

Review of the Lake Brunner Project 2015

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Lake Brunner at Moana



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Introduction

Situated near Greymouth Lake Brunner is the largest lake in the West Coast region of New Zealand's South Island. Covering an area of 36.1km² and with a maximum depth of 106m.

The Lake Brunner Project is a community led project which came about when West Coast Region Council (WCRC) identified the Lake as being phosphorus sensitive. This means an increase in phosphorus, when combined with existing nitrogen levels, could cause the lake to degrade further.

Elevated phosphorus levels contributed to greater phytoplankton growth, which in turn led to a decline in water clarity. This triggered 'alarm bells' for the local community because the Lake is important as a Trout fishery and recreational area for locals and tourists alike. The town of Moana, situated beside the Lake, can host up to 2,500 people in holiday periods and is an important destination for local and international tourists who visit and contribute to the local economy.

Intensive dairy farming around the lake was identified as the main driver of nutrient increases.

The Lake Brunner problem - dairy farming?

There are 22 dairy farms around Lake Brunner and Lake Poerua. The industry has been under high development pressure, plus 25% of the catchment is in farmland pasture.

WCRC water quality monitoring alerted the community to the following:

- Increasing Phosphorus
- Declining autumn oxygen levels on the lake bed
- Decreasing water clarity
- 4825mm/yr in rainfall

Westland Milk Company and DairyNZ encouraged land-users to mitigate the effects of farming operations to meet Council regulations. Full compliance and clean water is now recognised as an important value for Dairy products sold in the international dairying market.

Farmers were interviewed to determine their perspectives. Once they understood what was expected of them, the most common sentiment was 'they needed time.' Time to conduct research and identify solutions that took advantage of the latest technologies. Farmers said they needed time to evaluate new effluent system options, low rate application systems for spreading effluent to land, planning for bridging, culverts and the fencing off of streams. They also needed time to plan financially and physically while performing normal farming routines.

History of work at Lake Brunner

Improving freshwater through community collaboration and farm environmental planning.

Background

In 2002-3 Community awareness of the potential for Lake Brunner to succumb like the Rotorua Lakes to eutrophication* was raised by the West Coast community; who wanted to be proactive and intervene sooner rather than attack a bigger problem later on.

This led to a study which was funded by Sustainable Farming Fund and carried out by DairyNZ and AgResearch. It included trials on five different dairy farms around Inchbonnie to look at the effectiveness of different mitigation options on individual farms, in terms of phosphorus loss to the lake and the impact on profitability.

The study used the Farmax model for profitability analysis and the Overseer model to estimate the potential phosphorus loss reduction for each scenario. Options included all paddock soil-testing, only applying phosphorus fertiliser at required rates to maintain optimal Olsen P, moving to a low solubility source of phosphorus fertiliser, changing from high-rate to low-rate application of effluent as well as changing the size of the effluent area, restricted grazing using a feed pads, wintering facilities and fencing off streams.

Those five farms then signed a statement of intent and were given environmental farm plans.

NZ Landcare Trust together with WCRC, DairyNZ and farmers committed to taking a community led approach to help initiate farm plans throughout the catchment area. This was funded by the Sustainable Farming Fund and NZ Landcare Trust. The aim of this initiative was collaboration with farmers in developing personalised Environmental Farm plans over a twelve month time frame.

Individual Environmental Farm plans were prepared during 2004/05 by Jan Derks of TACCRA Ltd in collaboration with willing farmers. The plans allowed for differences in farm scale, landscape, stream numbers and a variety of other factors.

This was a voluntary measure with the following outcomes:

- 81% participation by farm number
- 82% of recommended works completed by 2010
- 90% would like to have a phase two farm plan

* See Appendix 1: Potential impacts of eutrophication on water quality and mahinga kai

2010 The challenge for the Lake Brunner community became mandatory

In 2010 the West Coast Regional Council introduced their Land and Water Plan, which included special provisions for Lake Brunner:

- All stock excluded from waterways (minimum 1 m setback).
- Humping and hollowing – Discretionary activity (previously permitted up to 5 ha in 12 month period).
- Fertiliser applied to developed land (e.g. humping and hollowing) must have water solubility of less than 10% (e.g. RPR).
- Resource consent required for any stock crossing that has not been bridged or culverted.
- Low rate application of agricultural effluent to land.

Lake Brunner & Inchbonnie Farmers faced the economic realities of a future which requires finding the balance between sustainable farming and ecological good practice. Many farms in the Lake Brunner catchment have numerous waterways flowing through them. Monitoring reports warned of poor water quality but it was noted that within a national context the Lake was a lot better than many others. A few farmers could not see the need for action believing 'the lake is fine, overseas fishers say there is nothing wrong.'

However the farming community pushed on with their farm plan approach to meet environmental expectation, supported by WCRC, Industry, NZ Landcare Trust and broader community.

The WCRC with its small rating base and 87% of the region in Conservation estate had to balance its limited income against many competing demands. There was no general contingency budget or contestable environmental fund to assist landowners.



2012 Funding was granted to the group from Ministry for the Environment Fresh Start for Freshwater Fund

The West Coast Regional Council and Westland Milk Products formed a partnership with the Ministry for the Environment to assist farmers and the Lake Brunner community to deliver projects that go beyond what is simply required to protect the lake.

Central government provided \$200,000 to the catchment to help with fencing and riparian planting along the myriad of waterways.

Lake Brunner Community Catchment Care Group was formed with support and Guidance from NZ Landcare Trust and West Coast Regional Council to enhance public land around the lake. This group was allocated \$20,000 for plantings and restoration works.

- Regional Council and Westland Milk Products have funded the preparation of a second round of farm plans in the catchment to the value of \$66,000.
- Freshwater fund has contributed up to 50% of the works recommended in the farm plans (up to \$10,000 per farm) with the landowner contributing the remainder.
- Works funded under the farm plan recommendations will need to go over and above what is already required under the current regional rules e.g. 5m setback from waterways and planting out of riparian margins.
- Works funded must also contribute to freshwater remediation.
- NZ Landcare Trust made a large 'in kind' contribution as well as providing a small cash contribution.



The current state of Lake Brunner

Lake Brunner currently remains in an oligotrophic (low nutrient) state, safe for swimming and other recreational activities. Water quality has declined since 1992. In the past, when data from the entire record has been analysed, there have been important deteriorating trends for a number of parameters. From 2001 onward, only nitrate and total nitrogen were increasing. An increase in total nitrogen was driven by increasing nitrate. Nitrate levels have also increased in the tributaries. Increasing nitrate is most likely a result of agricultural activity. Nitrogen is high in proportion to other variables like phosphorus and chlorophyll a. Dissolved nitrogen is easily leached and nitrogen from all sources is likely to leach in abundance given the catchments wet climate. But as Lake Brunner is phosphorus limited, an increase in nitrate is unlikely to affect lake biology without an accompanying increase in phosphorus.

Cashmere Bay water quality is poorer than that in the open lake due to a different suite of physical features when compared with the main body of lake water. Nitrate has increased but clarity has improved. Despite increasingly long periods of low oxygen at the bottom, phosphorus and subsequent plankton proliferations were not observed.



Farmer engagement and uptake of Environmental Practices

Twenty farmers were telephoned to take part in a survey. Eleven agreed to complete the survey. All of the farmers interviewed were dairy farmers.

The purpose of the project survey was to determine whether farmers have been successfully engaged in actions to improve water quality in Lake Brunner and to gauge the level of implementation of good environmental management practices on Dairy farms, following up on the development of individual management plans. It seeks to establish:

1. The level and type of changes in environmental practices.
2. What is driving the changes?
3. The level of financial investment in changes.

Age Bracket (years)	Number of Respondents
20 – 29	1
30 – 39	2
40 – 49	2
50 – 59	3
60 – 70+	3

Completed Works by 11 of the 22 Lake Brunner farmers over past three years

Bridges	70K Fencing cost	Culverts	Plants	Cow Barns	Effluent upgrades	76 ha Land Retired @ \$20,000per ha	Labour	total
45,000	73,500	73,000	53,386	\$550,000	1,730,000	1,520,000	227,086	4,198,972

Prior Works completed

Bridges	Fencing	Culverts	Plants	Cow Barns	Effluent upgrades	Land retired	Labour	Total
300,000	25,000	34,000	6000	0	65,000		28,000	458,000

Works planned for next 5 years

Bridges	Fencing	Culverts	Plants	Cow Barns	Effluent upgrades	Land retired	Labour	Total
			7000		864,000		10,000	\$881,000

Information received, was it relevant and useful and how did you receive it?

Farmers say that when they first received information about the state of the Lakes they found it hard to believe because the Lake looked OK. Landowners learned from Council, DairyNZ and Ag-research meetings that the Lake is Phosphorus sensitive due to a number of factors including land use practices:

- The high rainfall,
- Leaching from their intensive farming practices and natural sources of the surrounding eroding mountain country,
- Nitrogen, nitrates and phosphorus ends up in the Lake because it is a 'sink'.
- The lake has increasing high nitrogen levels and phosphorus escape from farms must be limited to stop further decline.

One farmer said *'when it all first began in 2004 there was no one around who could give good sound advice for the high rainfall conditions.'* She said, *'they had trouble getting some of the Council staff to understand Phosphorus was the problem.'*

Some farmers say, the most recent information received about the lake is still somewhat confused. *'To us the Lake looks fine. We don't really know if what we have done is making a difference yet.'*

Farmer contact with regional council staff or professional organisations

When farmers were asked about contact with Council staff or other professional organisations they showed appreciation for a number of Regional Council staff and rural professionals, especially those who could collaborate and have a genuine working relationship with them. Farmers expressed frustration when initially they perceived a strong regulatory approach but they openly appreciated Council staff understanding weather, financial and or time constraints.

Comment included:

'The young lass from the Council has been practically helpful.'

'Westland Milk staff have been helpful and supportive.'

'Individuals in the Council have been patient and helped me heaps with Fish & Game.'

'NZ Landcare were good, they got the true collaboration going.'

Four of the eleven farmers interviewed said they preferred to work independently however on further questioning admitted they have talked with other farmers or observed what others have done.

The majority of farmers commented they recognised the whole exercise has been a collaborative effort between, Council, Westland Milk and farmers *'a problem was identified, we became pro-active'*.

A large number of Farmers mentioned time difficulties and politely expressed frustration about this.

What farmers initiated

Farmers were asked about actions they have initiated and replied, *'contact and discussion with other farmers about infrastructures and methods to reduce nitrogen and phosphorus run-off from farms to improve Lake Brunner's water quality has taken a mix of approaches over a number of years.'* They also acknowledged the benefits of working as a group.

Farmer leaders also said, *'they tried to lead by being a good example.'*

A number of farmers mentioned talking with others outside of the district to learn from what works elsewhere. *'75% of what we have done has been influenced by discussion with other farmers', 'It's been a hard, long road, but out of that confusion and frustration has evolved a dairying community with a set of workable rules that make sense and are not so onerous after all.'*

Farmers report they are positive about the changes they have made. A number of the farmers have history with the area and say they now have a special interest in achieving environmental good practice. *'It's a balance',* one said, *'Between trying to make a living for our family and protecting the environment we live in. We want our children to enjoy farming.'* Some said *'it's about protecting the asset'* and another *'about keeping the farm saleable.'* One reported they had to be open to change. A number acknowledged DairyNZ, the Regional Council staff, NZ Landcare Trust, Westland Milk naming individuals who they have talked them through the process, assisted them with consents, support with practical fencing fund assistance.

Discussion to identify barriers

Factors defined by farmers are:

- Cost, excessive costly engineering for a volatile ephemeral stream.
- Cash flow/ low payout.
- Consent process, time and cost is an added frustration for many.
- Time.
- Number of wet days in the year.
- Learning how to collaborate.
- Researching and learning what would work.
- Finding solutions for our high rainfall area of over 4.5 meters annual rainfall, took time.

Farmers say financial concerns, wet weather and the time for learning and collaboration required to make long term sustainable changes, particularly when the milk payout is depressed are all barriers to action and progress. When interviewed farmers tended not to put a dollar value against their time and say they are always time short.

What would you like to do in the future?

Younger farmers from the <50 age bracket said they are interested in more holistic natural, cost effective methods to filter farm run-off from land before it reaches the lake, specifically wetlands or, using worms to break down effluent, nutrient management was also mentioned.

Those farmers in the older 60+ bracket said they feel they've done all they can to improve water quality on the lake and want out of the dairy industry. Some suggest they could do more fencing and realignment of paddocks to reduce impacts and improve day to day farm management.

Others say they would like to plant more riparian areas and to plant stock shelter for windy wet conditions.

Another said he would keep making improvements.

Farmers expressed interest in information about the lakes improvement. Most farmers said they are almost there, meaning, their farm plans are almost complete.

General Discussion - the cost of progress

After 10 years of action farmers around Lake Brunner and Inchbonnie say they are suffering from the demands of organising and completing works to improve the lake. They say they still want to come together as a Landcare Group without 'hangers-on' who have their own agenda. The general opinion amongst farmers is that most have risen to the challenge. They say, farm plans are all but completed, with only a few lagging behind. Some farmers say they're hoping just maintenance will be required from now on, while others say they would like to see new innovations and are interested to know what ideas will evolve in the future.

Another said he is keen to see improving trends in the lake and wants to hear about visitors enjoying the lake and fishery. He suggested reading stories which report Lake Brunner has not been ruined by dairy farming would be a very nice conclusion to the past 10 years of community work.

Do you need any support from any agencies to progress improvements?

Farmers say they need Council and agency help. They also need staff and the wider community to understand that it took several generations to create the problems in the Lake and it's going to take time to find solutions and see results. Farmers say, *'there is no instant fix, it is a journey that is inherited, they will need ongoing Industry and Council support to make it happen.'*

One farmer suggested streams of importance should be ranked, while another expressed concern that the up take of slurry tankers is not going to be the answer.

This question also prompted requests for education about grazing of winter crops and new innovative ideas such as incorporating wetlands to filter farm run-off or using worms to break down effluent. They also raised TB as an industry problem that needed continued ongoing awareness, as planted riparian margins will create further habitat for possums alongside where cows graze - creating yet another risk for farmers.

'Rural communities will require higher levels of external support and over longer periods to move towards sustainability, compared with communities closer to urban areas.'

Gerard FitzGerald 'The enduring rural community: an endangered species? Applied Sociology, Christchurch



Appendix 1:

Potential impacts of eutrophication on water quality and mahinga kai

Excessive plant and algae growth and decay - especially invasive weed species.

Decreased dissolved oxygen (DO) levels - fish 'breathe' oxygen through their gills, therefore a decrease in available oxygen (anoxia) in the water column threatens their ability to respire, which may lead to death.

Increased turbidity and decreased water clarity - water becomes cloudy and coloured green and brown, which reduces the ability of fish to see, prey, and detect predators.

Seasonal release of nutrients stored in the lake bed sediment - contributes to the cycle of eutrophication.