop a methodology to estimate the irrigation demand of a range of soils and enterprises, based on irrigation system performance and real-time climate data, to derive industry BMPs (end 2009).
- Trial the methodology to identify compliance with industry BMPs and outliers in a selected irrigation region, based on measurement of actual irrigation water use.
- Implement facilitation and improvement services to assist poorly performing systems to comply with best practice norms.
- Work with dairy, arable and horticulture to realise the goal of having 80% of all irrigation water use under self management to meet industry good practice guidelines.

### 2010-2011 ACHIEVEMENTS

The Rakaia-Selwyn collaborative management project has highlighted the complexities of developing industry benchmarking systems and the implementation of ASM programmes with individual irrigators. Agreement has been reached with the two user groups in the Rakaia-Selwyn zone to set up a climate station network and 40 benchmark farms have been identified. Data recording and subsequent water benchmarking will begin in the 2011/12 irrigation season and a universal benchmarking tool will be developed alongside this, using the user groups and data hosting service providers to guide its development to ensure successful uptake.

### Significant activities not covered under commitments

Audited self management as a concept has now assumed national significance. The scope of ASM programmes now proposed has changed to be all inclusive (quantity and quality). This has resulted in the ASM timelines contained within this document with regard to roll-out plans being put in place now being not achievable. With the increased focus and scope there are more considerations of which more parties have to be satisfied. The positive side of this is ASM is now viewed as one of the best pathways forward for effective water resource management in New Zealand.

### Looking forward

ASM and the introduction of benchmarking systems for irrigators remains a key focus with INZ. The Rakaia-Selwyn project is providing a valuable insight into the resourcing needs required to move successfully forward with such an approach. Resourcing uptake needs will be the biggest hurdle to overcome. By the end of the 2011-2012 year, INZ is looking forward to having robust benchmarking data, (associated with the pilot study) and an adaptable benchmarking system that can be released nationally for use by all irrigators.

2. This will require support from industries, availability of metering of water use data, and support from industry extension specialists – as specified in the Leadership document.

## Federated Farmers of New Zealand

A major focus for 2010/11 was again the Land and Water Forum: Federated Farmers participated as an active member of the Small Group, supported the presentation and discussion of Forum recommendations during the Regional Roadshow tour, and is committed to an ongoing role supporting the new emphasis on collaborative policy development at the national level.

COMMITMENTS	2010-2011 ACHIEVEMENTS
<i>Identification of priority water bodies/catchments</i>	Federated Farmers members, officers and staff have actively engaged with regional initiatives - in Canterbury, Waikato, Wairarapa, Gisborne and elsewhere - to develop more effective models for collaborative planning and action on the ground partnerships in regions, and especially in priority catchments.
<i>Promoting tools and mitigation practices to members to address priority areas and specific issues</i>	Federated Farmers is involved at multiple levels in supporting understanding and uptake of cost-effective tools and mitigating technologies in priority catchments; and more broadly, promoting sustainable farming systems through regular communication channels and membership forums.
<i>10 in 10 Campaign</i>	Federated Farmers is a member of the Dairy and Environment Leadership Group; and continues to work closely with other primary sector partners to support industry-led initiatives and targets around nutrient efficiency and water efficiency.
<i>Acknowledge other industry or sector, agreed targets and agreements</i>	Federated Farmers continued to be involved in the PSWP catchment programmes by providing the other Partners with the necessary support to ensure that the catchment programmes are a success.
<i>Maintain dialogue with councils to update priority areas and mitigation</i>	Federated Farmers provincial executives and policy staff maintain ongoing dialogue with 14 regional authorities (each of which is at varying stages in prioritising key catchments, and implementing on-the-ground partnership programmes).

### Significant activities not covered under commitments

Federated Farmers was a founding member of the NZ Landcare Trust; and continues an active involvement on the Board of the Trust.

### Looking forward

In the coming year, Federated Farmers will be giving particular priority to the contribution the Partnership can make in respect of "leadership" and "capability building, research and extension" in two key areas:

- Rural water infrastructure
- Integrated catchment management

In respect of the first, Federated Farmers warmly welcomed recent Government announcements for expanded investments in rural water infrastructure. Along the length of the East Coast, water storage has the ability to help secure production from the land and enable investment in water efficient reticulation and application systems, while also delivering benefits for communities and the environment. The challenge is to support the development of irrigated land uses which deliver on tight water and nutrient management, and the PSWP is well-positioned to take a lead in this area.

In respect of the second point, the Land and Water Forum report clearly identifies the "catchment" as the focus for science, management and extension effort. Equally, the National Policy Statement for Fresh Water strongly signals the importance of engaging local people in the process of developing catchment limits, targets and action plans. While it is reassuring that these positions are absolutely consistent with Primary Sector Water Partnership principles, it is also clear that the demands on local people to step up to leadership roles in their catchment communities can be expected to increase. Federated Farmers has been actively involved with new community catchment models in Canterbury and other regions; and a priority in the coming year will be exploring ways to more effectively support the growing network of catchment farmer leaders in collaboration with other members of the Partnership.

# Primary Sector Water Partnership

## Annual Report 2010-2011

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**BEFORE THE ENVIRONMENT COURT**

*In the matter of* appeals under clause 14 of the First Schedule to the Resource Management Act 1991 concerning proposed One Plan for the Manawatu-Wanganui region.

*between* **HORTICULTURE NEW ZEALAND**  
**ENV-2010-WLG-000155**  
*Appellant*

*and* **MANAWATU-WANGANUI REGIONAL COUNCIL**  
*Respondent*

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**MEMORANDUM REGARDING AGREEMENT ON  
ADDITIONAL SCHEDULE AB VALUE - DOMESTIC FOOD SUPPLY**

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Dated: February 2012



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## MEMORANDUM OF AGREEMENT

1. In its appeal, Horticulture New Zealand sought relief to specific policy provisions in the Proposed One Plan or, alternatively, amendment to Schedule AB that would satisfy the appeal points.
2. The parties to this memorandum agree that the concerns raised can be addressed by including a new surface water management Value of Domestic Food Supply (DFS) in Schedule AB which results in the consequential amendments listed below and documented in Appendix A:
  - (a) Add DFS to Amend Table 6.2
  - (b) Add DFS to SCHEDULE AB INDEX
  - (c) Add an extra column in Table AB.1 with "ticks" where the DFS Value applies
  - (d) Add new Figure AB:12 Visual Guide to the Distribution of the Domestic Food Supply (DFS) Value
  - (e) Add new Table AB.12: Domestic Food Supply (DFS) Value in the Region
  - (f) Add DFS to Part AB.3
3. For the sake of clarity, these amendments will resolve appeal points 18, 19, 20, 21, 22, 29, 50, 51, 60, 75 and 77
4. There is no issue as to costs.



On behalf of Manawatu-Wanganui Regional Council



17/2/2012.

On behalf of Horticulture New Zealand



# APPENDIX A



**Table 6.2** Surface *Water*<sup>^</sup> Management Values and Management Objectives

Value Group	Individual Values		Management Objective
Ecosystem Values	NS	Natural State	The <i>river</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> are maintained in their natural state
	LSC	Life-supporting Capacity	The <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> support healthy aquatic life / ecosystems
	SOS-A	Sites of Significance - Aquatic	Sites of significance for indigenous aquatic biodiversity are maintained or enhanced
	SOS-R	Sites of Significance - Riparian	Sites of significance for indigenous riparian biodiversity are maintained or enhanced
	IS	Inanga Spawning	The <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> sustain healthy inanga spawning and egg development
	WM	<i>Whitebait</i> <sup>*</sup> Migration	The <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> are maintained or enhanced to provide safe passage of inwardly migrating juvenile native fish known collectively as <i>whitebait</i> <sup>*</sup>
Recreational and Cultural Values	CR	Contact Recreation	The <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> are suitable for contact recreation
	MAU	<i>Mauri</i> <sup>*</sup>	The <i>mauri</i> <sup>*</sup> of the <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> is maintained or enhanced
	SOS-C	Sites of Significance - Cultural	Sites of significance for cultural values are maintained
	TF	Trout Fishery	The <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> sustain healthy rainbow or brown trout fisheries
	TS	Trout Spawning	The <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> meet the requirements of rainbow and brown trout spawning and larval and fry development
	AE	Aesthetics	The aesthetic values of the <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> are maintained or enhanced
Water <sup>^</sup> Use	WS	<i>Water</i> <sup>^</sup> Supply	The <i>water</i> <sup>^</sup> is suitable, after treatment, as a drinking <i>water</i> <sup>^</sup> source for human consumption
	IA	Industrial Abstraction	The <i>water</i> <sup>^</sup> is suitable as a <i>water</i> <sup>^</sup> source for industrial abstraction or use, including for hydroelectricity generation
	I	Irrigation	The <i>water</i> <sup>^</sup> is suitable as a <i>water</i> <sup>^</sup> source for irrigation
	SW	Stockwater	The <i>water</i> <sup>^</sup> is suitable as a supply of drinking <i>water</i> <sup>^</sup> for livestock
	<u>DFS</u>	<u>Domestic Food Supply</u>	<u>The <i>water</i><sup>^</sup> is suitable for domestic food production</u>
Social/Economic Values	CAP	Capacity to Assimilate Pollution	The capacity of a <i>water body</i> <sup>^</sup> and its <i>bed</i> <sup>^</sup> to assimilate pollution is not exceeded
	FC/D	Flood Control and Drainage	The integrity of existing flood and <i>river</i> <sup>^</sup> bank erosion protection <i>structures</i> <sup>^</sup> and existing drainage <i>structures</i> <sup>^</sup> is not compromised
	EI	Existing <i>Infrastructure</i> <sup>^</sup>	The integrity of existing <i>infrastructure</i> <sup>^</sup> is not compromised

## Schedule AB: Surface Water<sup>^</sup> Management Values

Schedule AB is a component of Part II - the Regional Plan.

This Schedule uses the terminology "Surface Water<sup>^</sup> Management Values". In some cases, these Values also apply to the *beds*<sup>^</sup> of the relevant *water body*<sup>^</sup>. This is clarified in Part AB.3 and the respective policies and rules of Part II.

### SCHEDULE AB INDEX:

Section	Page Numbers
<b>Part AB.1: Surface Water<sup>^</sup> Management Values listed by Sub-zone*</b>	AB-3 - AB-14
<b>Part AB.2: Where Specific Surface Water<sup>^</sup> Management Values Apply</b>	
Zone-wide values (except for LSC)	Not mapped
Life-supporting Capacity (LSC) Value	AB-15
Natural State (NS) Value	AB-17 - AB-19
Sites of Significance - Aquatic (SOS-A) Value	AB-21 - AB-31
Sites of Significance - Riparian (SOS-R) Value	AB-33 - AB-37
Inanga Spawning (IS) Value	AB-39 - AB-42
Whitebait* Migration (WM) Value	AB-43 - AB-46
Sites of Significance - Cultural (SOS-C) Value	AB-47 - AB-49
Trout Fishery (TF) Value	AB-51 - AB-59
Trout Spawning (TS) Value	AB-61 - AB-71
Water <sup>^</sup> Supply (WS) Value	AB-73 - AB-80
Flood Control and Drainage (FC/D) Value	AB-81 - AB-106
Domestic Food Supply (DFS) Value	AB-??? - AB-???
<b>Part AB.3: Surface Water<sup>^</sup> Management Values Key (fold-out)</b>	AB-107???





### Part AB.1: Surface Water<sup>4</sup> Management Values listed by Sub-zone\*

**ADVICE NOTE:** To help with interpretation of these tables please turn to Part AB.3 (the back of Schedule AB) and fold out the VALUES KEY and view together with the tables and figures in this schedule.

**Legend:**

Table Headings: LSC: Life-supporting Capacity; AE: Aesthetics; CR: Contact Recreation; Mau: Mauri; IA: Industrial Abstraction; I: Irrigation; SW: Stockwater; EI: Existing Infrastructure<sup>1</sup>; CAP: Capacity to Assimilate Pollution; NS: Natural State; SOS-A: Sites of Significance - Aquatic; SOS-R: Sites of Significance - Riparian; IS: Inanga Spawning; DFS: Domestic Food Supply; WM: Whitebait<sup>1</sup> migration; SOS-C: Sites of Significance - Cultural; TF: Trout Fishery; TS: Trout Spawning; WS: Water Supply; FCD: Flood Control and Drainage.

Key for LSC Classes: UHS: Upland Hard Sedimentary, UVA: Upland Volcanic Acidic, UVM: Upland Volcanic Mixed, ULI: Upland Limestone, HM: Hill Mixed, HSS: Hill Soft Sedimentary, LM: Lowland Mixed, LS: Lowland Sand. The LSC Classes are listed as the geology of the catchment influences water quality and life-supporting capacity

Key for Fishery Classes: I: Outstanding, II: Regionally Significant, III: Other Trout Fishery

**Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone\***

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	I <sup>2</sup>	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
Upper Manawatu (Mana_1)	Upper Manawatu (Mana_1a)	Manawatu River from Weber Road at approx. NZMS 260 U23:751-027 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II	✓			✓	
	Mangatawainui (Mana_1b)	Mangatawainui River from Manawatu River confluence at approx. NZMS 260 U23:829-086 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II	✓			✓	
	Mangatoro (Mana_1c)	Mangatoro Stream from Manawatu River confluence at approx. NZMS 260 U23:810-027 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II	✓			✓	
Weber-Tamaki (Mana_2)	Weber-Tamaki (Mana_2a)	Manawatu River from Tamaki River confluence at approx. NZMS 260 U23:709-003 to Weber Road at approx. NZMS 260 U23:751-027	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II		✓			✓
	Mangatera (Mana_2b)	Mangatera Stream from Manawatu River confluence at approx. NZMS 260 U23:737-025 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓

<sup>1</sup> Includes all inflowing tributaries and surrounding catchment area unless otherwise specified.  
<sup>2</sup> All natural water bodies\* except those classified as NS and those identified as zero allocation in Schedule B.  
<sup>3</sup> All natural water bodies\* and their beds\* except those classified as NS.

Table AB-1: Surface Water Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values										
			LSC	AE	CR	Mau	IA <sup>2</sup>	P	SW	EI	CAP <sup>3</sup>	NS	SOSA	SOS-R	IS	WM	SOS-C	TF	TS	WS	F/C/D	DFS	
Upper Tamaki (Mana_3)	Upper Tamaki (Mana_3)	Tamaki River from water supply weir at approx. NZMS 260 U23:709-111 to source	UHS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Upper Kumeti (Mana_4)	Kumeti Stream from Te Rehunga flow recorder at approx. NZMS 260 T23:663-052 to source	UHS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Tamaki-Hopelands (Mana_5)	Tamaki-Hopelands (Mana_5a)	Manawatu River from Hopelands at approx. NZMS 260 T24:616-899 to Tamaki River confluence at approx. NZMS 260 U23:709-003	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II	✓	✓	✓	✓	✓	✓	
	Lower Tamaki (Mana_5b)	Tamaki River from Manawatu River confluence at approx. NZMS 260 U23:709-111	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Lower Kumeti (Mana_5c)	Kumeti Stream from Manawatu River confluence at approx. NZMS 260 U23:701-006 to Te Rehunga flow recorder at approx. NZMS 260 T23:663-052	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Oruakeretaki (Mana_5d)	Oruakeretaki Stream from Manawatu River confluence at approx. NZMS 260 T23:690-000 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Raparapawai (Mana_5e)	Raparapawai Stream from Manawatu River confluence at approx. NZMS 260 T24:643-932 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hopelands-Tiraumea (Mana_6)	Hopelands-Tiraumea (Mana_6)	Manawatu River from Tiraumea River confluence at approx. NZMS 260 T24:553-870 to Hopelands at approx. NZMS 260 T24:616-899	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II	✓	✓	✓	✓	✓	✓	✓
	Upper Tiraumea (Mana_7a)	Tiraumea River from Makuri River confluence at approx. NZMS 260 T24:578-780 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓	✓	✓	✓	✓	✓
Tiraumea (Mana_7)	Lower Tiraumea (Mana_7b)	Tiraumea River from Manawatu River confluence at approx. NZMS 260 T24:555-870 to Makuri River confluence at approx. NZMS 260 T24:578-780	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓	✓	✓	✓	✓	✓
	Mangaone River (Mana_7c)	Mangaone River from Tiraumea River confluence at approx. NZMS 260 T24:541-730 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table AB.1: Surface Water Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values										
			LSC	AE	CR	Mau	IA <sup>2</sup>	I <sup>2</sup>	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS	
Mangatainoka (Mana_8)	Makuri (Mana_7d)	Makuri River from Tiraumea River confluence at approx. NZMS 260 T24:568-771 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Mangaramama (Mana_7e)	Mangaramama Creek from Tiraumea River confluence at approx. NZMS 260 T24:559-854 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Upper Mangatainoka (Mana_8a)	Mangatainoka River from Larsons Road at approx. NZMS 260 T25:308-595 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Middle Mangatainoka (Mana_8b)	Mangatainoka River from Makahi River confluence at approx. NZMS 260 T24:475-775 to Larsons Road at approx. NZMS 260 T25:308-595	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Lower Mangatainoka (Mana_8c)	Mangatainoka River from Tiraumea River confluence at approx. NZMS 260 T24:577-854 to Makahi River confluence at approx. NZMS 260 T24:475-775	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Makahi (Mana_8d)	Makahi River from Mangatainoka River confluence at approx. NZMS 260 T24:475-775 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Upper Gorge (Mana_9a)	Manawatu River from Upper Gorge at approx. NZMS 260 T24:494-933 to Tiraumea River confluence at approx. NZMS 260 T24:553-870	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Mangapapa (Mana_9b)	Mangapapa Stream from Mangaatua Stream confluence at approx. NZMS 260 T24:515-922 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Mangaatua (Mana_9c)	Mangaatua Stream from Manawatu River confluence at approx. NZMS 260 T24:496-925 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Upper Mangahao (Mana_9d)	Mangahao River from Ballance at approx. NZMS 260 T24:468-818 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Lower Mangahao (Mana_9e)	Mangahao River from Manawatu River confluence at approx. NZMS 260 T24:496-891 to Ballance at approx. NZMS 260 T24:468-818	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	



Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone<sup>5</sup>

Water Management Zone <sup>6</sup>	Sub-zone <sup>7</sup>	Sub-zone <sup>8</sup> Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values										
			LSC	AE	CR	Mau	IA <sup>2</sup>	P <sup>2</sup>	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DPS	
Middle Manawatu (Mana_10)	Middle Manawatu (Mana_10a)	Manawatu River from Teachers College at approx. NZMS 260 T24:331-892 to Upper Gorge at approx. NZMS 260 T24:494-933	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III				✓		
	Upper Pohangina (Mana_10b)	Pohangina River from Totara Reserve at approx. NZMS 260 T23:534-167 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓				✓	
	Middle Pohangina (Mana_10c)	Pohangina River from Mais Reach at approx. NZMS 260 T23:467-053 to Totara Reserve at approx. NZMS 260 T23:534-167	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓				✓	
	Lower Pohangina (Mana_10d)	Pohangina River from Manawatu River confluence at approx. NZMS 260 T24:450-966 to Mais Reach at approx. NZMS 260 T23:467-053	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓				✓	
Lower Manawatu (Mana_11)	Aokautere (Mana_10e)	Aokautere Stream from Manawatu River confluence at approx. NZMS 260 T24:349-899 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
	Lower Manawatu (Mana_11a)	Manawatu River from Oroua River confluence at approx. NZMS 260 S24:167-826 to Teachers College at approx. NZMS 260 T24:331-892	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓				✓	
	Turitea (Mana_11b)	Turitea Stream from Manawatu River confluence at approx. NZMS 260 T24:304-881 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓				
	Kahuterawa (Mana_11c)	Kahuterawa Stream from Manawatu River confluence at approx. NZMS 260 S24:292-876 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓				
	Upper Mangaone Stream (Mana_11d)	Mangaone Stream from Milson Line at approx. NZMS 260 T24:311-953 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	
	Lower Mangaone Stream (Mana_11e)	Mangaone Stream from Manawatu River confluence at approx. NZMS 260 S24:283-872 to Milson Line at approx. NZMS 260 T24:311-953	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	
	Main Drain (Mana_11f)	Main Drain catchment (including Taonui Stream) from Manawatu River confluence at approx. NZMS 260 S24:181-836 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	
	Oroua (Mana_12)	Upper Oroua (Mana_12a)	Oroua River from Almaddale at approx. NZMS 260 T23:365-113 to source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓	✓			✓
				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓

Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values								Site/Reach-specific Values											
			LSC	AE	CR	Mau	IA <sup>2</sup>	I <sup>2</sup>	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
Coastal Manawatu (Mana_13)	Middle Oroua (Mana_12b)	Oroua River from Awahuri Bridge at approx. NZMS 260 S23:243-002 to Almadale at approx. NZMS 260 T23:365-113	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓	✓	✓
	Lower Oroua (Mana_12c)	Oroua River from Manawatu River confluence at approx. NZMS 260 S24:167-826 to Awahuri Bridge at approx. NZMS 260 S23:243-002	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓		✓	✓	✓
	Kiwiitea (Mana_12d)	Kiwiitea Stream from Oroua River confluence at approx. NZMS 260 T23:309-066 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
	Makino (Mana_12e)	Makino Stream from Oroua River confluence at approx. NZMS 260 S23:243-004 to source	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓	✓	✓
Coastal Manawatu (Mana_13)		Manawatu River at approx. NZMS 260 S24: 977-788 to Oroua River confluence at approx. NZMS 260 S24:167-826 (excluding the mainstream of the Manawatu River from the cross-river CMA boundary at NZMS 260 S24:2700963-607688 seawards)	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓	✓	✓	✓
	Upper Tokomaru (Mana_13b)	Tokomaru River from Horseshoe Bend at approx. NZMS 260 S24:241-768 to source	UHS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓	✓	✓
	Lower Tokomaru (Mana_13c)	Tokomaru River from Manawatu River confluence at approx. NZMS 260 S24:134-727 to Horseshoe Bend at approx. NZMS 260 S24:241-768	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓	✓	✓
	Mangaore (Mana_13d)	Mangaore River from Manawatu River confluence at approx. NZMS 260 S24:123-717 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
	Koputaroa (Mana_13e)	Koputaroa Stream from Manawatu River confluence at approx. NZMS 260 S24:106-708 to source	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
Upper Rangitikei (Rang_1)	Foxton Loop (Mana_13f)	Manawatu River from downstream limit of Whirikino Cut at approx. NZMS 260 S24:010-789 to SH1	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	Upper Rangitikei (Rang_1)	Rangitikei River from Makahikatoa Stream at approx. NZMS 260 U21:726-888 to source	UHS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	I		✓	✓	✓	✓

Table AB.1: Surface Water Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/ Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	P	SW	EI	CAP <sup>3</sup>	NS	SOSA	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
Middle Rangitikei (Rang_2)	Middle Rangitikei (Rang_2a)	Rangitikei River from Pukeokahu at approx. NZMS 260 U21:713-708 to Makahikatoa Stream at approx. NZMS 260 U21:726-888	UHS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Pukeokahu – Mangaweka (Rang_2b)	Rangitikei River from Mangaweka at approx. NZMS 260 T22:504-513 to Pukeokahu at approx. NZMS 260 U21:713-708	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Upper Moawhango (Rang_2c)	Moawhango River from Moawhango Dam at approx. NZMS 260 T20:469-960 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Middle Moawhango (Rang_2d)	Moawhango River from Moawhango Township at approx. NZMS 260 T21:557-745 to Moawhango Dam at approx. NZMS 260 T20:469-960	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lower Rangitikei (Rang_3)	Lower Moawhango (Rang_2e)	Moawhango River from Rangitikei River confluence at approx. NZMS 260 T21:609-623 to Moawhango Township at approx. NZMS 260 T21:557-745	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Upper Hautapu (Rang_2f)	Hautapu River from Taihape at approx. NZMS 260 T21:506-670 to source	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Lower Hautapu (Rang_2g)	Hautapu River from Rangitikei River confluence at approx. NZMS 260 T22:529-574 to Taihape at approx. NZMS 260 T21:506-670	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Lower Rangitikei (Rang_3a)	Rangitikei River from Onepuhi at approx. NZMS 260 S23:201-222 to Mangaweka at approx. NZMS 260 T22:504-513	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coastal Rangitikei (Rang_4)	Makohine (Rang_3b)	Makohine Stream from Rangitikei River confluence at approx. NZMS 260 T22:400-443 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Coastal Rangitikei (Rang_4a)	Rangitikei River from McKelvie's at approx. NZMS 260 S24:033-985 to Onepuhi at approx. NZMS 260 S23:201-222	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	I <sup>2</sup>	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
	Tidal Rangitikei (Rang_4b)	Rangitikei River at approx. NZMS 260 S24:991-984 to McKelvie's at approx. NZMS 260 S24:033-985 (excluding the mainstem of the Rangitikei River from the cross-river CWA boundary at NZMS 260 S23:2700960-6100119 seawards)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓		
	Porewa (Rang_4c)	Porewa Stream from Rangitikei River confluence at approx. NZMS 260 S23:190-212 to source		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
	Tutaenui (Rang_4d)	Tutaenui Stream from Rangitikei River confluence at approx. NZMS 260 S23:101-095 to source		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
	Upper Whanganui (Whai_1)	Whanganui River from Whakapapa River confluence at approx. NZMS 260 S19:189-499 to source		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓	✓	
Cherry Grove (Whai_2)	Cherry Grove (Whai_2a)	Whanganui River from Cherry Grove at approx. NZMS 260 S18:057-545 to Whakapapa River confluence at approx. NZMS 260 S19:189-499		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓	✓	✓
	Upper Whakapapa (Whai_2b)	Whakapapa River from Footbridge at approx. NZMS 260 S19:226-293 to source		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II/III		✓	✓	✓	✓
	Lower Whakapapa (Whai_2c)	Whakapapa River from Whanganui River confluence at approx. NZMS 260 S19:189-499 to Footbridge at approx. NZMS 260 S19:226-293		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II/III		✓	✓	✓	✓
	Pioptea (Whai_2d)	Pioptea Stream from Whakapapa River confluence at approx. NZMS 260 S19:174-356 to source		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓	✓	✓
	Pungapunga (Whai_2e)	Pungapunga River from Whanganui River confluence at approx. NZMS 260 S18:124-546 to source		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III		✓	✓	✓	✓
	Upper Ongarue (Whai_2f)	Ongarue River from Waihuka Stream confluence at approx. NZMS 260 S18:108-785 to source		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	II/III		✓	✓	✓	✓



Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	I <sup>2</sup>	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
Te Maire (Whati_3)	Lower Ongarue (Whati_2g)	Ongarue River from Whanganui River confluence at approx. NZMS 260 S18:056-547 to Waihuka Stream confluence at approx. NZMS 260 S18:108-785	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓				
	Te Maire (Whati_3)	Whanganui River from Te Maire at approx. NZMS 260 S19:998-490 to Cherry Grove at approx. NZMS 260 S18:057-545	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III				✓	
Middle Whanganui (Whati_4)	Middle Whanganui (Whati_4a)	Whanganui River from Retaruke River confluence at approx. NZMS 260 R19:886-306 to Te Maire at approx. NZMS 260 S19:998-490	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III					
	Upper Ohura (Whati_4b)	Ohura River from Tokorima at approx. NZMS 260 R18:863-521 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		
	Lower Ohura (Whati_4c)	Ohura River from Whanganui River confluence at approx. NZMS 260 R19:887-386 to Tokorima at approx. NZMS 260 R18:863-521	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	Retaruke (Whati_4d)	Retaruke River from Whanganui River confluence at approx. NZMS 260 R19:890-309 to source	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓				
Pipiriki (Whati_5)	Pipiriki (Whati_5a)	Whanganui River from Pipiriki at approx. NZMS 260 R21:859-897 to Retaruke River confluence at approx. NZMS 260 R19:886-306	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III					
	Tangarakau (Whati_5b)	Tangarakau River from Whanganui River confluence at approx. NZMS 260 R20:714-175 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	Whangamomona (Whati_5c)	Whangamomona River from Whanganui River confluence at approx. NZMS 260 R20:731-130 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	Upper Manganui o te Ao (Whati_5d)	Manganui o te Ao River from Makatote River confluence at approx. NZMS 260 S20:129-120 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	I					
	Makatote (Whati_5e)	Makatote River from Manganui o te Ao River confluence at approx. NZMS 260 S20:129-120 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	I	✓				
Waimarino (Whati_5f)	Waimarino Stream from Makatote River confluence at approx. NZMS 260 S20:129-120 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	I						

Table AB.1: Surface Water Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	I <sup>2</sup>	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
	Middle Manganui o te Ao (Whai_5g)	Manganui o te Ao River from Hoihenga Road at approx. NZMS 260 S20:047-077 to Makatote River confluence at approx. NZMS 260 S20:129-120	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Mangaturuturu (Whai_5h)	Mangaturuturu River from Manganui o te Ao River confluence at approx. NZMS 260 S20:057-067 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Lower Manganui o te Ao (Whai_5i)	Manganui o te Ao River from Whanganui River confluence at approx. NZMS 260 R20:861-879 to Hoihenga Road at approx. NZMS 260 S20:047-077	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Orautoha (Whai_5j)	Orautoha Stream from Manganui o te Ao River confluence at approx. NZMS 260 S20:026-067 to source	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Paetawa (Whai_6)	Whanganui River from Paetawa at approx. NZMS 260 S22:937-566 to Pipiriki at approx. NZMS 260 R21:859-897	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Lower Whanganui (Whai_7)	Lower Whanganui (Whai_7a)	Whanganui River from Aramoho Bridge at approx. NZMS 260 R22:858-420 to Paetawa at approx. NZMS 260 S22:937-566	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Coastal Whanganui (Whai_7b)	NZMS 260 R22:797-328 to Aramoho Bridge at approx. NZMS 260 R22:858-420 (excluding the mainstem of the Whanganui River from the cross-river CMA boundary at NZMS 260 R22:2684857-6138015 seawards)	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Upokongaro (Whai_7c)	Upokongaro River from Whanganui River confluence at approx. NZMS 260 S22:908-463 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Matarawa (Whai_7d)	Matarawa River from Whanganui River confluence at approx. NZMS 260 R22:857-403 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Upper Whangaehu (Whai_1)	Upper Whangaehu (Whai_1a)	Whangaehu River from Karoi at approx. NZMS 260 S21:218-884 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone<sup>6</sup>

Water Management Zone <sup>5</sup>	Sub-zone <sup>6</sup>	Sub-zone <sup>6</sup> Description <sup>1</sup>	Zone-wide Values										Site/ Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	P	SW	EI	CAP <sup>3</sup>	NS	SOSA	SOS-R	IS	WM	SOS-C	TF	TS	WS	FC/D	DFS
	Waitangi (Whau_1b)	Waitangi Stream from Whangaehu River confluence at approx. NZMS 260 T21:316-888 to source	UVM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Tokiahuru (Whau_1c)	Tokiahuru Stream from Whangaehu River confluence at approx. NZMS 260 S21:219-865 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Middle Whangaehu (Whau_2)	Middle Whangaehu (Whau_2)	Whangaehu River from Aranui at approx. NZMS 260 S21:175-627 to Karoi at approx. NZMS 260 S21:218-864	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Lower Whangaehu (Whau_3a)	Whangaehu River from Kauangaroa at approx. NZMS 260 S22:045-397 to Aranui NZMS 260 S21:175-627 (including the Mangawhero River from Whangaehu River confluence to Raupiu Road at approx. NZMS 260 S21:099-646)	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lower Whangaehu (Whau_3)	Upper Makotuku (Whau_3b)	Makotuku River from water supply weir at approx. NZMS 260 S20:103-011 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Lower Makotuku (Whau_3c)	Makotuku River from Mangawhero River confluence at approx. NZMS 260 S20:080-903 to water supply weir at approx. NZMS 260 S20:103-011	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Upper Mangawhero (Whau_3d)	Mangawhero River from Makotuku River confluence at approx. NZMS 260 S20:080-903 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Lower Mangawhero (Whau_3e)	Mangawhero River from Raupiu Road at approx. NZMS 260 S21:099-646 to Makotuku River confluence at approx. NZMS 260 S20:080-903	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Makara (Whau_3f)	Makara Stream from unnamed tributary confluence at approx. NZMS 260 S20:065-992 to source	UVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coastal Whangaehu (Whau_4)	Coastal Whangaehu (Whau_4)	Whangaehu River at approx. NZMS 260 R23:990-275 to Kauangaroa at approx. NZMS 260 S22:045-397 (excluding the mainstem of the Whangaehu River from the cross-river CMA boundary at NZMS 260 S23:2690359-6128748 seawards)	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	I <sup>2</sup>	SW	EI	CAPs	NS	SOSA	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
Turakina (Tura_1)	Upper Turakina (Tura_1a)	Turakina River from Otairi at approx. NZMS 260 S22:236-471 to source Turakina River at approx.		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Lower Turakina (Tura_1b)	NZMS 260 S23:924-231 to Otairi at approx. NZMS 260 S22:236-471 (excluding the mainstem of the Turakina River from the cross-river CMA boundary at NZMS 260 S23:2692145-6125465 seawards)	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Ratana (Tura_1c)	Lakes Waipu and Oraekomiko and all surrounding catchment area	LM	✓	✓	✓	✓	✓	✓	✓	✓											
Ohau (Ohau_1)	Upper Ohau (Ohau_1a)	Ohau River from Rongomatane at approx. NZMS 260 S25:072-577 to source	UHS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓	✓	✓	✓	✓
	Lower Ohau (Ohau_1b)	Ohau River at approx. NZMS 260 S25:918-578 to Rongomatane at approx. NZMS 260 S25:072-577 (excluding the mainstem of the Ohau River from the cross-river CMA boundary at NZMS 260 S25:2692921-6059503 seawards)	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓	✓	✓	✓	✓
Owahanga (Owha_1)	Owahanga River at approx. NZMS 260 U25:932-532 to source (excluding the mainstem of the Owahanga River from the cross-river CMA boundary at NZMS 260 U25:2792204-6053185 seawards)	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
East Coast (East_1)	Wainui, Tautane and Waimata - whole catchments (excluding the mainstem of the Wainui River from the cross-river CMA boundary at NZMS 260 V24:2811596-6073518 seawards)	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
Akitio (Akit_1)	Upper Akitio (Akit_1a)	Akitio River from Weber Road at approx. NZMS 260 U24:919-632 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓
	Lower Akitio (Akit_1b)	Akitio River at approx. NZMS 260 U25:992-610 to Weber Road at approx. NZMS 260 U24:919-832 (excluding the mainstem of the Akitio River from the cross-river CMA boundary at NZMS 260 U25:2799657-6061852 seawards)	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓



Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone\*

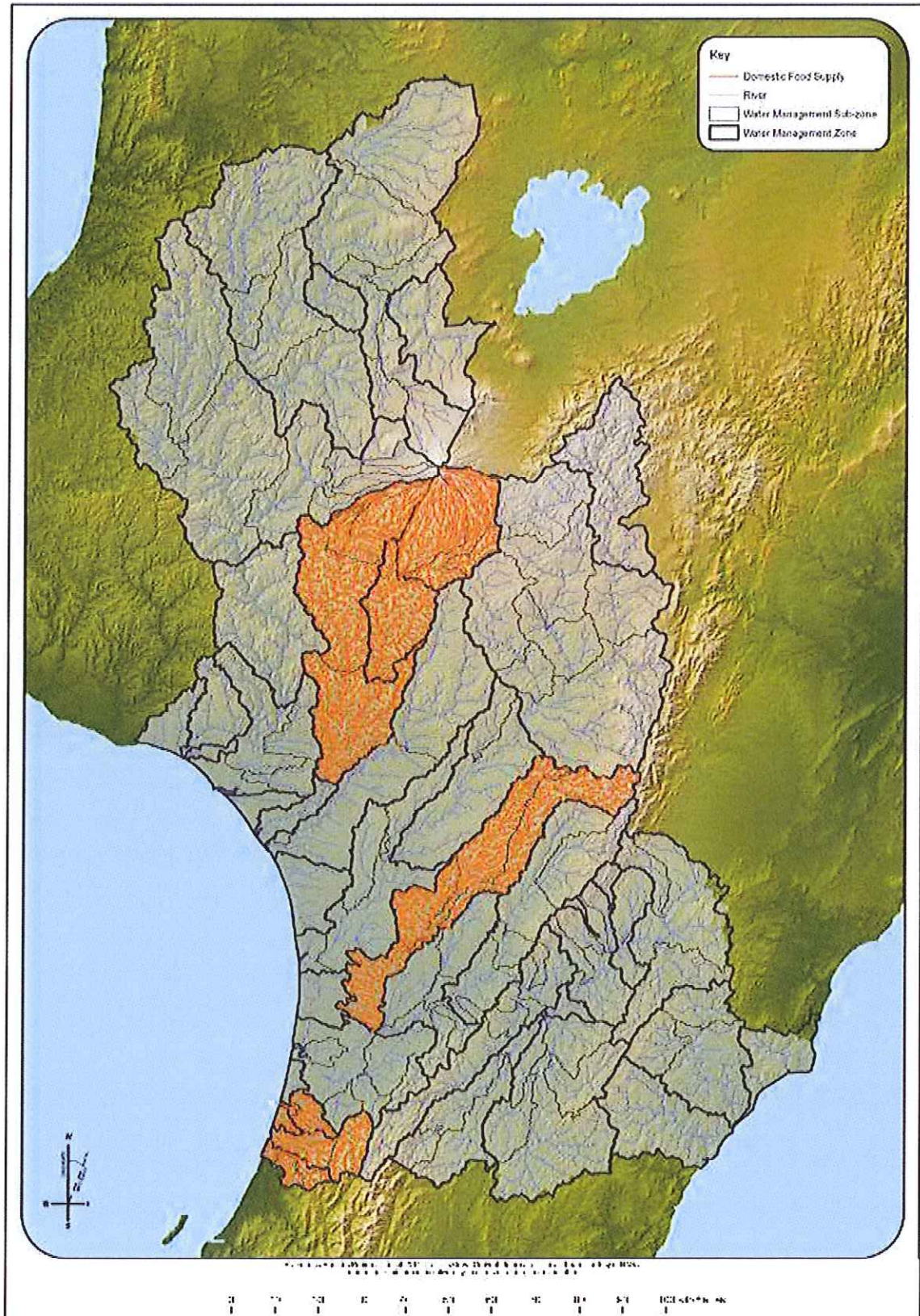
Water Management Zone <sup>6</sup>	Sub-zone <sup>5</sup>	Sub-zone <sup>5</sup> Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	P	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
	Waihi (Akit_1c)	Waihi Stream from Akitio River confluence at approx. NZMS 260 U24:895-901 to source	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Northern Coastal (West_1)	Northern Coastal (West_1)	All coastal catchments and dune lakes between Kai Iwi and Waitotara catchments	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Kai Iwi (West_2)	Kai Iwi (West_2)	Kai Iwi Stream at approx. NZMS 260 R23:723-449 to source (excluding the mainstem of the Kai Iwi Stream from the cross-river CMA boundary at NZMS 260 R22:2672262-6145059 seawards)	HSS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mowhanau (West_3)	Mowhanau (West_3)	Mowhanau Stream at approx. NZMS 260 R22:725-447 to source (excluding the mainstem of the Mowhanau Stream from the cross-river CMA boundary at NZMS 260 R22:2672640-6144895 seawards)	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Kaitoke Lakes (West_4)	Kaitoke Lakes (West_4)	Lakes Kaitoke, Pauri, Wiriota, Kohata and all surrounding catchment area	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	III	✓	✓	✓	✓	✓	✓
Southern Whanganui Lakes (West_5)	Southern Whanganui Lakes (West_5)	Lakes Vipan, Heaton, Bernard, William, Herbert, Hickson, Alice, Kotiata, Dredding and all surrounding catchment area	LS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Northern Manawatu Lakes (West_6)	Northern Manawatu Lakes (West_6)	All lakes and lagoons between Coastal Rangitikei and Coastal Manawatu and all surrounding catchment area	LS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Waitarere (West_7)	Waitarere (West_7)	All lakes and lagoons between Coastal Manawatu and Lake Horowhenua catchment and all surrounding catchment area	LS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lake Papatonga (West_8)	Lake Papatonga (West_8)	Lake Papatonga catchment	LS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table AB.1: Surface Water<sup>4</sup> Management Values by Sub-zone\*

Water Management Zone*	Sub-zone*	Sub-zone* Description <sup>1</sup>	Zone-wide Values										Site/Reach-specific Values									
			LSC	AE	CR	Mau	IA <sup>2</sup>	I <sup>2</sup>	SW	EI	CAP <sup>3</sup>	NS	SOS-A	SOS-R	IS	WM	SOS-C	TF	TS	WS	FCD	DFS
Waikawa (West_9)	Waikawa (West_9a)	Waikawa Stream at approx. NZMS 260 S25:908-548 to source (excluding the mainstem of the Waikawa Stream from the cross-river CMA boundary at NZMS 260 S25:2691531-6055429 seawards)	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Manakau (West_9b)	Manakau Stream from Waikawa Stream confluence at approx. NZMS 260 S25:946-549 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lake Horowhenua (Hoki_1)	Lake Horowhenua (Hoki_1a)	Whole lake catchment above Hoki Stream outlet	LM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Hoki (Hoki_1b)	Hoki Stream downstream of Lake Horowhenua outlet (excluding the mainstem of the Hoki Stream from the cross-river CMA boundary at NZMS 260 S25:2634967-6065799 seawards)	LS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

[Formerly POP Table D.2 at D-3 to D-10]

**Domestic Food Supply (DFS) Value**



**Figure AB: 12 Visual Guide to the Distribution of the Domestic Food Supply (DFS) Value**





**Table AB.12: Domestic Food Supply (DFS) Value in the Region**

<b>Water Management Zone*</b>	<b>Sub-zone*</b>	<b>River*</b>	<b>Description</b>	<b>Domestic Food Supply Value</b>
<u>Oroua (Mana 12)</u>	<u>Upper, Middle and Lower Oroua and Kiwitea and Makino (Mana 12a, Mana 12b, Mana 12c, Mana 12d and Mana 12e)</u>	<u>Oroua River and tributaries</u>	<u>From Manawatu River confluence at approx. NZMS 260 S24:167-826 to source</u>	<u>Seed potato production</u>
<u>Upper Whangaehu (Whau 1)</u>	<u>Upper Whangaehu, Waitangi and Tokiahuru (Whau 1a, Whau 1b and Whau 1c)</u>	<u>Whangaehu River and tributaries</u>	<u>From Karioi at approx. NZMS 260 S21:218-864 to source</u>	<u>Vegetable production</u>
<u>Middle Whangaehu (Whau 2)</u>	<u>Middle Whangaehu (Whau 2)</u>	<u>Whangaehu River and tributaries</u>	<u>From Aranui at approx. NZSM 260 S21:175-627 to Karioi at approx. NZSM 260 S21:218-864</u>	<u>Vegetable production</u>
<u>Lower Whangaehu (Whau 3)</u>	<u>Lower Whangaehu, Upper and Lower Makotuku, Upper and Lower Mangawhero, and Makara (Whau 3a, Whau 3b, Whau 3c, Whau 3d, Whau 3e and Whau 3f)</u>	<u>Whangaehu River and tributaries</u>	<u>From Kauangaroa at approx. NZMS 260 S22:045-397 to Aranui at approx. NZSM 260 S21:175-627</u>	<u>Vegetable production</u>
<u>Ohau (Ohau 1)</u>	<u>Upper and Lower Ohau (Ohau 1a and Ohau 1b)</u>	<u>Ohau River and tributaries</u>	<u>From approx. NZMS 260 S25:918-578 to source (excluding the mainstem of the Ohau River from the cross-river CMA boundary at NZMS 260 S25:2692921-6059503 seawards)</u>	<u>Vegetable production</u>
<u>Lake Papatonga (West 8)</u>	<u>Lake Papatonga (West 8)</u>	<u>Lake Papatonga and tributaries and Waiwiri Stream</u>	<u>Lake Papatonga catchment and Waiwiri Stream</u>	<u>Vegetable production</u>
<u>Waikawa (West 9)</u>	<u>Waikawa and Manakau (West 9a and West 9b)</u>	<u>Waikawa Stream and tributaries</u>	<u>From approx. NZMS 260 S25:908-548 to source (excluding the mainstem of the Waikawa Stream from the cross-river CMA boundary at NZMS 260 S25:2691531-6055429 seawards)</u>	<u>Vegetable production</u>
<u>Lake Horowhenua (Hoki 1)</u>	<u>Lake Horowhenua (Hoki 1a)</u>	<u>Lake Horowhenua and tributaries and Hoki Stream</u>	<u>Lake Horowhenua Catchment and Hoki Stream (excluding the mainstem of the Hoki Stream from the cross-river CMA boundary at NZMS 260 S25:2694967-6065799 seawards)</u>	<u>Vegetable production</u>

**Part AB.3: Surface Water<sup>A</sup> Management Values Key: showing the management objectives, where the Values apply and where to find them in Schedule AB**

Value Group	Individual Values	Management Objective	Where it applies	Location in Schedule AB
Ecosystem Values	NS	Natural State	The river <sup>A</sup> and its bed <sup>A</sup> are maintained in their natural state	Public Conservation Land Figure AB.2 page AB-24 and Table AB.2 page AB-25
	LSC	Life-supporting Capacity	The water body <sup>A</sup> and its bed <sup>A</sup> support healthy aquatic life/ecosystems	All natural water bodies <sup>A</sup> and their beds <sup>A</sup> (8 LSC classes) Figure AB.1 page AB-18
	SOS-A	Sites of Significance - Aquatic	Sites of significance for indigenous aquatic biodiversity are maintained or enhanced	Specified sites/reaches Figure AB.3 page AB-27 and Table AB.3 pages Ba-28 to AB-38
	SOS-R	Sites of Significance - Riparian	Sites of significance for indigenous riparian biodiversity are maintained or enhanced	Specified sites/reaches Figure AB.4 page AB-40 and Table AB.4 pages AB-41 to AB-43
	IS	Inanga Spawning	The water body <sup>A</sup> and its bed <sup>A</sup> sustain healthy inanga spawning and egg development	Specified sites/reaches Figure AB.5 page AB-48 and Table AB.5 pages AB-49 to AB-50
	WM	Whitebait <sup>A</sup> Migration	The water body <sup>A</sup> and its bed <sup>A</sup> are maintained or enhanced to provide safe passage of inwardly migrating juvenile native fish known collectively as whitebait <sup>A</sup>	Specified sites/reaches Figure AB.6 page AB-56 and Table AB.6 pages AB-57 to AB-59
Recreational and Cultural Values	CR	Contact Recreation	The water body <sup>A</sup> and its bed <sup>A</sup> are suitable for contact recreation	All natural water bodies <sup>A</sup> and their beds <sup>A</sup>
	Mau	Mauri <sup>A</sup>	The mauri <sup>A</sup> of the water body <sup>A</sup> and its bed <sup>A</sup> is maintained or enhanced	All natural water bodies <sup>A</sup> and their beds <sup>A</sup>
	SOS-C	Sites of Significance - Cultural	Sites of significance for cultural values are maintained	Specified sites for the Manawatu River in Mana_10a, 11a, 13a and 13f Figure AB.7 page AB-60 and Table AB.7 pages AB-61 to AB-62
	TF	Trout Fishery	The water body <sup>A</sup> and its bed <sup>A</sup> sustain healthy rainbow or brown trout fisheries	Specified zones/reaches (3 categories) Figure AB.8 page AB-64 and Table AB.8 pages AB-65 to AB-72
	TS	Trout Spawning	The water body <sup>A</sup> and its bed <sup>A</sup> meet the requirements of rainbow and brown trout spawning and larval and fry development	Specified sites/reaches Figure AB.9 page AB-74 and Table AB.9 pages AB-75 to AB-85
	AE	Aesthetics	The aesthetic values of the water body <sup>A</sup> and its bed <sup>A</sup> are maintained or enhanced	All natural water bodies <sup>A</sup> and their beds <sup>A</sup>
	Water <sup>A</sup> Use	WS	Water <sup>A</sup> Supply	The water <sup>A</sup> is suitable, after treatment, as a drinking water <sup>A</sup> source for human consumption
IA		Industrial Abstraction	The water <sup>A</sup> is suitable as a water <sup>A</sup> source for industrial abstraction or use, including for hydroelectricity generation	All natural water bodies <sup>A</sup> except those classified as NS and those identified as zero allocation Water Management Zones <sup>A</sup> or Sub-zones <sup>A</sup> (other than the Upper Moawhango (Rang 2c) Water Management Sub-Zone) in Schedule B
I		Irrigation	The water <sup>A</sup> is suitable as a water <sup>A</sup> source for irrigation	All natural water bodies <sup>A</sup> except those classified as NS and those identified as zero allocation Water Management Zones <sup>A</sup> or Sub-zones <sup>A</sup> in Schedule B
SW		Stockwater	The water <sup>A</sup> is suitable as a supply of drinking water <sup>A</sup> for livestock	All water bodies <sup>A</sup> including artificial Specified water management sub-zones West 8, West 9, Hoki 1, Ohau 1, Whau 1, Whau 2, Whau 3 and Mana 12 New Figure AB: (new) New Table AB.10A: pages AB- to AB-
DFS		Domestic Food Supply	The water <sup>A</sup> is suitable for domestic food production.	
Social/ Economic Values	CAP	Capacity to Assimilate Pollution	The capacity of a water body <sup>A</sup> and its bed <sup>A</sup> to assimilate pollution is not exceeded	All natural water bodies <sup>A</sup> and their beds <sup>A</sup> except NS
	FC/D	Flood Control and Drainage	The integrity of existing flood and river <sup>A</sup> bank erosion protection structures <sup>A</sup> and existing drainage structures <sup>A</sup> is not compromised	Existing flood/ erosion control and drainage schemes Figure AB.11 page AB-95 and Table AB.11 pages AB-96 to AB-120
	EI	Existing Infrastructure <sup>A</sup>	The integrity of existing infrastructure <sup>A</sup> is not compromised	This applies in the general vicinity of any existing infrastructure <sup>A</sup> such as roads, culverts, bridges, water <sup>A</sup> intakes, discharge <sup>A</sup> pipes, flow recording stations and gas pipelines

[Formerly POP at D-1 to D-2]

**Surface Water<sup>A</sup> Management Values Classification Sub-code Key**

Value	Classification Sub-codes
LSC	Life-supporting Capacity UHS: Upland Hard Sedimentary UVA: Upland Volcanic Acidic UVM: Upland Volcanic Mixed Ull: Upland Limestone HM: Hill Mixed HSS: Hill Soft Sedimentary LM: Lowland Mixed LS: Lowland Sand
TF	Trout Fishery I: Outstanding II: Regionally Significant III: Other Trout Fishery

[Formerly POP at D-3]