# Dairy industry engagement in the setting and management of water quality limits

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## Abstract

The progressive definition of water quality and quantity limits in catchments throughout New Zealand is a positive step towards improving the management of our freshwater resources. The process brings with it significant challenges for the sustainability and competitiveness of the dairy industry. In responding to these challenges, the dairy industry is working to develop a range of systems, resources and capability building programmes that will mitigate risks to the industry and support farmers through what is the largest shift in resource management in a generation. The dairy industry has defined a four-step model for engagement in the process. Essentially, the four steps can be considered to represent the setting of limits to address water quality issues, the definition of regulatory and non-regulatory methods to achieve those limits, managing to limits on farm, and the assessment of progress towards desired outcomes.

**Keywords**: water quality limits; audited self-management; capability building

## Introduction

New Zealand's freshwater resources are valued for a wide range of uses, including domestic and stock water supply, electricity generation, recreational activities, irrigation, food production and harvesting (referred to as mahinga kai ("those places where food was produced or procured") in Waitangi Treaty claims) and the cleaning, dilution and disposal of waste. Other national values relate to the intrinsic values of freshwater ecosystems and the indigenous species, functions and processes they support. All of these values are important, but many of them are conflicting and some are mutually exclusive such as mahinga kai and human waste disposal. Sustainable management of freshwater resources requires a deliberate balancing of these values through the setting of objectives that reflect community-agreed environmental outcomes. Increasingly, these freshwater objectives will be given effect through catchment-specific water quality and quantity limits in regional plans.

Under the National Policy Statement for Freshwater Management (Ministry for the Environment 2011), hereafter referred to as NPSFWM, a limit is defined as "the maximum amount of resource use available, which allows a freshwater objective to be met". For the agricultural sector, the systematic setting of water quality and quantity limits in catchments throughout New Zealand brings both opportunities and significant risks. Imposing limits requires a clear definition of the size of the resource available for allocation and implies greater certainty for resource users, assuming that access and allocation issues are appropriately resolved (Parsons 2012). However, limits will, by definition, constrain land use intensity and productivity. Furthermore, the processes put in place by local government to achieve freshwater objectives, as expressed through targets and limits, are likely to increase compliance costs of farmers, with potential flow-on effects for industry competitiveness.

Over the last twenty years we have seen significant growth in dairying in New Zealand as a result of relatively unconstrained access to land and water resources. The next 10 to 20 years will see increasing constraints on the availability of freshwater resources and increasing obligations for reducing impacts on freshwater values. The dairy industry supports the setting of catchment limits to improve the sustainable management of our freshwater resources and is developing capability, tools and resources to ensure the industry is well-prepared to meet the challenges that flow from what is the most comprehensive reform of our freshwater management system for a generation (Ministry for the Environment 2013).

In this brief paper, we outline a dairy industry model adopted for engaging in the limit setting process (Figure 1) and highlight examples of industry activities within each step of the process, with a deliberate focus on water quality limits. Essentially, the four steps can be considered to represent the setting of limits to address water quality issues, the definition of regulatory and non-regulatory methods to achieve those limits, managing to limits on farm, and the assessment of progress towards desired outcomes.

## Limit setting

There are growing concerns that the range of freshwater values is becoming increasingly limited in a number of waterways as a result of current and historic human activity. In particular, the water quality of lowland streams, wetlands and lakes is under pressure from elevated levels of contaminants such as nutrients, sediment and faecal microbes, associated with both point source discharges involving stormwater and municipal wastes, and diffuse discharges from agricultural land

**Figure 1** Dairy industry process adopted for engaging in 'limit setting' processes.


(Parliamentary Commissioner for the Environment 2012). Whilst most of the point source discharges in New Zealand are strictly controlled, diffuse discharges from agricultural land have not traditionally been tightly regulated in regional plans, except in a few isolated catchments such as Lake Taupo and Lake Rotorua.

Central to the NPSFWM is the concept that community-defined values can be maintained or enhanced through the setting of appropriate resource allocation limits. Below a particular level of resource allocation such as river nutrient loads, the defined values are protected, while above the level values will be adversely affected. The fundamental principle, therefore, is that limits should be set relevant to achievement of defined values. The dairy industry is a proponent of this principle to define the problem in terms of loss or degradation of community-agreed values, identify the key water quality attributes limiting the realisation of the values, and set measurable limits and targets for maintaining or improving the relevant water quality attributes.

Recent work on water quality trends in Lake Rotorua highlights the importance of clearly defining the problem and how best to manage it. Abell et al. (2012) analysed 10 years of water quality data from Lake Rotorua. They identified a number of improving trends in key water quality parameters encompassing total nitrogen (N), total phosphorus (P), water clarity and algal biomass, with the conclusion that Lake Rotorua is at, or very close, to meeting community water quality expectations. That is the water quality is similar to what it was in the 1960s. While the exact causes of the improving trends cannot be determined with certainty, the changes are consistent with significant investment in P load controls such as alum dosing of in-flowing streams. Further controls on P loads to the lake are likely to drive additional improvements in water quality. In contrast, controls on N loads from the catchment may contribute to long-term improvements in the lake, but are unlikely to influence short-term improvements demanded by the community, due to significant groundwater lags. In recognition of this, changes to the Regional Policy Statement have been made to extend the timeframes for addressing catchment N loads.

The process of limit setting is outlined in the NPSFWM and is being defined further through development of the National Objectives Framework (NOF) (Ministry for the Environment 2013). The limit setting process involves a number of logical steps:

- Determination of water management units, such as a river catchment
- Definition of the desired value(s) for a particular water management unit
- Identification, for each identified value, of specific water quality 'attributes' that control expression of that value as with *Escherichia coli* levels indicating suitability for contact recreation
- Description of each 'attribute' in relations to a number of quality bands , for example, A, B, C or D, and measurement of current state relative to those bands
- Definition of freshwater objectives, and setting of limits to achieve those objectives
- Assessment of 'trade-offs' and likely impacts on economic, social, cultural and environmental outcomes
- Determination of the feasibility of the limits, including timeframes for implementation

It is inevitable that initial value sets defined by the community, and the expectations around quality bands for those values, will lead to conflict. For example, requirements under the NPSFWM to maintain or improve aquatic ecosystem health and indigenous species biodiversity may come into conflict with other values, including maintaining a healthy trout fishery, or expanding agricultural land

use in a catchment. Therefore, the process recognises the need for multiple iterations to manage 'trade-offs' within a collaborative, community process. Establishment of a collaborative approach to definition of values and subsequent limit setting is a central element of government's proposed reforms of the Resource Management Act (1991), as the current legislation relies heavily on an outdated, adversarial approach to resource management.

## Methods to achieve limits

Once freshwater objectives and associated limits are set, policies and methods need to be established in regional plans to enable achievement of those objectives. A range of regulatory and non-regulatory methods are available to manage the allocation of resources to users within established limits. Full coverage of these limits is beyond the scope of this paper. Parsons (2012) provides a useful perspective on potential methods for management of nitrogen load limits as it relates to farming enterprises in a catchment.

In more generic terms, Ministry for the Environment (2011) provides an example of an objective limits cascade: A numeric objective is set to maintain filamentous algae at levels that will protect a defined community value as a visual amenity and for recreation; this objective is given effect through definition of a limit on N and P loads in the catchment; and a choice of methods provided that will achieve the limit. These include:

- Restriction of land use to specified type and/or area
- Allocation of a resource such as N or P, through resource consent
- Landowner liaison

The choice of an effective and efficient method will be influenced by the allocation status of the water management unit. For example, catchments where the current status falls short of community expectations will be defined as over-allocated. As such the NPSFWM requires regional councils to specify targets and implement regulatory and non-regulatory methods to assist the improvement of water quality to meet those targets within a defined timeframe. In the case of over-allocated catchments, there will need to be restrictions on land use relative to new resource-use applications and an equitable allocation of the resource to existing users.

Regardless of the allocation status of particular water management units, there is a need for clearly defined expectations for existing resource users to ensure resources are used responsibly and efficiently. With the possible exception of cases of significant over-allocation, the dairy industry strongly supports audited self-management as a framework for defining resource user expectations.

Audited self-management is defined as management of an industry by that industry towards outcomes desired by a third party such as a consumer or regulator, with audit of performance standards to provide credibility and verification of industry reported results.

A good example of audited self-management is the recently-released Sustainable Dairying: Water Accord. The Accord builds on, and effectively succeeds, the successful Dairying and Clean Streams Accord that ran from 2003 until 2012 (Ministry for Primary Industries 2013). It seeks a further step change in the management of risks to waterways posed by dairy farming, to ensure that our waterways continue to provide for the full range of values and interests enjoyed by New Zealanders.

The Accord seeks to enhance the overall performance of dairy farming as it affects freshwater by committing to good management practices expected of all dairy farmers in New Zealand and recording pledges by the dairy sector, with the support of others, to assist and encourage dairy farmers to adopt those good management practices and to monitor and report progress.

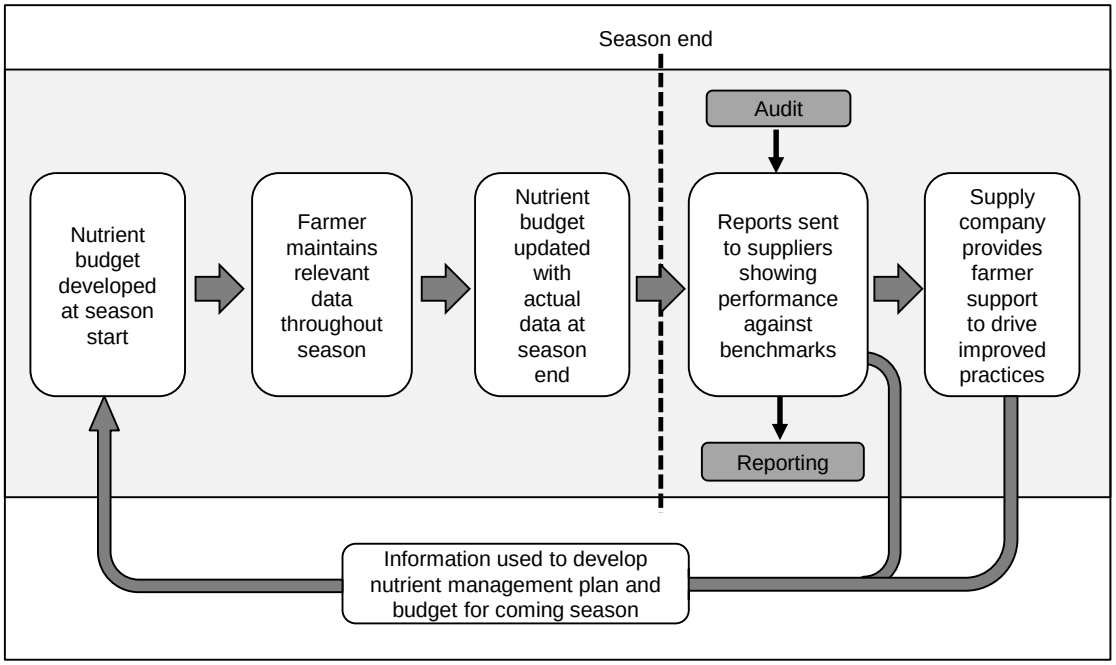
In many situations, the achievement of performance standards identified within the Accord is likely to be sufficient for catchment limits to be met. However, it is recognised that there will be situations where achievement of the expectations outlined in the Accord will fall short of meeting defined catchment limits. In these cases, regional councils will need to establish additional methods and measures to meet freshwater objectives.

## Managing to limits

As the limit-setting process rolls out through catchments around New Zealand, farmers will face varying levels of challenge in maintaining and growing their farming businesses within established limits. Increased management capability, expert advice, mitigations research and better targeting of industry support will all be required to support farmers grappling with catchment or even property-scale discharge limits.

Kingi et al. (2012) provides a valuable case study of the farming community response to nutrient load reduction targets for Lake Rotorua. Land owners within the Lake Rotorua catchment have been operating under a nitrogen discharge cap since 2005. However, this was always considered to be only the first step in achieving community objectives for the lake. The Bay of Plenty Regional Policy Statement has signalled significant N and P load reductions required from the catchment over the next 20 years. In addition to on-going research, adoption of good management practices and significant investment in infrastructure upgrades, farmers in the catchment have formed the Lake Rotorua Primary Producers Collective. The Collective seeks opportunities to reduce N and P loads to the lake, while also

**Figure 2** The dairy industry 'audited nutrient management system' process.




providing a collective buffering mechanism for individual farms.

For the vast majority of farmers, nutrient limits are some way off; regional councils have until 2030 to fully implement the NPSFWM. This provides a significant opportunity for the industry to work proactively with farmers and regional councils well ahead of the policy development process. By raising farmer awareness and skills, and building industry capability to support change, we seek to reduce the potential future shocks that may arise from limit setting.

As one of a broad suite of industry sustainability initiatives in the Waikato catchment, DairyNZ is working with 700 dairy farmers in the Upper Waikato catchment between the Huka Falls and the Karapiro Dam over the next three years to accelerate the adoption of good farm management practices through development and implementation of a Sustainable Milk Plan. Our aim is to support on-farm changes that will enhance the Waikato River and demonstrate the collective environmental commitments of farmers to policy-makers and the wider community.

To achieve this we have defined a set of narrative industry targets for the catchment and commitments to on-farm action from individual farmers. They include, but go beyond, general industry expectations as indicated in the Sustainable Dairying Water Accord. The commitments to action from individual farmers include improvements in nutrient, effluent, land and waterway management practices that will achieve reductions in nutrients, sediment and faecal bacteria entering waterways.

The ability of the dairy industry to drive change is limited by a number of factors. One of these is the availability of suitably-qualified rural professionals, who can directly support farmers through the change process. DairyNZ and The Fertiliser Association of New Zealand have partnered to develop a Nutrient Management Adviser Certification Programme to aid capability building in this critical sector.

The aim of the programme is to build and uphold a transparent set of industry standards for nutrient management advisers so that they provide nationally consistent advice of the highest standard to farmers. The programme has processes for setting standards and certifying qualified individuals, as well as managing an on-going certification system.

Certification is open to all nutrient management advisers who wish to be recognised as meeting the standards set for New Zealand. It is anticipated that approximately 50% of New Zealand's nutrient management advisers will have completed their certification competency assessment by midway through 2014.

## Monitoring and reporting

Improving management of nutrient losses from farms is very clearly a priority for policy makers at national and regional scales. Diffuse sources of N and P often contribute the greatest proportion of total loads in rivers and lakes (Parliamentary Commissioner for the Environment 2012). Given the importance of managing losses of nutrients from farms it is surprising that there is limited information available on current farm performance on a national scale.

In recognition of this significant knowledge gap, DairyNZ and Fonterra have recently developed an audited nutrient management system that seeks to

measure and monitor a dairy farm's nutrient performance on a regular basis. This system, based on the Overseer® nutrient budget model (Wheeler et al. 2003), will enable farmers to make more informed and effective management decisions around nutrient use, as well as provide the industry with the ability to demonstrate improving industry performance to our communities, markets and regulators.

The system, trialled on 180 farms over two full seasons, requires farmers to collect a range of relevant input data for their farm system throughout the season (Figure 2). At the end of the season that data is modelled through Overseer® (Version 6.0) and the farmer receives a report on their performance for the season relative to an appropriate peer group. Assessment of comparative performance also allows prioritisation of farms for one-on-one support from industry advisors, such as Fonterra's Sustainable Dairy Advisors. The whole system revolves around the relationship between farmers and their nutrient management advisors, who develop the nutrient budgets.

The benefits of the audited nutrient management system are:

- Overseer® is used following a clearly-defined protocol, providing consistency and repeatability, with results that are comparable between farms,
- Inputs into the Overseer® model are auditable and are a fair representation of the farming system,
- A dataset is created that can demonstrate changes in nutrient performance over time,
- Reporting to farmers is easily understood and based on actual data at the end of the season,
- The industry is able to target assistance and resources to the areas of greatest need,
- Farmer understanding of nutrient use efficiency and nutrient loss concepts is improved and
- It supports the implementation of audited self-management systems in place of regulations.

Fonterra implemented the audited nutrient management system as part of milk supply agreements with their suppliers for the 2012/13 season. Other milk companies are assessing the system ahead of full implementation by May 2015, as required under the Sustainable Dairying: Water Accord.

## Discussion

We see four important steps in the process of setting limits for water quality in our waterways. Dairy industry engagement in each step is critical. At the outset, the community needs to clearly define the set of values relevant to each water management unit and agree on freshwater objectives, expressed as limits or targets, that link water quality state to desired outcomes. It would be counter-productive to set limits and targets for attributes that do not control agreed values.

The inevitable trade-offs between environmental, social, cultural and economic values must be made with the best possible information. Farmers and industry bodies hold much of the relevant information pertaining to current farm performance. Policy-makers will need to work with industry to ensure that the methods set out in regional plans to drive farm change are the most effective and efficient means of achieving desired outcomes.

Every dairy farmer in the country will face increased environmental obligations as the NPSFWM is gradually implemented. However, support systems are being put in place within the industry, so that farmers have access to a suite of options based on sound science that is delivered by certified or accredited advisors. We need to ensure that the timeframes set out for change do not exceed the capacity for change.

Finally, robust monitoring systems need to be in place within the dairy industry. These systems are a cornerstone of industry self-management. Environmental monitoring systems provide us with the means to quantify the current state and trends in environmental indicators. Without simultaneous land management data we cannot provide robust verification of the cause and effect between changes in farm practice and environmental outcomes. Assessing the quantum of change over time provides for a re-assessment of the values, objectives and limits through an adaptive management process.

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