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## **The Orari, Temuka, Opihi, Pareora (OTOP) Project – social community assessment**





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## Summary

As part of the Canterbury Water Management Strategy (CWMS), the Orari, Temuka, Opihi and Pareora (OTOP) Zone committee will provide recommendations on regulatory and non-regulatory measures as an addendum to the already developed zone implementation programme. This report has been prepared by Landcare Research, at the request of Environment Canterbury, to provide the OTOP Zone committee with background and contextual information about the OTOP community, to underpin community consultation, and to support the development and assessment of different scenarios for the Zone. The report aims to provide an overview of contemporary community profiles in OTOP zone, and identify the key relationships and/or indicators that will allow the community, rūnanga, industry, and local authorities to understand the implications of different future scenarios for the zone.

Information was gathered using desktop research methodologies, drawing on publicly available and existing data from a range of organisations. Data were supplemented with information gathered from interviews conducted with key individuals representing a range of community interests and backgrounds. A high level thematic analysis identified the key social, economic, and community relationships and measures that could be used to examine alternative future scenarios.

### Key findings

From the analysis a number of key themes emerged that provide insight into local drivers of social and economic change in the OTOP zone:

**A long, proud, and diverse history as an agricultural zone:** The OTOP zone has been largely agricultural since the late 19<sup>th</sup> century, and has weathered many changes, including restructuring and removal of subsidies in the 1980s. The area is highly versatile and produces a mix of agricultural products that has varied over time with changes in markets and other relevant factors. The secondary processing industry has also developed and changed over time, but has always been strongly centred on the port at Timaru.

**Strong economic growth:** Currently, the OTOP zone is experiencing a period of strong economic growth. This is driven primarily by the dairy sector and accompanying increases in irrigation, which bring a number of associated environmental pressures and social challenges. Environmentally, both water availability and water quality have become key issues. This is starting to have adverse effects on the relationship between farmers and the urban community. Dairy farming also brings with it different structures in the operation of a farm, including more permanent staff as well as casual workers, sharemilking arrangements, and often a different gender balance in roles. These changes are likely to impact on the way decisions are made on farms.

The expansion of dairying has also changed the dynamic of secondary processing industries in the area. There is increasing dependence on Fonterra, which has recently expanded its processing operations at the Clandebye plant and is looking to become more closely involved with other local operations, such as the port.

**Changes in community composition and identity:** The OTOP area, particularly Timaru, has traditionally been seen as a pleasant place to retire, and demographic projections suggest that the ageing of the population will continue. An increasing percentage of the population identify as Māori, and there is also increasing influence of Māori in resource management issues, for example, in promoting the creation of *Te Ahi Tarakihi Mataitai Reserve* at Caroline Bay.

Immigration to the area from both international and domestic sources is growing. This creates an increasingly multicultural community and brings with it the challenges of a range of newcomers to the area. Employers are a key resource both for understanding and improving problems facing migrant workers. In particular, the well-being of migrant dairy workers may be important to improving the environmental performance of dairy farms as farm workers play a key role in on-farm outcomes.

**Recreation and tourism:** Tourism is growing quickly and represents an area of opportunity. Currently, the Timaru district is often a stopping point for visitors to Tekapo and Geraldine on their way to or from Queenstown. There is general appreciation of the environment and associated recreational opportunities in the OTOP zone, especially those provided by the waterways in the area. Increasing pressure on water quality and quantity, however, is creating tensions that may focus on particular locations, such as areas of poor water quality.

**Health and education:** The area is relatively well serviced in terms of health and education, although statistics follow national trends of increasing obesity in younger people. The older age group (65+) has lower levels of obesity than the national average. Health statistics show a much higher level of diagnosed mental health issues in younger women in the zone, the cause of which may require further investigation. School deciles and rolls are increasing, particularly in rural areas.

**Community spirit and social capital:** The OTOP zone has a long history of community spirit. Previous community assessments have indicated strongly that people are involved and value the cohesive, self-reliant nature of their communities. The farming community is experienced, well-educated, and engaged with the wider community. There is a strong sporting tradition in the area and farmers are most likely to be engaged with the community through sporting activities, as well as through schools. There is scope to improve farm environmental performance and farm decision makers in the zone exhibit a cautious openness to change.

Successful examples already exist of collaborative groups that are working together to identify and overcome areas of tension in resource management. Examples included the proactive Opuha Environmental Flow Release Advisory Group (OEFrag) and some of the catchment groups, such as the Lower Opihi catchment groups.

## **Conclusions**

This report has identified several areas of particular strengths and vulnerability in the OTOP community. Particular vulnerabilities stem from changes taking place in community composition, especially migration; from increasing reliance on the dairy sector and



primarily, on one major secondary processor; from changes in the way farms are structured; and from the increasing reliance on irrigation to drive the local economy.

It will be particularly important to understand ongoing changes in these areas. For some of these factors, for example, the well-being of migrant workers on dairy farms, data gaps exist that may need to be addressed.

Notable assets include a strong economy, community spirit, experienced farmers, and a strong rural tradition. The growing influence of Māori values in the zone may also be an asset to achieving a more sustainable future. It will be important to strengthen and build on these assets in order to address environmental challenges and identify opportunities that will support the economy, environment, and people of the zone.

For the purpose of scenario planning, there are specific areas where potential exists to meet future challenges:

- Mechanisms to drive irrigation efficiency
- Reconsideration of the balance of agricultural industries in the area
- Close alignment with and support for catchment and other community groups.



## **1 Introduction**

As part of the Canterbury Water Management Strategy, the Canterbury Region is divided into 10 zones. For each zone, a committee has been established to make decisions on water management. The Orari, Temuka, Opihi and Pareora (OTOP) Zone committee is one of these committees and will be providing recommendations on regulatory and non-regulatory measures as an addendum to the already developed zone implementation programme.

In order to provide the OTOP Zone committee with background and contextual information to underpin community consultation and support the development and assessment of different scenarios for the zone, Landcare Research, at the request of Environment Canterbury, has conducted a social community assessment for the zone.

## **2 Objectives**

- Profile current social and economic conditions in OTOP zone communities.
- Identify the key relationships and/or indicators that will allow the community, rūnanga, industry, and local authorities to understand the implications of different future scenarios for the zone.

## **3 Methods**

The project used desktop research methodologies, drawing on publicly available data as well as additional data from a range of organisations. Both quantitative and qualitative information was included according to availability and suitability. Primary sources of information include the 2015 Survey of Rural Decision Makers (SRDM), Statistics New Zealand demographic information for the Zone, agricultural census data, DairyNZ statistics, internet searches, and newspaper articles. While this report is focused on the OTOP zone, in many cases the data gathered or source of the information relates to the Timaru District or to South Canterbury as a whole, rather than the OTOP zone in particular. The areas referred to throughout this report relate to the source of the original data.

A high level thematic analysis revealed key social, economic, and community relationships and/or measures that could be used to examine alternative future scenarios. From this analysis, key social themes and indicators were identified to support scenario development and the assessment of the implications of the scenarios, from individual, industry, and community perspectives.

## **4 Historical context**

The only sheltered point on the coast between Banks Peninsula and North Otago, Timaru has been known as a port town, a seaside resort (Johnson 1996), and an important contributor to New Zealand's primary production. The name Timaru is thought to originate from the Māori Te Maru: The shelter, as Timaru harbour provided shelter for travelling canoes.

The area from the Rakaia River through to the Waitaki River is the takiwā (territory) of the Ngati Huirapa, descended from the Ngai Tahu, Ngati Mamoe, and Waitaha (Environment Canterbury 2013). Ngati Mamoe were thought to have arrived in the 16<sup>th</sup> Century, and Ngai Tahu around a century later (Johnson 1996). There are hundreds of sites of early Māori rock art in the area, estimated to be about 500 years old (Environment Canterbury 2013). The principle settlement was at Arowhenua, which was the first fertile land south of the Canterbury plains and the southernmost point at which kumara could be cultivated (Johnson 1996).

In the 1800s, European whalers were also drawn to the shelter of Timaru's harbour. Early Māori and European settlers intermingled and the chief Tūhawaiki adopted many European customs, including Christianity, and encouraged European settlement.

Ngati Huirapa steadily lost access to the land during these years, and with it, access to traditional mahinga kai, which was of primary importance as most of the area was unsuitable for the cultivation of kumara (Environment Canterbury 2013).

In the late 1800s South Canterbury became a major producer of wheat as well as wool. More than 350,000 acres were cultivated in the time before the First World War, including grain, potatoes, rape, and turnips. The region was bountiful and initially experienced problems of oversupply – the size of sheep flocks meant that large number of sheep would often need to be culled at once, and this led to overstocking. When the New Zealand Meat Preserving Co opened a boiling-down works in Washdyke, it was unable to cope with demand. Although the 1880s and early 1890s saw a drop in produce prices and economic depression, steady growth in town facilities continued.

Between the turn of the century and the First World War, Timaru developed the character that has largely been retained to the present. The early 20th century saw many of the original churches outgrowing their congregations, and many of Timaru's places of worship for a range of religions – Presbyterian, Roman Catholic, Wesleyan, Anglican, Baptist, Congregationalist, Salvation Army, and Jewish – were built during this period (Johnson 1996).

*Sport, especially rugby, has long been interwoven with the identity of the area.* The Timaru area has a strong tradition of civic duty in support of the armed forces, and volunteer units have been formed regularly since 1865.

The period between the First World War and the 1960s was a time of slow, steady growth and stability for South Canterbury. Small towns including Waimate, Geraldine, and Temuka, grew steadily in servicing the farming community.

The removal of agricultural subsidies in the early 1980s was a shock to the agricultural community, and had a strong impact on the Timaru area. The increase in interest rates, and drop in profitability and mortgagee sales that followed meant a drop in farm prices, which eventually drew the attention of mobile dairy farmers from the north Island.

Relatively slow growth (New Zealand History: Timaru) has meant that Timaru has maintained a well-preserved early 20th-century main street and many notable historic buildings such as churches and hotels. However, economic growth has rapidly increased in recent years and a number of historic buildings are now making way for modern economic developments.

#### **4.1 Timeline of events**

16<sup>th</sup> Century: arrival of Ngāti Mamoe

17<sup>th</sup> Century: arrival of Ngai Tahu

Early 19<sup>th</sup> century: European whalers

1839: Whaling station set up

1844: Death of Tūhawaiki

1849: Māori population approx. 150

1853: licenses to occupy land being issued

1856: European population of Mid- and South Canterbury – 120. Government town site proclaimed. Most of South Canterbury now divided into over 30 pastoral runs of between 15,000 and 50,000 acres, excluding town sites and Māori Reserves (Johnson 1996)

1859: First migrant ship arrives with 120 passengers. European population now 469

1865: First volunteer unit in support of the Land Wars

*1867: First recorded match 'resembling rugby' in South Canterbury taking place at 'Arowhenua' (Temuka) (South Canterbury Rugby Football Union)*

1867: Formation of the Timaru Foresters band

1870: New Zealand Meat Preserving Co. opened a boiling-down works in Washdyke

1875: Railway from Christchurch reaches Timaru. The Main South Line is still a significant freight corridor, although there are no longer passenger services to the area

1877–79: Protest heke led by the prophet Te Maiharoa, aimed at regaining access to mahinga kai in an area they did not believe had been sold. Protest ended peacefully but unsuccessfully with the return of the protesters to reserves on the coast

1882: First shipment of frozen meat was successfully shipped to England

1883: Refrigerating company formed

1883: Temuka Butter and Cheese factory opened, after which South Canterbury was able to supply its own requirements and have products available for export. It was the largest of a number of dairy cooperatives, and included a butter factory at Waimate and a number of cheese factories in the Geraldine area (Johnson 1996)

1888: South Canterbury Rugby Football Union established

1894: Cecil Woods opened his cycle factory and shop. Working people usually walked to work and the introduction of cycling was met with enthusiasm in the area, especially the introduction of pneumatic tyred roadster cycles in the 1890s. Recreational cycling became popular and cycling clubs were formed, church groups and sporting clubs organised cycle outings. Cecil Woods progressed to building motorised vehicles, including making in 1897 what was thought to be New Zealand's first successful 4-wheeled motor car

Late 1870s and the early 1880s: Grain harvest too much for the available storage capacity; sacks awaiting shipment had to be piled in the city streets

Late 1800s: Development of an artificial harbour (breakwater), allowing Timaru to become an industrial centre, processing products from South Canterbury farms. The harbour also provided easier access to Caroline Bay and gradually, as fine sand began to cover the rough shingle, the bay developed into a seaside resort where carnivals and public events became popular. A band rotunda was built and put to good use

Early 1900s: Flax for rope manufacture was also grown in the swamps around Timaru, until the surrounding areas were drained

1910. Potato digger machines introduced

1914: Within a day of the call for volunteers for the First World War, 130 men had offered to serve (Johnson 1996)

Early 1900s: Church building: many of the original churches outgrowing their congregations, and places of worship built for a range of religions – Presbyterian, Roman Catholic, Wesleyan, Anglican, Baptist, Congregationalist, Salvation Army, and Jewish (Johnson 1996)

1926: Timaru Foresters band, then the 2<sup>nd</sup> (South Canterbury) Regimental band, became the award-winning Timaru Municipal Band

Second World War: linen flax production was reintroduced for the manufacture of canvas, and one the four processing plants in Geraldine, South Canterbury, continued to produce canvas for more than 30 years after the war

1948: Population of Timaru 20,000, officially a city (Johnson 1996)

1950: South Canterbury won the Ranfurly Shield from Wairarapa

1950s: War Service Settlement Scheme provided farms to soldiers returning from Second World War

1960s: New Farm Lands and Million Acres a Year schemes

Mid-1970s: population of Timaru reaches 30,000

1980s: Removal of agricultural subsidies

Mid-1990s: population of Timaru reaches 27,000

## 5 Changes over the last 30 years

According to the Land Cover Database (see Figure 34, Annex 1) the OTOF Zone has undergone very little change over the past 30 years, although Ag Census data (2002–2012) shows some drop in grassland and a greater drop in tussock grassland.

There have been changes in the use of grasslands areas (Fig. 35, Appendix 1) – predominantly an increase in the area under dairying, and a drop in the area under sheep farming (Fig. 36, Appendix 1). The number of sheep in the zone dropped from around 760,000 to 472,000 and in the same period, dairy cattle in the zone doubled between 2002 and 2012 to 142,727 cows (Figs.37-38, Appendix 1). South Canterbury (including the MacKenzie, Waimate and Timaru) is now home to 4.9% of New Zealand's dairy cattle or 244,075 cows on 71,476 effective ha (LIC/DairyNZ 2014-15 statistics).

There has been a notable increase in urea use, effluent spreading and irrigation (Figs. 5–7), likely as a result of these changes.

**Table 1** Change in Stock Numbers in Timaru District 1996–2012

	Stock units	1996	2002	2007	2012
Dairy Cattle	8	26,072	52,955	100,053	142,747
Beef Cattle	5.5	46,926	51,283	70,110	51,878
Sheep	1	945,830	766,105	697,432	472,278
Deer	2	64,706	80,356	86,873	64,949
<b>Total SU</b>		<b>1,541,911</b>	<b>1,632,514</b>	<b>2,057,207</b>	<b>2,029,481</b>

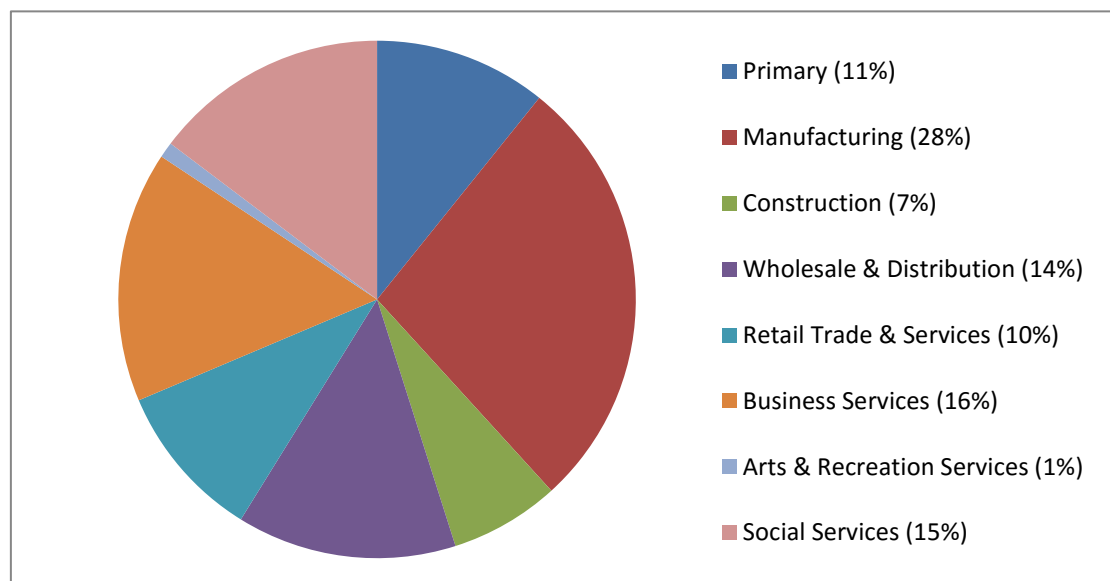
### 5.1 Recent economic growth

As described in the recent OTOF zone economic report (Business & Economic Research Limited 2016) the zone has a strong and growing economy, driven largely by primary production and associated processing and manufacturing industries as well as some growth in the tourism sector. The past 30 years have seen an increase in the value of primary production, particularly through the growth and intensification of the dairy industry, including a large increase in irrigated land area.

Between 2005 and 2015, the Timaru district's average annual growth rate at 1.9% outstripped both the national (0.9%) and Canterbury (1.4%) growth rates. Figures for employment growth between 2000 and 2015 reflect the strength of the dairy industry with an average annual increase of 10% for dairy farming, along with corresponding growth in construction and freight industries (BERL 2016).

With 5,330 businesses and approx. 21,390 FTE's<sup>1</sup> Timaru district's 5-year GDP growth is the highest in NZ for the largest 20 centres (see Fig. 1). Figures 2 and 3 provide an overview of changes in the balance of the different employment sectors. Figure 2 shows a steady increase in the number of people employed in most sectors. However, there is a slight drop in hospitality and also in manufacturing and agriculture since the 2006 census. Figure 3 also shows a recent drop in the number of people usually resident in the zone and employed in agriculture and fisheries, trades and as plant and machine operators. Migrant workers are also regularly employed in agriculture and hospitality, however it is difficult to obtain exact statistics on the number employed in a particular area (see section 6.1.2).

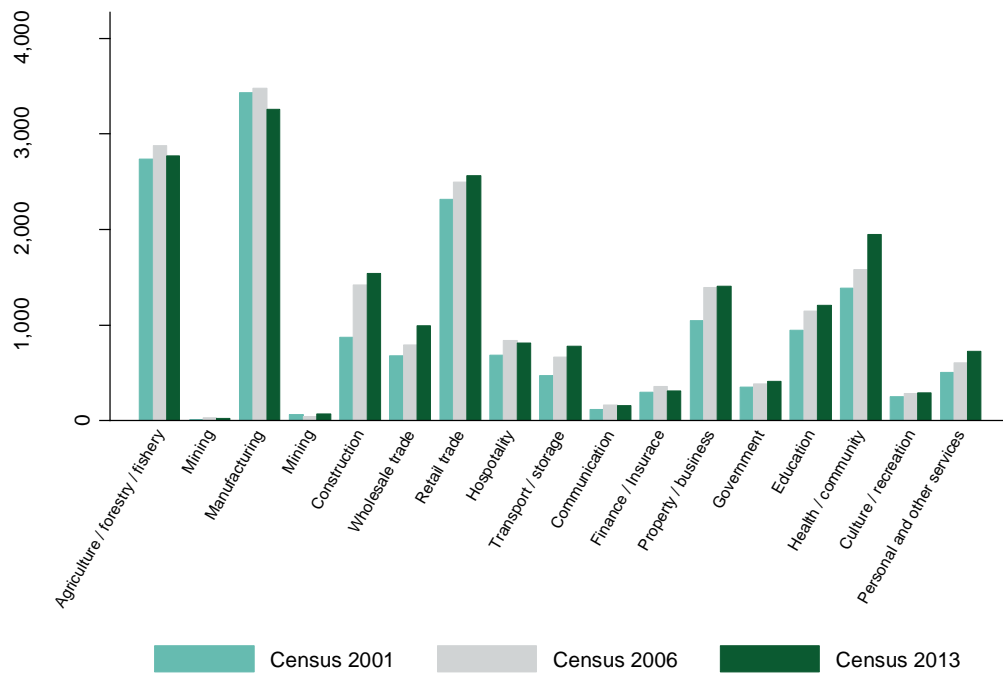
According to the Timaru District Economic Strategy (2015–2035), the number of working people is expected to grow by 300 FTEs per year to 2025, mostly in construction, wholesale and retail, transport, and warehousing. GDP in Timaru District is expected to continue to grow mainly from wholesale and retail, transport and warehousing; and food processing.



**Figure 1** Timaru District 5 year GDP by industry. Source: South Canterbury Regional Investment Initiative 2014 (See footnote 1).

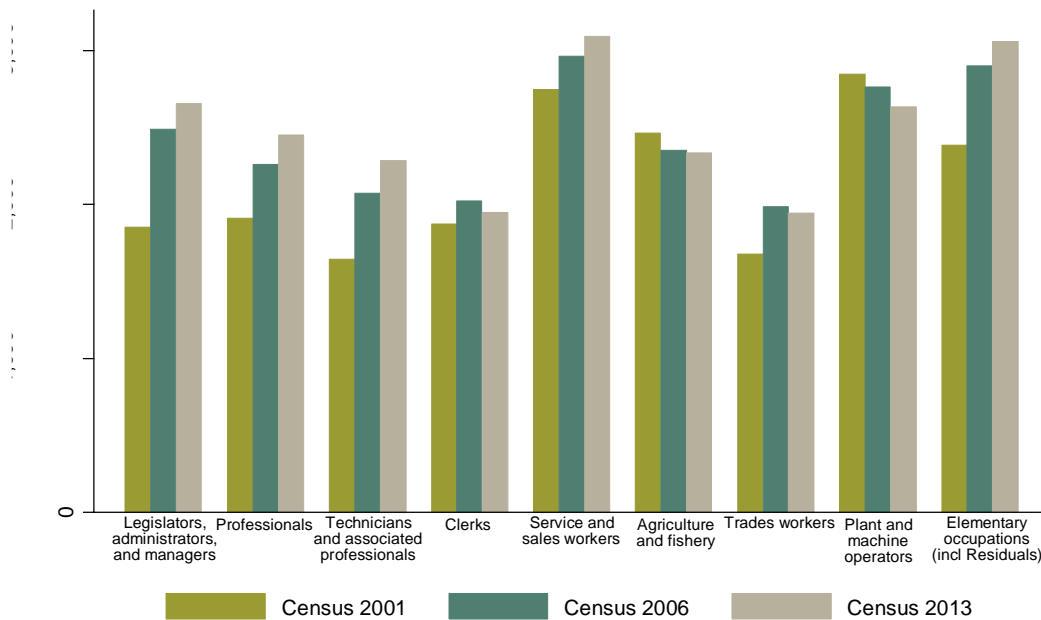
<sup>1</sup> Source: Document prepared by Aoraki Development and Tourism (CE Wendy Smith) as a South Canterbury Regional Investment Initiative in 2014. Provided by Fiona Stevens





Source: New Zealand Census. Statistics New Zealand

**Figure 2** Number of workers employed by industry in the OTOF zone usually resident population.



Source: New Zealand Census. Statistics New Zealand.

**Figure 3** Occupation of OTOF zone usually resident population over age 15.

Demand for industrial zoned land is mainly driven by a significant increase in the dairy, forestry, and freight sectors as well as increased activity at the Port and Washdyke. The main associated challenge is the availability of good land with links to transport networks, away from sensitive land uses.

Industrial zoned land is currently in various locations including Timaru CBD, Port of Timaru, Washdyke, Redruth, Geraldine, and Temuka. Additional industrial zoned land is anticipated to be needed in Geraldine, Temuka, and Timaru over the next 30 years, but Pleasant Point is thought to have enough to accommodate growth.

Electricity demand for South Canterbury is also predicted to increase due to developments at Oceania Gold's Glenavy Factory and proposed Hunter Downs irrigation scheme.

Fonterra's processing plant in Clandeboye has expanded recently, and Fonterra is increasing its cooperation with other businesses in the area, particularly in areas such as the expansion of the PrimePort. The Port area is developing quickly and there are increasing industrial and warehouse developments at Washdyke.

In addition, there are two meat processing plants in Timaru: Oceania Meat Processors and the Alliance Group Limited, Smithfield Plant. Silver Fern Farms also has a processing facility in Pareora. Other significant processors include McCain's food processing plant, DB Mainland Breweries, NZ Light Leathers, and the Barker's factory in Geraldine that produces juice, preserves, and bakery products.

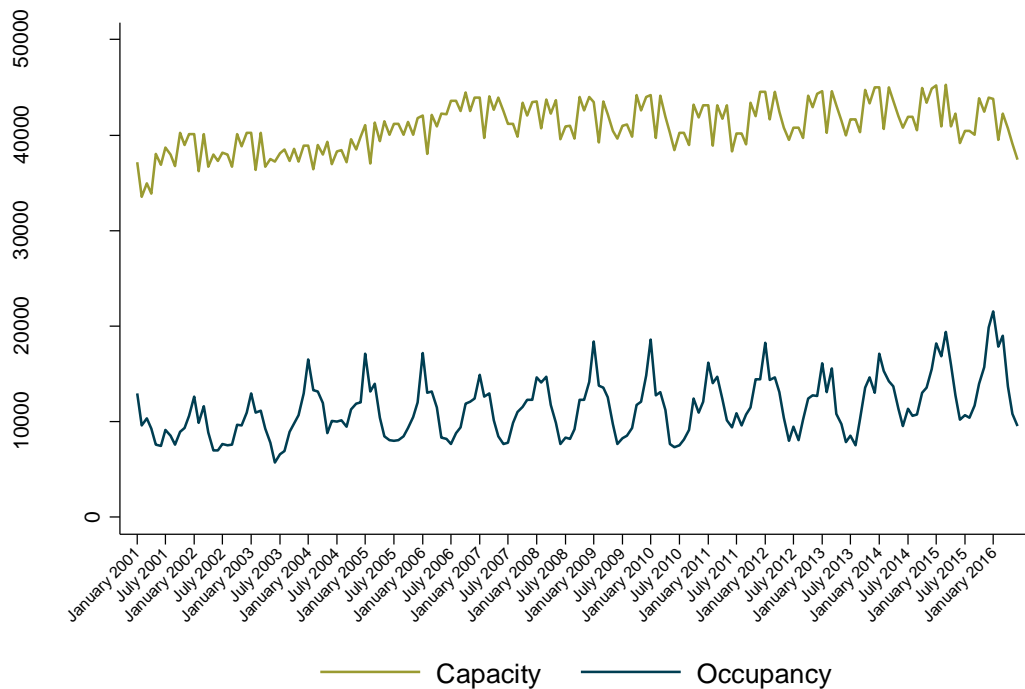
The South Canterbury Chamber of Commerce indicates IT literacy in the region is high and broadband is widely available. A diverse range of "sectors of opportunity" are also available in the district, with multiple examples of South Canterbury businesses in the areas of clean technology, food and beverages, high value manufacturing, information and communications technology, infrastructure, and life sciences.

### **5.1.1 Tourism**

Tourism in the area continues to grow. The number of guest nights in accommodation increased by 21% from 2004 to 2014 (BERL 2016). Accommodation capacity and occupancy figures show a strongly seasonal pattern.

In the year ending July 2015, Timaru visitor nights increased by over 15% (Timaru Herald, 21 August 2015); guest nights in the Mackenzie District were also up by 11%. Accommodation statistics show a strongly seasonal pattern (Fig. 4).

The Timaru district is often a stopping point for visitors to Tekapo and Geraldine on their way to or from Queenstown. The influx of visitors and addition of new flights have strained facilities at Timaru's Richard Pearce Airport (Timaru Herald, 29 March 2016), and necessitated the building of a temporary carpark and baggage reclamation area until planned upgrades can be completed.



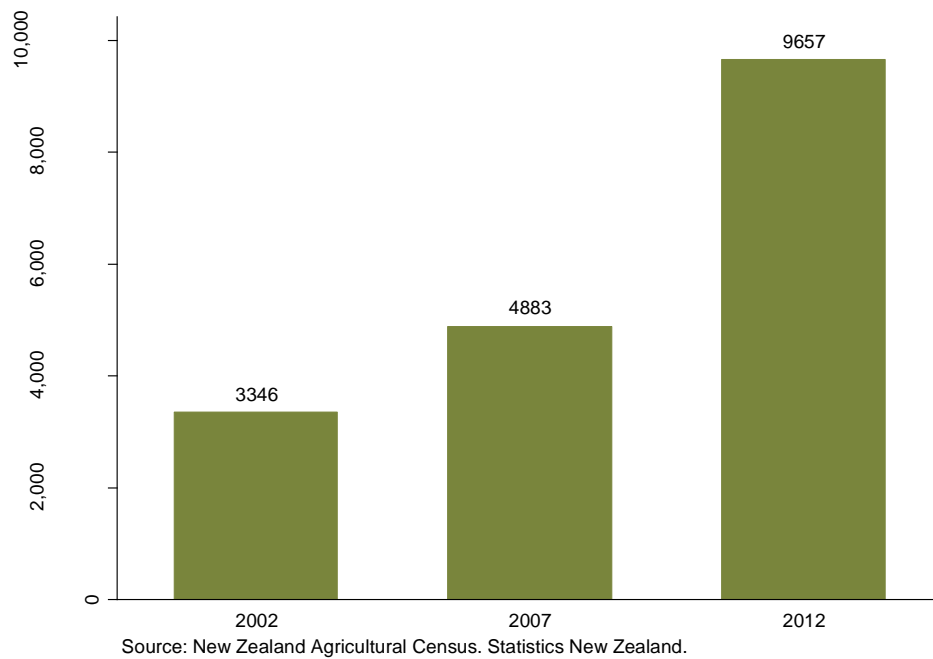
Source: Accommodation survey. Statistics New Zealand.

**Figure 4** Accommodation capacity and occupancy measured in monthly unit nights in Timaru District from January 2001 to January 2016.

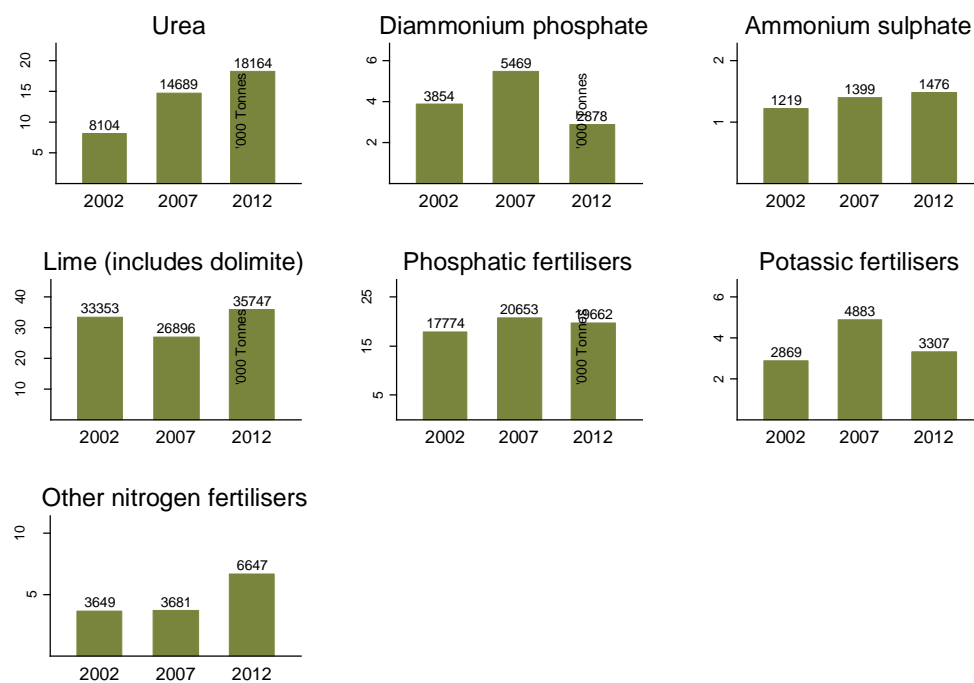
## 5.2 Dairy production

Economic growth in the OTOP zone has been driven primarily by increases in dairy production. DairyNZ statistics show that in the past 3 years growth in the Timaru district has increased from 109,975 cows in 149 herds over 31,053 ha in the 2012/13 season, to 131,178 cows in 174 herds over 37,420 ha in the 2014/15 season (Table 1). Accompanying this growth in cow numbers has been an increase in the amount both of effluent spread on land (Fig. 5) and fertiliser use (Fig. 6).

Production in South Canterbury is high, with an average stocking rate of 3.41 (NZ average is 2.87). For Timaru, the average is 3.51. South Island farms tend to have higher production than North Island farms, reflecting a higher stocking rate, larger herds, and higher per cow production. North Canterbury led the country for production in the 2014/15 season with 1,457 kg milksolids/ha and 416 kg milksolids/cow, and South Canterbury was also highly productive with an average 1,347 milksolids/ha and 395 milksolids/cow. In South Canterbury, cows were milked an average of 6 days longer than the South Island and NZ average.



**Figure 5** Total area over which effluent is sprayed in Timaru district.



**Figure 6** Fertiliser use in Timaru district.

**Table 2** Production statistics and farm structure for dairy farms in the South Canterbury districts, compared with South Island and NZ averages

<i>District</i>	<i>Total herds</i>	<i>Total cows</i>	<i>Total effective hectares</i>	<i>Average herd size</i>	<i>Average Cows/hectare</i>	<i>Av. kg milksolids per effective hectare</i>	<i>Average kg milksolids per cow</i>	<i>Number of owner operators</i>	<i>Number of sharemilkers</i>
Timaru	174	131,178	37,420	754	3.51	1,375	392	122	52
MacKenzie	15	13,567	4,789	904	2.83	1,074	379	8	7
Waimate	114	97,230	28,807	853	3.38	1,345	398	61	52
South Island	3,152	1,997,245	659,277	634	3.03	1,182	390	2,124	1,010
New Zealand	11,970	5,018,333	1,746,156	419	2.87	1,082	377	8,059	3,879

Production levels parallel the percentage of cows that are artificially inseminated – in the 2014/15 season this was 79.9% for North Canterbury and 76.1% for South Canterbury compared with the NZ average of 72.8%.

The percentage of herds tested is fairly low (65.7%) compared with 72.1% in North Canterbury and the NZ average of 72.9. Of the herds tested, those in South Canterbury recorded the lowest average somatic cells in the country (156,000 cells/ml) in the 2014/15 season. Somatic cell count is an indicator of cow health and milk quality as it indicates lower numbers of harmful bacteria such as *Staphylococcus aureus*, which causes *mastitis*.

Of 302 herds in the South Canterbury area, 191 (63%) are owner operators and 111 (37%) are run by sharemilkers, of which 27% are 50/50 sharemilkers and 73% are variable order sharemilkers. In the South Island in general there are more variable order sharemilkers than 50/50 sharemilkers, while the inverse is true in the North Island for the 2014/15 season. Farm ownership structure affects the way decisions are made on farm; for example, an owner-operator may be quicker to invest in infrastructure than a sharemilker.

### **Farm plans**

Under Schedule 7 of Environment Canterbury's Land & Water Regional Plan (LWRP), Farm Environment Plans (FEPs) are required for farms considered to have a higher risk of leaching nutrients for animal effluent discharge, water take and use, land use for farming, and nutrient discharge from an irrigation scheme.

A number of supporting organisations have developed templates for such plans that have been approved by Environment Canterbury, including plans developed by Beef&Lamb NZ, DairyNZ, and the Foundation for Arable Research; Pork Farm Environment Plan; and plans developed by Irricon Resource Solutions, Opuha Water Ltd, and the AgriBusiness Group (Environment Canterbury website).

Synlait Milk Ltd has its own "Lead with Pride" farm certification system which has also been accredited by Environment Canterbury as meeting the requirements of Schedule 7. Farmers work with an environmental advisor to develop an in-depth and thoroughly documented plan that is audited at the same time as the other Lead with Pride requirements (Angela Harvey, DairyNZ Catchment Engagement, pers. comm., 5 Sept. 2016).

Most dairy farms in the OTOP zone supply Fonterra, with only a few Synlait and Oceania suppliers. Fonterra and Oceania farmers use the DairyNZ Sustainable Milk Plan (SMP) unless they are already part of an irrigation scheme that has their own template. There are 172 dairy farms in OTOP region that require farm plans, of which 94 have been developed by DairyNZ. DairyNZ contract farm consultants to develop the FEPs, as farmers often already have a preferred consultant. Of these 94, 75 have now been completed and the rest are in progress (A Harvey, pers. comm.).

According to DairyNZ's Angela Harvey, Farm Environment Plans will help dairy farmers to assess and manage environmental risks on-farm, and benchmark the performance of their farm systems against industry-agreed good management practices (A. Harvey, pers. comm.). The new plans consolidate existing farm management tools (e.g. nutrient management

plans) into a single planning document, and will add value to farm businesses by identifying improvements to existing management systems.

Farmers can work with their existing rural advisors, industry groups and Environment Canterbury to develop their Farm Environment Plans.

### **5.3 Water use in agriculture**

Irrigation development has been a major driver of increased agricultural productivity and prosperity in the OTOF zone. Between 2002 and 2012, the total irrigated area in the Timaru district grew from 29,550 hectares to 49,820 (Fig. 7).

McCrostie-Little and Taylor (2001) noted that irrigation can change the landscape and provide farm families with a sense of security. They note that many generations of New Zealand farmers viewed irrigation as a form of insurance against a perverse climate, and it was only with the development of more sophisticated technology such as spray and sprinkler systems that the greater potential for irrigation as a management tool came to be recognised.

Irrigation development creates social impacts through both on-farm changes and also through the impact of these on wider demographic and community structure. McCrostie et al. (2001) note that key parameters in the decision to take up irrigation are on-farm establishment costs, increasing labour requirements and potentially increasing profit margins for both old and new products. Conversion from dryland farming to dairying can therefore affect the age structure of the community, increasing the number of younger farmers and it can also increase population growth through increasing both profitability and labour requirements. The waves of change that can accompany irrigation development and the associated effects on the community are further explored in McCrostie et al. (2001) and McClintock et al. (2002).

Steve Breneger of IrrigationNZ (pers.comm 16 September 2016) observed that farmers in the OTOF area are mainly very traditional, many having developed irrigation over the past 15 years and are moving to a more corporate structure. During this period, family farming progression has been changing from the more traditional practice of the children working on the farm until it is time to take over, to a more modern arrangement where it is common for the sons and daughters to leave the farm to study, then return at a later time and take over the farm as a business. Currently, return on investment is high. There is a noticeable trend of sons and daughters of farmers returning from overseas, and more young people staying in the OTOF zone instead of transitioning to an urban lifestyle.

For these long-term, traditional farmers with lower debt levels, the dairy downturn has only temporarily affected net margins. Many of the newer farmers with higher debt levels are struggling as low interest rates have provided an incentive to borrow more. Breneger estimates that most of the expansion in dairying in the OTOF area has come from existing farms changing land use (>60%), rather than farms changing hands. The boom in irrigation and the accompanying change in farm structure has meant greater attention to succession planning, with many farms pre-empting the generational change.

Some irrigation schemes, such as Rangitata south, have developed their own farm environmental plan templates and hold the farming consents as a scheme. The data collected can then be used to target knowledge gaps on farm, and the collective approach effectively puts pressure on non-performers. The first round of data collection from FEPs has suggested that the application of irrigation scheduling is a key knowledge gap. The diversity of soils in the OTOF area suggests that there should be scope for scheduling takes at different times; implying that this is a key area where efficiency gains could be made (S Breneger, pers. comm.).

**Table 3** Irrigation schemes in South Canterbury (Source: IrrigationNZ)

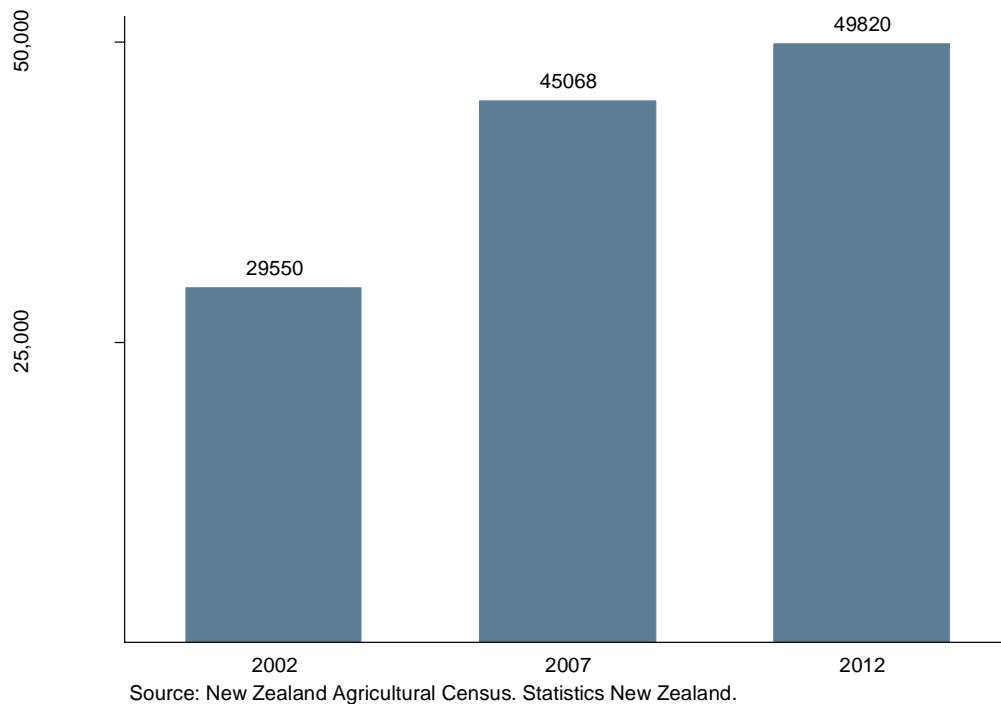
Name	Description of scheme	Started
Hunter Downs Irrigation	Diversion from Waitaki River. Water delivered to farms in the Waimate and Timaru districts using a combination of gravity canals small pumping stations and pipe secondary distribution system. Water from Waitaki River diverted into an irrigation intake at the existing site of the Morven Glenavy Ikawai Irrigation Scheme intake, 35 km downstream of the Waitaki Dam.	Water consents approved 2011  Not yet operational
Rangitata South	Water harvesting and storage strategy to divert water from the Rangitata River when flows exceed 110 cumecs (cubic metres per second). This water will later irrigate an area of 14,000ha, between the Rangitata and Orari Rivers, from Arundel to the coast. Consent to take water from the Rangitata River when it is above 110 cumecs.	2012
Opuha Water Limited	The Opuha Dam is situated at the confluence of the North and South Opuha Rivers, 17 kms north-east of Fairlie. The scheme includes three independent schemes: Levels Plain Irrigation Co, Kakahu Irrigation, and Totara Valley Irrigation. The scheme has a dam on the Opuha River and regulates releases into the Opuha River that flows into the Opihi River. Irrigation takes are from both the Opuha and Opihi rivers. The dam has a power station with a single hydro-turbine but is principally for irrigation. It also provides commercial and domestic water for Timaru District Council.	Main dam completed 1998. LPIC existing from 1937. Totara Valley 1998 and Kakahu 2004. Sutherlands Scheme 2011

Breneger also noted that there may be considerable scope for improvements in irrigation efficiency. The top 5% of farmers use only around 1/3 of their allowable water every year. There is currently no built-in incentive for improving efficiency through the water take permit. However, this is now changing through the FEP process. As part of the FEP process, farmers are required to undertake formal irrigation manager training every two years and there has been a steady increase in the number of training courses run by IrrigationNZ for a wide range of stakeholder sin irrigation including farmers, retailers, lwi, milk companies, and regional councils.

The mechanism by which the schemes take water is also a potential source of efficiency. For example, when the Valetta Irrigation Scheme in Ashburton upgraded from open channel to pipe, they were able to increaser the scheme from about 7000 ha to 13000 ha using the same amount of water. This is a combination of efficiency gains through the conveyance structure and also low reliability water to storage. With pipes, the water is also pressurised, allowing for more efficient irrigation system design. In some cases, however, the trade-offs



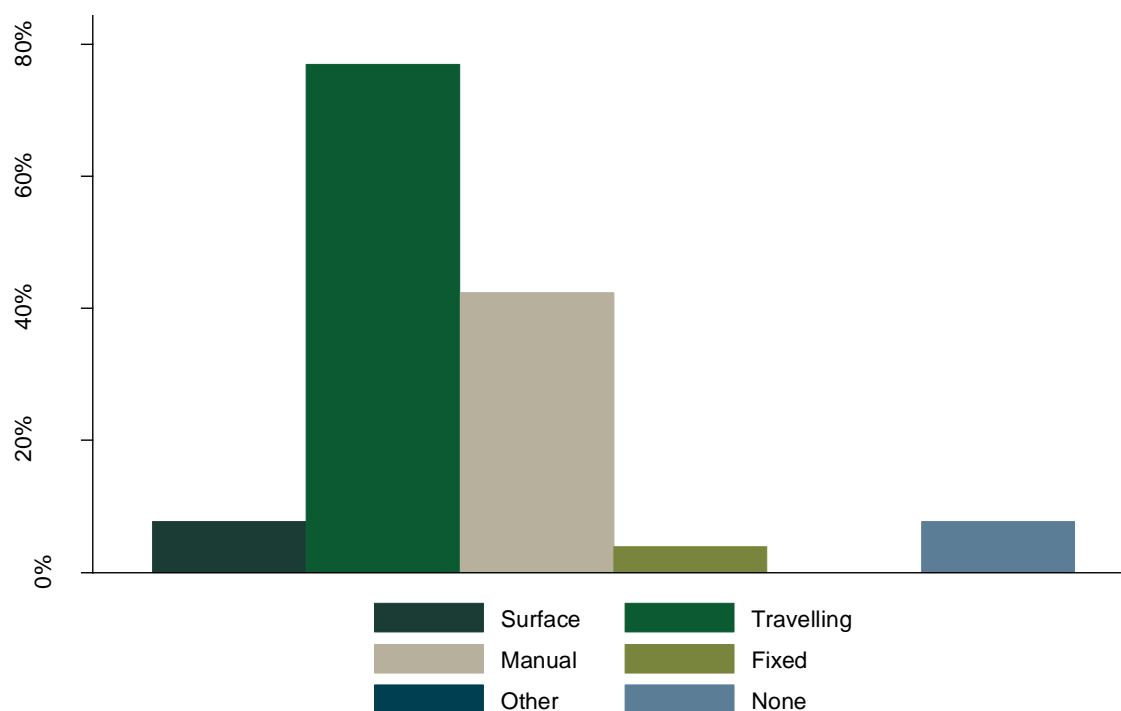
are not clear cut. In the Rangitata South scheme, for example, an open channel distribution system is used, at approximately 50% of the cost of a piped system. While this is less efficient, the porous nature of the soil means that the leakage recharges groundwater in the area. For the Hunter Downs scheme, which is under development, the final design has not yet been agreed (S Breneger, pers. comm.) but it will be piped.



**Figure 7** Total area of irrigated land in Timaru district.

In the Opuha scheme, some of the irrigation systems are new with potential for large gains in efficiency. The Opuha scheme works to a high environmental standard, carefully maintaining minimum summer flows (S Breneger, pers. comm.). For this purpose, a proactive Opuha Environmental Flow Release Advisory Group (OEFrag) was formed, which meets regularly to agree on river flow management issues. The group is generally perceived to operate very successfully.

In the 2015 Survey of Rural Decision Makers (SRDM), 21 of 73 respondents said they had consent for taking water, and of these, 11 participated in an irrigation scheme. Thirty-three respondents said their water came from groundwater, 34 took surface water, and the water of 36 came from rainfall. Most of the respondents indicated that they used a travelling irrigator (Fig. 8). As noted in the BERL (2016) report, the majority of irrigation systems in use are spray systems, although in 2012 agricultural census data showed a small increase in the relative proportion of the less efficient flood systems between the 2007 and 2012 census.



Source: 2015 Survey of Rural Decision Makers  
N=26

**Figure 8** Irrigation system used by farm decision makers who have an irrigation system on their farm in Timaru, Waimate, and Mackenzie districts.

## 5.4 Drinking water

Most water supplies in the OTOZ zone are managed by the Timaru District Council. The largest supply is the Downlands Scheme, which crosses district boundaries. Details of smaller schemes can be found on the TDC website (Water supplies). In addition, four piped, public water supplies are managed by the Mackenzie District Council as well as the Allandale rural water supply and three public stock water race systems (Mackenzie District Council website: essential services).

The Timaru area saw early development of a reticulated water supply for stock and drinking water, with the Downlands scheme built in the 1930s. Before this stock water reticulation, farmers relied mainly on dams. The Downlands supply scheme now covers 78,000 ha in the Timaru, Waimate, and Mackenzie districts but supplies only 56 litres per hectare per day, and security of supply is a concern for Timaru. There has been no additional water for 4–5 years, and this has reduced the potential to intensify and subdivide. A \$10 million project to put in new pipeline has recently been initiated to allow a greater volume per hectare per day, with an additional \$7 million to treat the water to drinking water standards (J Blakemore, Timaru District Council, 7 September 2016, pers. comm.).

In the last year, for all water supplies in the Timaru district there have been 35 clarity complaints. These were mainly related to two sites where major work in reticulation was

being carried out in the trunk mains. In addition, 6 odour complaints and 7 taste complaints were received from the 33,000 residents in the district on supply. For the Downlands scheme, which serves approximately 5,200 people, there have been 9 clarity, 2 odour, and 2 taste complaints over the past year (J Blakemore, pers. comm.).

TDC treats all its water schemes for bacterial compliance, with the exception of the Pareora pipeline, which feeds less than 100 consumers and has a permanent boil water notice. However, only some schemes treat water for protozoa (J Blakemore, pers. comm.). TDC currently uses only UV disinfection treatment, which requires <1 NTU. This poses a challenge as Environment Canterbury only monitors at 1, 3, and 5 NTU, so data are not directly useful. A new treatment plant utilising filtration for river sources is planned; however this treatment system is approximately 10 times more expensive to operate and install. For the last two summers, a significant quantity of water has been over 1 NTU and did not meet the drinking water standards for the month of January. The reason for this is unclear but may be related to low flows in January (J Blakemore, pers. comm.).

Environment Canterbury monitors the quality of drinking water sources in the region and compares these with the New Zealand Drinking Water Standards (2008) for bacteria, protozoa and chemicals. As shown in table 4, nearly all sources in the OTO zone met chemical and bacteria standards but over half did not meet protozoa standards.

**Table 4** Achievement of drinking water sources in the OTOF zone against microbiological (bacteria and protozoa) and chemical standards. Source: Adapted from Ministry of Health 2016

Zone code	Distribution zone	Population	Size	Type	Bacteria	Protozoa	Chemical
ARO002AO	Arowhenua	215	Small	Private Other	X	✓	✓
DOW001ST	Sutherlands/Taiko	3000	Minor	Local Authority	✓	X	✓
DOW001WR	Waimate Rural	360	Small	Local Authority	✓	X	✓
DOW001WT	Waitohi/Totara Valley	700	Minor	Local Authority	✓	X	✓
GER001GE	Geraldine	2433	Minor	Local Authority	✓	✓	✓
HAD001HA	Hadlow	312	Small	Local Authority	✓	X	✓
PAR002PA	Pareora	427	Small	Local Authority	✓	✓	✓
PEE001PF	Peel Forest	130	Small	Local Authority	✓	X	✓
PLE001PP	Pleasant Point	1282	Minor	Local Authority	✓	✓	✓
SEA001SE	Seadown	896	Minor	Local Authority	✓	✓	✓
STA004ST	St. Andrews	304	Small	Local Authority	✓	X	✓
TEM001OR	Orari	170	Small	Local Authority	✓	✓	✓
TEM001TE	Temuka	4200	Minor	Local Authority	✓	✓	✓
TEM002GD	Geraldine Downs	324	Small	Local Authority	✓	X	✓
TEM002GF	Geraldine Flat	180	Small	Local Authority	✓	X	✓
TEM002TE	Te Moana	710	Minor	Local Authority	✓	X	✓
TIM001GL	Gleniti	3400	Minor	Local Authority	✓	X	✓
TIM001TI	Timaru	22620	Large	Local Authority	✓	X	✓
WIN002WI	Winchester	250	Small	Local Authority	✓	X	✓
ALB001AL	Albury Rural	125	Small	Communal	X	X	✓
ALL001AL	Allandale	291	Small	Local Authority	X	X	✓
FAI002FA	Fairlie	693	Minor	Local Authority	X	X	✓
FAI002KI	Kimbell	150	Small	Local Authority	X	X	✓
CAN001CM	Cannington/Motukaika	120	Small	Local Authority	X	X	✓

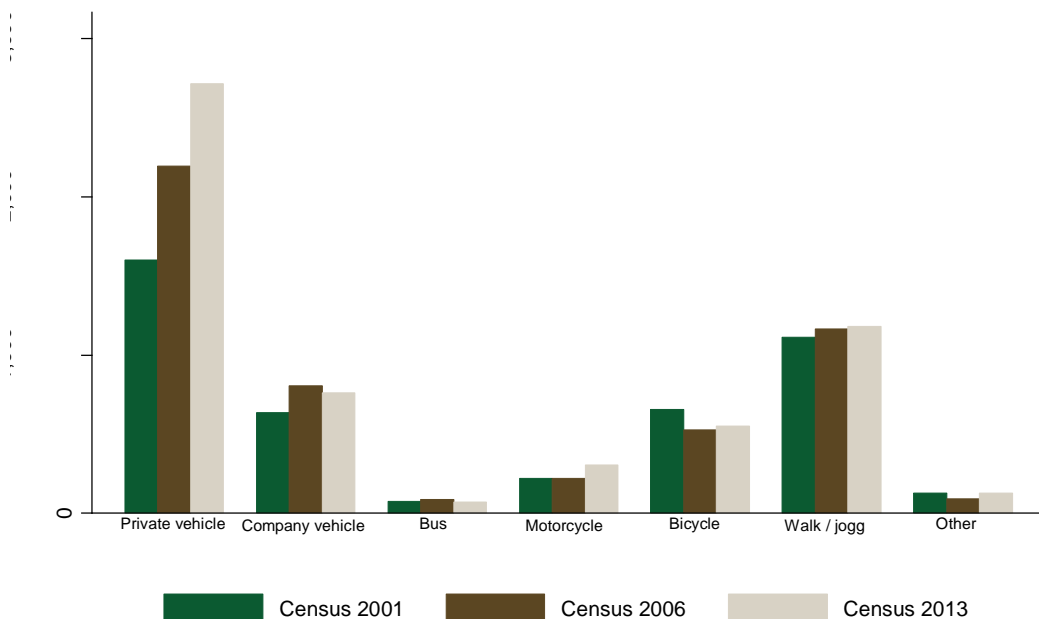
For nitrate concentrations, most areas in the OTO zone are considered either low risk, where nitrate concentrations in groundwater are always below Maximum Acceptable Value (MAV), or moderate risk areas, where it is unclear whether concentrations are above or below MAV. MAV is defined as “the highest concentration of a parameter in water that, based on present knowledge, is considered not to cause a significant risk to human health” (Scott & Hanson 2013). One area north of the mouth of the Orari River is considered high risk.

## **5.5 Transport**

The Timaru District Growth Strategy highlights the potential impact of increasing intensification in the rural sector and the resulting increase in freight from the dairy, forestry, and logistics sectors on existing transport networks. In particular, industrial growth in Washdyke is considered likely to result in a significant increase in traffic flows. Increased traffic may increase demands on maintenance and can potentially result in deterioration of rural roads. It will be important to ensure particular attention to transportation corridors, roads used regularly by heavy vehicles.

Currently, rural roads in Timaru are in good condition compared with urban roads and with New Zealand in general. This is measured by the New Zealand Transport Agency’s indicator of ‘smooth travel exposure’ or the proportion (%) of vehicle kilometres travelled in a year that occurs on ‘smooth’ sealed roads.

For individuals commuting to work, the private motor vehicle is increasingly dominant as the main mode of transport (Fig. 9). Public transport (bus) use is low and a TDC road user survey for the 6 months to December 2015 showed that it continues to decrease, with only around 6% of Timaru residents using public transport, down from 17% in 2014. This is contrary to expectations (Timaru Active Transport Strategy 2011) that an ageing population would increase demand for public transport and pedestrian movements.



Source: New Zealand Census. Statistics New Zealand.

**Figure 9** Main means of travel to work for OTOF zone usually resident population over age 15.

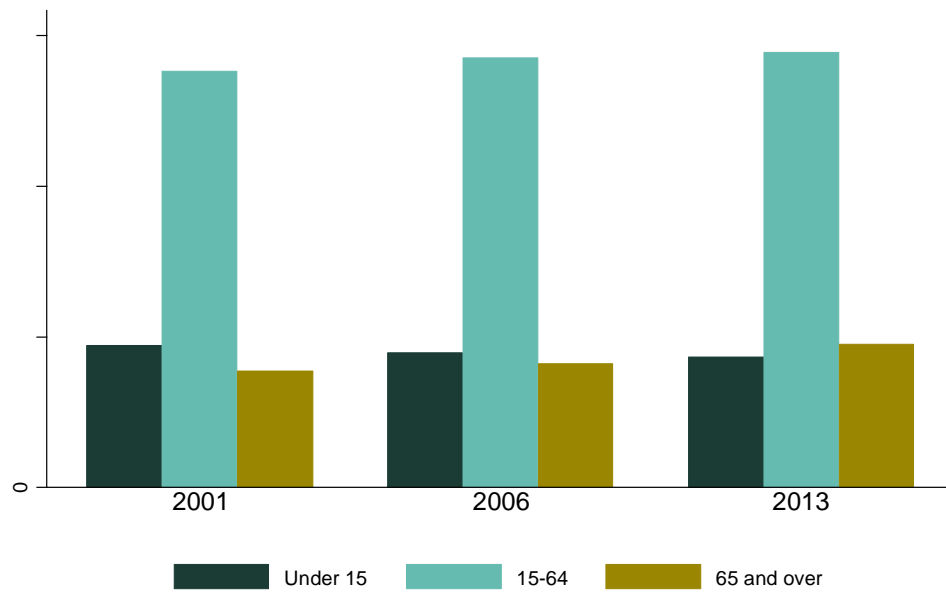
Recreational walking and cycling is more popular than commuting by foot or cycle due to a range of factors, including an older population, low population density, generally longer travel distances, and fast moving traffic on main roads (Timaru Active Transport Strategy 2011). There is a supply of readily available and cheap car parking, particularly at and around workplaces. Demand for cycling, especially recreational, is expected to continue.

## 6 Current community

### 6.1 Population demographics and immigration

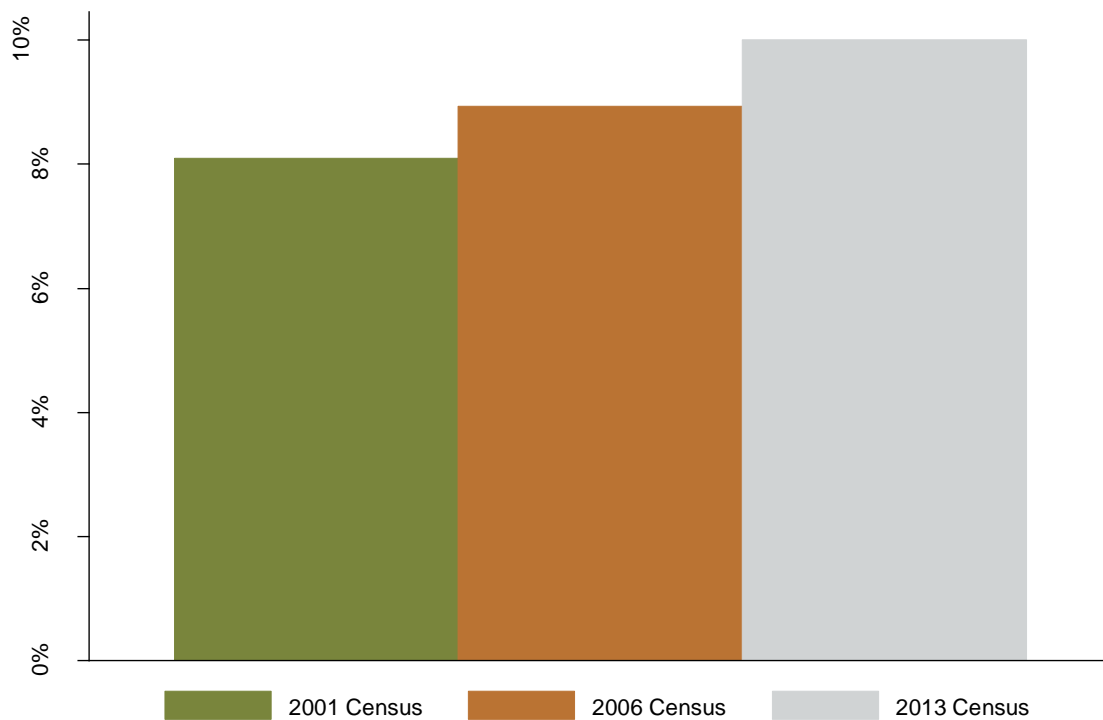
The population of the OTOF zone has increased slightly between the 2001 and 2013 census, from around 44,750 to 47,000. At the same time, the population has aged slightly, with a reduction in the number of people under 15 years of age and increases in the 15–64 and 65+ age groups (Fig. 10). The male and female population has increased at a similar rate, with slightly more females than males.

The number of residents born overseas has increased, and the number born in NZ has remained steady or decreased slightly, suggesting that population growth stems mainly from immigration. The percentage of people identifying as Māori has also increased from 8 to 10% in the same period (Fig. 11).



Source: New Zealand Census. Statistics New Zealand

**Figure 10** Age of OTOF zone usual resident population.



Source: New Zealand Census. Statistics New Zealand

**Figure 11** Percent of OTOF zone usually resident population who identify as Māori.

According to median projections (Jackson 2014) the population of the Timaru District will increase to around 48,853 (+7.6%) by 2033, peaking around 2038 at 49,041 and declining to 48,660 in 2063.

### **6.1.1 Māori**

A greater number of people identify as Māori in the 2013 census, and this trend is mirrored by the number of school pupils who identify as Māori in the Timaru district, which has risen from 835 to 1054 between 2010 and 2015.

As described in section 5, Arowhenua was the principle settlement of the Māori in the area, thought to be the southernmost point at which kumara could be cultivated (Johnson 1996). Mahinga kai has always been of particular importance to Māori in the South Canterbury region, as kumara cultivation in the area was difficult (OOP water supplement). The 100–200 early Māori in the area were quick to adopt potato cultivation when the Europeans arrived, but lost access to traditional food gathering sites during this period as this was restricted to reserves. These resources are also important to the Waihao, mainly located to the south of the OTOF zone in the Waimate area. The name Waihao refers to the hao eel, and important food resource for local Maori (Tipa & Associates, 2012).

The quiet resurgence in the number of people identifying as Māori in the zone is coupled with evidence of growing influence in natural resource management in the Māori community at Arowhenua. For example, in 2014 the Arowhenua runanga sought protective reserve status over Caroline Bay and a coastal site south of Timaru to boost seafood stocks (Timaru Herald, 25 June, 2014). Two years later, the area has been declared a mataitai reserve (New Zealand Coastal Society website) or traditional fishing ground with *co-guardianship by the local tangata whenua and Ministry for Primary Industries (MPI). Te Ahi Tarakihi Mataitai Reserve will extend about 500 m offshore and cover 1.5 km<sup>2</sup> from the southern end of Washdyke Lagoon to the Caroline Bay Wharf. Te Rūnanga o Waihao are also involved in environmental advocacy work and recently received \$517,000 from the Ministry for the Environment for the Wainono Lagoon restoration project (Waatea News, 15 Jul 2016).*

Māori have long voiced concern about the changes in water quality in the rivers of the OTOF zone. With Environment Canterbury's water strategy, engagement with Ngai Tahu about resource management issues has improved, and 15–20 people connected with Arowhenua Marae are regularly involved in representing Māori perspectives in different forums for engagement, including the OTOF zone committee and some catchment groups. However, resources to participate in the different forums on a voluntary basis are stretched as demands are fairly high (J Henry, Chairman of Te Runanga o Arowhenua, pers. comm., 16 Sept. 2016).

Māori consider the health and quality of the water in the rivers to be closely connected with the health of people, and are pressing to raise the goal for water quality beyond what is currently considered swimming standard, to drinking standard (J Henry, pers. comm.).

Springs, creeks, and river beds are becoming dryer and many native species that are important for mahinga kai, such as the lampry eel and freshwater crayfish, are



disappearing. Of particular concern is the loss of wetlands, especially along the coast. Cyanobacteria are a problem over the summer months (J Henry, pers. comm.).

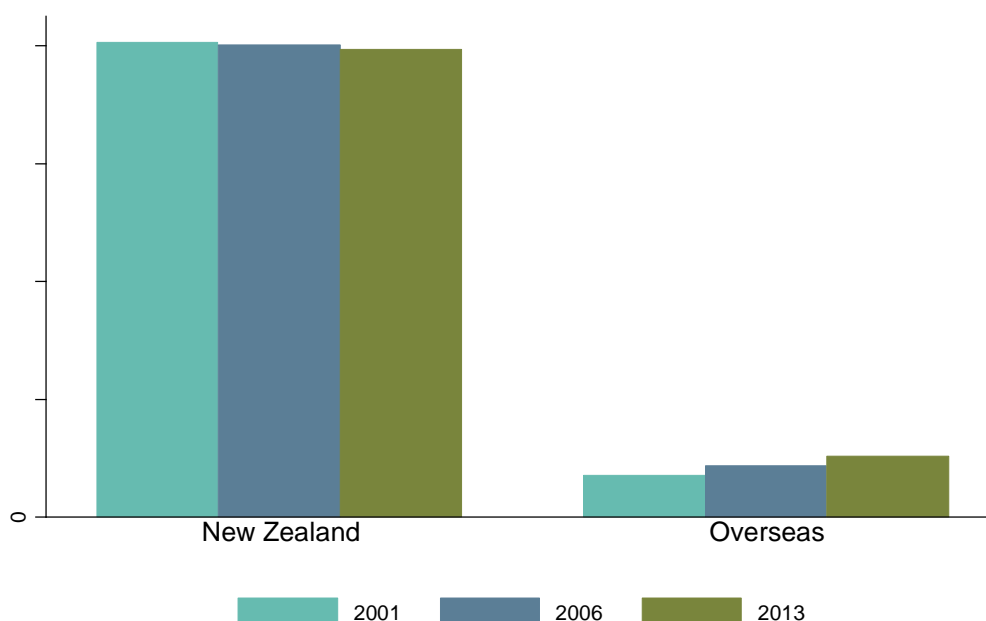
One of the most concerning aspects of these issues is a lack of clarity and available data about the cause of the problems. Trout and salmon may be having a negative impact on the native fish species, and in some cases, rivers being “cleaned up” of debris can also have a negative impact on refugia. Coastal erosion is affecting coastal wetlands and lagoons (J Henry, pers. comm.).

The impact of climate change is of concern for Arowhenua, especially potential impacts on flooding, increasing coastal erosion from storm events, water quality and quantity, and mahinga kai species (King et al. 2012).

The expansion of intensive farming and increases in irrigation are especially worrying. Gains made in efficiency of irrigation and improving the environmental performance of farms through farm plans will be negated by the continued expansion of intensive, irrigated agriculture. There is a need to encourage water use efficiency and currently there is no penalty for farmers who are inefficient or pollute the environment. A tax or levy on (inefficient) water use could provide funds to support environmental improvements (J Henry, pers. comm.).

### **6.1.2 Migrant community**

Economic growth in the OTOF zone has seen a steady increase in the number of migrants arriving in the area. In the 2013 census approx. 1,500 or 3% of zone residents gave their usual residence 5 years ago as overseas, and the number of Timaru residents born overseas has also increased (Fig. 12). Immigration NZ encourages skilled migrants to come to New Zealand, with additional encouragement for immigrants to the South Island via the points scheme in the “general skills” immigration category.



Source: New Zealand Census. Statistics New Zealand

**Figure 12** Number of OTOF zone usually resident population born in New Zealand compared with number born overseas.

The changing ethnicity of the Timaru district population is even more clearly reflected in school rolls. Table 5 shows changes in the ethnicity of school rolls for schools in Timaru city and other (rural) schools in the Timaru district. All schools show a drop in the relative percentage of European/ Pākehā students, with a 63% increase in the number of Asian students, most coming from South-East Asia, an increase in the number of Pasifika students and those from the Middle East/Latin America and other parts of the world, as well as a larger percentage of students identifying as Māori. Some Pasifika students are drawn directly to the area on rugby scholarships.

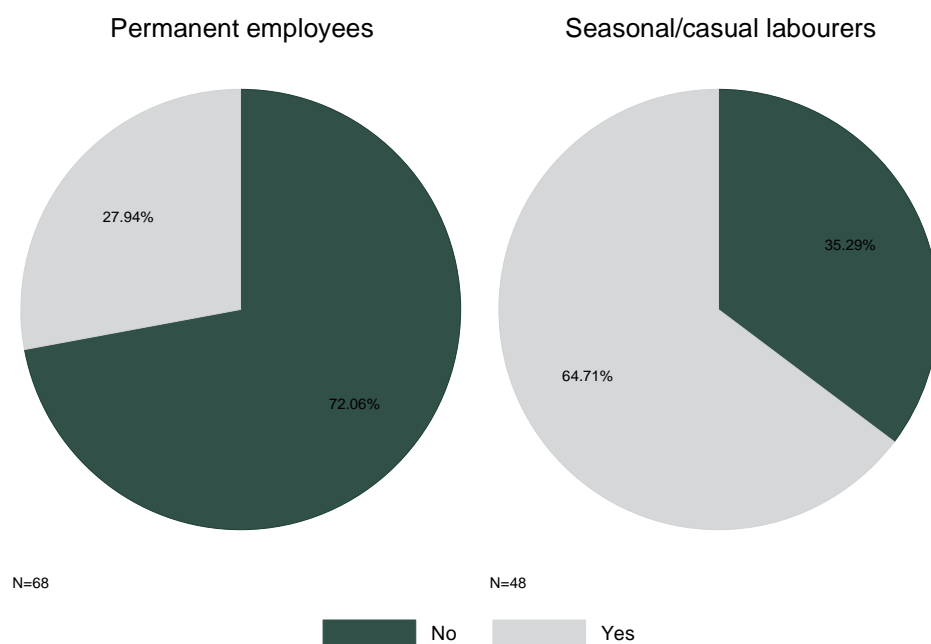
However, the number of international fee paying students dropped between 2010 and 2015 from 125 to 95 students in total.

**Table 5** Changes in ethnicity of schools in the Timaru district

	<i>European/ Pākehā</i>		<i>Māori</i>		<i>Pasifika</i>		<i>Asian</i>		<i>MELAA</i>		<i>Other</i>	
	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015
Rural	84.5%	80.1%	12.2%	14.6%	0.4%	1.0%	1.2%	3.1%	0.0%	0.6%	0.9%	0.3%
Timaru	82.7%	78.1%	10.2%	13.2%	1.5%	2.3%	2.4%	3.1%	0.0%	1.3%	1.3%	0.3%
Average	83.2%	78.7%	10.9%	13.7%	1.2%	1.9%	2.0%	3.1%	0.0%	1.0%	1.1%	0.3%
Total	6403	6074	835	1054	90	148	153	241	0	81	87	23

Migrants also come from an increasingly diverse range of countries, in particular from Europe, India, the Philippines, China, and Oceania. The report ‘Settling in Aoraki’ (2013) highlighted the challenges facing immigrants to the area. As part of the “settling in” initiative, the Aoraki Migrant Centre was opened in 2014 to provide a point of contact for immigrants and support their integration process. Migrant support manager Rosie Knoppel noted (pers. comm., 29 August 2016) that it could be hard to find the data required to fully understand changes in the migrant population at local level as in New Zealand, unlike many countries overseas, people are not required to register with a local municipality. For the wider Canterbury region in 2014/15, there were 1473 permanent migrants, 7,166 temporary work visas in the “essential skills” category, and 6,720 international students.

A significant proportion of immigrants come from the Philippines and Brazil to work on dairy farms in the area. This is a changing community of which it is hard to keep track, as workers and sharemilkers often move to another farm every year on “gypsy day”, usually the 1<sup>st</sup> June, which marks the start of a new dairy farming season (R Knoppel, pers. comm.). Data from the 2015 SRDM shows there is a far greater proportion of seasonal/casual workers on farm (64.7%) than permanent staff (27.9%).



Source: 2015 Survey of Rural Decision Makers

**Figure 13** Percentage of farms in Timaru, Mackenzie, and Waimate districts that have permanent and seasonal/casual employees.

The Migrant Centre has initiated support groups for newcomers to the area, and noted that as well as immigrants from overseas, these groups often comprise a significant number of New Zealanders who have come from other parts of the country (R Knoppel, pers. comm.). People are attracted to the Timaru district by the strong economy and lower house prices, and it is also a popular area to retire. Internal migration has increased following the Christchurch earthquake. Newcomer group coffee mornings often comprise around 30%

“earthquake refugees”. The building sector is also growing with the strong economy, for example around the Port area. While Jackson (2014) suggested it is likely the Timaru district has made a small, direct earthquake-related gain, overall migration trends suggest there is likely also an indirect earthquake effect that has worked to reduce previous migration loss, particularly among people in their early 20s.

Migrants occupy a wide range of professions, from highly skilled workers to unskilled labourers. Different groups of migrants face different challenges. Highly skilled professionals have sometimes faced disillusionment with unclear employment expectations, for example, doctors have found they are unable to practice their speciality as expected and decide not to stay. Rural areas, however, are particularly challenging as employment tends to be in hospitality and farm work (R Knoppel, pers. comm.).

Challenges face by migrants, especially unskilled workers in rural areas, can be extreme. Job insecurity, access to housing and medical services, and even to sufficient food, can be limited by long working hours, low income, lack of information about entitlements, and also by transport in rural areas (R Knoppel, pers. comm.).

Localised trends result in localised issues. For example, migrants in the McKenzie district tend to be employed in the hospitality sector. Around Lake Tekapo there is not enough accommodation for workers, with some people living in tents. The Waimate district employs many Chinese people in agricultural work. For people coming from highly populated countries such as China, the rural community can be a culture shock and social isolation is a major issue, particularly for single migrants or those who have left families behind as they do not have social contact through organisations like schools and Plunket (R Knoppel, pers. comm.).

Employer awareness of such problems, particularly employers of rural workers, is a major challenge. While some employers are highly aware and support their workers to integrate, others simply pick workers up at the airport and drop them on the farm without providing further information on basic issues such as where they are located geographically, medical services, how to obtain a drivers’ license, transport, and even how or where to buy groceries. Language can also be a barrier, and access to services such as medical care can be limited for non-residents (R Knoppel, pers. comm.).

Farm workers play a key part in on-farm outcomes, from treatment of animals to shifting the effluent irrigator at the right time to avoid the application of excess nutrients. For farm workers struggling with basic human needs, their duty of care to the environment is likely to be a low priority (R Knoppel, pers. comm.).

The Migrant Centre directly helped over 450 people in the last year, however it faces funding challenges, and is limited to two staff members (Timaru Herald, August 1, 2016).

### **6.1.3 Housing supply**

The percentage of the population who own or partially own their own residence has dropped from 64% to 60% since the 2001 census, although the number of owned residences has dropped only slightly.

The Timaru District Growth Strategy notes that the supply of residential zoned land is an important aspect of labour mobility, as it allows people to take up new job opportunities. The Strategy suggested there is sufficient residential zoned land to account for projected future growth over the next 30 years in Timaru, Temuka, and Pleasant Point, but that some additional residential zoned land may be required in the Geraldine area. In smaller settlements, growth was considered more likely to be constrained by available service infrastructure than by zoning.

The Strategy further notes that the ageing population and falling house formation rates will likely lead to an increased demand for smaller dwellings on smaller sites, close to services. The number of one-person households is projected to increase by 31% between 2013 and 2045 (Jackson 2014).

The Timaru District Growth Strategy identifies a number of key issues for housing development in the area:

- The potential to “unlock” land supply through infill development by enabling growth in areas where there is spare capacity within existing infrastructure networks. However, such intensification can also increase built form, adverse landscape effects
- The risk that rural residential growth can result in a loss of productive soil, potentially impacting the agricultural sector, and limiting both urban and rural growth. Provision of services in these areas is also costly
- Rural residential growth is constrained by infrastructure availability, the most significant of which is water supply. Development in new areas that lack infrastructure is likely to be inefficient and uneconomical
- Flood risks need to be taken into account
- Reverse sensitivity effects in rural areas
- Future demand for stormwater may come from communities not currently connected to the reticulated system or infill development within existing settlements. This will increase the cost of services and might degrade secondary flow paths for stormwater, and potentially also wastewater
- If a major “wet” industry left Timaru, this would have a significant impact on wastewater quantities and maintaining cost effectiveness.

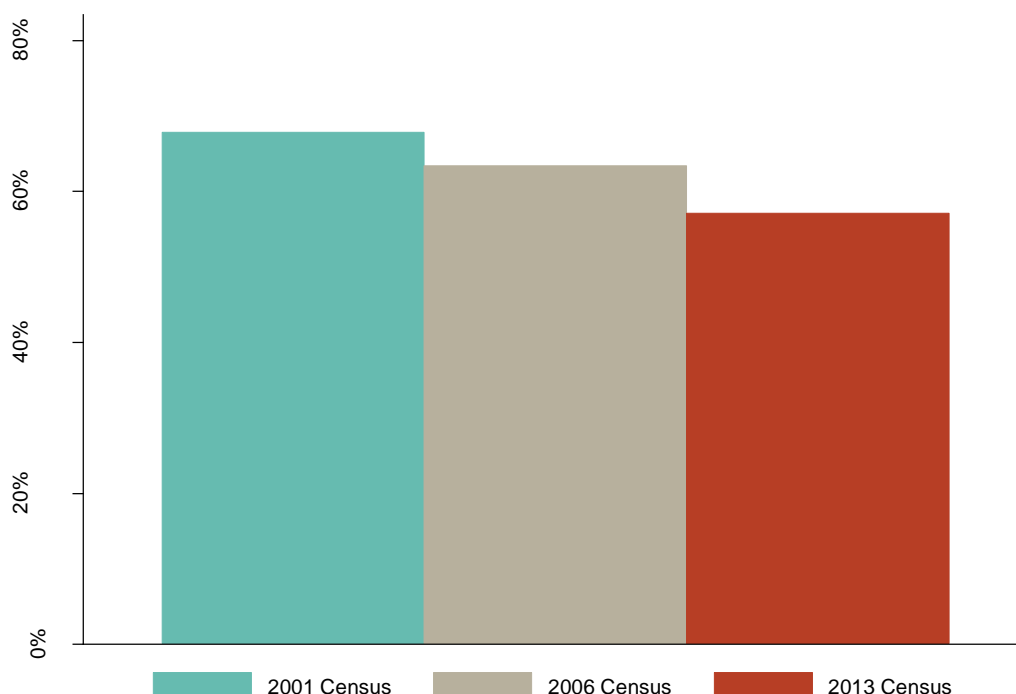
## 6.2 Community groups and organisations

The Timaru District has a long history of strong community spirit, and the ongoing strength of this was reflected in workshops held for the South Canterbury community profile (2009). Participants in the workshops made it clear they enjoyed living in the region and felt valued and supported by their communities. They felt people in the region were involved with the community and emphasised the value of living in small settlements with wide open spaces and the cohesive, self-reliant nature of their communities (South Canterbury Community Profile 2009).

The community also has a sound relationship with the Timaru District Council: in a recent survey (TDC website), 82% of respondents were satisfied with overall services and facilities. Survey results indicated that 77% of residents had positive feelings towards the council and the work it was doing.

However, the number of people involved in volunteer work in the district has dropped from 6,108 to 5,985 between 2006 and 2013, reflecting a national trend and local charities have admitted increasing challenges in finding volunteers (Timaru Herald, 7 March 2016). Volunteering in the district is supported by Volunteering Mid & South Canterbury, an organisation that offers support in areas such as training, information, advocacy, recruitment, placement, recognition, and promotion of volunteering.

There is also a declining affiliation with religion in the OTO zone (Fig. 14).



**Figure 14** Percentage of OTO zone usually resident population who identify as being affiliated with a religion.

The MPI-funded Opihi water project, led by Landcare Trust, provides a home for the nine catchment groups that work with the OTOP zone committee to “develop widespread understanding of water quality issues and realistic land management solutions to improve the quality of the surface and ground water in the Opihi catchment” (NZ Landcare Trust website: Opihi Water project):

- Kakahu Catchment Group
- Waihi Catchment Group
- Orari & South Rangitata Catchment Group
- Washdyke/Waitarako Group
- Tengawai & Totara Valley Catchment Group
- Upper Opihi Catchment Group
- Lower Opihi Catchment Group
- Opuha Catchment Group
- Pareora Community Catchment Group

The project addresses the OTOP zone/Opihi river catchment, which covers around 384,000 ha and includes over 2,600 farms. Catchment groups meet monthly and are facilitated by professionals from industry partners such as DairyNZ and fertiliser companies, as well as Environment Canterbury staff. The composition of the groups varies, depending on the catchment. Some consist primarily of farmers. Other groups are more diverse and have required effort, understanding, and careful facilitation to work through initially polarized views on water quality issues and form a positive working relationship (N Pridham, group facilitator for the Lower Opihi Catchment Group, 9 Sept 2016, *pers. comm.*). A range of local viewpoints can be highly valuable in such groups and in some areas efforts are being made to involve more of the community, for example through developing publicity material about the catchment groups.

The catchment groups were initially formed to gain an in-depth, local understanding of the issues and report their findings to the Zone Committee, who then reports to Environment Canterbury. The success of the groups in working through local level issues has led to feelings of frustration in some cases when hard-won recommendations have not been taken up. This raises the question of whether the groups need to work more closely with Environment Canterbury to ensure their mutual goals are well-aligned. Janet Gregory, Landcare Trust’s Regional Coordinator for Southland, has indicated that work is currently underway to clarify the role of the catchment groups and how it fits into the larger process.

More recently, groups such as the Lower Opihi catchment group have become involved in small projects, for example, considering ways to restore whitebait breeding grounds near the mouth of the Milford Lagoon, where draining of swampland has negatively affected the breeding ground. They are also considering how best to support ongoing work by other groups in the area, such as efforts by Forest and Bird to restore the lowland plain forest around Arowhenua station (N Pridham *pers. comm.*).

Apart from Forest and Bird, other active groups include the Talbot Forest Working Group (Nature Space website: Talbot Forest Working Group), which works with the Department of Conservation (DOC) to enhance and protect Talbot Forest Scenic Reserve at Geraldine. The reserve is a small remnant of the extensive broadleaf/podocarp forests that once covered large areas of Canterbury.

The Orari River Protection Group near Geraldine aims to “protect the environmental and cultural integrity of the Orari river in it’s free-flowing state” including advocating for greater protection of the Upper Orari and catchment in the District and Regional plans (Orari River protection group website). The Group’s website specifically notes that one of the threats to the river is a proposed dam for an irrigation scheme. The group is also actively engaged in water quality monitoring.

DairyNZ runs a number of events and discussion groups for dairy farmers in the zone. These can be found on the DairyNZ website (<http://www.dairynz.co.nz>) and include the Temuka/Geraldine Farm Systems Group, Fairlie Farm Systems Group, the Dairy Holdings Canterbury Discussion Group, Biz Start South Canterbury, as well as farmer wellness and heat detection workshops. The Dairy Women’s network has a South Canterbury Regional Group, and South Canterbury Rural Women are also active in supporting the dairy community. A few schools in the Timaru district are also affiliated with the Enviroschools programme ([www.enviroschools.org.nz](http://www.enviroschools.org.nz)): St Joseph’s schools in Temuka and Timaru (and in Fairlie), and Waimataitai School, as well as three preschools and kindergartens in the area (Geraldine Preschool Incorporated, Grantlea Downs School and Rhona Day Free Kindergarten).

Farm decision makers who responded to the SRDM were well connected with their local communities, and 14% were involved in conservation organisations (Table 6). Patterns of involvement were similar to the rest of the country, except that OTOF farmers showed heavier involvement in sports clubs (68%). South Canterbury currently has 10 cricket clubs, 9 rugby clubs, and 13 soccer clubs.

**Table 6** Percent of respondents who are personally involved or whose partner/spouse is personally involved in organisations in the local community

Organisation in local community	Percent of respondents involved
Schools	34%
Religious	5%
Returned servicemen association	0%
Arts clubs	11%
Cultural clubs	6%
Sports clubs	68%
Special interest clubs	24%
Conservation organisations	14%
Community service clubs	18%
Volunteer organisations	26%
Other	2%



## **6.3 Health and education**

### **Education**

Over the past 5 years (2010–2015), school rolls in the Timaru district have increased and the average decile rating of schools has risen. This trend is dominated by schools in rural areas – when schools were divided into those in Timaru and in other areas, no urban increase was observed over the past 5 years. In fact, “rural” school roles had increased by 47 and “urban” school roles had decreased by 24 pupils between 2010 and 2015. In addition, rural school average deciles increased from 6.8 to 7.4, while Timaru school deciles increased from 5.9 to 6.1.

While the number of pupils enrolled in primary schools has increased with the population, the number of high schools pupils enrolled has fallen. For the two rural secondary schools, rolls decreased by 116. In Timaru, the five secondary schools rolls decreased by 139. Single-sex boys and co-ed school rolls declined, while single-sex girls schools remained steady (+4). Arowhenua Māori School remained unchanged in both decile and roll.

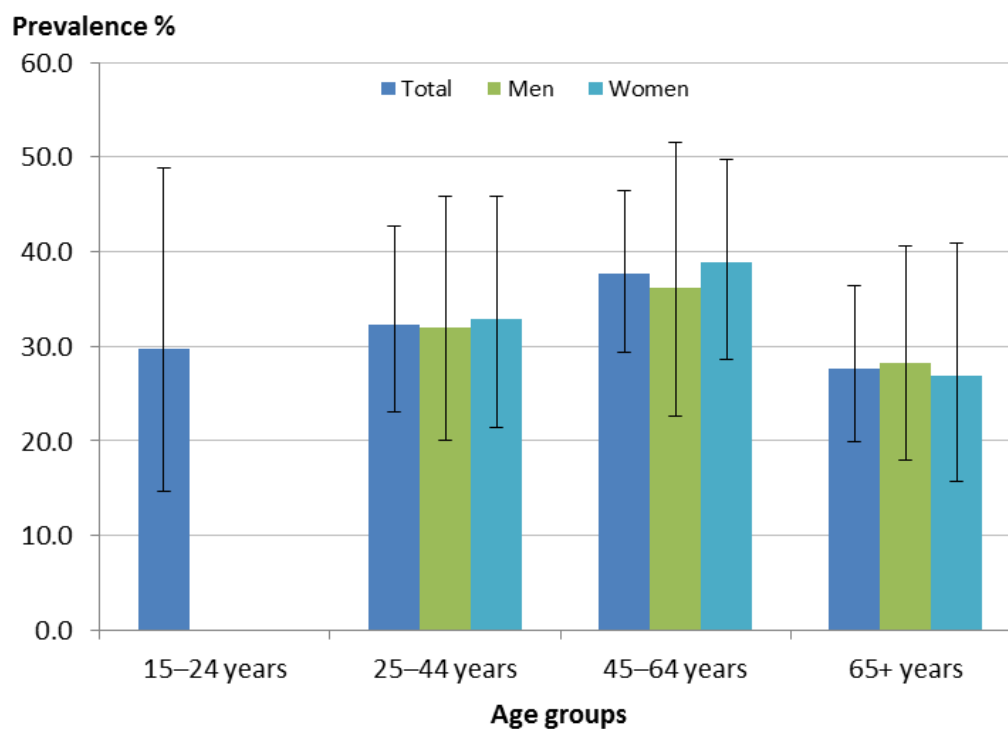
Around 30% of Timaru district children leave school with no qualification, and about 60% gain a level 1–6 diploma.

### **Health**

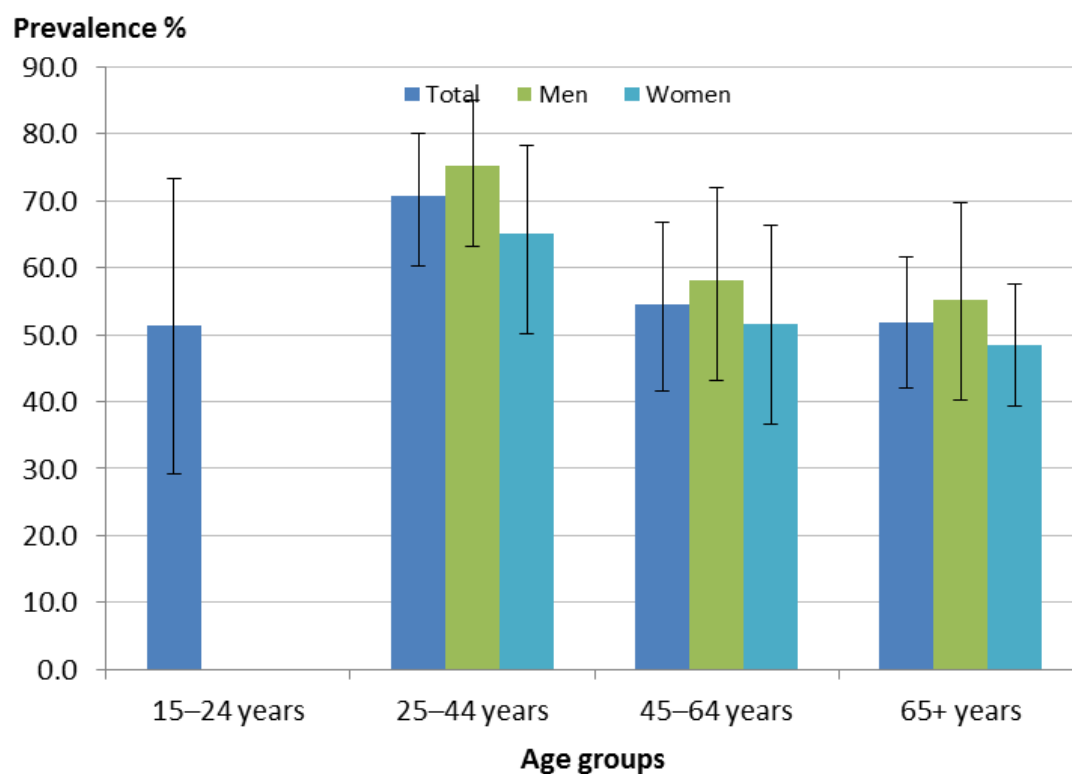
Like most areas in New Zealand, most GPs’ patient rolls are full. However, the percentage of people who experienced an unmet need for primary healthcare in the past 12 months is lower in South Canterbury compared with the national percentages for all age groups and genders.

Figures 15–17 highlight observations about the health of the Timaru district:

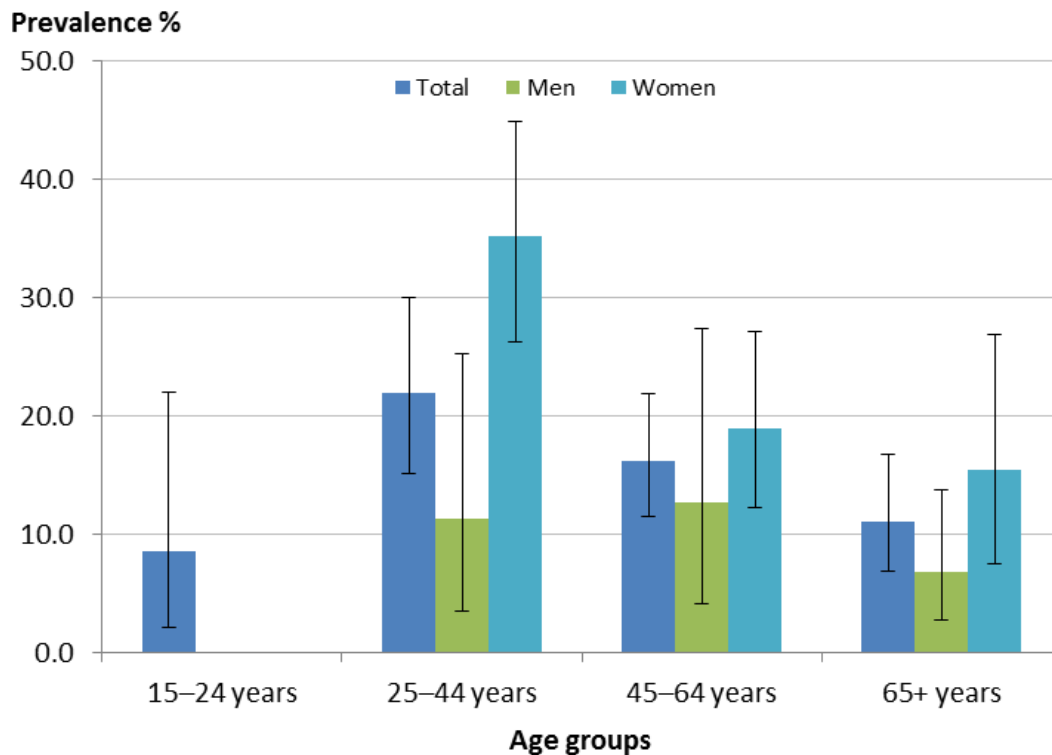
- The percentage of population over 65 who are considered obese is lower in South Canterbury than the national averages. Timaru’s reputation as a good place to retire and the general awareness of the ageing population may mean that sporting and recreation facilities in the district are particularly well set up for this age group.
- The rate of diagnosed arthritis is higher in South Canterbury, particularly in the 45–64 age bracket, compared with national statistics. This is true for both genders.
- The rate of diagnosed common mental disorder is much high for women 25–44 years compared with the national percentages (22.1%). This is an issue that may warrant further investigation.



**Figure 15** Obesity in the Timaru district. Source: 2011–2013 New Zealand Health Survey. Ministry of Health.



**Figure 16** Physically active (met physical activity guidelines in past 7 days). Source: 2011–2013 New Zealand Health Survey. Ministry of Health.



**Figure 17** Diagnosed common mental disorder (depression, bipolar disorder, anxiety disorder). Source: 2011–2013 New Zealand Health Survey. Ministry of Health.

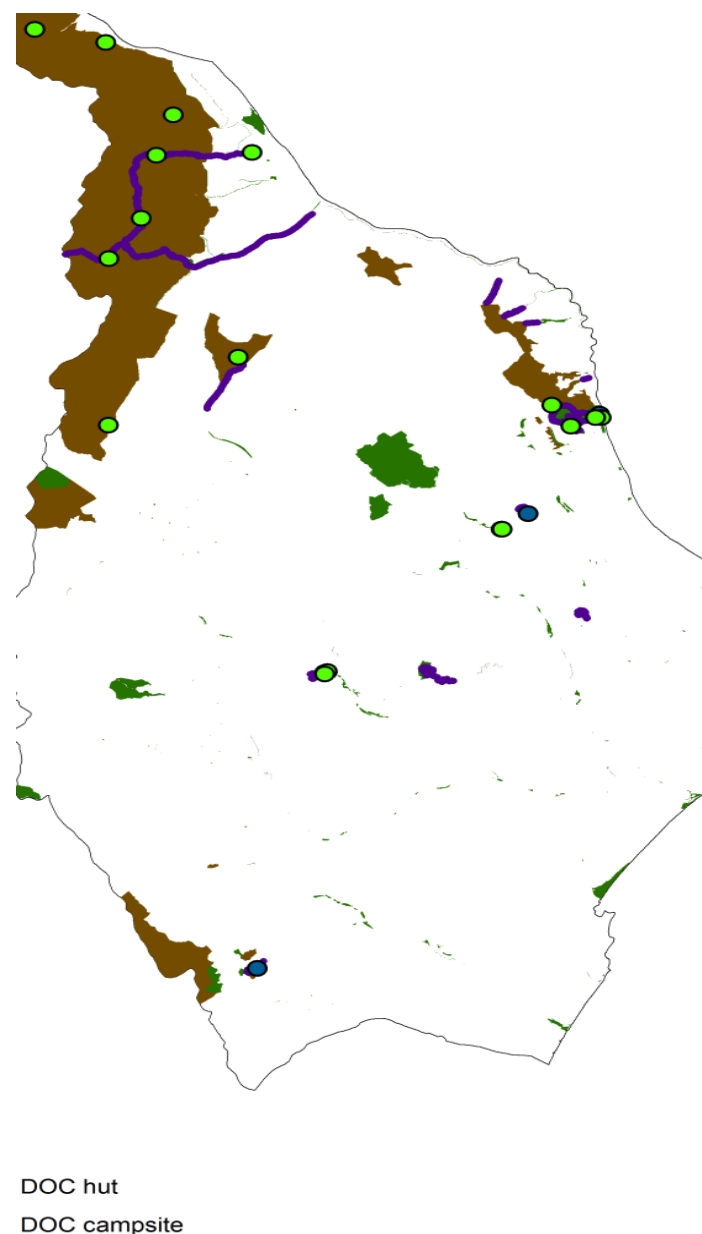
## 6.4 Recreation and leisure

Many of the recreational opportunities in the South Canterbury area are centred on water resources, including walking, tramping, boating, kayaking, swimming, hunting, fishing, whitebaiting, rafting, camping, and picnicking (2009 Canterbury Water Management Strategy; Orari-Opihi-Pareora Zone).

Shared walking and cycling tracks have been established in Timaru, Temuka, Geraldine, and Pleasant Point and are proving popular, as are some tracks in rural areas. There is increasing demand for new tracks, and the Timaru District Council plans to progressively extend off-road tracks in the District.<sup>2</sup> The Timaru District Active Transport Strategy was developed to encourage active transport, such as walking and cycling, in the Timaru District.

The majority of DOC land, tracks, and huts are located in northern corner of the zone, with several huts also located in the north east near the Rangitata river (see Fig. 18). These areas will be hotspots for hunting and tourism.

<sup>2</sup> TDC website



**Figure 18** Location of DOC recreational areas. Source: DOC.

The current supply of recreation land is outlined in the Timaru District Council Parks Strategy 2012–2022 (Parks Strategy). In comparison with other local authorities, the Parks strategy notes that Timaru has a low provision of sport and recreation, neighbourhood and natural parks, and also a low provision of recreational land, at only 10.9 ha per 1000 residents (the national average is 20.9 ha per 1000 residents). The Parks Strategy recommends increasing recreational land area to 12.5 ha per 1000 residents. The Parks Strategy categorises the parks network into different park categories and levels of service identified based on the New Zealand Recreation Association Parks Categories project. Timaru District has a comparatively low provision of park land, especially Sports and Recreation, Neighbourhood and Natural Parks.

**Table 7 Forecast from Parks Strategy**

Park Category	Current Provision ha/1,000 Residents	Recommended Provision ha/1,000 Residents	Changed ha/1,000 Residents
Premier	1.2	1.2	0
Sports Recreation	1.7	2.0	0.3
Neighbourhood	0.3	1.0	0.7
Amenity	5.5	6.3	0.8
Natural	2.0	2.0	0
<b>TOTAL</b>	<b>10.7</b>	<b>12.5</b>	<b>1.8</b>

The Timaru District Growth Strategy suggests that the ageing population may mean demand for active sports could decrease over time, and other recreational options could be required such as gardens and gentle walking tracks. The Growth Strategy notes that denser patterns of urban growth, which favour shorter commuting times, encourage physical activity, more social connectedness, and broaden social options of easily accessible community, education, and recreation facilities.

**Table 8** Sports facilities in Timaru District (Source: TDC website)

Location	Park	Sports
Timaru	Ashbury Park	Cricket, rugby, croquet
	Anzac Square Park	Model railway, croquet, football, rifle shooting, boxing
	Marchwiell Park	Football
	Aorangi Park	Hockey, tennis, netball, athletics, football, cricket and bowls, indoor sports held in Southern Trust Events Centre
	Caledonian Grounds	Pistol range, football, cycling
	Sir Basil Arthur Park	Football, squash, indoor tennis
	West End Park	Football, tennis, croquet
	Māori Park	Tennis, swimming
	Highfield Golf Course	Golf
Temuka	Buzan Square	Football
	Gunnion Square	Cricket, football, touch rugby
	Temuka Domain	Rugby, cricket, athletics, cycling, golf, bowls, netball, tennis, badminton
Geraldine	Geraldine Domain	Cricket, football, bowls, croquet, tennis, netball, athletics
	Raukapuka Reserve	Rugby
Pleasant Point	Pleasant Point Domain	Rugby, cricket, football, tennis, golf

## **Kayaking**

Three rivers in the OTO zone are important for kayaking: the Rangitata, Orari, and Opihi. The Rangitata River has three main runs, two of which are protected by a water conservation order, and the Rangitata Gorge is the only class IV–V water on the East Coast that flows reliably and as a result is a very important kayaking resource. Although the Orari River provides good beginner to intermediate class II–III white water, the river requires spring flows or rain to provide sufficient flow and is normally too low to run in summer. Timaru kayakers regularly use a bottom section of this run for instruction and introducing kayakers to white water (Rankin et al. 2014).

## **Jet boating**

There are 3 commercial jet boating operations in Canterbury, none of which are located in the OTO zone. In the Jet Boating on Canterbury Rivers 2015 report, the Opihi and Rangitata Rivers are identified as being used for jet boating. The RiVAS river significance assessment found the Opihi to be of local significance for jet boating, while various sections of the Rangitata River were found to be of local, regional, and national significance (the braided channel is of national significance).

The RiVAS river significance assessment lists the Orari as being precluded from jetboating because the Godley River is preferred and the Pareora River cannot be used by boats. The Jet Boating on Canterbury Rivers Report lists the Opihi River as being used by local users. There are 50 user days per year, and the river can be used by boats 5% of the time.

The Rangitata River is used by local and regional users and is considered a nationally significant jet boating resource. It sees over 1,000 user days across various parts of the river. The percentage of time that the river is boatable varies depending on the section of the river, and ranges from 5 to 95% of the time.

## **Swimming**

Environment Canterbury conducts water quality monitoring at a number of recreational sites throughout the region. These sites are then graded according to their general suitability for recreation based on the risk of faecal contamination to a site, supported by water testing for faecal indicator bacteria. The recreational grade allocated follows the Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (2003) produced by the Ministry for the Environment and Ministry of Health (Environment Canterbury website).

*However*, swimming water quality grades do not cover algal blooms. Environment Canterbury monitors cyanobacteria and algal blooms through their state of environment monitoring and warnings are provided about toxic algal blooms separately. Although all the sites listed in Table 9 indicate suitability for swimming and fishing, Mark Webb of Fish and Game notes (pers. comm., 16 Sept 2016) that there is considerable public concern about water quality in the waterways, especially about cyanobacteria. Most of the popular

recreational spots, particularly in the Opihi and Pareora Rivers, have issues with algal blooms that affect swimming as well as the quality of fish catch.

Webb notes that for some areas and issues, the cause can be unclear to the public. For example, a well-known swimming spot in the upper Waihi in Te Moana gorge recently had warning signs about swimming in summer although stock access in the area seems very minor compared with other rivers, causing concern over the apparent sensitivity of the catchment. However, Daniel Clark of Environment Canterbury noted (pers. comm. 28 October 2016) that the warning signs in this area related to cyanobacteria, rather than *E. coli* which was affected by stock access. The causes of high cyanobacteria levels were still under investigation. For the Waihi-Temuka catchment group in particular, swimming water quality is a high priority. This group is made up of a diverse cross-section of the community and is well attended by farmers. As a result, some of the sites in this catchment have been fenced recently (M Webb, pers. comm.).

High periphyte growth is also an area of concern. Although streams with periphyte growth are still considered safe to swim in, such activity is less enjoyable. The lower Temuka River is an example where this is a problem. The Temuka benefitted greatly from the closure of the wool scour on its banks a decade ago. In the past, when the wool scour affected water quality in the Temuka, the Opihi River was the preferred public swimming spot. About 5 years ago, however, the Opihi River began to have an issue with cyanobacteria, and, with the closure of the wool scour and the resulting improvements in water quality, the Temuka became the preferred public swimming location. More recently, algal growth has become an issue in the Temuka and it has become less popular (M Webb, pers. comm.).

Dry summers and a lack of flooding have contributed to issues with cyanobacteria and algal growth. Due both to climatic changes (drier summers) and greater control of river flows through dams such as the Opuha, the rivers no longer flood in winter. While dams such as the Opuha contribute positively to maintaining summer flows, they restrict the flushing effect that results from flooding, thus contributing to the buildup of periphyton and cyanobacteria. This issue has been highly topical in public debates, and the Opuha Dam has conducted work to understand the potential for releasing artificial flushes from the dam and monitoring effects on cyanobacteria and other algae. However, finding a solution has proved difficult, as they do not currently have the facilities to generate a flush of sufficient volume (M Webb, pers. comm.). A study is currently underway on swimming values in the area that will help address knowledge gaps in this area.

## **Angling**

The Survey of New Zealand Freshwater Anglers, conducted by NIWA on behalf of Fish and Game in 2013 aimed to measure the relative value of different fisheries in New Zealand. Respondents to the survey were asked to identify rivers they had fished over the last 3–5 years, rate their enjoyment from 1 (least enjoyable) to 5 (most enjoyable), and provide reasons why they fished each river. Summary scores for both enjoyment level (average of ratings) and reasons (based on the number of respondents citing that reason) were generated for all rivers.

In the survey, the Rangitata gained mean enjoyment scores above the national average. Ease of access and closeness to home are both commonly given as reasons for fishing rivers in the zone. Across all New Zealand rivers, the mean enjoyment score is 2.38 and the range is 1.24 to 4.08. The South Canterbury Anglers Club also lists among its “favourite” fishing waters in the zone the Rangitata, Ohau River, and the Opihi Rivers ([www.nzfishing.com](http://www.nzfishing.com)).



**Table 9** Recreation indicators by monitored site

River catchment area	Monitored site	Recreational activities site is suitable for:							Private land (access by permission)
		Overall recreation risk	Picnicking	Dogs	Swimming	Fishing	Kayaking / Boating	Walking	
Opihi	Hae hae Te Moana River at To Moan Gorge	No Data	1	0	1	1	0	0	0
	Opihi River at Saleyards Bridge	Caution	0	1	1	1	1	1	0
	Opihi River at SH1 Bridge	Caution	1	1	1	1	1	1	0
	Opihi River at Waipopo Huts	Caution	1	1	1	1	0	1	0
	Temuka River at SH1 Bridge	Caution	1	1	1	1	1	1	0
	Waihi River at Waihi Gorge	Caution	1	0	1	1	0	1	0
Orari	Orari River at Orari Gorge	Caution	1	1	1	1	0	1	0
Pareora	Pareora River- Evans Crossing	Caution	1	1	1	1	1	1	0
	Pareora River at Pareora Huts	Caution	1	1	1	1	0	1	1

Source: Land and Water Aotearoa <https://www.lawa.org.nz/>

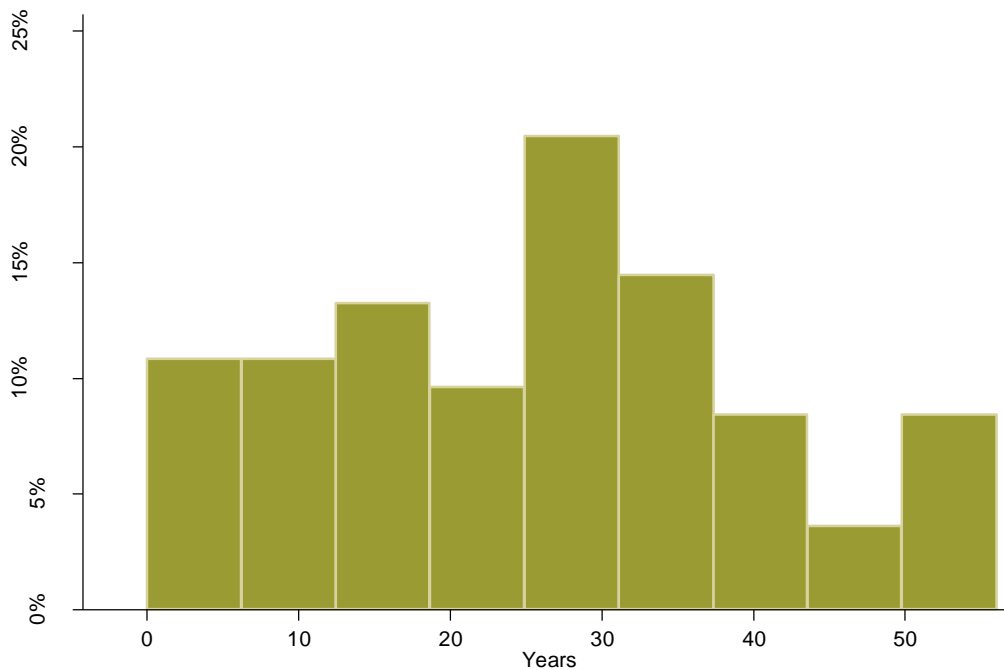
**Table 10** 2013 New Zealand Angling Survey

Mainstem rivers (fishery)	Tributaries	Respondents	Mean enjoyment score	Close to home	Ease of access
Rangitata River (salmon)		131	2.73	27%	35%
Rangitata River (trout)		111	2.57	26%	33%
	Deep Stream	16	2.25	19%	31%
	Deep Creek	12	2.92	0%	25%
Orari River		37	2	27%	46%
Opihi River		85	2.29	35%	58%
	Temuka river	33	2.24	30%	61%
	Te Ngawai River	14	2	71%	36%
	Opuha River	34	2.15	29%	32%
Pareora River		11	1.55	45%	45%

## 6.5 OTOP farmers

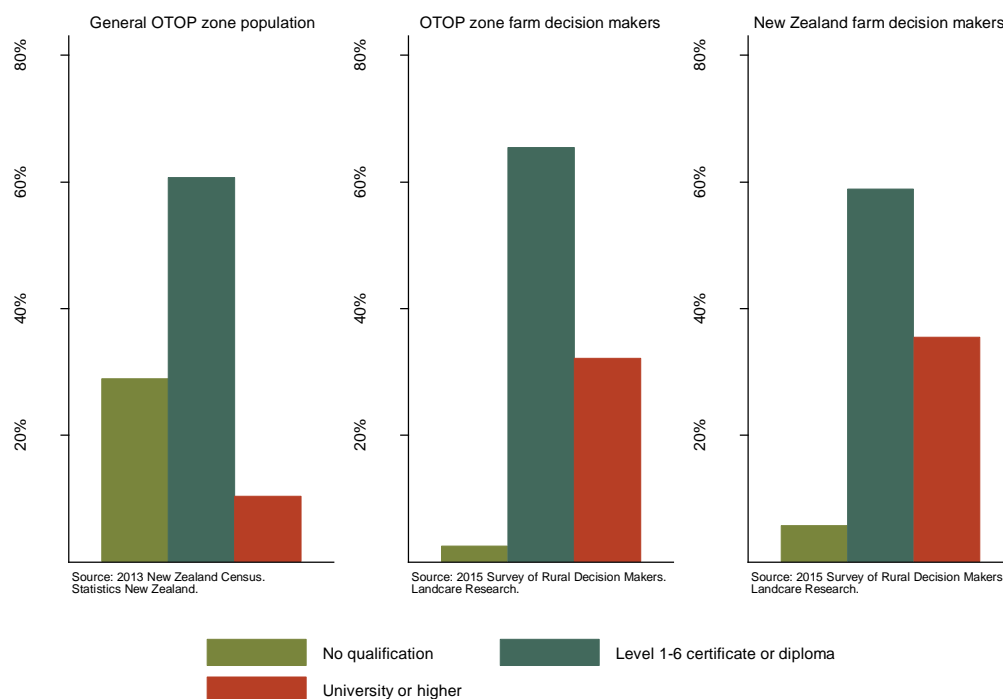
Of the respondents to the 2015 Survey of Rural Decision makers in the OTOP zone, 87% (of 78 respondents to that question) were farm owners, 8% were equity partners, and the remainder were farm managers, lessees, trust representatives, and share milkers; 66% were male; 96% identified as either NZ European or “New Zealander”; and there was only one Māori respondent.

Farm decision makers in the OTOP zone who responded to the SRDM are very experienced (Fig 19.) and also well-educated compared with the general OTOP zone population (Fig. 20). Compared with the rest of the country, there are a very high number of farmers in the area whose family has been on the land for three or more generations (Fig. 21).

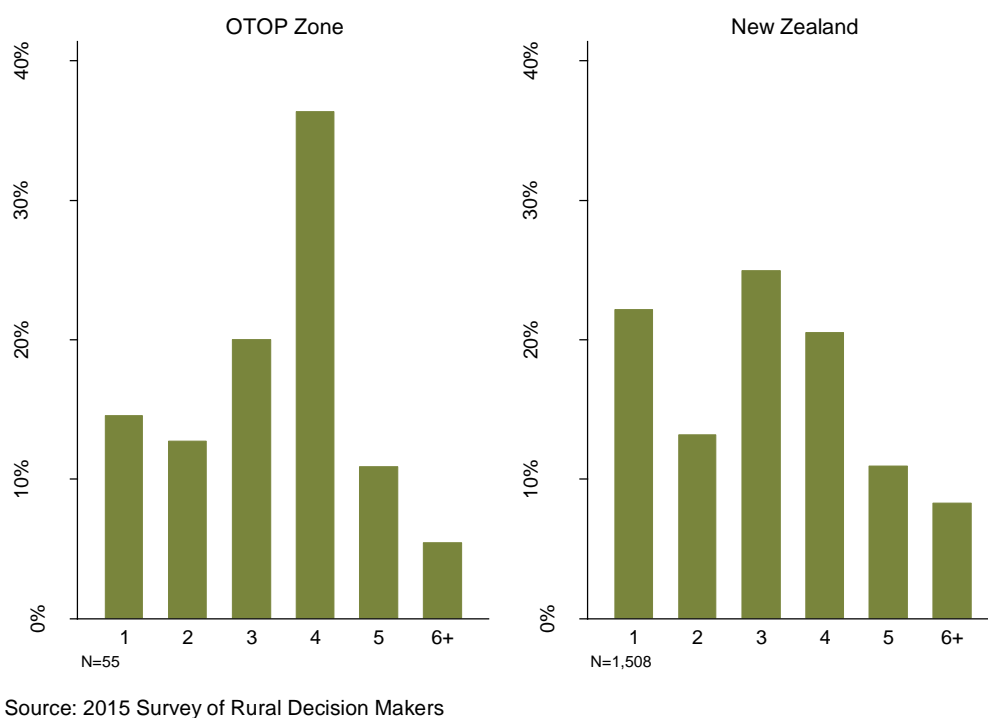


Source: 2015 Survey of Rural Decision Makers.  
N=83

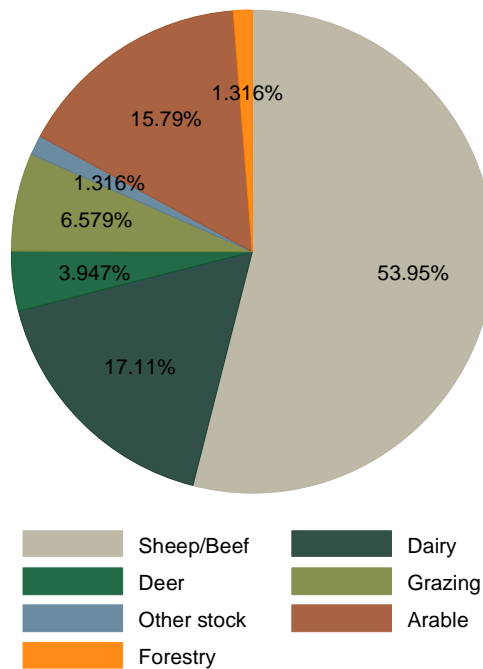
**Figure 19** Years farm experience after age 18 of farm decision makers in Timaru, Mackenzie, and Waimate districts.



**Figure 20** Highest level of education of OTOF zone usually resident population, OTOF zone farm decision makers, and New Zealand farm decision makers.



**Figure 21** Highest number of family generations farming in New Zealand of decision maker and decision makers spouse/partner in Timaru, Mackenzie, and Waimate districts.



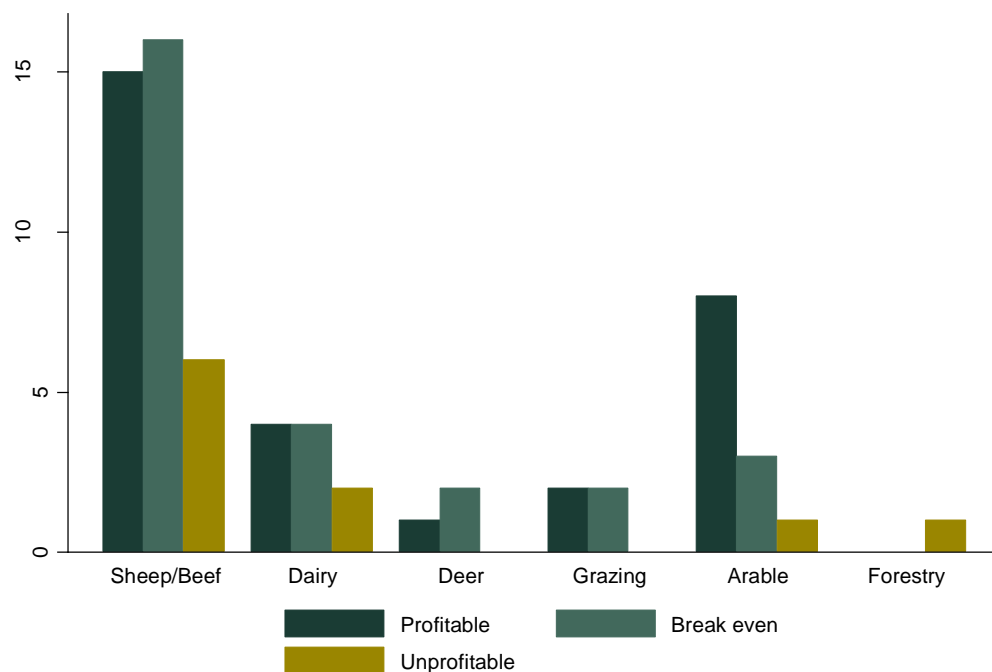
Source: 2015 Survey of Rural Decision Makers  
N=76

**Figure 22** Primary land use of respondent farms in the 2015 Survey of Rural Decision makers in Timaru, Mackenzie, and Waimate Districts.

Respondents represented a range of land uses (see Fig. 22). Only seven dairy farmers provided information on their farm system, and of these all were either a system 2 or 3. Most farms in the zone operated conventionally; 3 of the respondents were certified organic farms; and a two identified as uncertified organic farms.

### Farm profitability

The SRDM also asked farmers to rate their operation in terms of its profitability. Figure 23 shows their assessment of whether their farm was unprofitable, breaking even or profitable, which may indicate potential drivers of future land-use change.



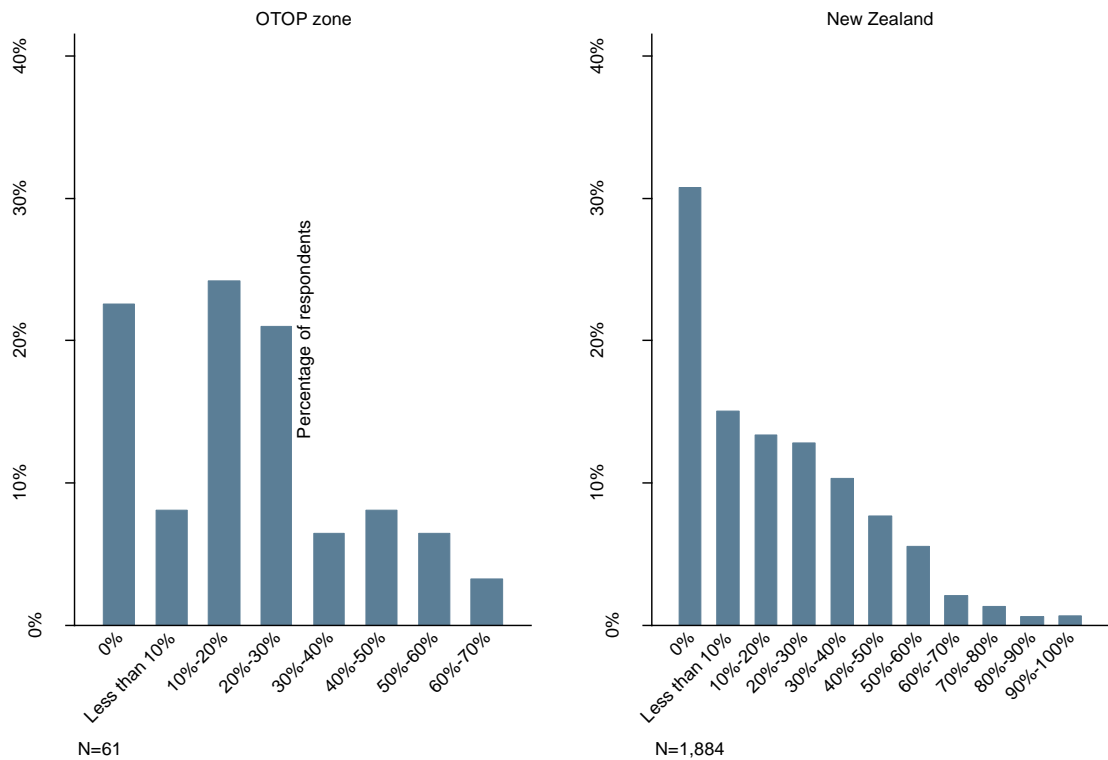
Source: 2015 Survey of Rural Decision Makers

**Figure 23** Farm decision makers in Timaru, Mackenzie, and Waimate districts assessment of the profitability of their farm operation.

Figure 23 indicates that the highest percentage of clearly profitable farms is in the arable sector, which may suggest a potential driver to increase cropping area in the zone. For both dairy and sheep and beef, about the same number of farms were considered profitable as those breaking even, with a number considered unprofitable. While farmers are used to variability, this may suggest that increases in these sectors are currently less likely. Further investigation would be required to assess these apparent trends accurately. Those grazing operations that responded either broke even or were profitable.

Debt levels of OTOP SRDM respondents are higher than the national average (Fig. 24), likely due to the rapid expansion of large scale dairying.

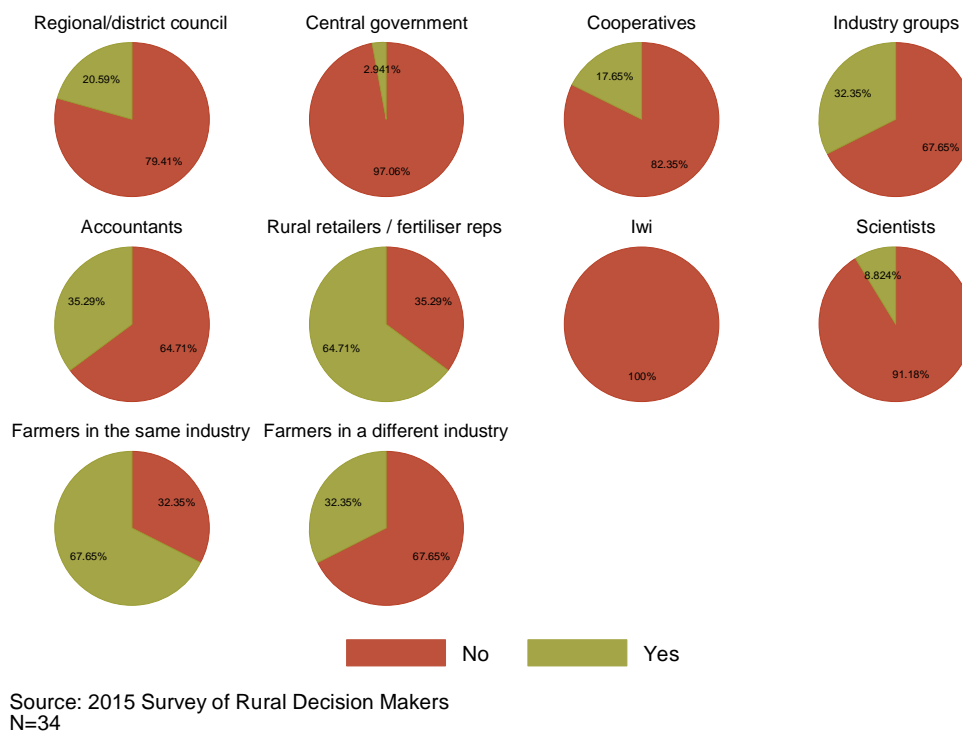
Milk production is high on a national scale and the continuing potential for grain production in the area was emphasised recently when cropping farmers Warren and Joy Darling from just south of Timaru broke the world record for a barley yield, with a crop of 13.8 tonnes a hectare.



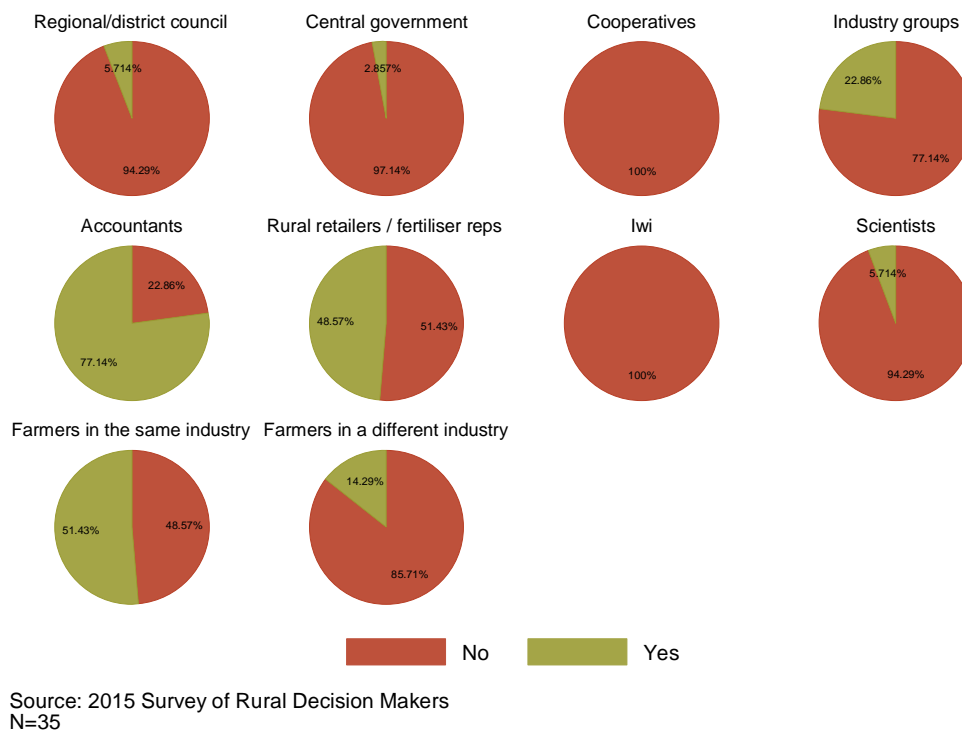
Source: 2015 Survey of rural decision makers

**Figure 24** Debt level relative to farm assets, excluding seasonal borrowing of farms in Timaru, Mackenzie, and Waimate districts.

OTOP farmers discussed environmental performance most often with fertiliser reps/retailers and other farmers, then with accountants/bank managers and industry groups (Fig. 25). Financial performance was most discussed with accountants/financial advisers and then with other farmers and fertiliser reps/retailers (Fig. 26).



**Figure 25** Percentage of farm decision makers in Timaru, Mackenzie, and Waimate districts who met with individuals from various groups to discuss the environmental performance of their farms.



**Figure 26** Percentage of farm decision makers in Timaru, Mackenzie, and Waimate districts who met with individuals from various groups to discuss the financial performance of their farms.

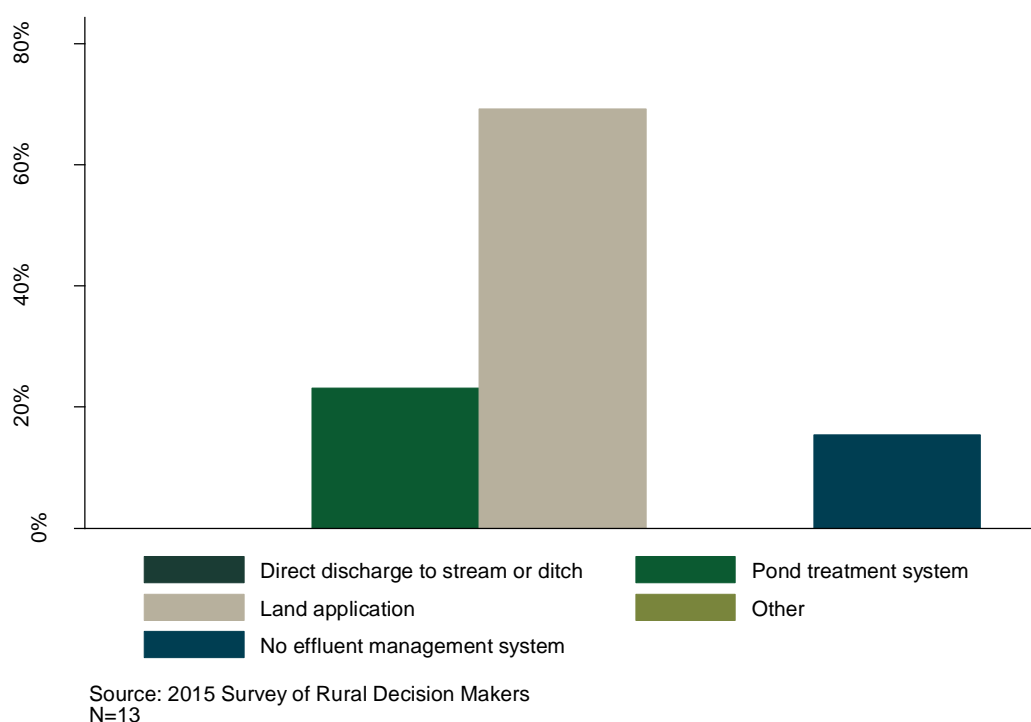


## Environmental attitudes and practices

OTOP farm decision makers were similar to those in the rest of the country when it came to environmental expectations. Nearly all respondents agree or strongly agree that their family, the farming community, and the New Zealand public expect them to farm in an environmentally friendly way. Most also agreed or strongly agreed with statements that the right to hunting on public land should be maintained, that it is important to maintain the recreational use of waterways, and that private landowners should protect habitat for native plants and animals on private land.

The excellent environmental practices of some farmers in the area have been recognised – the 2016 Ballance farm environment supreme award for Canterbury was won by sharemilkers Joe and Suz Wyborn, who farm a 253-ha irrigated property near Geraldine.

However, effluent management on dairy farms shows there is still room for improvement. Of 13 respondents to the SRDM question on effluent management systems (relevant only to dairy farmers), just over 20% had a pond treatment system in place, although most were applying the effluent to land (Fig. 27).

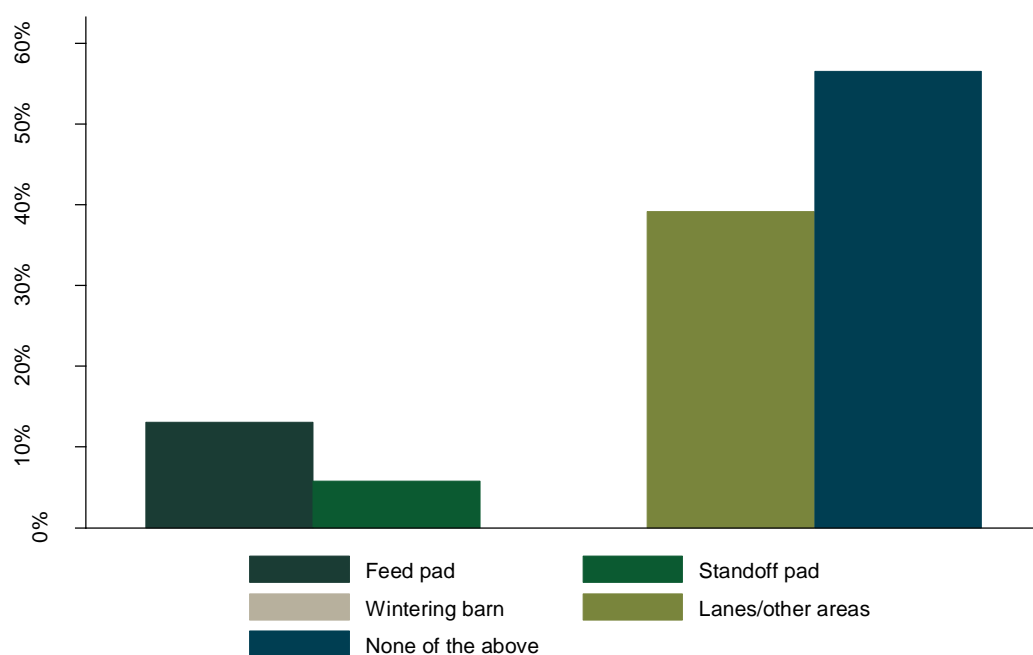


**Figure 27** Effluent management practices used by farm decision makers whose primary land use is dairy farming and have implemented an effluent management system in Timaru, Waimate, and Mackenzie districts.

Although 89% of respondents indicated that stock were generally wintered on their farm, with a further 10% indicating their stock were wintered both on their farm and on someone else's, there were limited facilities for taking stock off pasture in winter. Over half had no such facilities, just under 40% used lanes and other areas, around 20% had a feed pad or

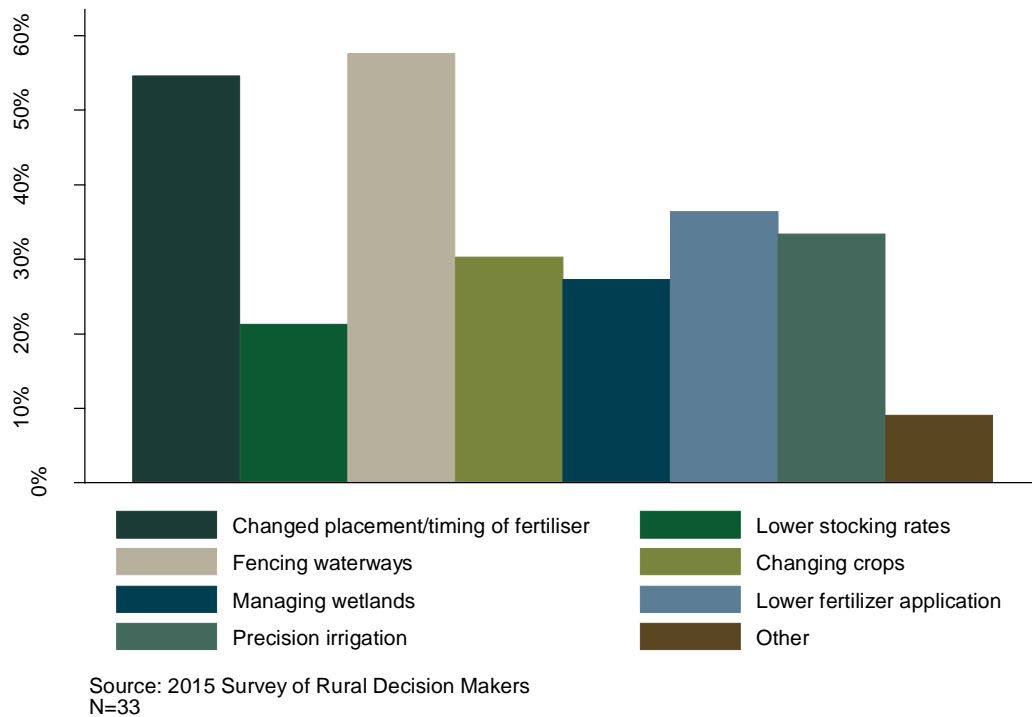
standoff pad, and none reported having wintering barns (Fig. 28). While the need for such facilities varies considerably, with factors such as terrain, soil type, type of stock, and local climate all to be taken into consideration, it may be valuable to further investigate the extent and value of such practices in the OTOF zone. In particular, the relationship between farm ownership and management arrangements and willingness to invest in environmental infrastructure could be further examined.

Regarding nutrient management practices, the most common practices mentioned by SRDM respondents in the Timaru, Mackenzie, and Waimate districts who have implemented a nutrient management were fencing of waterways and changing the timing and/or placement of fertiliser (Fig. 29).



Source: 2015 Survey of Rural Decision Makers  
N=69

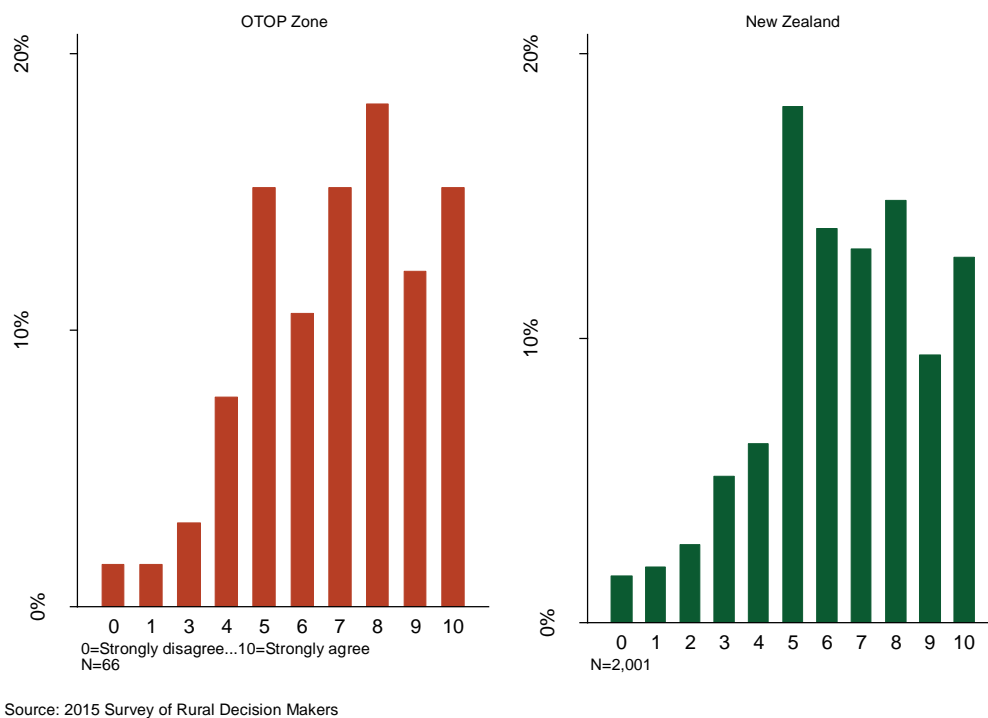
**Figure 28** Facilities for taking stock off pasture in winter used by farmers in Timaru, Mackenzie, and Waimate districts who list some form of pastoral agriculture as a land use on their farm.



**Figure 29** Nutrient management practices adopted by farm decision makers in Timaru, Mackenzie, and Waimate districts who have implemented a nutrient management plan.

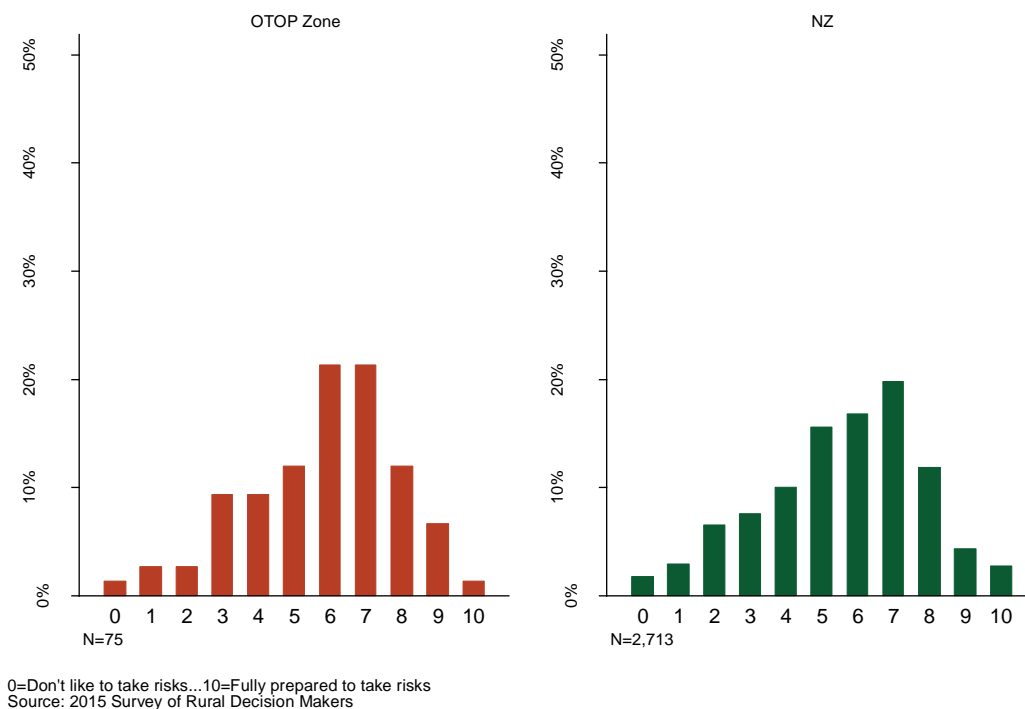
### Readiness for change

OTOP respondents to the SRDM indicated more strongly than respondents from the rest of NZ, that they would reduce total output if they could maintain profitability (Fig. 30). They indicated in general a higher level of willingness to take a moderate amount of risk, although very few responded at either extreme, perhaps reflecting their experience.

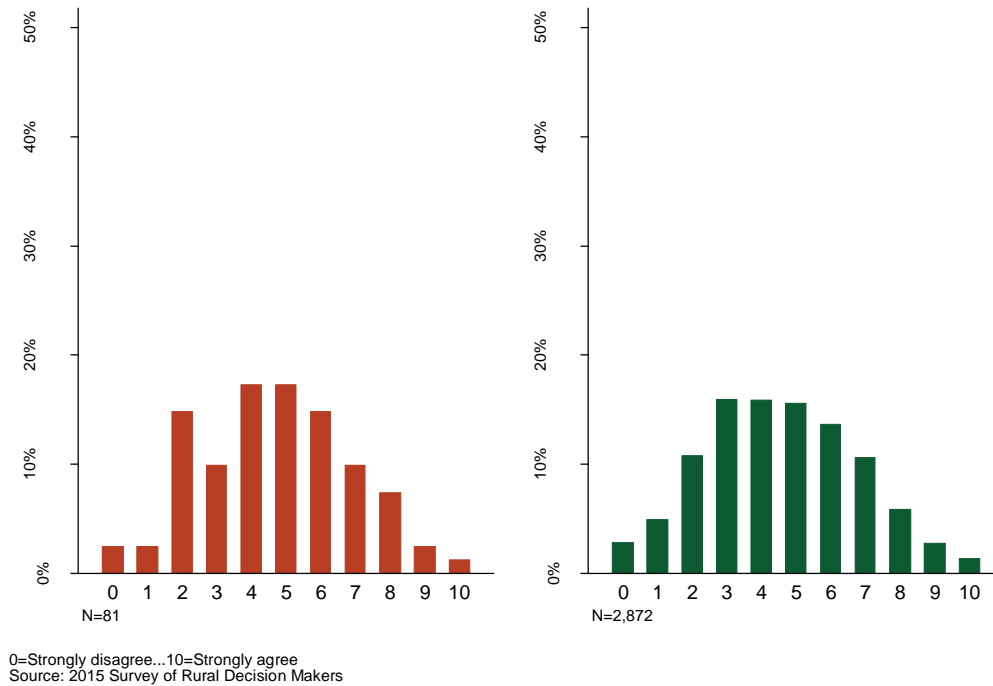


**Figure 30** Farm decision maker from Timaru, Mackenzie and, Waimate districts' responses to the statement "I would reduce total output if I could maintain the same level of profit".

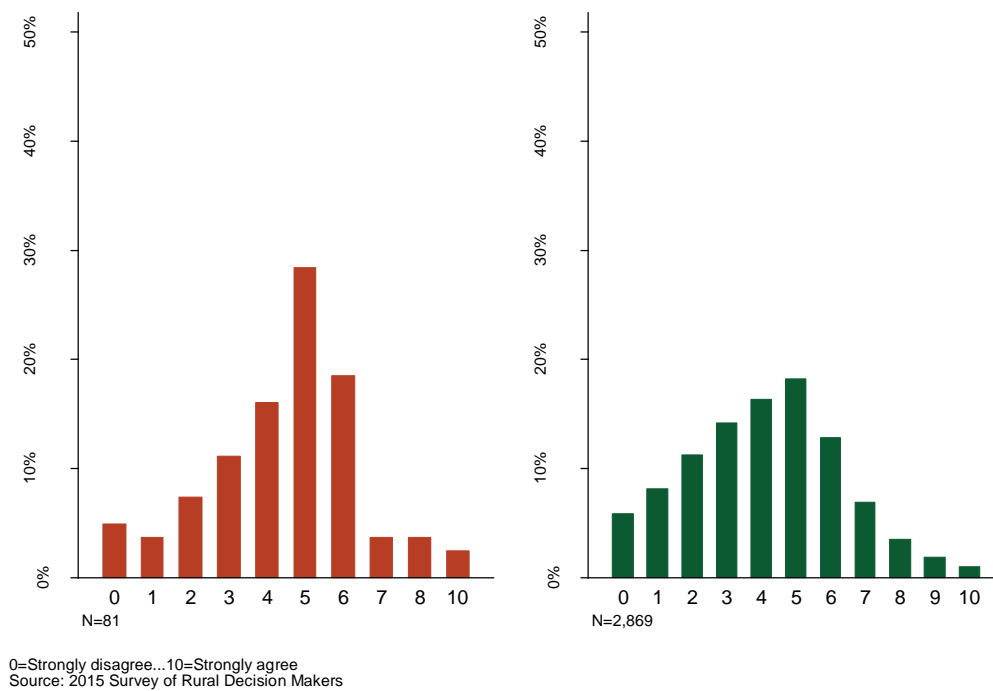
OTOP respondents were on average slightly more willing to be the first to try new things, experiment, and take more risks than the average, with most answers in the upper middle ranges, showing a considered but open attitude to change (see Figures 31-33).



**Figure 31** Farm decision maker from Timaru, Mackenzie and, Waimate districts' responses to the statement "Are you generally a person who is prepared to take risks or do you try to avoid risks?".



**Figure 32** Farm decision maker from Timaru, Mackenzie and, Waimate districts' responses to the statement "I prefer to leave experimenting with new ideas to someone else".



**Figure 33** Farm decision maker from Timaru, Mackenzie and, Waimate districts' responses to the statement "I am always one of the first in my region to try something new".

## **7 Key themes and indicators**

### **7.1 Themes**

#### **7.1.1 A long, proud, and diverse history as an agricultural zone**

The Timaru area has been the backbone of New Zealand's agriculture since the late 19<sup>th</sup> century, and has weathered many changes in the New Zealand agricultural sector. The region is capable of high productivity in a range of different agricultural endeavours and the mix of agricultural produce has varied accordingly over time with changes in markets and other relevant factors. The secondary processing industry has also developed and changed over time, but always strongly centred on the Port as the destination for much of the zone's agricultural produce.

#### **7.1.2 Rapid changes in the agricultural sector**

The nature of agriculture in the zone has seen rapid changes over the past 15–30 years, including a significant increase in dairy farming and irrigation. Currently, the OTOP zone is experiencing a period of strong economic growth. Increases in both dairying and irrigation bring associated environmental pressures and social challenges. Environmentally, the quantity of water available for competing uses, and nutrient management, particularly nitrogen, have both become key issues and have affected the relationship between farmers and the urban community. Dairy farming also brings with it different structures in the operation of a farm, including more staff, more casual workers, sharemilking arrangements, and often a different gender balance in roles on the farm, and these impact on the way farm decisions are made.

The increase in dairying has also changed the dynamic of secondary processing industries in the area, increasing dependence on Fonterra as it expands and looks to become more closely involved with other local operations, such as the port.

Although Timaru is currently mainly a stopping point for visitors to Tekapo and Geraldine on their way to or from Queenstown, tourism is growing fast in the zone and represents an area of opportunity.

#### **7.1.3 Changes in community composition and identity**

Timaru has traditionally been seen as a pleasant place to retire, and demographic projections suggest that the ageing of the population will continue. However, other changes are taking place in the community. There has also been an increasing percentage of the population who identify as Māori.

There is an increase of immigration to the area from both international and domestic sources, creating a multicultural community and bringing with it the challenges of settling in a wide range of newcomers to the area. Employers of migrant workers are a key resource both for understanding and improving the situation. In particular, the well-being of migrant

dairy workers may be an important link in efforts to improve the environmental performance of dairy farms.

#### **7.1.4 Recreational values**

There is a general appreciation of the environment in the OTOF area and of recreational opportunities, especially those provided by the rivers in the zone. Increasing pressure on water quality and quantity is creating tensions that may be focussed on particular locations, such as areas of poor water quality. There is an increasing division between rural and urban communities and also an expectation on the part of urban dwellers that farmers should take increasing responsibility for their environmental performance.

#### **7.1.5 Cultural values**

There is increasing involvement of Māori in resource management issues, for example, the creation of Te Ahi Tarakihi Mataitai Reserve at Caroline Bay. Māori are particularly concerned with deteriorating water quality, loss of wetlands and coastal lagoons, and loss of mahinga kai.

#### **7.1.6 Health and education**

The area is relatively well serviced in terms of health and education, although statistics follow national trends of increasing obesity in younger people. School deciles and rolls are increasing, particularly in rural areas.

#### **7.1.7 Community spirit and social capital**

The OTOF zone has a long history of strong community spirit. People in the zone have indicated strongly that they are involved in and value the cohesive, self-reliant nature of their communities. The farming community is also experienced, well-educated, and engaged with the wider community. There is a strong sporting tradition in the area and farmers are most likely to be engaged with the community through sporting activities, as well as through schools. There is scope to improve environmental performance, and farm decision makers in the zone exhibit a cautious openness to change.

Successful examples already exist of collaborative groups that work together to identify and overcome areas of tension in resource management. Examples included the proactive Opuha Environmental Flow Release Advisory Group (OEFRAF) and some of the catchment groups, such as the Lower Opihi catchment groups.

## **7.2 Indicators**

A set of indicators have been selected for consideration, based primarily on themes identified in this report (Table 10).

In addition, consideration has been given to other similar studies. For example, Morgan et al. (2003), as cited in MAF (2004), conducted a scenario-based exploration of the environmental, economic, and social impacts of water use on New Zealand agriculture. Social indicators identified in this report included population structure, farm numbers, number of schools (as schools are commonly recognised as the social centre/focal point of interaction in rural New Zealand), and number of sports clubs as measures of community vitality and well-being. They identified four indicators of particular significance for healthy communities and social well-being and their link to water:

- Existence of neighbouring farms (the community)
- Retention of a balanced population structure
- Retention of a primary school roll (young family retention and social activities to attract all farm families)
- Existence of sports clubs (watch and support).

In addition, we propose the inclusion of a measure of overall economic diversity as an important component of community resilience. One example is the Hachman Index or Economic Diversification Index (EDI), as described by the Pembina Institute for Appropriate Development (2005). For the purpose of scenario development, it may also be useful to consider different frameworks for thinking about water assessed by NZIER (2014).



**Table 10** Indicators identified for the OTOF zone

Area of measurement	What needs to be measured	Examples of indicators
<b>Community composition</b>	The proportion of the community that is changing in composition, in order to understand changes to the zone	<ul style="list-style-type: none"> <li>• School rolls</li> <li>• Employer data on migrants</li> <li>• Registration with migrant services</li> <li>• Census data (standard demographics including age)</li> <li>• Land use</li> </ul>
<b>Well-being of community</b>	The well-being of farmers, the migrant community and the urban community should be monitored separately to identify trends in these groups	<ul style="list-style-type: none"> <li>• School deciles, rural and urban</li> <li>• Health statistics – rural and urban. Obesity, mental health, alcohol intake.</li> <li>• Access to services</li> <li>• Employment data</li> <li>• Change in composition and number of sports clubs</li> </ul>
<b>Recreational quality</b>	Trends in public use and enjoyment of recreational areas	<ul style="list-style-type: none"> <li>• Swimmability in different rivers (safety and/or enjoyment scores)</li> <li>• Angling scores</li> <li>• Cyanobacteria levels</li> </ul>
<b>Farm environmental performance</b>	The urban population, recreational water users and consumers of agricultural products are increasingly demanding accountability for environmental performance	<ul style="list-style-type: none"> <li>• Amount of water used compared with similar enterprises</li> <li>• Change in water demand</li> <li>• Irrigation scheduling</li> <li>• Farm Environment Plans</li> <li>• Effluent management practices</li> <li>• Nutrient use</li> </ul>
<b>Farm economic performance</b>	Trends in performance of farms in different sectors, to understand likely drivers of change	<ul style="list-style-type: none"> <li>• Debt levels by sector</li> <li>• Profit by sector</li> <li>• Mixed operations</li> </ul>
<b>Cultural values</b>	Values of particular significance to Māori	<ul style="list-style-type: none"> <li>• Coastal erosion and wetland loss (areas)</li> <li>• Mahinga kai (indicator species selected in discussion with local kaumātua)</li> </ul>
<b>Community groups</b>	Composition of catchment groups and connection with other groups. Engagement and activity levels	<ul style="list-style-type: none"> <li>• Composition (diversity) of catchment groups</li> <li>• Connections with other groups</li> <li>• Perceptions of effectiveness</li> </ul>
<b>Adaptive capacity</b>	Potential for and resilience to change	<ul style="list-style-type: none"> <li>• Farmer attitudes (SRDM)</li> <li>• Farm structure (e.g. sharemilking arrangements, no. of migrant workers)</li> <li>• Diversity in secondary processing industries</li> <li>• Economic Diversification Index (EDI)</li> </ul>

## 8 Conclusions

Changes over the past 15–30 years in the OTOF zone have brought with them significant challenges. In particular, the increase in dairying and irrigation has brought economic prosperity coupled with increasing environmental challenges and polarisation of rural and urban values.

Much potential exists in the OTOF zone to meet these challenges. Particular assets include a strong community spirit and a rich and diverse agricultural history. In order to meet these challenges, it will be important to capitalise on these assets and invest in both existing and new mechanisms to work together to build on opportunities.

For scenario planning, there are specific areas with potential to meet future challenges:

- ***Mechanisms to drive irrigation efficiency.*** There is a need to drive improvements in irrigation efficiency. Consideration should be given to mechanisms that can potentially drive change.
- ***Reconsideration of the balance of agricultural industries in the area.*** The OTOF zone has a rich and diverse agricultural history. Increasing reliance on irrigation and on the dairy industry and Fonterra may be a source of vulnerability. Further exploration of areas of potential and the ideal balance of agricultural industries in the zone may enable spatially driven planning of more efficient land use.
- ***Close alignment with and support for catchment and other community groups.*** Groups such as catchment groups have the potential to solve localised problems with local solutions. If carefully facilitated, they can also overcome polarised discussions and achieve a high level of engagement and understanding, as well as identifying key gaps. There is also potential to expand the mandate of highly functional groups such as OEFRAG to address water quality issues.

## 9 Acknowledgements

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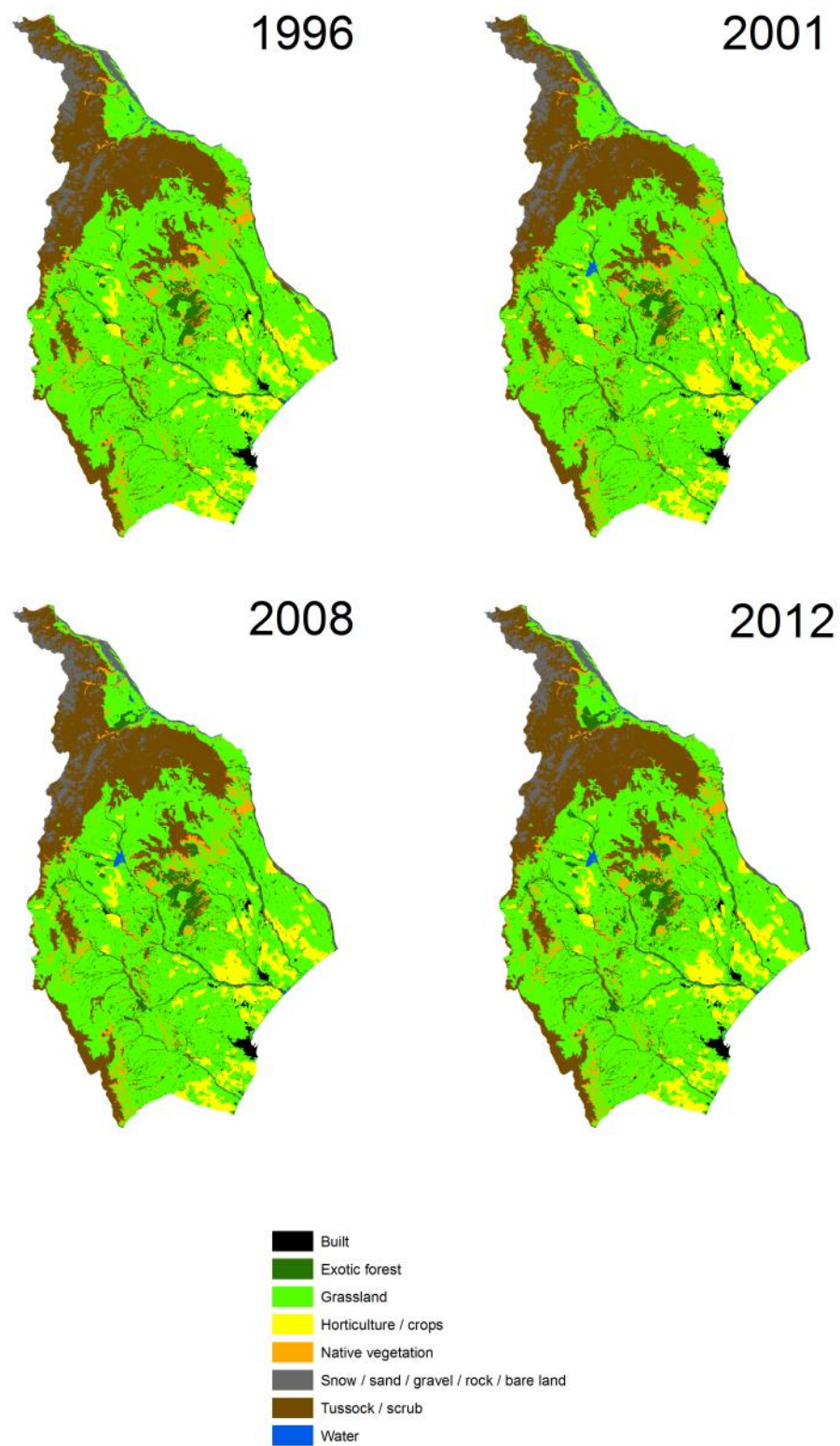
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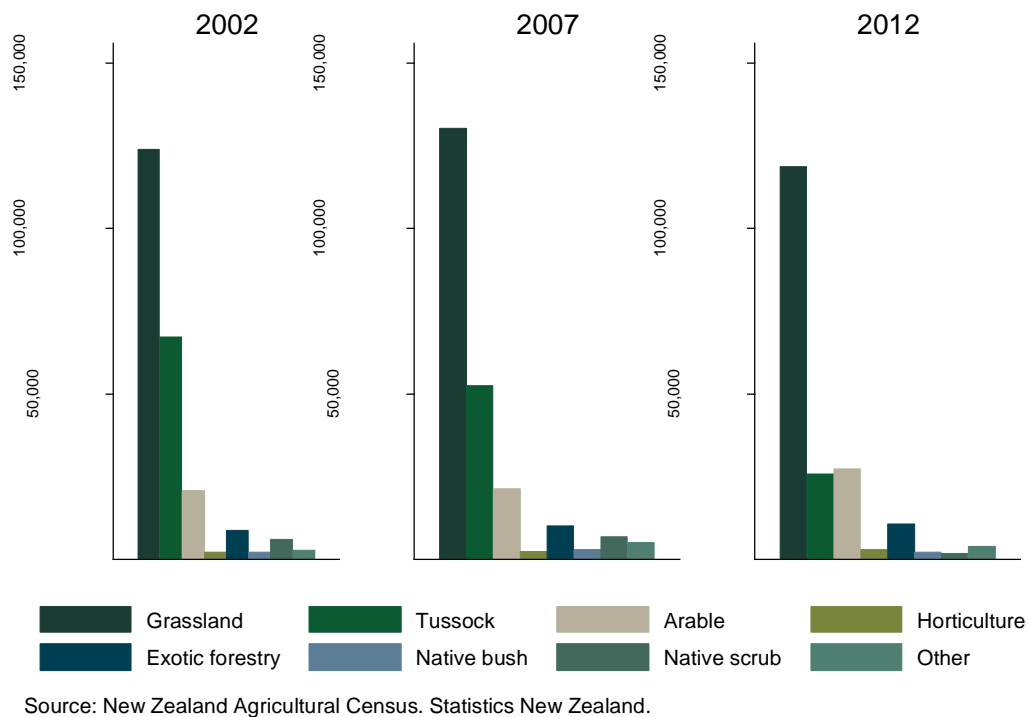
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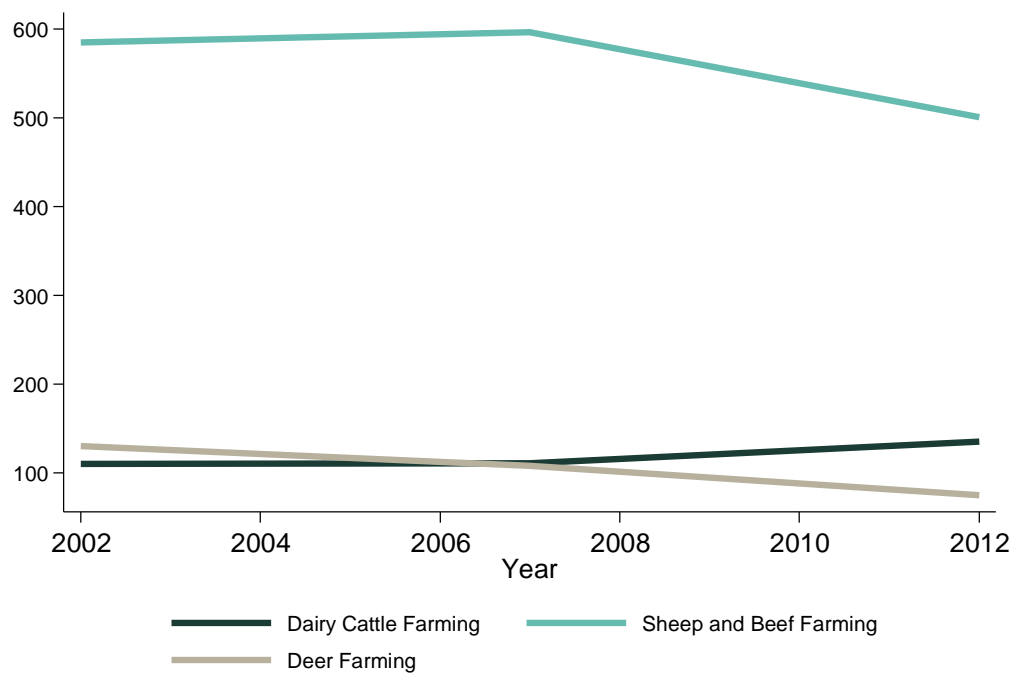
## Appendix 1 – Land use and land cover change maps and additional figures



**Figure 34** Land cover changes 1996–2012.

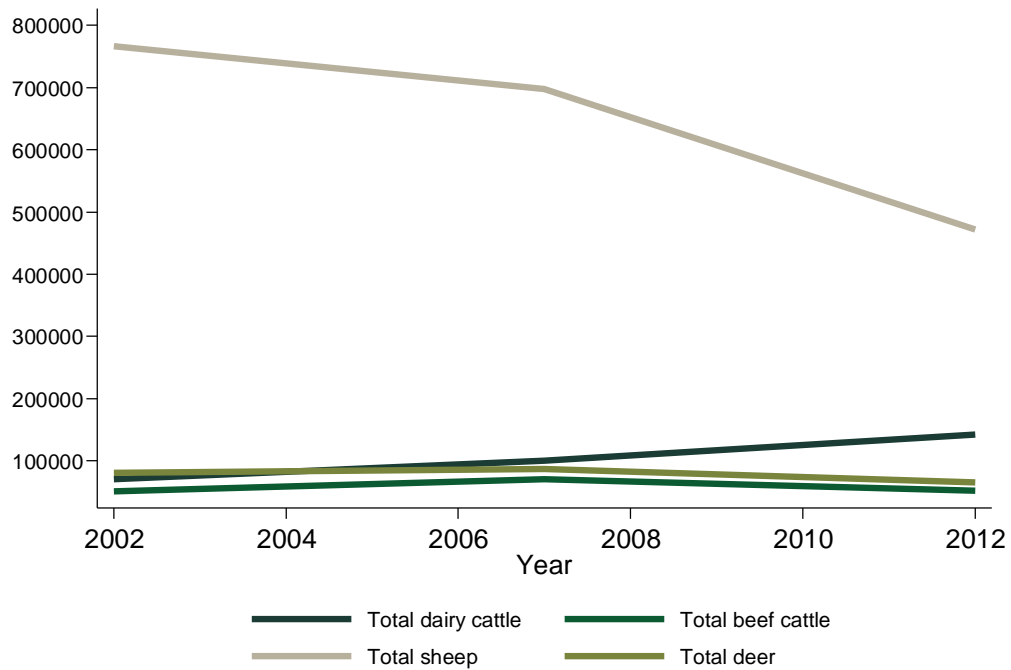


**Figure 35** Changes in land cover 2002-2012 in hectares for the Timaru District.



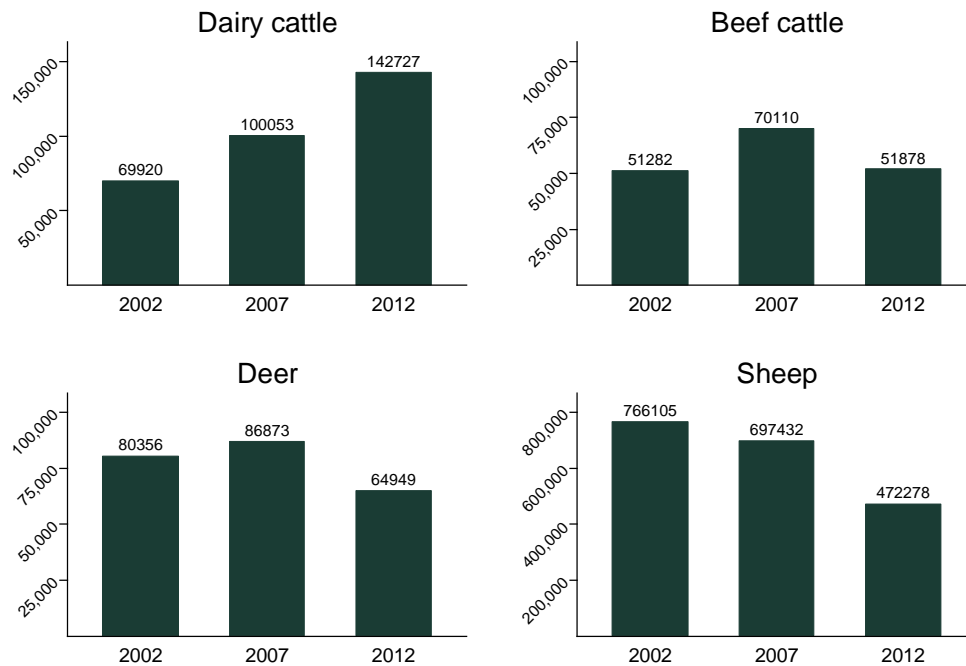
**Figure 36** Number of livestock farms by livestock type. Timaru district.





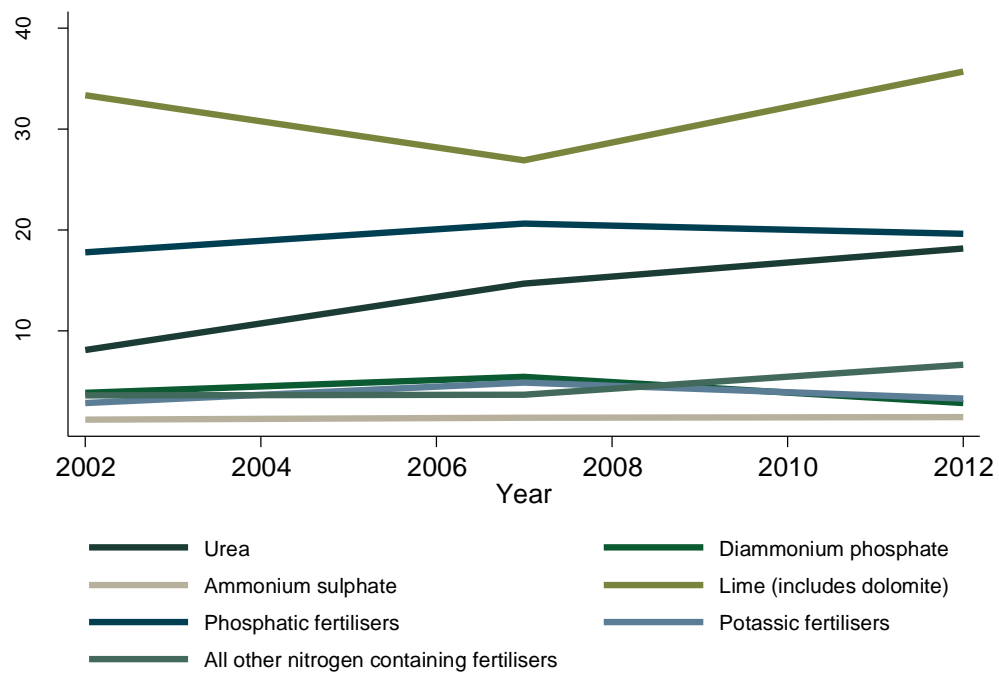
Source: New Zealand Agricultural Census. Statistics New Zealand.

**Figure 37** Livestock numbers in Timaru District.



Source: New Zealand Agricultural Census. Statistics New Zealand.

**Figure 38** Livestock numbers by livestock type. Timaru District.



Source: New Zealand Agricultural Census. Statistics New Zealand.

**Figure 39** Fertiliser used in Timaru District.