

Dairying and Declining Water Quality

**Why has the
Dairying and Clean Streams Accord
not delivered cleaner streams?**

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October 2008

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Executive Summary

The 2003 Dairy and Cleans Streams Accord was an implicit challenge to the dairy industry to deliver on its aspirations to provide an excellent standard of product integrity. Such integrity must be demonstrated throughout the supply chain. A producer must meet not just end-product quality tests, but also take responsibility for its by-products and their effect on the environment. The results presented in this paper are one measure of the extent to which the dairy industry is not meeting its environmental responsibilities.

The Accord was an attempt to bring about a partial solution to the widespread and steep decline in the quality of lowland waterways. Although a voluntary agreement, it was to address a very significant and readily treatable source of degradation – dairy effluent and nutrients entering rivers and streams.

The Accord has failed to achieve its major goal: to

“reduce the impacts of dairying on the quality of New Zealand’s streams, rivers, lakes, ground water and wetlands”.

Where it has been monitored, water quality in dairying areas has generally continued to fall during the five years of the Accord’s operation.

The key reason that the Accord has failed is that it has not been focused on measurable improvements in water quality. Instead it has focused on increasing the number of dairy farmers operating at so-called ‘best’ practice levels. The Accord partners: Fonterra, the Ministers for the Environment, Agriculture & Forestry, and Local Government New Zealand, have assumed that the voluntary ‘best’ practice measures promoted by the Accord will deliver improved water quality, but this has not been the case. Even in the five closely monitored “best practice” catchments that have been managed above Accord standards, water quality has not improved or has declined prior to and during the period of the Accord.

Concern was expressed by some regional councils that they have been unable to verify the statistics gathered for Accord reporting because most are self-reported by farmers and there is no independent audit of their accuracy.

The Accord has consistently failed to meet a number of its principal targets. The most disturbing is the failure to meet the target that all farm dairy effluent discharges will comply with their resource consents and regional plans. In some major dairying regions 18 to 24% of all dairy farms are in “serious non-compliance” with their legal obligations. This is five years after of the establishment of the Accord.

Reporting of progress or lack of progress, against the Accord’s targets has often been inconsistent between regions and often incorrect. Regional councils have used different measures to gauge whether dairy farms meet the conditions of their dairy effluent discharge consents. In some cases the level of compliance reported in the Accord’s reports differs markedly from the regional councils’ internal reporting. The national average of serious non-compliance is more than 14% of dairy farms - twice the 7% reported in this year’s Snapshot Report by the Accord partners.

A further problem has been that the reporting has in some cases not been against the targets set in the Accord. For example the Accord sets a target that 100% of dairy farms will have

systems in place to manage nutrient inputs and outputs by 2007. However, the Accord partners have instead reported against how many farms simply have a written nutrient budget. There is no assessment as to what proportion of these farms have nutrient management systems that are actually operational, which is the intent of the Accord.

Most regional councils have failed to identify regionally important wetlands. In all but rare circumstances Councils have also failed to prosecute dairy farmers who are in repeated non-compliance with the conditions of their effluent discharge consents.

While supporters of the Accord have argued that it has been instrumental in changing attitudes and actions among the majority of dairy farmers, it is clear that as a voluntary measure the Accord has failed to deal with serious non-compliance and poor operating practice on dairy farms. An Accord may have a place for improving practice beyond RMA environmental standards, but it is no substitute for enforcement of rigorous compliance by farmers and sound monitoring by regional councils.

The other key reason that that Accord has failed to meet its goals is that, in line with Fonterra's stated production growth goal of 4% compound per annum (or a doubling of dairy production in 17 years), dairy farming has continued to intensify and to expand. The effects of intensification are cumulative and pervasive even when coupled with the improved use of simple technologies such as fencing streams from stock, riparian planting and the use of nutrient management systems. The obvious solution to water quality problems from over-intensification is less intensive management.

The failure of the Accord to meet its major goal after five years of implementation, plus the continued failure of a significant minority of dairy farmers to comply with the legal obligations set in their effluent discharge resource consents, indicates that it is time to move beyond the Accord.

If the impacts of dairying on the quality of New Zealand's freshwater resources are to be reduced much stronger and enforceable requirements must be put in place by the industry and regional and central government.

A review of the effectiveness of the first five years of the Dairying and Clean Streams Accord

Background

At the beginning of this decade growing criticism of the environmental impact of intensive dairy farming practices and the failure of regional and central government to adequately address this came called the ‘dirty dairying campaign’. Fonterra’s response to this campaign was to approach regional and central government in 2002 to reach a voluntary ‘accord’ over the means of improving water quality. This became formalized as the ‘Dairying and Clean Streams Accord¹’ (the Accord), signed in May 2003 between Fonterra, Ministers for the Environment and of Agriculture & Forestry and Local Government New Zealand on behalf of the collective of Regional Councils.

The Accord was an attempt to bring about a partial solution to the widespread and steep decline in the quality of lowland waterways. Although a voluntary agreement, it was to address a very significant and readily treatable source of degradation – dairy effluent and nutrients directly entering rivers and streams.

It was also an implicit challenge to the dairy industry to deliver on its aspirations to provide an excellent standard of product integrity. Such integrity must be demonstrated throughout the supply chain. A producer must meet not just end-product quality tests, but also take responsibility for its by-products and their effect on the environment.

This accord differed from earlier accords such as the 1991 New Zealand Forest Accord in that it was not negotiated between the protagonists in this issue. Without organisations such as Fish and Game, Forest and Bird and other environmental interests, the government agencies and dairy industry produced an accord that included several soft targets and failed to include any requirement that changes in water quality would be measured.

The Accord was initially seen as entirely a voluntary and non-regulatory approach and was specifically noted not to affect any regulatory requirements of government agencies. As it has evolved, Fonterra has opted to introduce a degree of compulsion in respect of any failures by its suppliers which cause repeated breaches of resource consent conditions resulting in prosecution. However, this option has yet to be exercised by the company (as it requires repeated failure over three years before it is triggered). While the Accord provides for other parties such as Fish and Game Councils to join the Accord at a regional level, there was no invitation from the Accord parties to any other groups to consider what such an accord might include, what was intended to be achieved, and how it might be implemented and its effectiveness measured.

This review of the value of the Accord is timely, as similar instruments are now being promoted as the best method to address difficult environmental issues as an alternative to regulation. After five years of implementation the effectiveness of this Accord needs to be

¹ <http://www.mfe.govt.nz/issues/land/rural/dairying-accord-may03.pdf>

evaluated, both against its stated objectives and against wider community water quality objectives.

The benefits of such accords should be assessed alongside an evaluation of alternative methods of achieving environmental improvement. Alternatives are usually promoted as being some form of regulation, but this is a simplistic analysis. Fonterra already has considerable regulation in its supply agreements that complement other methods such as market-based incentives. Under the RMA, it is the responsibility of regional councils to manage water resources in the public interest. Use of water resources requires approval under the RMA, so where voluntary approaches are proposed, they should not be used as a means of avoiding legal responsibilities.

What has the Cleans Streams Accord been trying to achieve?

The Accord acknowledged that the ongoing intensification of dairy farming practice and the expansion of dairying into new regions had increased the importance of addressing impacts on water environments. The industry-backed Accord to improve the environmental performance of dairy farming was intended to send a “*strong message to the public and to domestic and international consumers, that environmental management is an integral and important component of the dairy industry*”. The Accord’s “*industry self-management*” was seen as “*more effective in achieving positive environmental outcomes than sole reliance on a rule-based regime imposed by regulatory agencies*”.

The Accord’s purpose is:

“This Accord provides a statement of intent and framework for actions to promote sustainable dairy farming in New Zealand. It focuses on reducing the impacts of dairying on the quality of New Zealand streams, rivers, lakes, ground water and wetlands.”

Its goal is:

“This Accord reflects an agreement that:

Fonterra Co-operative Group, regional councils and unitary authorities, the Ministry for the Environment, and the Ministry of Agriculture and Forestry will work together to achieve clean healthy water, including streams, rivers, lakes, ground water and wetlands, in dairying areas.

*In particular, the **goal** is to have water that is suitable, where appropriate, for:*

- Fish;*
- Drinking by stock;*
- Swimming (in areas defined by regional councils).”*

The priorities for action and performance targets are:

- 1. Dairy cattle excluded from 50% of streams, rivers and lakes by 2007, 90% by 2012.*
- 2. 50% of regular stock crossing points have bridges or culverts by 2007, 90% by 2012.*
- 3. 100% of farm dairy effluent discharges to comply with resource consents and regional plans immediately.*
- 4. 100% of dairy farms to have in place systems to manage nutrient inputs and outputs by 2007.*
- 5. 50% of regionally significant wetlands to be fenced by 2005, 90% by 2007*

A sixth priority for action was that Fonterra and regional councils were to develop regional action plans for the main dairying regions to implement the Accord by June 2004.

Review of the Accord's effectiveness

By May 2008, the Accord had existed for five years. As at March 2006 all but one of the 13 regions covered by the Accord had developed Regional Action Plans. Many of the other five targets had milestones that were to be achieved by 2007. The effectiveness of the Accord in achieving its milestones was analysed by the Accord partners in a report published in early 2008 and referred to here as the Snapshot Report².

As a check against the summary data provided in the Snapshot Report, Fish and Game regional staff enquired of their respective regional council officials as to the extent to which the CSA targets had been met, as at the end of 2007. The response sought was quite simple, for each of the five targets the regional councils were asked whether they could confirm that the target has either been met (yes); not met (no) or the regional council don't know or can't confirm (DK). This data is summarised on the following table.

It is possible this data differ from those formally advised to the reviewers of the Accord which produced the 2006-07 review, as Fish and Game staff may have contacted different people in those organisations. There has been some concern expressed by some regional councils that they have been unable to verify the statistics gathered because they are self-reported by the farmers involved (see an example for Canterbury below). Some regional council staff simply accepted the Fonterra data for their region.

Table 1 Summary of Regional Council data on the achievement of Accord targets

Compliance with Clean Streams Accord	Cattle excluded from 50% of water bodies by 2007	50% of open stock crossings eliminated by 2007	100% compliance with effluent consents or rules now	100% farms have nutrient management systems by 2007	90% of regionally significant wetlands fenced by 2007	Count if Yes	Count if Don't Know	Count if No
Proportion	67%	75%	0%	17%	15%	1.75	1.50	1.75
Marlborough	DK	Yes	No	DK	DK	1	3	1
Tasman	Yes	Yes	No	Yes	DK	3	1	1
Southland	Yes	Yes	No	DK	Yes	3	1	1
Taranaki	Yes	Yes	No	No	No	2	0	3
Waikato	Yes	DK	No	No	No	1	1	3
Northland	No	DK	No	Yes	DK	1	2	2
Hawke's Bay	Yes	Yes	No	No	Yes	3	0	2
Horizons	Yes	Yes	No	No	No	2	0	3
Otago	Yes	Yes	No	No	DK	2	1	2
Wellington	DK	Yes	No	DK	DK	1	3	1
EBOP	Yes	Yes	No	DK	DK	2	2	1
Canterbury	DK	DK	No	DK	DK	0	4	1
Total Yes	8	9	0	2	2			
Total No	1	0	12	5	3			
Total DK	3	3	0	5	7			
Total DK = don't know						21	18	21

² The Dairying and Clean Streams Accord: Snapshot of Progress, 2006/7 <http://www.maf.govt.nz/mafnet/rural-nz/sustainable-resource-use/resource-management/dairy-clean-stream/dairycleanstream-06-07.pdf>

Dairy Cattle Exclusion

Two thirds of the regions reported that dairy cattle had been excluded from 50% of Accord waterways (ie wider than a stride (1 m) and deeper than a redband (a type of gumboot, or about 300mm)). Only Northland reported less than 50% stock exclusion, at an estimated 40%. Several regional councils were unable to confirm that the targets had been met and some regional council staff were doubtful as to the accuracy of the data, that were provided by Fonterra and self-reported by farmers. There were also some concerns expressed that the stock exclusion requirement is simply an exclusion from the water itself, rather than a standard for appropriate riparian setback to enable water or habitat quality protection from the adjacent land use.

Eliminating Open Dairy Cattle Crossings

Two thirds of the regions reported that the objective of bridging or culverting 50% of regular dairy cattle crossings had been met. None of the remaining three regions indicated that the target had not been reached, but only that they did not know. Canterbury considered it was 'likely' that the target had been met but were unable to confirm this.

Consent compliance

No region reported 100% compliance with consent conditions and regional plans.

Nutrient Management systems

Regions differed as to their interpretation of what was required with this target. Some took it to mean that farmers had written nutrient budgets, whether used or not, while others sought to verify that the budgets were being used as part of a nutrient management 'system'. In the responses, however, only Northland and Tasman reported that nutrient management systems were in place, with the remaining regions equally divided between those that didn't know and those that considered the 100% target had not been met.

Wetland Protection

Only 2 regions, Southland and Hawke Bay, indicated that they had met the target of fencing 90% of their regionally significant wetlands by 2007. Three regions stated that they had not met the target and the 7 remaining regions did 'not know' whether the target had been met.

Summary of achievement of the Accord targets performance and comparison with 2006/7 Snapshot Report

Fencing and bridging

Most regions had achieved the modest targets of 50% fencing of stock from, or bridging of, Accord water bodies. A question arises as to what is happening in the minority of cases where dairy cattle access to, or crossings of, water bodies are continuing. Our analysis differs little from that reported by the Accord partners, but the data are presented quite differently in the Snapshot Report.

The Snapshot Report does not present a comparison between regions, but simply provides a national summary percentage achievement, as shown in Figure 1 below. This is, presumably, a summary of all data. It has a number of qualifications, such as that it includes farms which lack 'Accord-type' waterways. This means that it is difficult to determine whether the statistics represent 50% of the number of 'Accord-type' water bodies that should have been fenced/bridged; the percentage of the total length (or margin) of those water bodies; or the percentage of properties with or without "Accord-type" water bodies in which some or all fencing/stock bridging had occurred. These different options would make a very large difference to the final reported result.

In some regions progress towards the 2007 target of fencing excluding dairy cattle from 50% of streams, rivers and lakes is not as good as the Snapshot Report would indicate. For example in Taranaki many streams have long been fenced to stop stock becoming trapped in deep gullies and ravines, which are common on the ring plain. An estimated 45 per cent of streams crossing farmland surrounding Mt Taranaki were fenced when the Accord was signed in 2002.

Since 2002, stream fencing on dairy farms in the region has increased by an estimated 3 per cent, according to figures from Taranaki Regional Council's 2006/07 report. At this rate of less than 1 per cent a year it will be unlikely that farmers will reach the Accord target of excluding stock from 90 per cent of streams, rivers and lakes by 2012.

Our analysis showed that just over a quarter (29%) of regions either did not know, or considered the stock exclusion/bridging targets had not been met. The question arises as to what the implications of the stock remaining in contact with water bodies have on the water and habitat quality of those streams.

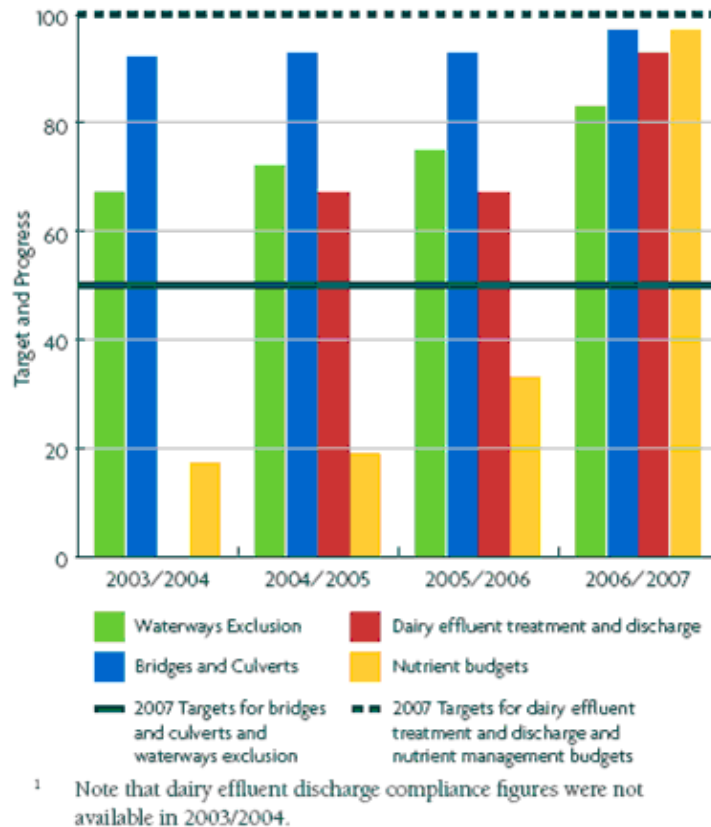


Figure 1: Summary achievement of the year-on-year progress against the Dairying and Clean Streams Accord targets. Figure taken from the 2006-7 Snapshot Report

Wetland protection

The 2006-7 Snapshot Report noted that only four of the regions had identified their regionally significant wetlands and only two of these regions (Southland and Hawke Bay) indicated the target for fencing these identified wetlands had been met. As most regions have yet to define regionally significant wetlands, it is not surprising that achievement of this objective could not be confirmed in most cases.

This is an area of significant failure for the Accord, with the blame for poor performance lying particularly with the regional councils and with the failure of the joint Fonterra / regional council Regional Action Plans to prioritise and implement this work.

Nutrient management

Nutrient budgets are readily available to most farmers from their fertiliser agents, so it should be relatively easy for dairy farmers to put into place management systems to manage nutrient inputs and outputs. However this 100% target has not been achieved. Most regions were unable to confirm that nutrient management systems are in place. This is in contrast to the Snapshot Report, which shows 97% of farms have nutrient ‘budgets’. When read carefully, the Snapshot Report confirms that this percentage refers to nutrient “budgets” rather than ‘nutrient management systems’ which is the actual Accord target.

This is one of several examples of the Accord partners publicly reporting progress against lower targets that are not in the Accord. In these cases the public has been misinformed as to what the Accord has achieved or nearly achieved.

Compliance with recourse consent conditions

There is agreement that the target of immediate 100% compliance with effluent discharge consents has not been achieved. In the Snapshot Report Taranaki is reported as achieving 100% compliance in 2006 / 07, but their own data showed that their regional plan conditions had only been applied in 45% of cases on farm, and several dairy farmers were prosecuted by the council for resource consent non-compliance. Both points seem to contradict the stated achievement figure.

There are several significant concerns about how the Snapshot report has reported on this target.

The first concern is that the Accord target of *“100% of farm dairy effluent discharges to comply with resource consents and regional plans immediately”* has been watered down in two important respects.

- The requirement that dairy effluent discharges comply with regional plans has disappeared from the reporting regime.
- The annual and Snapshot Reports now assess progress against the much less rigorous percentage of dairy farms in “serious-non compliance” with their effluent discharge consents. While there may be a case for not reporting against minor non-compliance such as the failure to have the appropriate documentation on a cowshed wall, there is a good case for reporting all non-compliance that is not minor, rather than just reporting “serious” non-compliance.

The second concern is that different regional councils use different definitions of “serious non-compliance”. Following the publication of the Snapshot Report Forest & Bird used the Official Information Act to request all of the regional council analyses that were used to supply the data for the Snapshot Report. It was clear from the responses that different regional councils use different definitions of what constitutes “serious non-compliance”. This lack of consistency makes comparisons between regions difficult and therefore creates problems when attempting to work out a national figure for “serious non-compliance”.

The third concern is that the compilers of the successive annual Accord reports and the 5 year Snapshot Report have made a very basic mathematical mistake by averaging the reported compliance percentages of the different regions. The mistake arises from the fact that the regions have very different numbers of dairy farms. For example Northland has over 1100 dairy farms and the reported 23% serious non-compliance therefore represents over 250 farms. The Waikato has over 4200 dairy farms and the while the region’s reported 15% of serious non-compliance is 8% lower than for Northland’s percentage it nevertheless represents over 630 farms because the base is nearly four times greater for the Waikato’s smaller percentage.

When this problem was pointed out by Forest & Bird, both Fonterra and Ministry of the Environment accepted that the national figures for “serious non-compliance” in the Snapshot Report, and pervious annual Accord reports, were wrong. The Snapshot Report had given a

national “average” of 7% “serious non-compliance” for the 2006/07 year. If the raw numbers are used, the national figure (ignoring the definition problems) nearly doubles to 13% of dairy farms in serious non-compliance with their effluent discharge resource consents.

The fourth concern is that the Snapshot Report uses some regional figures for serious non-compliance that are much lower than the regional council staff are reporting to their own councils for the same period. For example the Snapshot Report presents a figure of only 3% “serious non-compliance” for the Canterbury region in the 06/07 year. However, in the internal Environment Canterbury report³ for the 2006-7 year, reported only 39.6% of dairy farms were considered fully compliant, 42.7% in minor non-compliance and 17.7% (over 110 incidents) in serious non-compliance⁴. This report noted:

“In general, on-site visits indicated that many farmers still do not have sound dairy shed effluent management plans.”

In the 06/07 year Environment Canterbury issued infringement notices to 8% of the dairy farms in its region. It is therefore difficult to understand how the Snapshot report could present the figure of only 3% of Canterbury dairy farms being in “serious non-compliance”.

If the Environment Canterbury figures are included in the national calculation, the national level of farms in serious non-compliance with their effluent discharge consents rises to 14.5%. This is more than twice the level reported by the Accord partners in this year’s Snapshot Report.

If all regional councils were to operate rigorous random inspection regimes this figure of serious non-compliance would be much higher. Most regional councils calculate their figures after well-publicised annual inspections with prior notification. It does not instill much confidence that despite farmers being well warned about these inspections there is still such a high level of serious non-compliance.

A fifth concern is that the Accord has only been measured on the farms where milking occurs. Many large dairy farms are only able to operate because they are destocked during the winter season, with many or all dairy cows being removed to ‘run-off’ properties and dairy cow replacements being raised separately on other farms. These properties appear not to be covered by any of the Accord requirements. Dairy cattle on these properties are often managed by non-dairy farmers and the environmental consequences of this stock management can be poor, especially where stock are concentrated for winter feeding. None of this is monitored as part of the Accord.

A final concern is that compliance is only being measured where regional councils have required consents of dairy farms. Some activities have become permitted, subject to conditions that are rarely monitored. Other activities are overlooked or not required to have consents, such as the application of fertilizer or nutrients generally, which means there is no monitoring data from regional councils on these activities.

³ <http://www.ecan.govt.nz/NR/rdonlyres/B2B246F8-BF7F-409D-A948-402276E8DA79/0/200607DairyShedEffluentReport.pdf>

⁴ Interestingly none of these were regarded of sufficient severity to result in prosecution action, although 48 infringement or abatement notices were issued.

This all means that little reliance can be placed on the conclusions drawn by the Accord annual reports and the Snapshot Report regarding how well different regions are performing with regard to the legal requirement for dairy farmers to fully comply with the conditions of their effluent discharge resource consents and regional plans.

Unfortunately, a significant minority of dairy farms are continuing to fail to comply with their legal obligations under the RMA. Recent newspaper articles⁵ and district court reports from Southland and parts of the North Island have suggested that some farmers are recalcitrant offenders who have now been successfully prosecuted more than once. It has been disappointing that Fonterra has yet to implement its penalties on any repeat offenders, as set out in its current supply agreements. In addition, compliance with consents is not the only form of compliance, as many activities such as bridging or culverting regular cattle crossings are likely breaches of RMA plans.

While there is agreement that the summary data in most cases show positive trends towards the Accord's targets, the Snapshot Report is inaccurate and doesn't represent the true levels of uptake of the Dairying and Clean Streams Accord's original targets. More importantly, what difference has the Accord made to water quality? This is considered in the next part of this report.

⁵ *"Antara AG Ltd faced its second prosecution in four years, and was fined \$16,500 after discharging effluent on to land where it entered water on its Opio farm. Mr Hunter said the company had failed to comply with the Resource Management Act numerous times since 2004."* From <http://www.stuff.co.nz/southlandtimes/4652114a6568.html>; see also http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10528443

Has the Clean Streams Accord delivered clean streams? Reporting against the Clean Streams Accord objectives

Water Quality Trend Reporting

While the Accord has been seen as an alternative to regulation the objective, obviously, is to achieve 'Clean Streams'. This has been expressed as the document goal, which can be repeated, as:

*“In particular, the **goal** is to have water that is suitable, where appropriate, for:*

- Fish;*
- Drinking by stock;*
- Swimming (in areas defined by regional councils).”*

The Accord sets out a number of objectives and methods, but none of these relate to the measurement of water quality. Instead, the criteria relate to the achievement of certain objectives 'on farm', such as the development of nutrient budgets, compliance with regulation, fencing of streams or wetlands from stock.

Fonterra deserves credit for initiating and providing national data on Accord compliance (except for areas such as the West Coast of the South Island where the company does not operate), but as shown above there are still some important discrepancies with regional council information, particularly as to what is measured and how to analyse this. Some regional council staff noted that Fonterra had not necessarily upheld their requirements in respect of data gathering, but this concern is not unique to Fonterra, as most regional councils had failed to identify regionally significant wetlands. Some regional staff also noted that they did not have full confidence in the self reported data as the process was not adequately independently audited.

It was also noted in the development of a monitoring and reporting strategy for the Accord⁶ that:

“It will be difficult to link the implementation of the Accord with measurable effects in watercourses. A large number of factors affect water quality and biota in streams, and it will not be easy to separate what might be the relatively minor benefits of implementing the Accord from the background “noise” due to all other factors.... It is likely to take at least five years, and more likely 10-15 years, before definitive trends can be confirmed.”

In the absence of national monitoring standards from the Ministry for the Environment, obtaining and presenting national data on water quality through regionally based organisations has been difficult. The only truly national data on waters has been collected by NIWA based upon their own or contributed data⁷.

⁶ Cowie, B; R. van Voorthuysen and G Ridley (2006) A Monitoring and Reporting Strategy for the Dairying and Clean Streams Accord: Measuring the Outcomes of Implementing the Accord. Prepared for the Ministry for the Environment by Environmental Management Services Ltd,

⁷ eg Larned, S; M Scarsbrook; T Snelder and N Norton (2005) Nationwide and regional state and trends in river water quality 1996-2002 NIWA for Ministry for the Environment ISBN 0-478-25904-2 or Scarsbrook (2006) <http://www.mfe.govt.nz/publications/ser/water-quality-network-nov06/html/>

While regional councils often collect extensive water quality data there is little standardisation as to what data is collected and how it is collected.

Water quality is measured to varying degrees by regional councils around the country. There are numerous water quality criteria which can be measured and few of these are consistently measured across the country as a whole. It is therefore difficult to obtain or make direct comparisons between regions or across the entire country.

The inherent environmental variability in water quality due to rainfall events mean that water quality trend analysis requires long time frames to have any certainty about whether there are any particular trends in water quality and the direction of those trends. Trend analysis should remove consideration of seasonal and/or flow-related effects. Many parts of the country have dairy farming as only part of catchment land use. The contribution to water quality trends from dairying is difficult to measure in such cases without sound data and catchment modeling, especially where there has been land use change over the same period.

Trends can be measured in several ways. Trends in time at one site are very useful, as are trends in space (either downstream or between reference and affected sites), particularly where there is little historical data against which time-based trends can be analysed. It is clear that time-based trends rely on consistent gathering of enough data over many occasions. Trends in space, however, can be demonstrated after a single sampling occasion/period, as long as there is consistency in the way the data has been gathered

Some regions, such as Waikato, Canterbury, Marlborough and Taranaki, have undertaken varying levels of analysis of water quality trends, including analysis of changes occurring during the last five years when and/or where the Accord has been operating. Particular parts of the Waikato and Taranaki are almost exclusively dairy farming areas, these enable some comparison of the water quality effectiveness of the Accord.

Waikato

The Waikato region is a traditional dairying area and has half of the country's dairy farms. If the Accord was going to show results it would be expected that these would be obvious in the Waikato.

Environment Waikato has recently released a report summarizing water quality trends throughout the Waikato⁸. This excellent summary of detailed water and soil monitoring outlines the considerable effects of land uses on soil and water quality in the region. In particular, there is considerable emphasis on water quality trends in time and space. Overall, the report summarises that

“Monitoring of rivers and streams shows that levels of bacteria make water unsuitable for stock to drink in 75 per cent of sites, and too high for people to swim safely in 70 per cent of sites.”

The Accord goal relating to stock water drinking and swimming appears not to be met; nor is fish habitat as Figure 2 indicates.

⁸ Environment Waikato (2008) The condition of rural water and soil in the Waikato region: Risks and Opportunities



Predicted stream health for fish based on modelling and measurements.⁸

Figure 2 Fish habitat suitability in Waikato. NB Areas marked as poor fish habitat suitability are largely (but not exclusively) dairy farming areas, particularly at lower elevations. Source: Environment Waikato

It is clear that lower Waikato River tributaries plus the Waipa, West Coast and Hauraki Plains rivers, are quite likely to have water quality unsuitable for swimming. While fish habitat and swimming opportunities have worsened (figure 3), the nutrient situation in the Waikato has worsened at a faster rate, particularly over the last 10 years.

“Levels of total nitrogen and phosphorus have increased in many of the region’s rivers in the last 10–15 years. Concentrations of total nitrogen in streams across the Waikato region increased by an average of 1.3 per cent every year between 1990 and 2002. Total phosphorus also increased by an average of 1.3 per cent per year in the same period.”

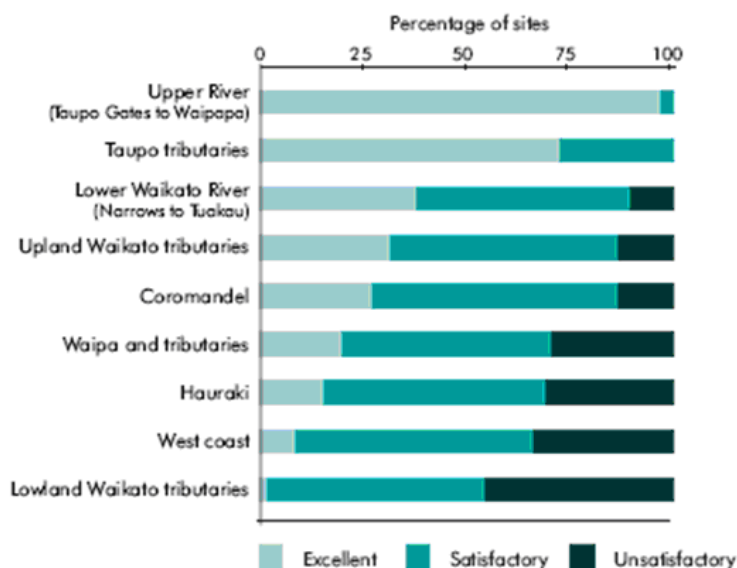


Figure 3: Bacteria Levels in Waikato rivers and streams: suitability for swimming. Source: Environment Waikato

These trends have continued. In July 2008 Environment Waikato released the background report⁹ and updated the trends to the 2007 year, as shown in the following figures 4 and 5:

“During the past ten years (1998–2007), nitrate concentrations have increased significantly at all eight sites from Ohakuri (site C) downstream (p-value ≤ 0.3% in each case). The average rate of increase during this period was 4.9% of the median value per year. These increases presumably result from the increase in agricultural intensity that has occurred across the catchment over recent decades.”

A similar trend in the Waikato River has occurred for another nutrient: phosphorus.

“During the past ten years (1998–2007), total phosphorus concentrations have increased significantly at seven of the eight sites from Ohakuri downstream (namely all except Tuakau, site J; p-value ≤ 0.4% in each case). The average rate of increase at these sites during this period was 3.5% of the median value per year. These increases presumably result from the increase in agricultural intensity that has occurred across the catchment over recent decades. That is, the removal of Taupo’s sewage wastewater from the river during the mid-1990s temporarily reduced total phosphorus concentrations in the river, but this effect has generally been out-weighted by subsequent increases in the loads delivered from other sources.”

⁹ <http://www.ew.govt.nz/PageFiles/10004/TR0833.pdf>

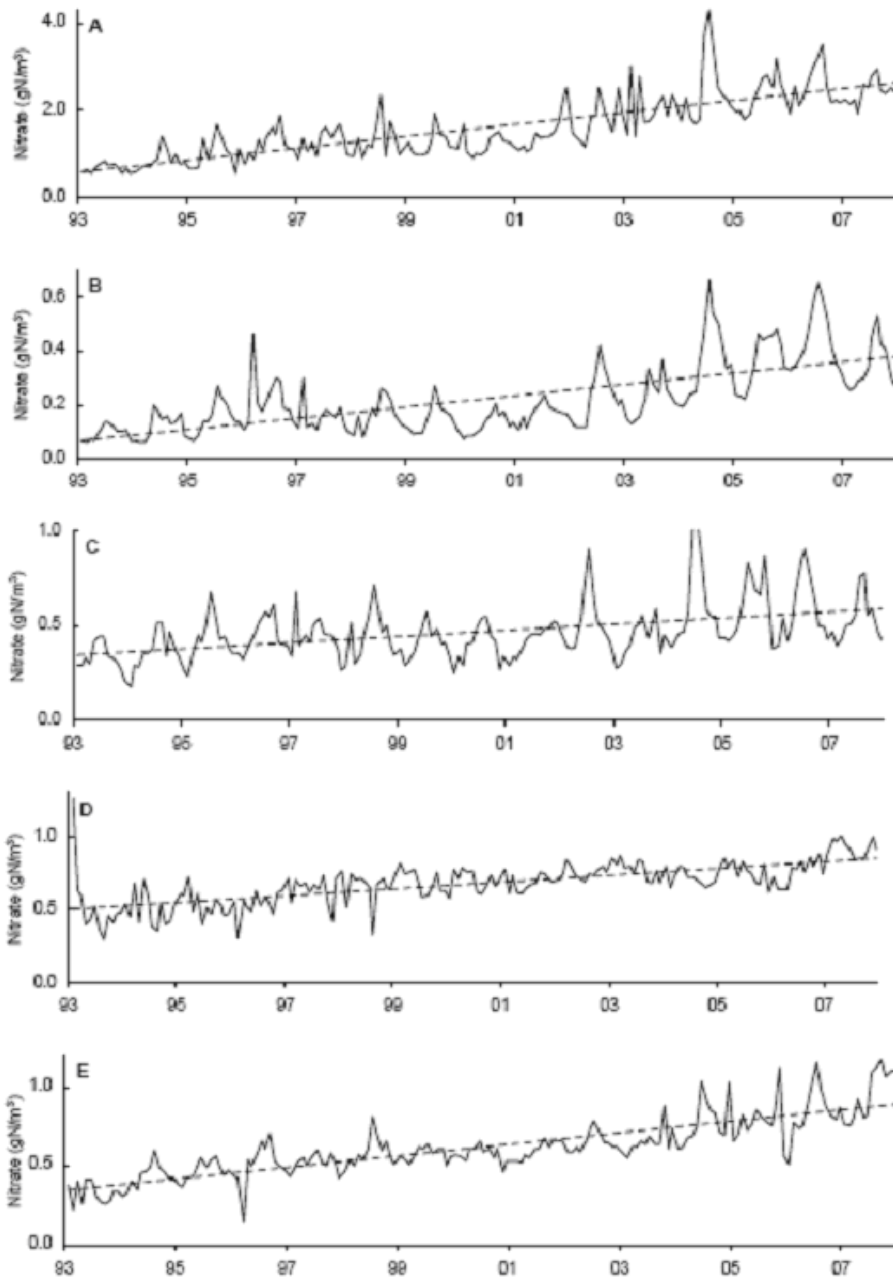


Figure 4: Nitrate concentrations at various sites in the Upland Waikato zone during 1993-2007. A, Kawaunui; B, Mangaharakeke; C, Tahunaatara; D, Waiotapu; and E, Waipapa. The dashed lines show the overall trends in the records. Source: Environment Waikato

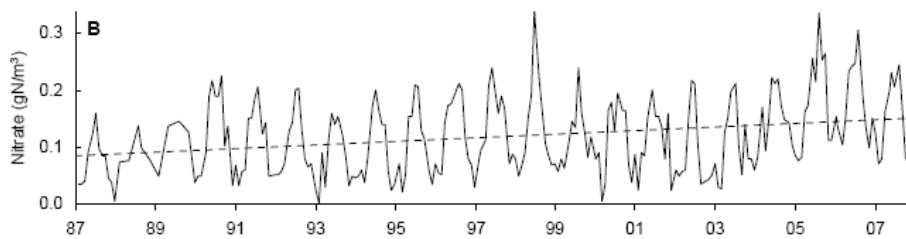


Figure 5: Trends in Nitrate in the Waikato River at Waipapa, 1987-2007. Source: Environment Waikato

It is worth noting that all of these trends have continued their long term trajectories of getting steadily worse. There has been no leveling off, or reversal, of these trends in the last 5 years of the Accord's operation.

These trends were also reflected in many of the smaller rivers and streams of the Waikato Region, as shown in the figure 6.

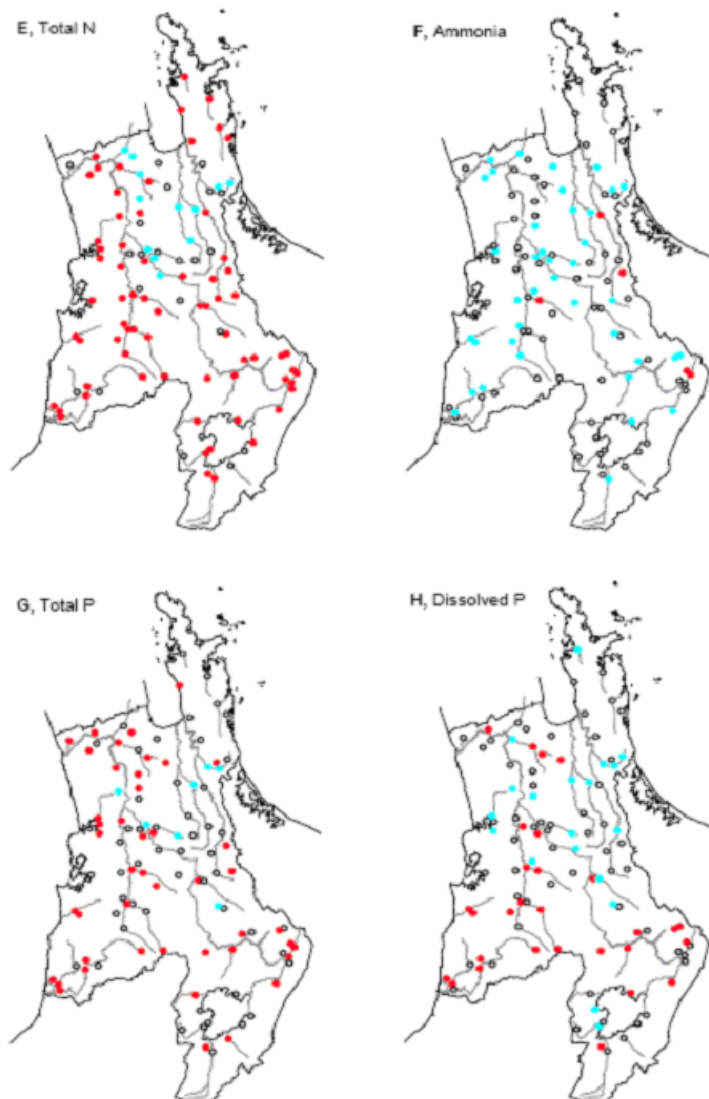


Figure 6: Nature of trends for selected water quality variables at regional river sites during 1990-2007: sites showing improving trends are shown in blue, those showing deteriorating trends in red, and those showing no significant trends as open circles. E, total nitrogen; F, ammonia; G, total phosphorus; and H, dissolved reactive phosphorus. Source: Environment Waikato

The background report states, in summary:

*“In these other rivers and streams the observed increases in concentrations of total nitrogen, nitrate, total phosphorus, *E. coli* and enterococci, and the decrease in dissolved oxygen represent a disturbing pattern of insidious water quality*

degradation which in many cases is likely to be related to the widespread and intense use of land for pastoral farming in the Waikato region.” [Our emphasis]

It is reasonable to conclude, therefore, that the water quality goals of the Accord have not been met in the Waikato; indeed, all the trend data shows trends have continued in the wrong direction.

Taranaki

Taranaki has the second highest number of dairy farms with approximately a quarter of the national total. The Taranaki ring plain has many relatively short streams arising from the mountain.

Taranaki has undertaken detailed water and macro-invertebrate monitoring¹⁰ at a number of sites throughout its region since the mid 1980s, with a specific State of the Environment Monitoring programme commencing in the mid 1990s. These have not yet been summarised in a single document as has happened with the Waikato data. The monitoring is reported on annually and compares an index of macro-invertebrates (Macroinvertebrate Community Index or MCI) as an indication of stream water health.

Unlike the Waikato, there are few consistent trends in water quality over time in all the Taranaki streams monitored. Most have shown little change; some have shown a slight improvement while others have shown declines. Where there are temporal trends in water quality it is difficult to attribute them to land uses.

While the water quality trends over time may not be clear, it is striking that in virtually every case there is a major decline in water quality as it passes through the through the dairy farmland. The streams may be short but the pristine waters that leave the National Park are significantly degraded by the time they flow into the sea.

Marlborough

Marlborough has focused on water quality concerns in the Rai River¹¹. The District Council responded to community concerns in this catchment, which is extensively used for water based recreation including kayaking, swimming and trout fishing. All landowners were contacted and stream crossings identified, with some crossings requiring bridging or removal by 2005. Despite considerable efforts by some farmers, the waters of the Rai River catchment have shown an increase in nutrients such as nitrates and total phosphorus since 1999. Initial apparently improving trends have been allowed to reverse in the latest annual report. The report notes, as is not uncommon in such reports:

“There are insufficient data from previous surveys to determine any changes to water quality that may have occurred as a result of elimination of stream crossings.”

Canterbury

Canterbury has seen a large proportion of the dairy expansion in the South Island. While this has occurred in many parts of the region, dairying remains a minor proportion of the land use

¹⁰ For example, Taranaki Regional Council (2008) Fresh Water Macroinvertebrate Fauna Biological Monitoring Programme Annual State of the Environment Monitoring Report 2006-2007 Technical Report 2007-22 (and Report CF409)

¹¹ Neame, L (2008) **Rai River Catchments Monitoring Report for the Dairying and Clean Streams Accord** for Marlborough District Council

in many catchments, some of which are comparatively large. It has been difficult, therefore to measure the effectiveness of the Accord on water and habitat quality in new dairying areas.

There are several areas with detailed monitoring, however. One is the relatively small Waikakahi Stream in South Canterbury. This is a lowland, low gradient, spring fed stream within the area of an irrigation scheme operating from the lower Waitaki River. It was formerly dry stock farming land with the stream having free stone gravels and providing good trout spawning habitat and habitat for freshwater mussels (kakahahi; hence the stream's name). At that time, little of the stream was fenced off, but as the adjacent land has been acquired and developed for dairy farming, its water and habitat quality has rapidly declined.

The Waikakahi has become one of five study catchments from throughout the country which have been intensively studied while receiving 'best practice' farming methods. Remedial action has been undertaken over the past 10 years or so, for example with most of the stream now fenced from stock. Regrettably the stream's water quality has not improved significantly and its water quality fails to meet standards for dissolved oxygen, water clarity, faecal coliforms, nitrogen and phosphorus levels.¹²

A similar example is the monitoring by Environment Canterbury of the Rhodes Stream and Petries Creek catchment, which are small spring fed streams on flat land lying north east of Temuka in South Canterbury.¹³ Some 87% of these catchments are in dairy farms. Most, but not all, these streams are fenced and most, but not all, stock crossings have been bridged or culverted. The report summary states:

“Rhodes Stream and Petries Creek have high levels of clarity and other than Nitrate and Nitrite N, reasonably low to moderate degrees of other nutrient enrichment. The microbiological quality of both streams is generally poor at times presumably because of run-off from surrounding pasture. Maintaining these high levels of clarity and low levels of enrichment should be a main area of focus.”

The nitrate/nitrite levels were many times the standards; being twice the level for safe human consumption and over 1000 times that for growths of undesirable periphyton (slimes). Relatively low levels of phosphorus generally limit algal growth, however. The report noted that there was a general decline in most water quality parameters down the length of the Petries Creek, but the reverse in Rhodes Stream. The report notes that there is inadequate information for water quality trends to be analysed, except that it states that, in respect of the elevated nitrate/nitrite levels:

“The trend data indicate that this has got progressively worse since 1999, as further land intensification has occurred (irrigation, and dairy conversion). Improvement in land management practices and especially nutrient budgeting in areas above the Rhodes Stream/Petries Creek catchment could significantly improve this effect.”

¹² Wilcock, RJ; RM Monaghan; BS Thorold; AS Meredith; K Betteridge; MJ Duncan 2007 Land-Water Interactions in Five Contrasting Dairy Catchments: Issues and Solutions *Land Use and Water Resources Research* 7 (2007) 2.1–2.10

¹³ Jones, R (2007) Dairying and Clean Streams Accord: Results of Tier 2 Monitoring within the Rhodes Stream/Petries Creek Catchment Area. Report No. U07/82 ISBN: 978-1-86937-731-1

The report also notes that the quantitative MCI scores show that both creeks are in the fair to poor water quality class for about 75% of the time and are typical of degraded lowland streams on the Canterbury plains, subject to ‘moderate to severe pollution’, together with evidence of instream habitat degradation.

The summary and also the conclusion goes on to level criticism at Fonterra and cast doubt upon the information provided to Fonterra on which it has reported:

*“While the thrust of compliance with the Dairying and Clean Streams Accord lies with Fonterra and its shareholder farmers it is disappointing to **discover there is little monitoring of progress towards achieving the Accord targets and no auditing of the information supplied by the shareholders. This is borne out by the data supplied by Fonterra and its shareholders which states compliance with Accord targets while ECan’s physical inspection of the catchment has revealed quite different conditions as revealed in this report.** There is, however, a window of opportunity for Fonterra to provide some robustness to their monitoring programme and request their shareholders to achieve a greater level of compliance before the next round of monitoring begins.” [Our emphasis]*

In Canterbury, therefore, there is still work to be done and little evidence of water quality improvement through the first five years of the Clean Streams Accord.

Implementation of so-called ‘Best Practice’

One of the foundations of the Accord has been the assumption that ‘best practice’ as outlined by the five inputs of the Accord, would deliver an acceptable improvement in water quality. However, the Accord does not provide any explicit measurable targets for its goal of improving water quality for fish, stock drinking and swimming.

Research has looked at implementation of ‘best practice’ water quality management in five dairy catchments across the country (Wilcock et al, cited above). The results have not been particularly encouraging:

“Trend analysis and specific yields of nitrogen, phosphorus and suspended solids for two streams that have been monitored for five years indicates that little change has occurred in water quality. However improved water quality has been detected in the trends of the streams which have been measured for 10 years, as a result of reductions in point sources and improved stock management (less intensive grazing and better instream fencing) that has taken place over the longer period. [Our emphasis]

Note that improvements, where these have occurred, are over longer periods as a result of reduced - rather than increased - intensification. Few of the water quality parameters measured were within target levels. Figure 7 gives examples of faecal coliform measurements which are all above the standard.

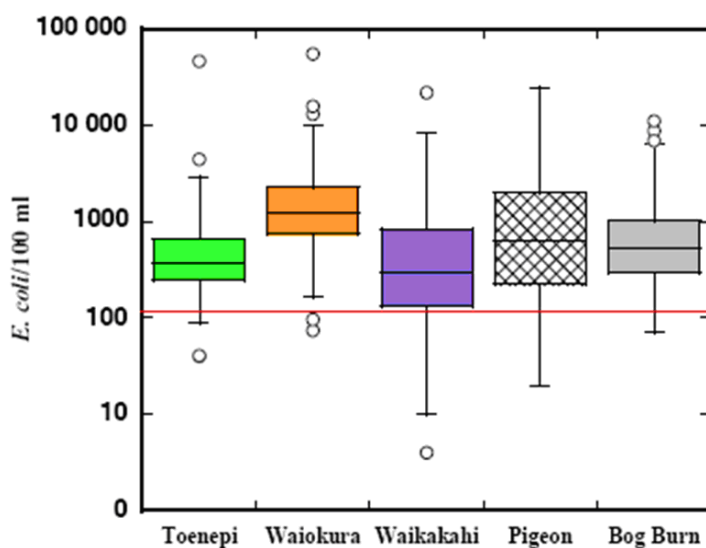


Figure 7: Range of Faecal coliform levels in five dairying catchments. Median faecal coliform standard is the red line. From Wilcock et al, 2007.

Stock has been fenced out of most of the length of these streams and the catchments have received considerable implementation of ‘best practice’; generally more than has been specified in the Accord. Yet, as the table shows, for the majority of these catchments standards for most water quality criteria have been breached; in most cases several fold.

Table 2 Summary of water quality results from five dairying catchments. Data from Wilcock et al (2007)

<u>Catchment</u>	<u>Dissolved Oxygen (%)</u>	<u>Black Disc (m)</u>	<u>E. coli (MPN/100 ml)</u>	<u>NOx-N (g/m²)</u>	<u>NH4-N (g/m²)</u>	<u>TN (g/m²)</u>	<u>FRP (g/m²)</u>	<u>TP (g/m²)</u>
<u>Toenepi</u>	80.7%	1.4	367	1.19	0.022	1.76	0.089	0.174
<u>Waiokura</u>	96.5%	0.38	1250	2.82	0.026	3.29	0.032	0.111
<u>Waikakahi</u>	87.4%	0.77	290	1.76	0.022	2.3	0.075	0.12
<u>Pigeon</u>	90.6%	0.86	640	0.284	0.104	0.713	0.059	0.12
<u>Bog Burn</u>	92.5%	1.05	530	0.755	0.02	1.1	0.023	0.102
<u>Mean of 5 site Medians</u>	89.5%	0.892	615.4	1.3618	0.0388	1.8326	0.0556	0.05
<u>Standard</u>	98-105%	1.6	126	0.444	0.9	0.614	0.01	0.033
Standard Exceeded	Yes	2-fold	5-fold	3-fold	No	3-fold	5-fold	Yes

For this reason we have called these examples of ‘good practice’ that is clearly not yet enough to meet the stated objectives. Of as much concern is that farmers and the public are likely to expect that so-called ‘best’ practice will be sufficient to achieve the stated water quality goals. If, even in the present best examples, the goal cannot be achieved, levels of frustration are likely to increase for both farmers and the community at large.

The problem is being exacerbated by land use intensification, coupled with dairy expansion. Fonterra has a stated production growth goal of 4% compound per annum, or a doubling of dairy production in 17 years. Part of this will come from the development of new dairy farms and part from intensification of existing farms. Figure 8 shows both the effects of increasing stocking rates of dairy cows on the amount of nitrogen runoff into streams and the increase in the amount of nitrogen fertiliser use from the early 1990s until 2007 in the Waikato.

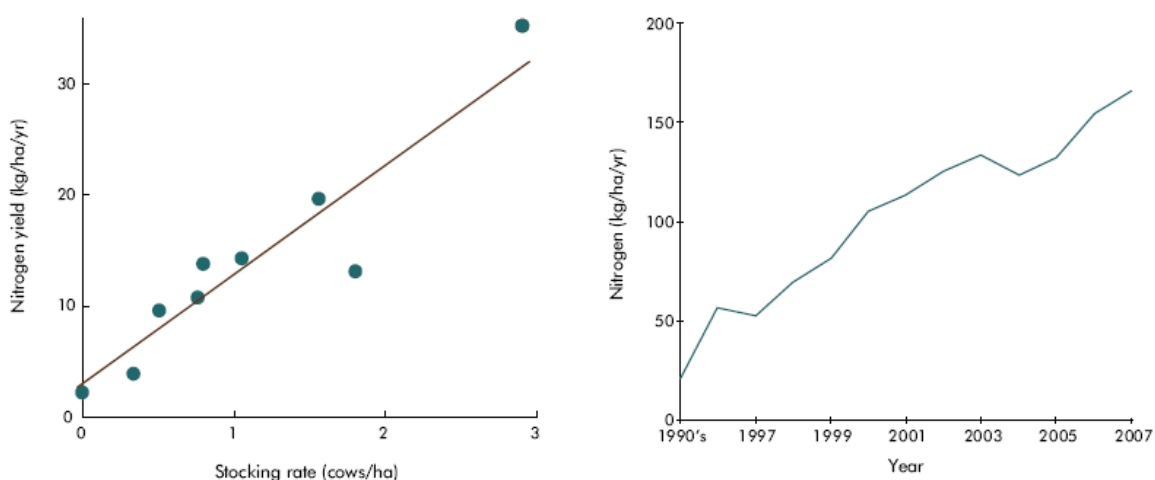


Figure 8 Relationship between stocking rate and nitrogen runoff; increase in use of nitrogen fertilisers in Waikato. Source: Environment Waikato

The effects of intensification are cumulative and pervasive even when coupled with the improved use of simple technologies such as fencing streams from stock, riparian planting and the use of nutrient management systems. The obvious solution to water quality problems from over-intensification is to carry out less intensive management. This was part of the message from the Parliamentary Commissioner for the Environment's 'Growing for Good' report¹⁴.

¹⁴ http://www.pce.govt.nz/work_programme/reports_by_subject/all_reports/land_use/growing_for_good

Do voluntary accords work?

The most successful recent accord to deal with issues of sustainability in the primary production sector would be the 1991 NZ Forest Accord. This was an agreement between the key protagonists in the heated debate during the 1980s regarding the clearing of native forests for wood-chipping and conversion to pine plantation. The Forest Accord was eventually negotiated and signed by 10 conservation and recreation organisations and the New Zealand exotic forest industry represented by the NZ Forest Owners Association, the NZ Farm Forestry Association, the NZ Wood Panel Manufacturers Association and the New Zealand Timber Industry Association.

In return for agreeing to strict rules restricting what native vegetation could be cleared for exotic forestry, the conservationist and recreation organisations agreed to acknowledge the importance of plantation forestry as a means of producing wood products and energy on a sustainable basis while promoting and protecting the conservation of remaining natural forests. They also agreed to promote this understanding both within New Zealand and internationally.

At the national level both the conservation movement and the forest industry have worked together to have the Forest Accord's definitions of what natural vegetation should be protected from clearance for plantation forestry adopted as the vegetation clearance rules in regional and district plans. The key international success of the Forest Accord has been the conservation movement assistance given to the New Zealand forest industry in its successful attempt in the 1990s to overcome the long held resistance to the use of fast grown New Zealand plantation *Pinus radiata* timber in the valuable Japanese building timber market.

This co-operation in promoting the Accord's voluntary objectives and instruments into the resource management regulations, and to international markets has meant that the Forest Accord has survived for 17 years. Recently the good working relationship between the Forest Accord partners has spawned the 2007 New Zealand Climate Change Accord and a recent joint forest sector, wood product sector and conservation sector statement on the elimination of illegal forest products in New Zealand.

The key differences between the Clean Streams Accord and the New Zealand Forest Accord are that:

- The Clean Streams Accord is not an agreement between the main protagonists. It is a voluntary agreement between the dairy industry and the local and central government agencies which are meant to regulate the dairy industry. The CSA has therefore not led to greater understanding and co-operation between the main protagonists in the water quality debate;
- Whereas the Forest Accord partners have worked together to have their vegetation clearance definitions adopted as regulations in regional and district plans, the Clean Streams Accord partners have used the Accord's voluntary approach as an argument against further regulation to improve water quality in dairying areas;
- Whereas the Forest Accord has been successful in achieving its goal of protecting native vegetation from clearance for plantation forestry, the Clean Streams Accord has so far proven unsuccessful in reducing the negative impact of dairying on the quality of our freshwater.

Within the district planning context, voluntarism as a substitute for rules in plans has also been a failure. In Rodney District (Auckland Region) an incentives programme to protect indigenous vegetation operating over the past 25 years has failed to halt a significant on-going loss of vegetation. Whereas a rules-based approach in neighbouring Waitakere City over the same period has resulted in on-going gains in indigenous vegetation cover and biodiversity values.¹⁵

This highlights the need for rules in plans as the baseline for protecting the environment, from which other agreements can improve upon practices to meet and improve on these minimum standards. Voluntary accords, like RMA plans, are most acceptable and enduring if there has been opportunities for all parties to participate in their development and implementation.

¹⁵ Bellingham M 2008 Does district planning under the RMA protect biodiversity? PhD thesis, University of Auckland.

What are the alternatives to the Accord / voluntary approach?

A common feature of voluntary approaches to dealing with controversial natural resource issues appears to be that they may be relatively effective in the first few years in promoting attitude changes within the majority of the industry to adopt new 'good practice'. However, because they are voluntary they tend to have little influence on the behaviour of those industry players who are not interested in changing their practices.

The absence of mechanisms to deal with poor performers means that the voluntary approach can soon become an impediment to making further progress. Following the initial attitude and practice shift the next step should be to set in regulation this new 'good practice' standard as the industry minimum. Such a move has no effect on the majority of industry participants as they have already reached this standard. However, it does drive poor performers who resist the necessary change to adopt the industry standards.

The voluntary approach adopted by the Government in 2004 to dealing with the bykill of seabirds by the New Zealand fishing industry has followed this trajectory. While many in the fishing industry responded to the government's voluntary guidelines for minimising seabird bykill, a significant minority did not. Continued examples of poor practice by that section of the fishing industry lead to the government introducing regulations that required compliance with what were previously voluntary mitigation measures.

The failure of the Clean Streams Accord to improve water quality, and the absence of any effective mechanisms to deal with the sizable minority of dairy farmers that continue to flout the law in respect to their dairy effluent discharge resource consents indicates that the Accord in its present form is failing and needs to be either fundamentally reformed or else a new approach is required.

Conclusions

From the outset the Clean Streams Accord has been criticized by organisations such as Fish & Game and Forest & Bird, as avoiding necessary regulation and not adequately addressing the key issue of achieving and measuring improved water quality.

This analysis of water quality in dairying areas and of the Accord's monitoring reports suggests that our original concerns were valid, despite the achievement of some of the Accord's targets in some regions. Water quality in dairying areas has not shown consistent improvement. In those few dairying dominated areas where detailed trend analysis has been undertaken, such as the Waikato and Taranaki, water quality has, at best, been maintained below the stated goals, or has continued to decline.

There has been no consistent or obvious improvement where water quality has been measured and in many cases water quality has continued to decline. In areas such as the Waikato, which has both some of the most intensive dairy farming and the highest proportions of catchments in dairy farming, the water quality trends are all heading in the wrong direction. As one university Professor has stated:

*“Government and the dairy industry have been prepared to sit back and say that self-regulation will work. It isn't and regulation and leadership are required urgently”.*¹⁶

This analysis goes further in questioning whether the stated goal to improve water quality is achievable using just the methods set out in the Accord. While these methods are undoubtedly necessary, they are almost certainly insufficient on their own. Regional council evidence shows Fonterra's goal of 4% compound growth is directly working against achievement of the Accord's goal of improving water quality.

While supporters of the Accord have argued that it has been instrumental in changing attitudes and actions amongst the majority of dairy farmers, it is clear that as a voluntary measure, the Accord is unable to deal with the significant minority of dairy farmers who have failed to comply with its requirements.

It can be argued that water quality would be in a worse state if the Accord had not been in place. However, it is also possible that without the Accord regional councils would have introduced and enforced stronger measures to improve water quality, and central government may have moved quicker to establish national water quality standards and policies.

The effectiveness of voluntary approaches such as the Dairying and Clean Streams Accord must be called into question. Calls for further voluntary approaches fail to answer the structural criticisms outlined above.

The failure of the Accord to meet its major goal after five years, plus the continued failure of a minority of dairy farmers to comply with their dairy effluent discharge resource consent conditions, indicates that it is time to move beyond the Accord. If the impacts of dairying on the quality of New Zealand's freshwater resources are to be reduced much stronger and enforceable requirements must be put in place.

¹⁶ Professor David Hamilton quoted, in reference to the 2007-8 CSA report <http://www.scoop.co.nz/stories/SC0802/S00062.htm>

Recommendations:

Fish & Game New Zealand and Forest & Bird recommend that:

- A full independent review of the Dairy and Clean Streams Accord's effectiveness should be commissioned
- If it is to continue, the Clean Streams Accord needs to:
 - be reconstructed as an agreement between all major stakeholders, not just the dairy industry and regional and central government;
 - include well-defined outcomes and timelines for improved water quality;
 - regulate and enforce the present Accord measures;
 - adopt new measures and targets for meeting the goals of improved water quality;
 - ensure there is regular review to enable new or improved methods to be brought in;
 - establish consistent nationwide benchmarks for assessing Accord performance;
 - establish consistent and effective nationwide measures and monitoring of water quality associated with dairying; and
 - contain enforcement provisions to ensure poor performers face appropriate sanctions.

Acknowledgements

Thank you to the many regional council staff who provided a response to our enquiries on this topic.