# TARANAKI AS ONE

## *Taranaki Tāngata Tū Tahi*

STATE OF THE ENVIRONMENT REPORT 2015

*Taranaki Tāngata* refers to the people, the mountain, the land—and the region as a whole. *Tū Tahi* refers to standing together as one people to achieve a united goal for the benefit of our region.

The vision statement recognises the roles and responsibilities shared by all people in Taranaki to ensure the sustainable management, development and protection of the region's natural resources for future generations.

Taranaki
Regional Council

TARANAKI AS ONE
Taranaki Tāngata Tū Tahi

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# TABLE OF CONTENTS


3 Message from the Chairman and Chief Executive

6 Acknowledgements

7 Sustaining Taranaki

8 At a glance

12 Executive summary

18 Introduction

1 Where we live 21
The Taranaki region
People
Regional economy
Tangata whenua
Our vision for the future

2 Land 37
Sustainable land use
Soil health
Land remediation

3 Fresh water 59
Surface water quality
Surface water quantity
Groundwater

4 Coast 107
Coastal water quality

5 Air 127
Air quality

6 Biodiversity 141
Biodiversity on land
Freshwater biodiversity
Coastal and marine biodiversity

7 Heritage and place 187
Historic heritage
Significant landscapes
Amenity values
Public access

8 Waste 225
Waste minimisation
Residual waste

9 Natural hazards 243
Geological hazards
Weather-related hazards

Photo credits 268

*David MacLeod (Chairman) and Basil Chamberlain (Chief Executive), Taranaki Regional Council.*

# Message from the Chairman and Chief Executive

We have great pleasure in presenting *Taranaki as One—Taranaki Tāngata Tū Tahi*, the region's fourth state of the environment report.

The report's title embodies an important theme: A united effort involving hard work and serious investment right across the regional spectrum is a key reason that Taranaki enjoys a generally good and improving environment. Taranaki can be proud of itself.

Challenges remain, of course. But based on the findings in this report, including its countless examples of Taranaki's 'get on and do it' attitude, we can be confident about the future.

This is a comprehensive report, backed up by robust science that has been independently peer-reviewed. It sets out current environmental conditions and trends since our state of the environment monitoring programmes began almost two decades ago.

And how times have changed. Back in the 1970s, for example, most dairy farm waste and a lot of poorly treated town and factory waste was discharged directly into the nearest watercourse. Untreated waste generated by tens of thousands of cows was washed into the region's rivers and streams every day.

Today, every dairy farm in Taranaki operates under a regularly monitored discharge permit that requires effluent to be treated before discharge. And the rates of compliance are consistently high at over 93%.

Clean, healthy water is the region's most precious resource. A highlight of the report is the finding that trends in ecological health and a wide range of physical and chemical measures of water quality are the best that have ever been recorded. For example, in ecological health monitoring in the past 18 years, 44 sites have shown improving trends, with no significant deterioration at any site. Improving trends at 14 sites have become highly significant since 2007.

The overall physical and chemical quality of fresh water is also good. There has been improvement or no significant change in nitrogen levels in the past 19 years. Overall trends of improvement are more apparent in recent years. The majority of sites meet NIWA guidelines for most water uses, most of the time.

It's important to note that pressures on our freshwater resource are stable compared with many other areas, particularly those experiencing widespread dairy conversions or rapid urbanisation. Dairy cow numbers and fertiliser use, for example, have changed little in Taranaki over the past decade.

However, we should not and cannot rest on our laurels. The community has high and growing expectations and aspirations around the quality of our waterways. Protecting and further enhancing our freshwater resource will effectively 'future-proof' the region, ensuring that Taranaki can continue to offer economic opportunities and enviable lifestyles to the children and grandchildren of today's citizens.

As part of a review of both the *Fresh Water Plan* and *Soil Plan*, the Council is proposing that farm dairy effluent should be discharged to land rather than to waterways wherever possible. We are also proposing to lock in completion of the region's world-scale riparian management programme by requiring the fencing and planting of ring plain and coastal terrace waterways to be finished by mid-2020. We are confident that these two steps would result in a significant step-up in water quality, at an acceptable cost to farmers.

Thousands of kilometres of streambanks have already been fenced and millions of native plants have already gone into the ground under the riparian management programme. It's a shining example of the region's 'get on and do it' attitude, under which the Taranaki landscape is literally being transformed. Many farmers are telling us that riparian planting has added precious biodiversity habitat and important amenity values, in addition to water quality benefits. It is the largest environmental enhancement planting scheme on privately-owned land in New Zealand.

Over 99.5% of Taranaki's 1,800 dairy farms now have riparian management plans in place covering 14,000 kilometres of streambank.

Our previous *State of the Environment Report* in 2009 noted that taking into account the pre-existing fencing and planting, 60% of streambanks were fenced and 43% planted. Now in 2015, 80% or 11,093 kilometres of streambank covered by riparian plans are fenced and 65% or 6,874 kilometres of streambanks recommended for planting are now protected by existing or new plantings. More than 3.6 million plants have been supplied to landowners since the programme began. This is remarkable progress indeed.

For yet another example of 'get on and do it', look at the progress that's been made in biodiversity protection and enhancement over the past few years. Biodiversity, the variety of all biological life and the ecosystems to which they belong, is an emerging issue and one that will become even more important in future. Much good work is being undertaken by many people from all corners of the region to combat the pressures on our biodiversity from land development and invasive pests.

The Council has led the charge with a $1.2 million biodiversity spend in 2013/2014—including working with others through biodiversity enhancement grants.

Our Key Native Ecosystem (KNE) database, which is regularly updated as new information comes to hand, has been crucial in allowing the Council to strategically target its limited resources to where they are most needed and in working with private landowners to prepare and implement Biodiversity Plans for the most significant sites. Monitoring bears out the effectiveness of this approach. For example, 70% of wetlands covered by Council Biodiversity Plans have shown overall improvement in the past five years, compared with 30% of those not covered by plans.

The Council has also worked hard in bringing together the diverse range of government agencies, community trusts and other interest groups in the region to agree on overall priorities for biodiversity protection and enhancement in the region. The Council has facilitated the Taranaki Biodiversity Trust and the Taranaki Biodiversity Forum Accord with this in mind.

The information in this report also reveals that in general, the region's land, air and coast are in very good or excellent shape, continuing or maintaining trends set out in earlier reports. So is Taranaki's wide range of heritage and amenity values, where the community maintains a progressive outlook. The region's approach to solid waste management has largely succeeded in addressing the environmental effects of disposal and is increasingly focused on waste minimisation—by recovering, reusing and recycling. The region is also generally well prepared to deal with natural hazards.

All of these trends are set to continue, and in many cases ramp up in future.

The information contained in this report draws on comprehensive state of the environment monitoring programmes put in place by the Council mainly in the mid-1990s. We acknowledge our highly qualified and committed team of environmental scientists and other specialists in-house, who have spent many long hours developing robust programmes with scientific integrity.

The report also draws on information compiled and supplied by the New Plymouth, Stratford and South Taranaki district councils, the Department of Conservation and many other agencies and community groups. This takes us back to the key theme reflected in the report's title, *Taranaki as One—Taranaki Tāngata Tū Tahi*: A whole range of agencies, iwi, and individuals are involved in managing the environment.

We have been struck by the extent to which the community has been willing to support and to lead environmental programmes. Three trends have become particularly apparent over the last few years: the first is that there has been more hard investment in the environment across the board, secondly, interventions designed to change behaviours have increased, and thirdly, community engagement amongst the population in general is up.

In respect of investment made in the environment, Business and Economic Research Limited (BERL) conservatively estimates that the region's annual capital and operating investment in environmental protection and improvement has increased from $85 million annually in the 2002–2007 period to $117 million a year between 2008 and 2014.

In relation to interventions, there has been more activity in this area—of both a regulatory and non-regulatory nature. There have been more national policy directions and standards, and more regional and district rules that are better targeted. There has also been greater use made of non-regulatory approaches including financial assistance and information and advisory services, especially where the intention is to support the community to take positive action to achieve outcomes.

Finally, there has been a trend towards the community increasingly leading by example. There are more people voluntarily doing more. This is very clearly the case for example, in protecting biodiversity on private land, and is markedly different from the situation even 10 or 12 years ago.

Looking to the future we can only see a further strengthening of these trends.

The Council is greatly heartened by the extent to which the Taranaki community has moved to embrace environmental stewardship and the concept of sustainability. This bodes well for meeting future issues that will almost certainly challenge us.

The Council believes that the sustainable use, development and protection of Taranaki's natural and physical resources ensures that we look after people and the environment in the long term. It is also consistent with the Council's Mission Statement to work for a thriving and prosperous Taranaki. This will involve continuing to work alongside other resource management and environment agencies, farmers, landowners, industries and businesses to bring about practical, positive and permanent results over the next five years and in the decades beyond.

David MacLeod, Chairman

Basil Chamberlain, Chief Executive

# Acknowledgements

The Council gratefully acknowledges the contributions of the many businesses, organisations, community groups, iwi, trusts and other agencies that have provided valuable information in compiling the *State of the Environment Report 2015*. In particular, we would like to acknowledge the Stratford District Council, the South Taranaki District Council, the New Plymouth District Council and staff at the Taranaki Regional Council. The Council also acknowledges the other agencies, organisations, businesses, industries, individuals and community groups that have contributed to the report. Particular mention must be made of the Department of Conservation, the QEII National Trust, the Rotokare Scenic Reserve Trust, the East Taranaki Environment Trust, Fish and Game New Zealand, Venture Taranaki, Landcare Research, Business and Economic Research Limited and GNS Science. We also acknowledge those individuals and businesses who have contributed information and material for use in case studies in the report.

Additional photographs were contributed by a number of individuals and organisations including Rob Tucker, Rob Suisted Photography, Alex Wilson, Conor Lee, Barry Hartley, the University of Waikato, Landcare Research, Lisa Dennis, Callum Lilley (Department of Conservation), Puke Ariki, Puketapu Kindergarten, Jason Darbyshire, Philip S Melgren and Fairfax Media/Taranaki.

We also acknowledge the services of Te Reo O Taranaki Charitable Trust in providing expert advice on the correct use and spelling of Te Reo Māori throughout the report, and Sugar Bag Communications for their assistance with the overall development of the report and final proofreading.

Finally, we would like to acknowledge the highly-valued expertise and experience of those independent specialists who undertook scientific peer review of the *State of the Environment Report 2015* as follows:

- Chapter 2: Land

  Reviewed by Bryan Stevenson, Landcare Research

- Chapter 3: Fresh water

  Surface water quality reviewed by Graham McBride, NIWA

  Groundwater reviewed by Gil Zemansky, PRIME Hydrogeology Limited

- Chapter 4: Coast

  Reviewed by Lesley Bolton-Ritchie, Environment Canterbury

- Chapter 5: Air

  Reviewed by Jeff Bluett, Golder Associates (NZ) Limited

- Chapter 6: Biodiversity

  Biodiversity on land reviewed by Nicholas Singers, Nicholas Singers Ecological Solutions (NSES) Limited.


# Sustaining Taranaki

Everyone depends on the environment to meet their most basic needs. Whether it's water to drink or clean air to breathe, we all rely on the environment, essentially to support our lives. Looking after the environment not only ensures we sustain the essentials of life, it also means the resources we depend on for our economy and the jobs and incomes that help build healthy, secure and vibrant communities, are also sustained.

In managing the region's resources, the Taranaki Regional Council must understand the factors that influence the region and the potential pressures on the region's resources. We work with the many communities in the region, responding to the environmental issues the region may face. We care for the environment in a way that builds a healthy and economically vibrant region—in a way recognised internationally as *sustainable development*.

This sustainable development approach is embedded in the principles of the Local Government Act 2002. Many of the policies and programmes described in this report represent major steps toward sustainable development in Taranaki. They demonstrate an attitude of 'doing'—of taking action on practical initiatives for the environment.

The Council must apply the rules and regulations of resource management to provide certainty and clarity in maintaining environmental standards. However, the Taranaki community continues to embrace environmental stewardship of the region's resources and successive councils have worked successfully with the community to achieve long-term sustainable outcomes that benefit our communities.

We invite you to read more about the many ways that businesses, farmers, landowners and ordinary people are taking action towards sustainable development in the region in our *State of the Environment Report 2015*.

# At a glance

## PEOPLE AND ECONOMY

Taranaki's GDP is the highest per capita in the country and is driven by the oil and gas, and agricultural industries.

$80,297
GDP per capita Taranaki

$51,319
GDP per capita NZ average

Taranaki's population was

**109,609**

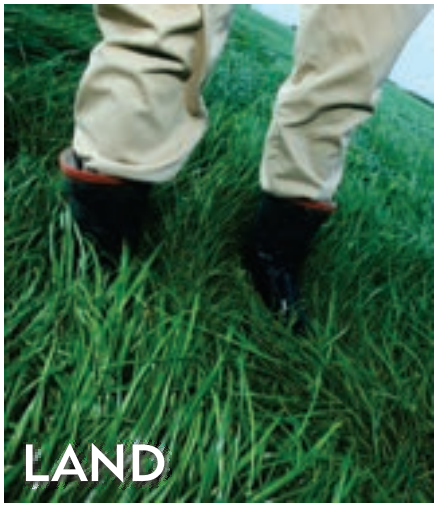
at the 2013 census—a 5.3% increase since the 2006 Census. The region has not experienced the population pressures of other regions.

Dairying in Taranaki is well-established and stable, in contrast to widespread dairy conversions in other regions. This region's milking cow numbers have changed little over the past 15 years and at 493,361, account for 10% of the national herd—down from nearly 15% in 1998/1999.

Tourism plays an important role in the economy.

The oil and gas industry has a long association with the region since the first wells were established in the 1860s. It has seen the greatest increase in employment growth in the region in the past decade, and it is New Zealand's fourth largest export earner.

## What's the story?



## LAND

**81%** of samples meet target ranges for soil health.

Some results indicate an increase in soil compaction.

**99.5%**

of dairy farms have riparian plans.

Council has facilitated supply of more than

**3.6 million**

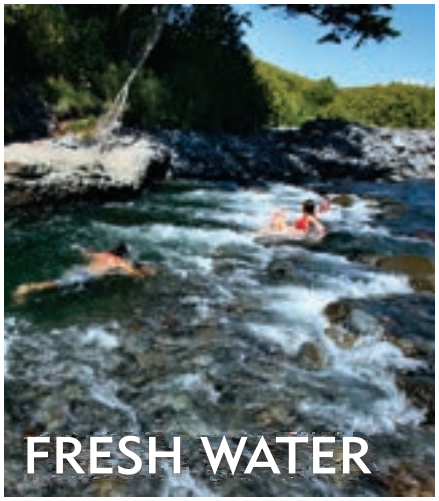
plants to landowners.

**92%**

of land is sustainably managed.

Of the most at-risk land

**65%** of privately-owned land has a farm plan.



# FRESH WATER

Good quality groundwater across all sites monitored.

Best-ever long term trends in physicochemical and ecological health.

Over the past 18 years ecological health has improved at 44 sites monitored with no significant deterioration at any site.

Nitrate concentrations in Taranaki groundwater have remained stable. In 2011/2012, 96% of samples were within Drinking-water Standards for NZ.

**80%**

of streambanks in the programme are fenced and **65%** are protected with vegetation.

The Council's riparian programme is the largest environmental enhancement planting scheme on privately-owned land in NZ.

In summer 2013/2014

**91%**

of samples taken from freshwater swimming spots were within MfE guidelines.

The majority of sites monitored in Taranaki meet NIWA guidelines for most water uses, most of the time.

Improving ecological trends at 14 sites have become highly significant since 2007.

Water allocated for use in the region is low—only

**4%**

of the total allocation.

The coast has a rich cultural history and quality of marine waters continues to improve.

# COAST

Major discharges to coastal waters have reduced from 25 to

**3**

since the 1970s.

In the past six years

**95%**

of sites sampled at popular swimming spots were within MfE guidelines for swimming.

# AIR

**80%**

of nitrogen oxide results in 'Excellent' category.

Natural sand accumulation impacts rocky shore ecology.

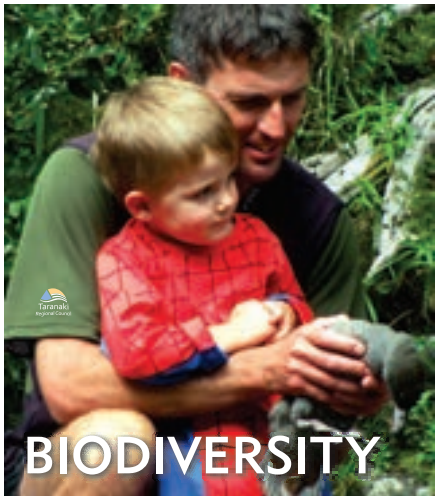
Survey results from 2008 to 2014 showed concentrations of metals and faecal coliform in shellfish were well below guidelines.

**97%**

air particle ($PM_{10}$) monitoring results in 'Good' or 'Excellent' category.

Low levels of carbon monoxide even in 'worst-case scenario' areas.

National air quality standards have never been exceeded in Taranaki.



# BIODIVERSITY

Taranaki's biological diversity and unique species are important taonga.

Taranaki has **151,054 hectares** formally protected by the Department of Conservation (DOC) or under a QEII or DOC covenant—up from 145,000 hectares in 2008. 31 new QEII covenants were registered in Taranaki in 2014—the largest number for any region.

Taranaki community groups and agencies collaborate closely to protect and enhance the region's indigenous biodiversity. The recently established Taranaki Biodiversity Trust has 19 groups and agencies as founding members.

**4,374**

properties in the Self-help Possum Control Programme—the largest participation in NZ.

There has been a small (1.3%) loss of wetland area between 2007 and 2012—but the annual rate of wetland area loss has reduced by 60%.

The condition of remaining wetlands is improving under the Council's programmes. 72% of wetlands covered by Council-developed biodiversity plans showed improvement in overall condition between 2010 and 2015, compared with 31% of wetlands without a plan.

**178**

sites covering 119,103 hectares are classed as Key Native Ecosystems.

The Council has increased its biodiversity budget to **$1.2million** (2013/2014).

Councils continue to invest in developing community facilities, for example the Brougham Street shared space and the Len Lye Centre in New Plymouth, the Hāwera Town Centre Revitalisation Strategy and development of the King Edward sporting area in Stratford.

Taranaki's heritage, landscape and other qualities make this a special place to live.

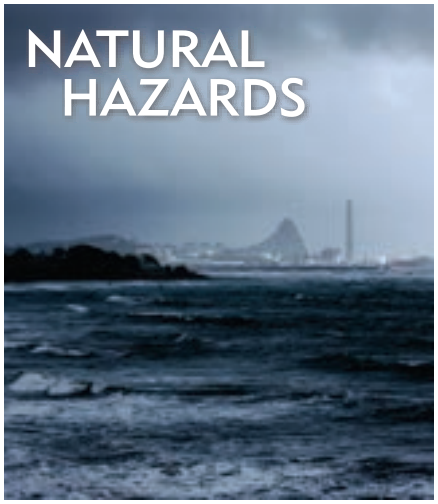
# HERITAGE AND PLACE

**90%**

satisfied with formal and informal public access to rivers, lakes and coast in the region.

The Taranaki Regional Council has made significant investments in the internationally recognised Pukeiti Gardens since taking over ownership in 2010.

**1140** heritage buildings and items identified by Taranaki's district councils.



# NATURAL HAZARDS

**$3 million**

upgrade to Waitara's flood protection to future-proof the town.

More than 90% approval rating for living environment, parks and reserves and access to natural environment in the New Plymouth District Council area and high ratings on similar measures within Stratford and South Taranaki districts.

Taranaki is readying itself for future challenges from extreme climatic and geological events.

Potential hazards include volcanic eruption, earthquakes, floods, high winds, drought and landslips.

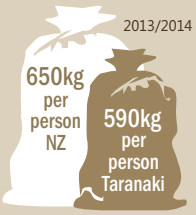
Taranaki Civil Defence Emergency Management Group plans and prepares for emergencies.


WASTE

**2**

farm plastics recycling programmes operating in Taranaki.

Waste disposal in Taranaki is not increasing as rapidly as it is nationally, despite the region leading New Zealand in economic growth.




Only **1** well-regulated landfill for all of the region.

The region has a firm focus on minimising waste.

More being recycled through district council kerbside collections and facilities.

Dedicated centres for e-waste collection in three districts.

# OUR RESPONSES . . .

*continuing the momentum*

Business and Economic Research Limited (BERL) estimates that the Taranaki community has invested $260 million in environmental improvements over the 2008–2014 period and has spent $117 million per year on capital and annual operating costs. This is an increase from $85 million per year in 2002–2007.

The review of the Council's Regional Fresh Water and Soil plans in 2015/2016 will see changes made to the management of farm dairy effluent. As a general rule, all farm dairy effluent will be required to be discharged to land.

The investments made in surface water quality have more than doubled over 2008–2014 compared with 2002–2007. District councils have invested heavily in this area.

The review of the Council's Regional Fresh Water and Soil plans will lock in completion of the Riparian Management Programme, requiring streambanks to be fenced and planted by 1 July 2020.

Taranaki Regional Council

The Council undertakes regular reviews of all of its policies, programmes and activities and this is continuing with reviews of the Regional Fresh Water and Soil plans, the Regional Coastal Plan, Biodiversity Strategy and pest management strategies.

The Council has significantly ramped up its efforts in biodiversity over the past seven years and there will be more happening in this area in future.

# Executive summary

This is the fourth state of the environment report for Taranaki—earlier reports were prepared in 1996, 2003 and 2009. The Resource Management Act 1991 requires regional councils to monitor the overall state of the regional environment and reports like this can help us to answer important questions about the quality of our environment and the effectiveness of our programmes and our future directions in promoting sustainable management.

The Taranaki environment is managed by a number of organisations, not just the Taranaki Regional Council. For this reason, the report includes relevant monitoring information from other agencies such as the New Plymouth, Stratford and South Taranaki district councils, the Department of Conservation, trusts and other community groups.

The report is organised around the core resources of land, fresh water, coast, and air as well as biodiversity, heritage, landscape and amenity values, waste, and natural hazards.

The **Introduction** describes the purpose and content of the report and how information is organised and presented. It explains how to go about finding more information on topics covered in the report.

**Chapter 1** describes the physical, economic and social characteristics of the region. This is important because managing the environment and its natural and physical resources takes place within and is influenced by these wider physical, economic and social considerations.

**Chapters 2 to 9** then cover each section of the environment in turn: land, fresh water, coast, air, biodiversity, heritage and place, waste, and natural hazards.

Much of the information contained in the report is based on comprehensive, purpose-built state of the environment monitoring programmes established by the Council in the mid-1990s. In most cases, the duration of these programmes is long enough to enable statistical analysis of trends in the data.

The report generally presents Taranaki as having a high-quality environment that is valued and well-managed by the community.

Important considerations in our management responses are the economic and social drivers for change. The report clearly identifies that our well-established dairy industry has remained stable for at least the last 15 years. In 1998/1999, the number of milking cows in Taranaki totalled 481,034, accounting for close to 15% of the national total. By 2013/2014, dairy cow numbers had reached 493,361—an increase of only 2.5% over this period. In the same period, the region's proportion of the total herd decreased to 10%, mainly because of the rapid dairy conversions in Southland, Canterbury and Otago in particular.

The oil and gas industry has seen the greatest increase in employment growth in the region in the past decade and is a significant contributor to the regional economy. The industry has been present in the region for around 150 years.

The region's overall population has continued to increase since 2001 but the rates of growth are nowhere near what are being experienced in other faster growing regions. So the environment is not under population-induced pressure.

Like any report card there are positives and negatives. The main conclusions of the report are summarised on the following pages.

# Land

Soil is one of Taranaki's most important resources. Taranaki's rural-based wealth is dependent on good pasture production which, in turn, depends on sustainable management of our land and soil resources. The main findings of the report are:

- About 92% of land within the Taranaki region is sustainably managed. Even within the more erosion-prone eastern hill country, rates of sustainable land use are high at 87%. Despite some sporadic scrub clearance since 2007, there has been little change in overall sustainable land use since this time.
- Because much of the area is protected by woody vegetation, Taranaki has only a very small proportion of the total North Island land area susceptible to mass movement erosion.
- Of the most at-risk land, 65% of privately owned land has a Council-prepared farm plan containing recommendations for sustainable land use on a whole-farm basis.
- Results of soil monitoring since 1995 show Taranaki has very few long-term issues with soil health.
- The latest monitoring completed in 2012 showed that 81% of samples met target ranges for soil productivity and health.
- There has been a decrease in macroporosity since 1995 indicating an increase in soil compaction, but this can generally be reversed with appropriate management.
- The vast majority of sites investigated show no evidence of contamination. There was a substantial effort in the 1990s to identify and, where necessary, undertake further site investigations and remediation.
- There has been a small increase in the number of verified HAIL sites (Hazardous Activities and Industries List) awaiting further assessment but the number is still low. The increase in verified HAIL sites since 2009 is the result of an increase in clandestine drug laboratories (P-labs) discovered by the New Zealand Police, and subsequently entered on to the Council's Register of Selected Land Use database.

# Fresh water

Fresh water is vital to the well-being, livelihood and lifestyle of everyone in the region. Rivers and streams in the region are of great significance to the tangata whenua of Taranaki. The main pressures on water quality stem from agricultural land use but Taranaki has not seen the large-scale conversions to dairying that other regions have experienced in recent years. Management of the region's waterways has improved considerably in the last 40 years and today, data indicates the best-ever trends in the health of monitored waterways. Key findings from the report include:

- Over the past 18 years, ecological health has improved at a number of sites, especially in the middle and lower reaches of rivers and streams, with no significant deterioration at any site.
- Improving ecological trends at 14 sites have become highly significant since 2007.
- Water quality is 'Good' to 'Very good' in the upper reaches of catchments and 'Fair' in lower reaches.
- Periphyton (or algae) levels rarely exceed Ministry for the Environment guidelines.
- Overall physicochemical water quality is good. There has been improvement or no significant change in nitrogen levels in the past 19 years.
- The majority of sites meet NIWA guidelines for most uses, most of the time.

- Water quality at popular swimming spots is significantly better than a decade ago. In the 2013/2014 summer, 91% of samples were within Ministry for the Environment guidelines for swimming, with water fowl responsible for almost all of the few exceedances.
- The *Riparian Management Programme* is the largest environmental enhancement planting scheme on privately-owned land in New Zealand. Some 99.5% of dairy farms have riparian plans: 14,000 kilometres of streambank is covered by fencing and planting plans, 80% of streambanks covered by riparian plans are fenced, and 65% of streambanks recommended for vegetation are protected by both established and more recent plantings.
- There is a high level of environmental compliance with farm dairy resource consents but the future focus will require dairy discharges to land wherever practicable and all riparian fencing and planting to be completed by mid-2020.
- Water allocated for use in the region accounts for only 4% of the total allocation, and the majority of this is from several larger river catchments.
- There is good quality groundwater across all sites monitored and overall nitrate concentrations in groundwater have remained stable between 2002 and 2012. In the latest monitoring 96% of samples were within the Ministry of Health Drinking-water Standards for New Zealand. No pesticides have been detected in groundwater samples since 1998.

## Coast

The report notes that coastal management has progressed enormously since the 1970s. Where once there were around 25 major dairy factory, industrial and municipal discharges to the coast, today there are only three. In addition there have been significant improvements in waste treatment. The main influence on coastal water quality is now from rivers and streams discharging to the coast. The coastline of Taranaki is of special significance to tangata whenua. The main findings from the report are:

- In the past six years, 95% of sites sampled at popular swimming spots were within Ministry for the Environment guidelines for swimming.
- Sand accumulation through natural processes has a major effect on intertidal rocky shore ecology.
- Survey results from 2008 to 2014 showed concentrations of metals and faecal coliform in shellfish to be well within the Australia and New Zealand Food Standard guidelines.
- All faecal coliform monitoring results between 2009 and 2014 were within national guidelines.

## Air

The overall quality of air in the Taranaki region is excellent. With air discharges from industry and agriculture well regulated there are no significant pressures on air quality in the region. Increased levels of poultry farming and hydrocarbon exploration and production have resulted in increased numbers of resource consents for air discharges in the region. However, effective regulation and monitoring means there has been a negligible impact on air quality in the region. The main findings of the report are:

- Air quality in Taranaki is excellent thanks to lots of wind, relatively light traffic and scattered industry.
- Discharges to air are well regulated and monitored.
- National air quality standards have never been exceeded in Taranaki.
- 97% of air particulate matter ($PM_{10}$) monitoring results are in the 'Good' or 'Excellent' category. The Council also monitors $PM_{2.5}$ (which are finer particles) with similar results. $PM_{2.5}$ levels are well within World Health Organisation guidelines.

- 80% of nitrogen oxide results are in the 'Excellent' category on the Ministry for the Environment performance indicator table.
- There are low levels of carbon monoxide, even in 'worst-case scenario' areas.

## Biodiversity

Biodiversity, or biological diversity, describes the variety of all biological life and the ecosystems of which they are a part. The arrival of humans radically changed New Zealand's indigenous biodiversity when introduced plant and animal species and human activity changed the landscape. As a result, Taranaki is now a highly modified landscape with approximately 52% of its land area classified as acutely or chronically threatened in that there is less than 20% of indigenous vegetation remaining in the area. A number of agencies, local community groups and organisations play an important part in protecting and enhancing Taranaki's remaining biodiversity. The Council works alongside these groups and the region's district councils to protect and restore remnant bush, wetland and dune systems and control pests on private land. A key element in the Council's strategy is working with landowners to make a difference in those areas that have important biodiversity values in our Key Native Ecosystems. Taranaki's biological diversity and unique species are important taonga to tangata whenua. The main findings of the report include:

- 40% of the region is covered by native vegetation.
- Taranaki has 151,054 hectares formally protected by the Department of Conservation (DOC) or under a QEII or DOC covenant—up from 145,000 hectares in 2008. The number of QEII covenants has increased from 249 in 2008 to 344 in 2013.
- The Council works with landowners and others and has increased its resourcing from a small budget in 2008 to a $1.2 million spend on dedicated biodiversity programmes (2013/2014).
- The focus of the Council's work is on Key Native Ecosystems and regionally significant wetlands. There are 178 defined Key Native Ecosystems covering 119,103 hectares of public and private land. To date the Council has prepared and facilitated the implementation of 64 biodiversity plans for private landowners.
- Taranaki community groups and agencies collaborate closely to protect and enhance the region's indigenous biodiversity. The recently established Taranaki Biodiversity Trust has 19 groups or agencies as founding members.
- There has been a small (1.3%) loss of wetland area between 2007 and 2012—but the annual rate of wetland loss has reduced by 60%.
- The condition of remaining wetlands is generally improving under the Council's programmes. 72% of wetlands covered by Council-developed biodiversity plans showed improvement in overall condition between 2010 and 2015, compared with 31% of wetlands without a plan.
- With 4,374 properties involved covering 235,464 hectares, the *Self-help Possum Control Programme* has the largest participation in a programme of this kind in New Zealand.
- There were 31 new QEII covenants registered in the Taranaki region in 2014—the highest of any region in New Zealand for that year.

# Heritage and place

Heritage features refer to the wide range of archaeological, architectural, cultural or scientific resources that contribute to an understanding or appreciation of Taranaki's history and culture. There are also a number of significant landscapes in the region that form an integral part of the region's identity, natural character and appeal. Features defined as amenity values also contribute to people's enjoyment of the environment. Taranaki's heritage, landscape and other qualities make this a special place to live. The main findings of the report are:

- There are 1,140 heritage buildings and items identified by Taranaki's district councils.
- District councils are addressing earthquake strengthening of historic buildings.
- There is a wide range of streetscapes and community facilities provided and these promote economic and social well-being.
- District councils continue to invest in developing community facilities, for example the Brougham Street shared space and the Len Lye Centre in New Plymouth, the Hāwera Town Centre Revitalisation Strategy and development of the King Edward sporting area in Stratford.
- The Taranaki Regional Council has made significant investments in the internationally recognised Pukeiti Gardens since taking over ownership in 2010 and has similarly increased its investment in the nationally recognised Hollard Gardens and Tūpare.
- In 2013, the Taranaki Regional Council and the New Plymouth District Council formed a joint venture arrangement over Yarrow Stadium with the Taranaki Regional Council assuming effective ownership of the asset and the New Plymouth District Council retaining operational management to ensure Yarrow Stadium is retained as a first-class regional facility.
- The latest community satisfaction surveys show a more than 90% approval rating for living environment, parks and reserves and access to natural environment within the New Plymouth District Council area and high ratings on similar measures within the Stratford and South Taranaki districts.
- There is good public access to major recreational beaches in the region.
- There is a 90% satisfaction with formal and informal public access to rivers, lakes and coast in the region.

# Waste

In the past, waste management has been about managing the environmental effects of solid waste disposal in dumps—things such as managing odour, seagulls and pollution leaching to groundwater. Now that these issues have largely been addressed, the region has focused on minimising waste by recovering, reusing and recycling material. District councils in the region follow current best practice in waste management by adopting the principles of minimisation, recovery and recycling and the trend is for this to continue in future. The main findings from the report include:

- Environmental issues associated with solid waste disposal have largely been addressed.
- Waste disposal in Taranaki is not increasing as rapidly as it is nationally, despite the region leading New Zealand in economic growth.
- The entire Taranaki region is served by one well-regulated landfill.
- More is being recycled through district council kerbside collections and facilities.
- More than half of the waste going to landfill could be recycled or composted.

- There are dedicated centres for e-waste collection in three district council areas.
- Two farm plastics recycling programmes are operating in Taranaki.
- None of the 21 cleanfills operating in Taranaki have environmental performance issues.
- A campaign exists to increase public awareness and encourage reporting of illegal dumping.

## Natural hazards

In Taranaki, potential natural hazards include volcanic activity, earthquakes, flooding, high winds, drought, and erosion and landslips although as the report notes, to some extent, vulnerability to natural hazards depends on where in the region residents live. Taranaki is readying itself for future challenges from extreme climatic and geological events. The main findings from the report are:

- There is a 50:50 chance of Mount Taranaki erupting in the next 23 years.
- Most earthquakes are shallow and centred west of Mount Taranaki.
- There is no link between earthquakes and fracking or deep well injection.
- One tornado occurs somewhere in the region every year, on average.
- Taranaki Civil Defence Emergency Management Group plans and prepares for emergencies.
- Flood control schemes for Lower Waitara and Waiwhakaiho, Waitōtara and Stony Rivers are in place.
- A $1.5 million upgrade of the Waiwhakaiho flood protection scheme was completed between 2012 and 2014. A $3 million upgrade to flood protection in Waitara is currently underway to future-proof the town.

## Working together

The *State of the Environment Report 2015* finds that Taranaki has made a substantial investment in protecting and enhancing the environment. Capital investment by the Taranaki community has been conservatively estimated to be in excess of $260 million between 2008 and 2014. Annual operating costs are of the order of $73.5 million compared with $41.8 million in the preceding five-year period. Total spending on the environment by the Taranaki community has been conservatively estimated at $117 million per year. This is an increase of $32 million per year from the $85.1 million per year reported in the *State of the Environment Report 2009*. The high-quality environment enjoyed by residents and visitors alike has therefore not come about by accident, but by the cooperative and proactive actions of the community.

The effects of all the policies, programmes and actions described in this report, representing the collective effort of not just the Taranaki Regional Council, but also the New Plymouth, Stratford and South Taranaki district councils, the Department of Conservation, community trusts and groups, iwi, and landowners, are significant steps along the path to sustainable management in Taranaki. The Council's slogan of *'Working with people, caring for Taranaki'* summarises the approach we believe to be critical to successful environmental programmes both now and in the future.

# Introduction

Like all regional councils in New Zealand, the Taranaki Regional Council monitors the overall state of the environment within the boundaries of its region. Not only is monitoring a requirement under the *Resource Management Act 1991* (RMA), it provides important feedback on how well the Council is promoting the sole purpose of the RMA—the sustainable management of Taranaki's natural and physical resources.

## Purpose of the report

While the *State of the Environment Report 2015* considers environmental trends and changes over the past five to 20 years or more, its fundamental purpose is to provide an outlook to the future. Collating and analysing the large amount of data we collect in our daily work, and identifying trends in each aspect of the environment, help us answer questions about:

- the state of our natural and physical resources and the direction each aspect of the environment is heading
- the effectiveness of our policies and programmes in promoting sustainable management, both now and into the future
- the standard of environmental quality desired for Taranaki and whether any policy changes or improvements are required.

The purpose of this report is to provide high-quality, easily understood environmental information that is accessible to all. It is also a comprehensive and in-depth collation of the work that has been undertaken in the past five to 20 years, upon which sound resource management decisions can be based.

## Content of the report

The primary focus of the *State of the Environment Report 2015* is on the state of those aspects of the environment managed by the Taranaki Regional Council under the RMA.

However, the New Plymouth, Stratford and South Taranaki district councils have assisted with the content of the report by providing information on the environmental conditions and trends for which they are responsible. Other agencies or organisations such as the Department of Conservation have similarly assisted in this way. Dozens of businesses, industries, individuals and community groups have contributed information on their environmental work including information for case studies. Information provided from all such sources has been a valuable addition to the report, enabling the Council to present relevant and up-to-date information to the community. Those who have contributed are gratefully acknowledged at the beginning of the report.

Following the Introduction the report has nine chapters: Where we live, Land, Fresh water, Coast, Air, Biodiversity, Heritage and place, Waste, and Natural hazards.

## How the report is organised

Generally, each chapter of the report follows the Pressure-State-Response model widely adopted overseas in state of the environment reporting. With the exception of the introduction and chapter one, each chapter deals with a particular aspect of the environment and the natural and physical resources it encompasses. Each chapter begins with an introductory commentary, providing readers a broad context for that aspect of the environment, including how that aspect of the environment is valued and any significant pressures on natural or physical resources. The 'What's the story?' sections detail the state of a particular aspect of the

environment, including analysis of the data collected as part of our monitoring programmes and, where applicable, information that has been provided to us from others. Lastly, each section outlines 'Our responses' in managing the resources within a particular aspect of the environment (including the responses of others), touching briefly on the future direction the management of resources is likely to take.

# Presentation of information

Since the *State of the Environment Report 2009*, the Council has had the benefit of another five years of data collection and analysis. In a number of cases data has now been collected over a relatively long time period—in some instances, almost 20 years. In almost all cases, we can know confidently that there is sufficient data to undertake statistically robust trend analysis.

## Presentation of data

Although this is not a technical report, the report is technically robust and has been subject to the most extensive independent peer review of any of our previous state of the environment reports. Where appropriate, each section has been scrutinised by an external specialist or expert in the field to ensure we have the best possible scientific accuracy and integrity. Each section has also been subject to one or more internal reviews to ensure the information is meaningful, accurate and informative.

The information presented is a collation of the data collected since our last report in 2009, up to and including the most recent data available. For some programmes and cycles of monitoring, the most recent complete data set available is up to 2013. In other cases, complete data is available up to 2014. The time period of each data set reported on is given in all sections.

Trend analysis can indicate with a high degree of certainty whether the data collected is showing an improvement, deterioration or no clear change. In all possible cases trend analysis has been presented. In some cases, such as where our monitoring programmes are new or have undergone changes in process or technology, there is not yet sufficient data to provide statistically robust trend analysis. These few cases have been identified and noted in the report.

In terms of interpreting trends, the Council tests both the certainty of a trend (questioning if the data really does show a trend that is statistically significant) and the scale of any change (whether the trend actually makes a difference). Both tests use recognised criteria.

Every attempt has been made to present the information in a form that is understandable to the community. Wherever possible, maps and diagrams have been used to demonstrate environmental conditions and trends. Case studies and examples of particular programmes are presented for added interest.

## Māori words and phrases

Assistance with the accuracy and correct usage of Te Reo Māori was received from Te Reo O Taranaki Charitable Trust. In considering the spelling of Māori words and place names that have long vowels, the report adopts the Māori orthographic conventions developed and promoted by Te Taura Whiri i te Reo Māori (2012): *Guidelines for Māori Language Orthography*. Dictionaries, historical documentation, Taranaki historians, research reports and the like have been referred to as credible sources of accurate spelling. In cases where a reference is unable to be sourced to accurately guide how a word or place name is spelt, the status quo has remained.

# How to find out more

In many cases the report presents summary information with a reference made to reports, reference material or databases containing more detailed information for those who wish to read further.

A 'Find out more' section included at the end of each section of a chapter lists references to further or more detailed information, including reports, references and other information referred to in the body of the report. Information is organised into the following categories with an associated symbol or icon:

This symbol indicates that further information (such as an additional report or detailed data) is available online, either on the Taranaki Regional Council website or another website. Click on the link or enter the URL to access further information.

This symbol indicates a reference publication such as a book or journal that is available to the public. You can use this reference in a library or other catalogue search to find the publication or journal listed.

For any further information, reports or for answers to any questions, simply call the Taranaki Regional Council and a qualified Council Officer will assist with further information.

Our motto is '*Working with people, caring for Taranaki*'. This symbol indicates a short video related to an aspect of the environment; for example real-life examples and stories of people in the community creating environmental success stories and other stories of interest.

## Contact us

The Council is happy to assist with any query or request for further information.
If you wish to contact us you may do so by:

Phone: 06 765 7127 or 0800 736 222

Fax: 06 765 5097

Email: publications@trc.govt.nz

By writing to the Council at:

Taranaki Regional Council

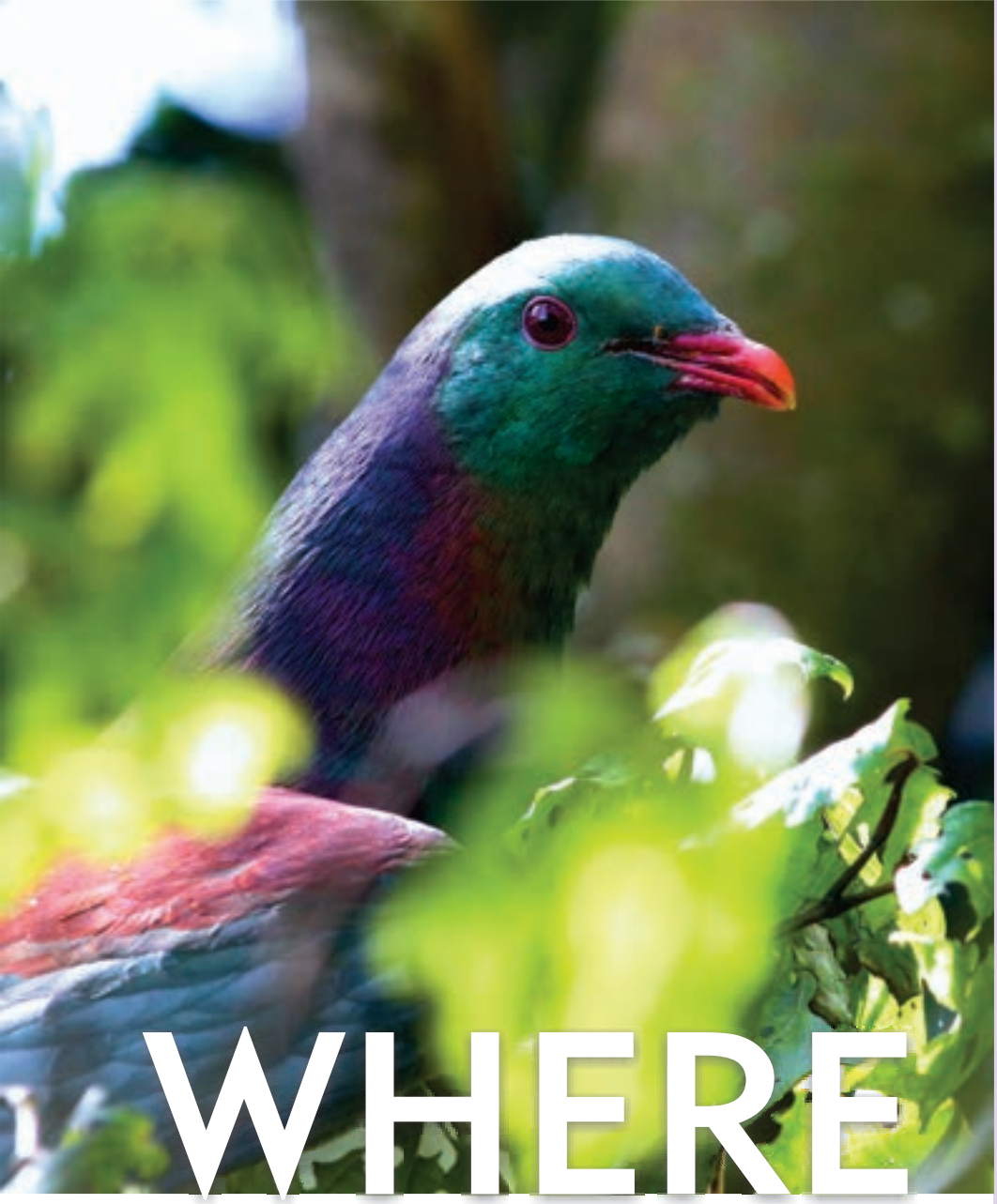
Private Bag 713

Stratford 4332

Or by calling into the Council offices at 47 Cloten Road, Stratford.

### Find out more

Taranaki Regional Council profile tinyurl.com/TRC1i



# WHERE WE LIVE

*Famed for its distinctive mountain and black sand beaches, the Taranaki region lies on the west coast of the North Island of New Zealand. Predominantly an agricultural region, Taranaki is also a leader in New Zealand's hydrocarbon industry.*

*Taranaki's rich landscapes, abundant natural resources and moderate climate all contribute to a flourishing economy and a range of lifestyle opportunities that mean a growing number of people choose to call Taranaki home.*

1

THIS CHAPTER COVERS:


## The Taranaki region

- Regional boundaries
- Landforms
- Rivers
- Climate

## People

## Regional economy

- Agriculture and forestry
- Oil and gas
- Manufacturing
- Wholesale and retail trade
- Construction
- Tourism and events

## Tangata whenua

## Our vision for the future


*The Taranaki region tinyurl.com/TRC1h*

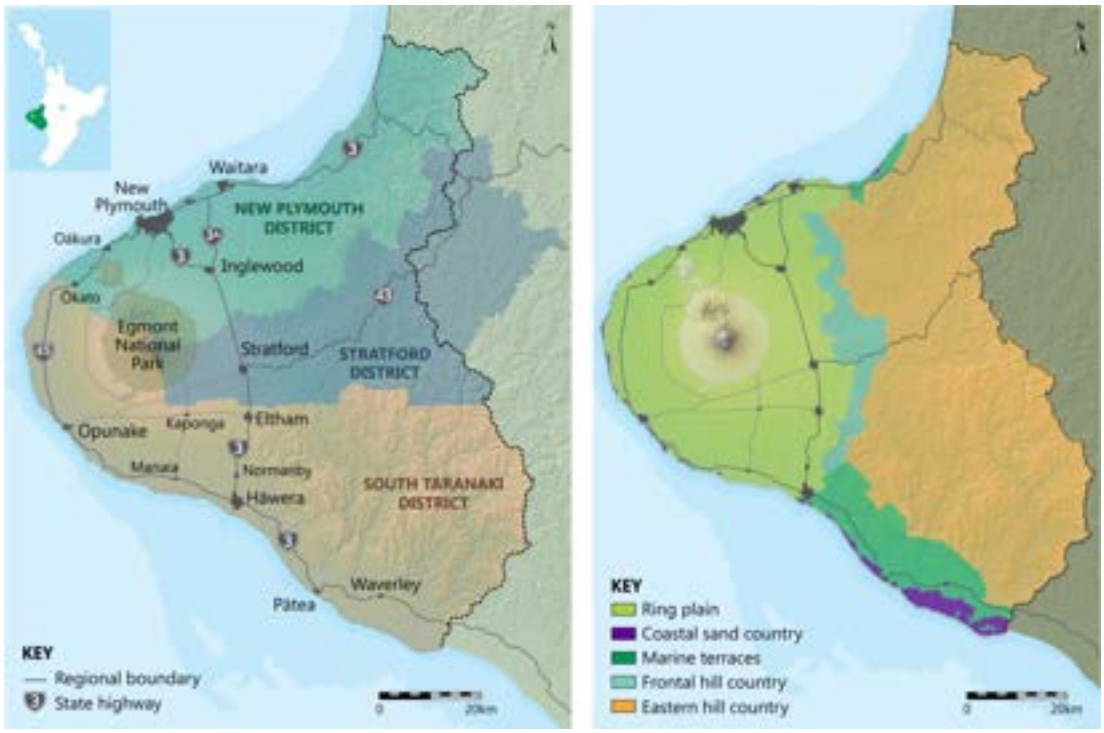
*'Taranaki ... an attractive place to live, work and play.'*

# The Taranaki region

Taranaki's distinctive landforms, rivers and streams, and temperate climate are all part of what makes the Taranaki region an attractive place to live, work and play.

## Regional boundaries

The Taranaki region extends across 723,610 hectares. It stretches from the Mōhakatino catchment in the north to the Waitōtara catchment in the south. Inland, its boundary is the Whanganui catchment. The region reaches 12 nautical miles (approximately 22 kilometres) into the territorial sea. There are three district councils within the region: New Plymouth, Stratford, and South Taranaki district councils.




*The Taranaki region comprises several units of local government (left) and a variety of landforms (right).*

## Landforms

Taranaki has four distinctive landforms, each requiring a different type of environmental management.

**Ring plain**

Centred on Mount Taranaki, the Taranaki ring plain has fertile and free-draining soils that are well suited to pastoral farming. Dairying is the most common land use here and it is more intensive on the flatter lands of South Taranaki.

**Frontal and eastern hill country**

The hill country to the east of the ring plain is made up of older rock including siltstone, mudstone and sandstone—known locally as papa. This country is steep, and prone to soil erosion and slipping. Managed properly, the hill country can support both pastoral farming and commercial forestry.

**Marine terraces**

The marine terraces that run along the Taranaki coastline in the north and south contain some of the most versatile and productive soils in the region. However, the combination of light, sandy soils and strong winds in some areas make the terraces susceptible to wind erosion if vegetation cover is lost.

**Coastal sand country**

The coastal and marine environment is exposed to the west. The land here is subject to erosion from waves and wind. There are few areas of sheltered water beyond the major estuaries and the confines of Port Taranaki. In both the north and south, erosion has resulted in a coastline of almost continuous papa cliffs; to the west, volcanic activity has produced boulder reefs and the region's famous black sand beaches.

# Rivers

Many rivers and streams flow across the Taranaki region. Over 300 radiate in a distinctive pattern from the flanks of Mount Taranaki and across the ring plain. Ringplain rivers are usually short, small and fast-moving, supplying a steady flow of water, even during long, dry periods. In the hill country, the drainage pattern is different. Hillcountry rivers have short tributaries contained by narrow valleys and generally carry high-sediment loads.

Taranaki's rivers and streams are used extensively throughout the region for agriculture, for industry, for community water supplies and for a wide range of recreational activities.

*'Taranaki's rivers and streams are used extensively throughout the region …'*

## Find out more

*Sharing the Waiwhakaiho website tinyurl.com/TRC3a*

*Sharing the Waiwhakaiho tinyurl.com/TRC3b*

*The Stony (Hangatahua) River is one of hundreds of rivers stemming from the flanks of Mount Taranaki.*


*Many rivers flow across the Taranaki landscape. Of these, around 530 are named.*

# Climate

Taranaki's temperate climate, with abundant rainfall and high sunshine hours, makes the region lush, green and fertile.

**Rainfall**

Annual rainfall varies throughout the region. Some coastal areas receive less than 1,400 mm annually, while the summit of Mount Taranaki receives around 7,500 mm.

Heavy rainfall events do occur and there can be extremes. In 2012 heavy rain caused a number of slips on the coastal road around Mount Taranaki, including a large slip at Oākura that covered the road, burying a block of public toilets.

Typically though, flooding is not a major problem on the ring plain because ringplain rivers are normally short and narrow with steep gradients—well incised into the volcanic ash and debris material of the surrounding land. However, in the hill country, where the drainage pattern is different, intense rainfall can lead to rapid rises in river levels and flooding on river flats.

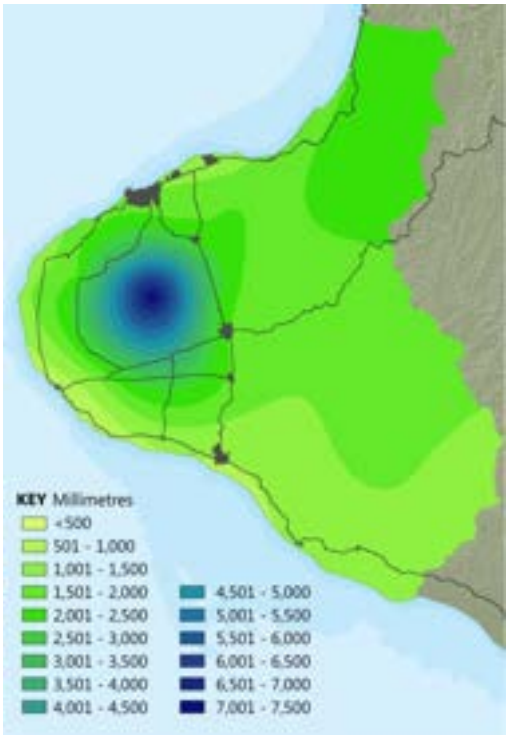
**Temperature**

Taranaki's generally moderate summer and winter temperatures, combined with average to high sunshine hours, create a pleasant environment for both indoor and outdoor lifestyles.

Average winter temperatures range between 6°C and 14°C, with summer temperatures between 13°C and 22°C. The highest temperature on record to date is 30°C.

Temperature variation is greater in sheltered inland locations than in coastal areas and elevated inland areas are generally cooler.

Most areas of New Zealand receive 2,000 sunshine hours annually; the average number of annual sunshine hours at New Plymouth Airport is 2,182.




*Average annual rainfall in the Taranaki region.*

**Wind**

Taranaki is windy, but wind strength varies depending on how exposed an area is. In coastal and exposed areas the wind often comes from the southeast, bringing generally fine weather—largely because of the shelter provided by the ranges to the east. In the spring and summer, the wind generally comes from the west, bringing more unsettled and showery weather.

Sometimes, the region experiences more extreme winds, including gale force winds and, occasionally, tornadoes.

*Taranaki lies in the path of weather systems moving west over the Tasman Sea.*

*South Taranaki can get very dry in the summer months.*

CASE STUDY

# Climate of varying extremes

Taranaki may enjoy a temperate climate but extremes are not unknown. In the past five years these have included extraordinary snowfalls blanketing the region to very low altitudes, and a devastating windstorm that caused severe damage in the Pātea area.

After near-record high temperatures early in 2011, July brought a polar blast and two snow dumps that turned Taranaki into a giant Christmas-card scene. Even coastal areas were affected, prompting the *Taranaki Daily News* to declare it a once in a generation event. With pastures covered and power out in many areas, it was a challenging time for farmers and some were forced to move stock indoors. Even moving along roads became difficult, with police temporarily closing SH3 between Stratford and New Plymouth.

In early March 2012, severe winds caused widespread damage in South Taranaki. Houses and commercial buildings in Hāwera and Pātea and other small towns were damaged, and a welfare centre was opened in Pātea for residents who could not stay in their homes. The winds damaged about 600 overhead lines or poles, cutting off power to many in South Taranaki, some for several days. Later the same month it was the north's turn to be buffeted.

Other weather fluctuations over the past five years have included:

- Wildly see-sawing temperatures in 2009 and a hot dry summer in 2009–2010 with drought in South Taranaki in April 2010.
- A swarm of tornadoes in north Taranaki in June 2011, which caused power outage and damage to property (but not to the same extent as the Ōākura storm in 2007).
- Gale force winds in January 2012, causing New Plymouth Airport to cancel eight flights and the Todd Energy Aquatic Centre to close its doors.

Ex-tropical cyclone Evan dragged warm and humid air over the country in December 2012, delivering stifling heat and humidity on Christmas and Boxing Day and through the rest of summer. New Plymouth experienced the sunniest year since records began, but very low rainfall caused region-wide drought by March 2013. Useful rain fell in April but the official drought status lingered until September.

2014 was the warmest winter since records began. However, heavy spring hailstorms cost many retailers in the New Plymouth CBD thousand of dollars when spouting was blocked and the heavy rain that followed flooded many buildings.

*Mount Taranaki snow dump in July 2011.*

*People are one of Taranaki's most valuable resources.*

# People

The region's distinctive environmental features make Taranaki unique. However, a diverse population that is gradually increasing is an integral part of what makes Taranaki a great place to live.

The region's population is growing and changing. According to the 2013 census, 109,609 people live in the region—an increase of 5.3% since the last census was taken in 2006. This is a larger increase than the increase between 2001 and 2006 when the region's population grew by only 1.2%. Despite this, Taranaki has not experienced the population growth pressures of other regions around the country.


*The region's overall population has continued to increase since 2001, with the largest increase in the New Plymouth district.*

Within the region the population is also changing. There has been a continued shift away from smaller rural towns and an increased concentration of people in the north of the region, and in the main centres.

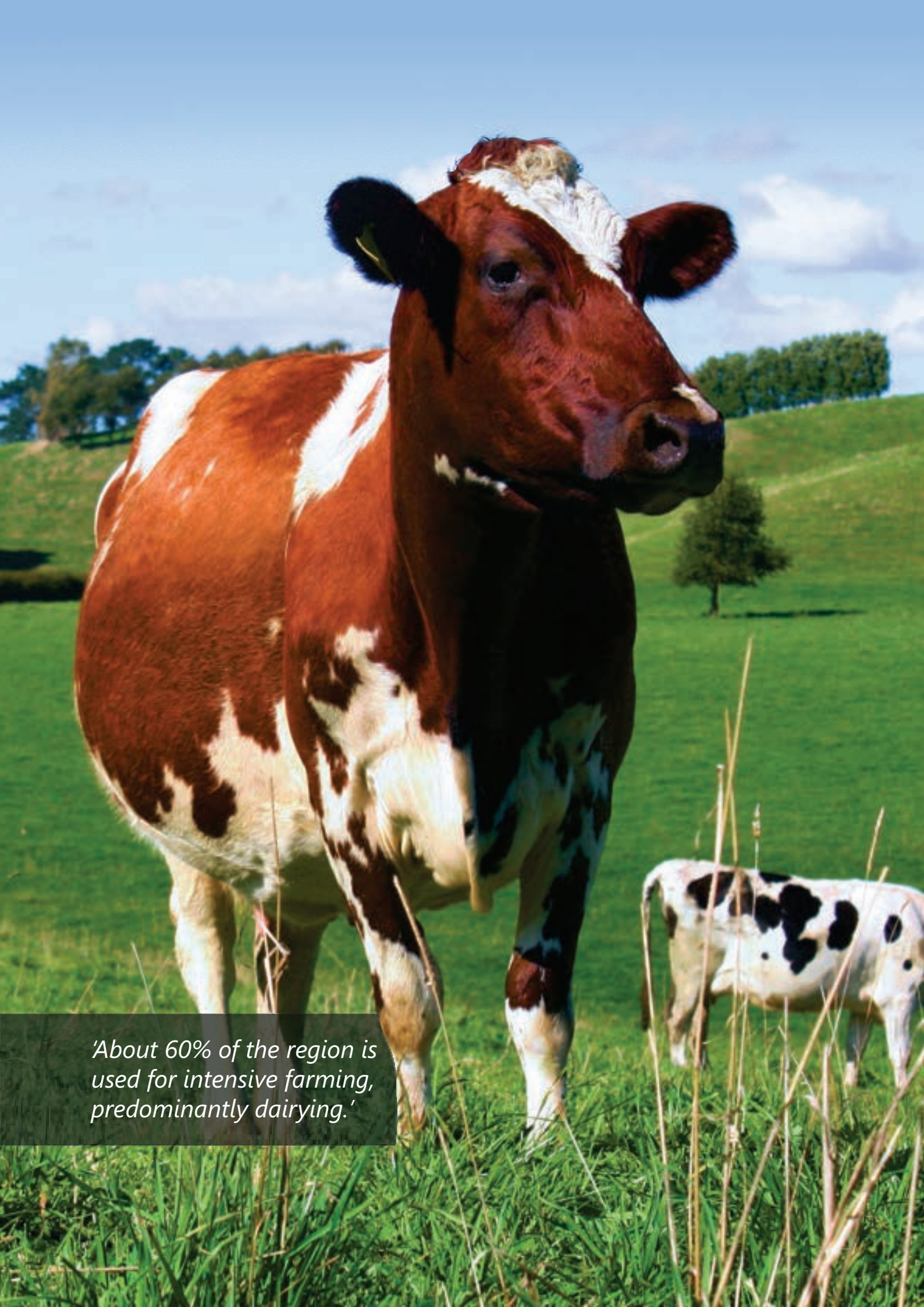
Between 2006 and 2013 the population in the New Plymouth district grew by 7.7%. Of the region's total population, 67.7% now live within the New Plymouth district. The Stratford district and the South Taranaki district have experienced small population increases since 2006, growing 1.1% and 0.4% respectively. The percentage of Māori within the region continues to increase, from 14.7% at the 2001 census, to 15.2% at the 2006 census, rising to 16.6% of the region's total population in 2013.

Taranaki's population is both older and younger than the national average, with a higher proportion of children under 15 and adults over 65 years of age calling Taranaki home.

Since 2006, the population has also become a little more diverse. The region's Asian community has increased by 1,440, almost doubling since 2001. There have also been small increases in the numbers of Pacific, Middle Eastern, Latin American and African peoples in the region.

Taranaki accounts for 2.45% of New Zealand's total population.


*'Taranaki's population is both older and younger than the national average ...'*

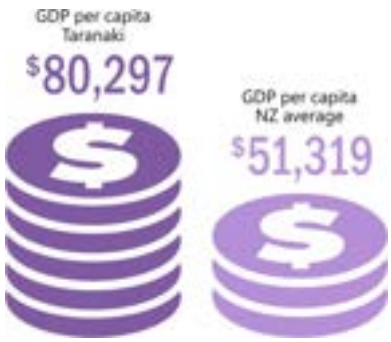


*'About 60% of the region is used for intensive farming, predominantly dairying.'*

# Regional economy

Taranaki boasts one of strongest regional economies in the country, which can be largely attributed to the strength of the oil and gas, and agricultural industries. Other industries, including tourism, also play a significant part in the region's prosperity.

Despite the global financial crisis that has affected the New Zealand economy over the past seven years, Taranaki's economy has continued to flourish. The region's booming GDP is the highest per capita in the country, with regional output growing at about 13% a year between 2007 and 2010. Between 2009 and 2014, the region's GDP grew by 7.9% and currently contributes 4% to national GDP. Much of the region's prosperity stems from the oil and gas, and agricultural industries.




# Agriculture and forestry

Taranaki relies heavily on its natural and physical resources. About 60% of the region is used for intensive farming—predominantly dairying. The region's approximately 1,800 dairy farms are located mostly on the ring plain and produce about 12% of New Zealand's total milk solids.

Dairy farming has been the major land use in Taranaki for many years. However, the total number of dairy cattle in the region has remained relatively stable over the last 15 to 20 years, as has the number of milking cows. In 1998/1999 Taranaki had 481,034 milking cows, accounting for close to 15% of all milking cows in New Zealand. By 2013/2014 dairy cow numbers totalled 493,361, accounting for only 10% of all New Zealand's dairy cows. The drop in the percentage of the national dairying herd was largely brought about by the rapid expansion and conversion to dairying in the South Island—in Southland, Canterbury and Otago in particular. Cow densities have also not changed markedly, averaging 2.8 cows per hectare in 1998/1999 and 2.85 cows per hectare in 2013/2014—below the national average. Taranaki is a well-established, stable dairying region.

Sheep and beef farming are also important, with about 840 sheep and beef farms in the region. These farms are concentrated mostly in the hill country, stocking approximately 103,500 beef cattle and about 434,400 sheep. A number of meat and by-product processing plants also provide employment in the region. Agriculture and its associated processing industries contribute almost 20% to regional GDP.

Farming plays a major role in employment. Sixteen percent of the region's labour force is employed in the agriculture and fisheries sector. Milk processing, and whey and cheese manufacturing also provide significant employment.

The poultry industry has expanded significantly in the last 15 years, and Taranaki is now a major poultry meat producing region in New Zealand. The poultry industry has an ongoing programme of infrastructure upgrade and capacity future-proofing that has seen

*Fonterra's Whareroa site near Hāwera produces the largest volume of dairy products from a single factory anywhere in the world.*

many farms upgrade their facilities recently. The major poultry processing facility is at Bell Block with broiler sheds throughout the New Plymouth district. The industry supports more than 800 jobs and is the second largest private employer in the region.

With a suitable climate for forestry, and a well-established roading system and port facility, exotic forest plantations also contribute to the regional economy. Currently 20,255 hectares in the region are dedicated to plantation forest.

# Oil and gas

Today, the oil and gas industry is a major contributor to the regional economy. The Taranaki Basin is New Zealand's only hydrocarbon producing area, and the Pohokura, Kapuni and offshore Māui fields make up the major part of New Zealand's natural gas resources. It is New Zealand's fourth largest export earner.

*A significant number of new fields have been added in the past 10 to 15 years and exploration interest in Taranaki remains high.*

In the past 10 to 15 years, continued drilling programmes have added a significant number of new small fields in Taranaki and exploration interest in the region remains high. Oil and gas has also led to development of industry in the processing, distribution, use, and export of hydrocarbons. There are a number of production stations in the region including the Pohokura, Māui, Kapuni, Kupe, Waihapa, Rimu, Kaimiro, McKee and Cheal production stations. Kapuni also hosts a gas treatment plant and an ammonia urea plant, and Bell Block a UF resin plant. The Stratford district is home to a large gas-fired power station and McKee operates a small operation in the New Plymouth district. Methanol production occurs at both Motunui and the Waitara Valley.

The oil and gas sector has stimulated support industries, including transport, machinery and equipment manufacturing, specialist engineering and construction. The sector has also experienced the greatest increase in employment growth in the region in the past decade, currently contributing about 30% to regional GDP.

*Taranaki is home to all of New Zealand's oil and natural gas production and provides 90% of the industry's nationwide employment.*

# Manufacturing

The manufacturing base in Taranaki is small but distinctive and the region has a national and international reputation for expertise in food processing—particularly of dairy products and speciality dough. The special servicing needs of the dairy and oil and gas industries have also helped both heavy and light engineering industries develop in the region.

In total, food processing, engineering and other manufacturing (including chemical, wood and paper products, textiles, printing and publishing) provide over 15% of all employment in the region.

# Wholesale and retail trade

Wholesale and retail industries are the third largest employer in the region, providing 12% of full-time employment in Taranaki. The majority of Taranaki businesses are involved in primary production, which includes farming and services to agriculture.

# Construction

The construction industry provides around 8% of all employment in the region and residential construction has continued to be a major driver of construction activity in the region, particularly in New Plymouth. For the year ending December 2014, the number of consents issued for dwellings in region (including apartments) was 486—an increase of 15% from 2013. There was also growth in commercial construction during 2014, in all three districts.

For the year ending December 2014, there were $310 million of building consents approved in the region—over $231 million in the New Plymouth district, $21 million in the Stratford district, and $57 million in South Taranaki. The value of building consents increased by over 25% in the 12 months up to June 2014, largely because of strong growth in commercial consents in South Taranaki, which experienced significant growth in factory construction or expansion and increased investment in farm buildings during this time.

*Residential construction is a major driver of construction activity in the region, particularly in New Plymouth.*

*'Visitors to Taranaki spent almost $119 million at retail outlets in 2014 ...'*

# Tourism and events

Tourism plays an important role in the regional economy. Various attractions such as Mount Taranaki, a range of surf breaks, the coastal and other walkways, and a number of parks, gardens, festivals and events attract a large number of visitors to the region. In 2014, travel experience provider *Experience OZ and NZ* ranked Taranaki at the top of New Zealand's best destinations.

According to Statistics New Zealand, a total of 271,446 people visited Taranaki in 2014, an increase of 4.3% on the previous year. In addition to the estimated 1.1 million visitors staying with family and friends, there were 553,209 guest nights spent in commercial accommodation.

The wide variety of festivals and sporting and cultural events attracts a large number of these visitors. This has significant benefits for the local economy. For example, the nine WOMAD festivals held in Taranaki up to 2014 have attracted 373,000 attendees, with an average of 60% visiting from outside Taranaki. By 2014, WOMAD had pumped more than $73 million into the regional economy since the festival moved here in 2003.

The June 2014 test match between the All Blacks and France brought 7,500 visitors to the region and injected $4.53 million into the regional economy—boosting regional GDP by $1.76 million.

Visitors to Taranaki spent almost $119 million at retail outlets in 2014.

## Find out more

- *ANZ Regional Trends tinyurl.com/TRC1d*
- *Ministry of Business, Innovation and Employment—Regional Economic Activity Report 2014 tinyurl.com/TRC1a*
- *Statistics New Zealand—Quick Stats: Taranaki Region tinyurl.com/TRC1f*
- *Venture Taranaki Economic Impact Assessments tinyurl.com/TRC1c*
- *Venture Taranaki report 'The Wealth beneath our feet', March 2015 tinyurl.com/TRC1g*
- *Venture Taranaki Trends tinyurl.com/TRC1b*

## Significant festivals and events

- ✓ *The World of Music, Arts and Dance (WOMAD) festival*
- ✓ *The biennial Taranaki International Arts Festival*
- ✓ *Festival of Lights*
- ✓ *Powerco Taranaki Garden Spectacular and the Fringe Garden Festival*
- ✓ *National and international music concerts at the TSB Bowl of Brooklands*
- ✓ *International rugby tests*
- ✓ *Cricket World Cup Qualifiers*
- ✓ *FIFA U20 World Cup*
- ✓ *Surf Festival*
- ✓ *Around the Mountain Relay and Around the Mountain Cycle Challenge*
- ✓ *Urenui Rodeo*
- ✓ *The Taranaki Wine and Food Festival*
- ✓ *Whangamōmona Republic Day*
- ✓ *Americarna*
- ✓ *Various exhibitions at Puke Ariki and the Govett-Brewster Art Gallery.*

# Tangata whenua

There are eight recognised iwi within the boundaries of the Taranaki region. Four of these have completed Treaty of Waitangi settlements. They are Ngāti Tama, Ngāti Ruanui, and Ngaa Rauru whose settlements were all legislated in 2003, and Ngāti Mutunga whose settlement legislation was passed through Parliament in 2006. At the time of writing, Te Atiawa and Ngāruahine iwi have initialled their respective deeds of settlement and are awaiting legislation to be passed in Parliament. Taranaki Iwi is expecting to initial a deed of settlement shortly, and Ngāti Maru Iwi is in the very early stages of seeking a mandate to begin their settlement discussions with the Crown.


*There are eight iwi whose rohe or tribal area falls either wholly or partially within the Taranaki region.*

Tangata whenua have a special relationship with the natural and physical world as part of a complete living system. Inherent in this relationship is kaitiakitanga or guardianship, which seeks to maintain the mouri of these resources while allowing their use and development for social, cultural and economic well-being.

Central to the values and the views expressed by iwi is that natural resources are taonga that must be protected for future generations, and balanced with the needs of today. Caring for and protecting natural resources is integral to the identity, spirituality and cultural integrity of tangata whenua. The Council recognises Māori culture and traditions—particularly the role Māori have as kaitiaki or guardians of the region's natural resources, integrating iwi o Taranaki values in planning and decision-making processes. While the values and concepts reflected in Council policy and planning are distinctly Māori, the intent—sustainable management—is clearly shared with wider New Zealand culture, with the responsibility for delivery shared across the whole community.

As a council, we work closely with iwi o Taranaki in planning, decision-making and resource consent processes. In the past five years, the Council has worked with iwi o Taranaki on a wide range of matters, from transport planning to biodiversity, and on resource management policy and planning. We have provided iwi with information on resource consents and resource consent processes and administration—including the opportunity to be involved in resource consent monitoring design and implementation. We have also encouraged resource consent applicants to consult with iwi as part of assessing the environmental effects of activities when iwi may be an affected party, and extended resource consent processing periods to allow adequate consultation and possible resolution of issues with iwi. Iwi o Taranaki have been involved in assessing environmental effects in resource consent enforcement proceedings.

The Council is committed to ongoing work with iwi o Taranaki on a range of fronts; from meeting on matters of mutual interest, to contracting iwi to provide services in a range of specific resource consent compliance programmes. We have also committed to permanent iwi representation on the Council's two main standing committees. This is currently being progressed through Treaty of Waitangi settlement legislation.

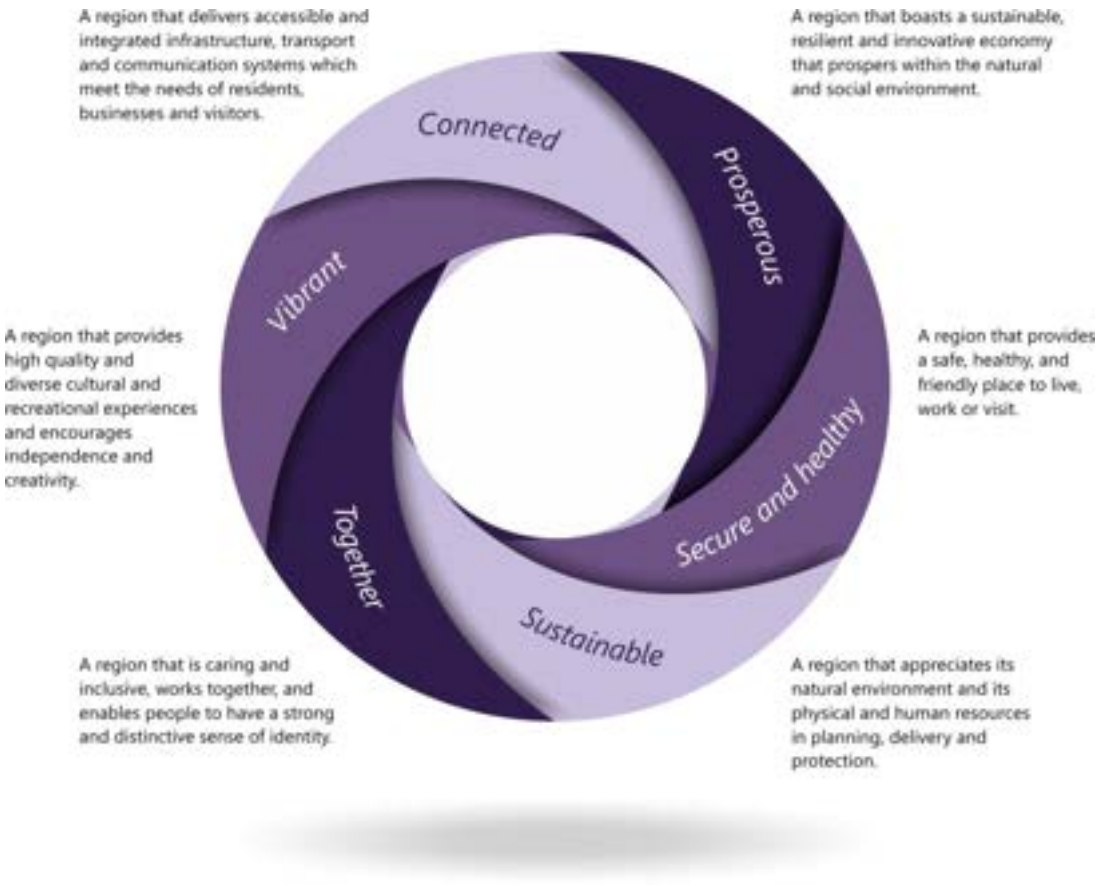
# Our vision for the future

The role of the Council and other local authorities in Taranaki is to fulfil the purpose of local government as set out in the *Local Government Act 2002*. An important part of this purpose is to meet the current and future needs of communities for good-quality local infrastructure, local public services, and performance of regulatory functions in a way that is most cost-effective for households and businesses.

In achieving this purpose, local authorities identify 'community outcomes' or the things that the local authority aims to achieve in meeting the purposes of local government.

Following extensive consultation with the people of Taranaki, the four local authorities in the region—the New Plymouth, Stratford and South Taranaki district councils and the Taranaki Regional Council—have identified the 'outcomes' that the people of Taranaki want for the present and future well-being of the region.

The state of our environment, reported on in this document, has an important influence on the achievement of a number of these community outcomes.



# LAND

2

THIS CHAPTER COVERS:

## Sustainable land use

- The eastern hill country
- The coastal sand country

## Soil health

- Soil quality

## Land remediation

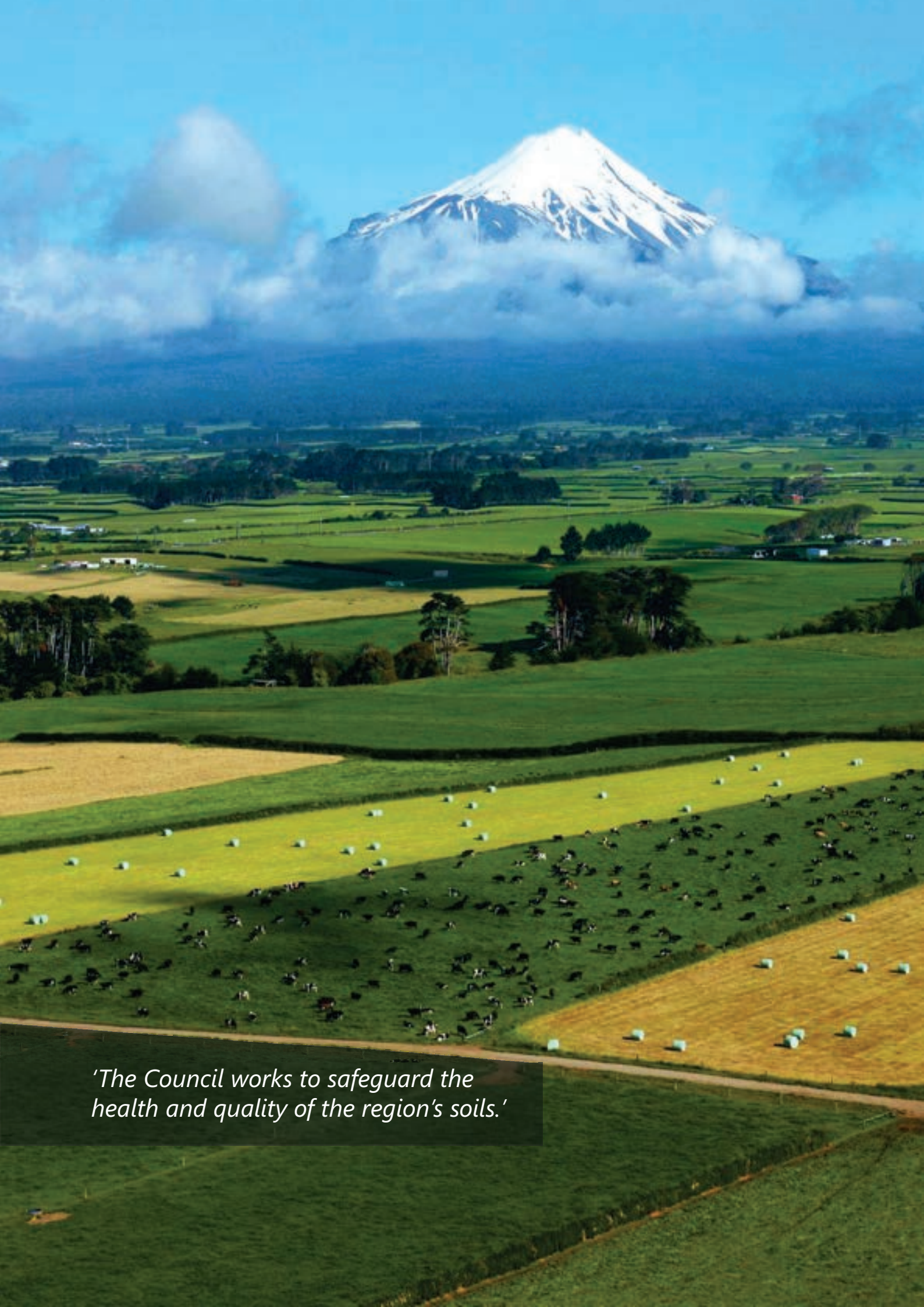
- Monitoring sites

*Land tinyurl.com/TRC2vid*

*Soil is one of Taranaki's most important resources, with the region's lush, fertile land the backbone of the regional economy. Taranaki's rural-based wealth is dependent upon good pasture production which, in turn, depends upon sustainable management of the land.*

*Managing the land works in two ways: retaining the soil on the land, and keeping the soil healthy.*

*The Council's sustainable land management and monitoring programmes are designed to care for all of the region's land resources—so important in the agriculturally-based economy upon which so many people in the region depend.*



*'The Council works to safeguard the health and quality of the region's soils.'*

# Land

Agriculture, particularly dairying, expanded and intensified during the first half of the 20th century and continues to dominate Taranaki's economy. Overseas demand for New Zealand's dairy and beef products means agricultural growth is likely to continue.

Land use supports the economic growth of both New Zealand and the Taranaki region. At the same time, we must minimise the impact of that growth on the region's natural resources and to this end, encouraging sustainable land management in the region is important.

Sustainable land use means using the land according to its capacity for sustained production. That is, matching the appropriate land use with land type. In addition to the riparian planting programme focused on Taranaki's ring plain (detailed in Chapter 3—Fresh water), the Council's sustainable land management programme focuses largely on the region's eastern hill country and coastal sand areas, where soil is most vulnerable to erosion.

In Taranaki, the eastern hill country is relatively steep with low natural fertility. However, it can support both pastoral farming and commercial forestry if it is managed sustainably and used within its physical limitations. The coastal sand country, vulnerable to wind erosion, can also support agricultural production if land use is managed appropriately.

*'Around 92% of the land resource in Taranaki is sustainably managed ... ''*

Around 92% of the land resource in Taranaki sustainably managed. Parts of the coastal sand country and the eastern hill country still require support to move toward more sustainable practices, but even in the hill country sustainable land use rates are high, at around 87%. Although there have been some instances of increased scrub clearance related to favourable returns for meat and wool farming, there has been little change in overall sustainability since 2007.

Soil health is vital for production and the Council works to safeguard the health and quality of the region's soils. Although Taranaki soils are generally in excellent condition, with no significant or immediate health problems, the Council has robust monitoring programmes in place, particularly on the intensively farmed ring plain. Soil health issues are usually short-term and reversible, and careful monitoring and sustainable practices can greatly reduce the impact of human activity on the land.

The Council is committed to continued and ongoing work with landowners to ensure Taranaki's land resources remain healthy and productive in the long term.

*Allowing land to revert to scrub or bush can reduce the risk of erosion.*

# Sustainable land use

Taranaki's sustainable land management programmes and planting schemes mean that sustainable land use in both the hill country and the coastal sand country has increased considerably in the past two decades.

Key factors that influence vulnerability to erosion are the underlying geology, the type of vegetation cover, and levels of rainfall. Although erosion is a natural process, human activity can accelerate its rate. However, land that is used sustainably is less susceptible to erosion. Therefore, practices such as land retirement, planting vegetation in areas prone to erosion, and managing stock appropriately all work to minimise pressure on land resources, and ultimately ensure the region's precious soil resource stays on the land. The Council monitors sustainable land use in areas of the region prone to erosion, predominantly the eastern hill country and coastal sand areas. Long-term data allows us to analyse trends and develop effective programmes to manage land well into the future.

## The eastern hill country

One of the ways the Council monitors sustainable land use in the eastern hill country is to compare the land use classification of an area with its actual physical use. In this way we can assess if land is being used sustainably—that is, used within its physical limitations. Between 1994 and 2012, the Council measured long-term sustainable land use by monitoring 25 representative sites in the eastern hill country. These sites cover 7% of the total area in the hill country. Overall, these results show that sustainable land use in the hill country has increased in the past two decades

Another way we measure sustainability in the hill country is by monitoring the implementation of soil conservation recommendations made in Council-prepared farm management plans. Most of the sediment that can end up in waterways is the result of mass-movement erosion, which encompasses various forms of landslide. Land with a slope greater than 20 degrees and sown in pasture, is most vulnerable to mass-movement erosion because shallow grass roots do not have the same capacity to hold soil as woody vegetation does. Compared with pasture, tree cover can reduce erosion by 90%. Planting open-spaced soil conservation trees can reduce erosion by 70%.

The Council captures the amount of recommended conservation work that has been implemented using the Geographic Information System (GIS). We estimate the amount of sediment generated by erosion that is likely to enter a watercourse using the New Zealand Empirical Erosion Model (NZEEM).

## What's the story?

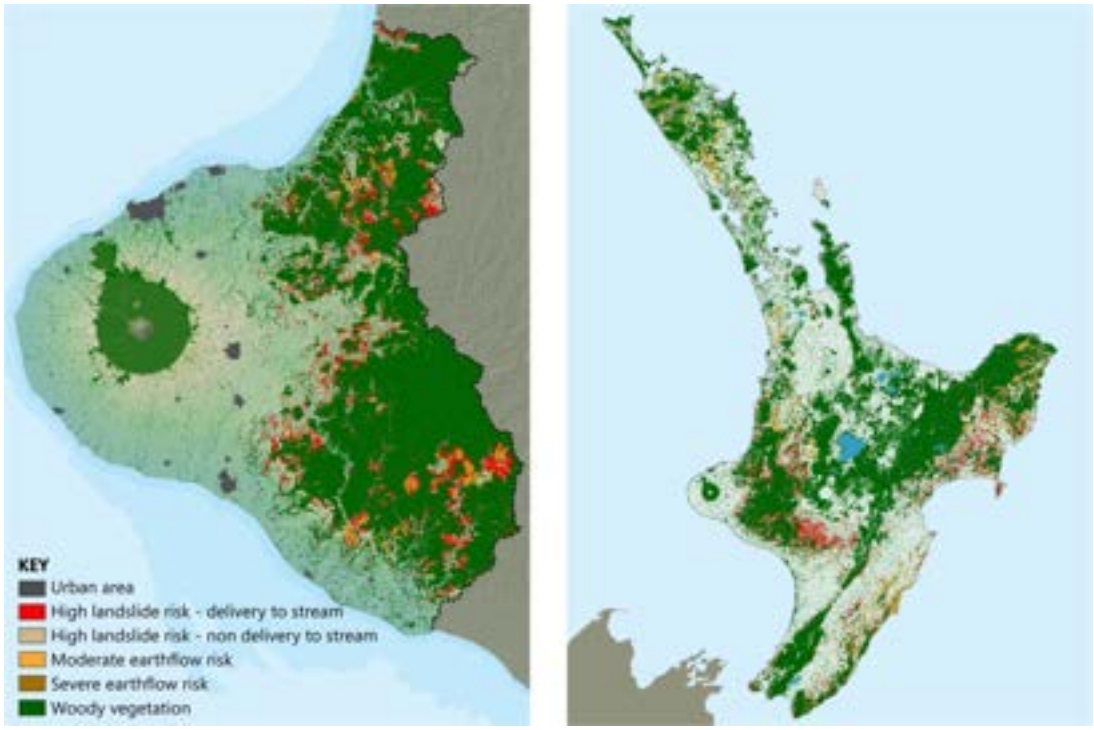
Most of New Zealand's soft rock hill country that is susceptible to the different forms of mass-movement erosion is in the south-east and west of the North Island. Of that, only about 14.5% is within Taranaki's boundaries. Even then, because much of Taranaki's hill country has woody vegetation cover, only a small proportion of the hill country actually has moderate to severe erosion potential—6.8% of the North Island's susceptible land area. The proportion of Taranaki's susceptible hillcountry area that is privately-owned is relatively high at 27%.

In the past 18 years, sustainable land use in the eastern hill country has either improved or has been maintained. As of 2012, monitoring shows 87.1% of the land area in the eastern hill country being used sustainably.

*'Only a small proportion of the hill country has moderate to severe erosion potential. '*

Since 1994, there has been a move away from meat and wool farming on eastern hillcountry land considered unsuitable, or marginally suitable, for these uses and the land has either been planted in forestry or reverted to scrub. These changes in land use led to a 2.4% increase in sustainability between 2000 and 2007.

Favourable returns for meat and wool farming stimulated some sporadic scrub clearance on steeper land between 2007 and 2012, but there was little change in sustainable land use overall.




*Most of New Zealand's soft rock hill country susceptible to mass-movement erosion is in the south-east and west of the North Island (right). In Taranaki, much of the at-risk land is stabilised by woody vegetation (left).*

| Category | Taranaki (ha) | North Island (ha) | % of North Island erosion categories in Taranaki |
|---|---|---|---|
| High landslide risked–delivery to stream | 45,962 | 526,711 | 8.7 |
| High landslide risk–non delivery to stream | 29,766 | 244,995 | 12.1 |
| Moderate earthflow risk | 7,222 | 295,628 | 2.4 |
| Severe earthflow risk | 524 | 101,482 | 0.5 |
| Gully risk | 0 | 49,849 | 0 |
| Total area of vulnerable land (ha) | 83,474 | 1,218,665 | 6.8 |

*Area in Taranaki vulnerable to the different types of erosion in relation to the North Island (table sourced from NZEEM).*

Currently, 65% of privately-owned land area in the hill country has a Council-prepared farm plan in place. These plans include recommendations for soil conservation measures to reduce erosion, reducing the potential for sediment generated from entering the region's waterways.

*'Currently, 65% of privately-owned land area in the hill country has a Council-prepared farm plan in place.'*

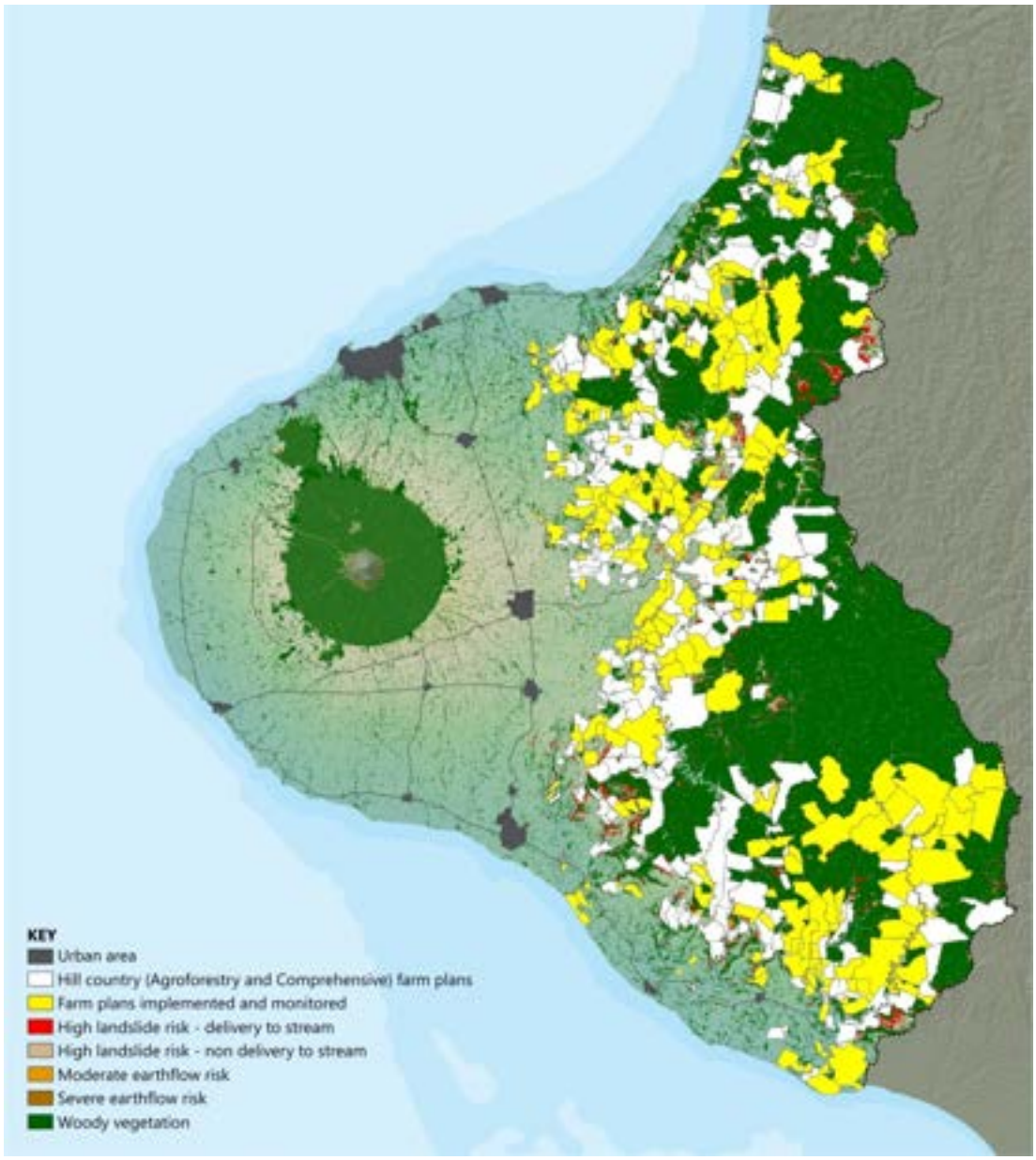
To date, 48% of the area covered by farm plans (95,616 hectares) has been monitored to determine if plan recommendations have been implemented.

Results show that 23,722 hectares of marginal land has been retired. Of that, 17,854 hectares is in existing native forest or regenerating shrubland and is largely unfenced. A further 5,868 hectares has been fenced, of which 3,444 hectares of pasture has reverted to scrub or bush.

In addition, 4,721 hectares of exotic forestry and 68 hectares of native production forestry have been established.

Estimates are that once the recommendations of farm plans are fully implemented, mature soil conservation works could reduce sediment from a calculated 2,056,000 tonnes per $km^2$/year to 953,000 tonnes per $km^2$/year.

*Planting on steeper land and in gullies is shown to significantly reduce soil erosion.*




*A large percentage of the eastern hill country has a Council-developed farm plan in place (in yellow and white above) and almost half of the land area has been monitored (in yellow).*

## Regional comparisons

Of the total land area in Taranaki, 56% is hill country. As previously mentioned, despite the soft rock geology, woody vegetation cover means that Taranaki has only a small proportion of the total North Island land area vulnerable to severe to moderate erosion (6.8%). The Manawatū-Wanganui region has about 75% hill country, of which 40% has potential for moderate to severe erosion.

The Taranaki Regional Council is one of five regional councils participating in the Government's *Sustainable Land Management Hill Country Erosion Programme for Regional Councils* which was introduced following the 2004 flood events in the Manawatū. An overview of three regional schemes is presented overleaf.

The Taranaki Regional Council delivers the South Taranaki and Regional Erosion Support Scheme (STRESS). The Greater Wellington Regional Council operates the Wellington Regional Erosion Control Initiative (WRECI) and Horizons Regional Council, the Sustainable Land Use Initiative (SLUI).

| | Taranaki (STRESS) | Greater Wellington (WRECI) | Horizons (SLUI) |
|---|---|---|---|
| Region (ha) | 723,610 | 813,000 | 2,200,000 |
| Hill country in private ownership under scheme (ha) | 306,000 | 96,600 | 1,391,481 |
| Moderate to severely erodible land under scheme (ha) | 92,053 | 56,000 | 272,582 |
| Moderate to severely erodible land under scheme as % of hill country | 30 | 58 | 20 |
| % of hill country in scheme under a farm plan | 65 | 59 | 26 |
| Grant funding ($) | 1,063,000 | 675,000 | 5,800,000 |
| Area retired (ha) | 3,333 | 88 | 3,431 |
| Forest planted (ha) | 204 | 37 | 7,470 |
| Forest planted under afforestation grant scheme (ha) | 734 | 900 | 1330 |
| Poles planted | 19,273 | 35,070 | 65,014 |

*A summary of the Taranaki, Greater Wellington and Horizons regional councils' hillcountry erosion and afforestation grant schemes over the last five years (1 July 2009 to 30 June 2014).*

## Find out more

*Basher et al. 2008. Hill country erosion: a review of knowledge on erosion processes, mitigation options, social learning and their long-term effectiveness in the management of hill country erosion. Landcare research Contract report: LC0708/081.*

*Regional council erosion model rollout: Landcare Research NZ Ltd and Institute of Geological and Nuclear Sciences Ltd.*

*South Taranaki Erosion Support Scheme—four year interim report to Ministry for Primary Industries.*

*Gibbs Family Trust tinyurl.com/TRC2m*

# Focused couple reaps the benefits

*Jacqueline and Robin Blackwell with Taranaki Regional Council Chairman David MacLeod.*

Robin and Jacqueline Blackwell have won plaudits for their land stewardship but they see more than environmental benefits in taking a sustainability approach to managing their 660 hectare Tariki cattle and sheep farm.

Take riparian fencing and planting, for example. It's a proven and effective method of protecting waterways and enhancing water quality and native biodiversity. But having fenced the entire Mangaotea Stream and most of its tributaries on their property, and protected the waterways with 3,300 native plants, the Blackwells see plenty of other advantages.

"It's better for animal welfare—we don't lose stock into waterways now," says Robin. "And with the smaller waterways fenced, they don't get clogged up and we don't have to spend time clearing them."

All in all, the Blackwells have fenced 14.4 kilometres of streambank and planted 4.27 kilometres in native plants. They've also put in native plants around the fringes of small wetlands and ponds, and on banks prone to soil erosion.

On steeper slopes, they have retained 21 hectares of native bush and 22 hectares of gully-head scrub to minimise the potential for erosion, and planted 700 poplar poles on erosion-prone slopes and in shelterbelts. Another 3.3 hectares of erosion-prone slopes have been planted in exotic forestry.

Most of these steps were laid out in a comprehensive farm plan prepared in conjunction with the Taranaki Regional Council in 2004. A riparian management plan was drawn up more recently and the Blackwells have already implemented 85% of it, having started this work in the 1990s well before the plan was prepared.

"As well as the environmental benefits and the aesthetic improvement, having all this in place really does make the property easier to work," says Robin. "We try to take a long-term view and when we decide to do something, we aim to do it once and do it right."

The Blackwells have also covenanted two bush blocks totalling 2.2 hectares with the QEII National Trust to protect kahikatea remnants, and have identified other areas for future protection.

*'As well as the environmental benefits and the aesthetic improvement, having all this in place really does make the property easier to work...'*

Their efforts have not gone unnoticed. At the inaugural Ballance Taranaki Farm Environment Awards in April 2014, they picked up the Taranaki Regional Council-sponsored sustainability award as well as the Donaghys award for farm stewardship, Beef+Lamb NZ's livestock award and the Hill Laboratories harvest award.

The wide scope of the awards won by the Blackwells demonstrates how sustainable stewardship can go hand in hand with a firm focus on production achievements. They have also done well in Beef+Lamb NZ's 'Steak of Origin' awards for a number of years running.

In the midst of dairy country, their farming operation encompasses Angus, Hereford and Murray Grey registered breeding cows to breed bulls for their on-farm beef and dairy bull auction, dairy grazing and a commercial Romney flock, Southdown sheep stud and hay sales. They winter 11,000-plus stock units.

# The coastal sand country

Two per cent of Taranaki's land is adjacent to the coast and exposed to strong prevailing winds from the west. Predominantly used for pastoral farming, the coastal sand country is susceptible to wind erosion if it is not managed sustainably and vegetation cover is lost. Changes and trends in the amount of bare sand in the coastal sand country are monitored to determine sustainable land use.

Two methods were used to assess sustainable land use in the coastal sand country. One is an historical programme, where the Council engages Landcare Research to monitor areas of bare sand at four representative sites covering 3,339 hectares or 26% of the coastal sand country area. In the other, the Council digitally captured areas of bare sand using aerial photography in 2007 and again in 2012 and compared the images. Sites with significant changes in the amount of bare sand were also 'ground-truthed' to verify the vegetation cover and analysed to determine actual land use.

*'An overall 11% reduction in the area of bare sand … totalling 65.5 hectares.'*

## What's the story?

Monitoring since 1994 shows an overall reduction in the area of bare sand in the coastal sand country. Between 1994 and 2012 there was a 26.7 hectare overall net decrease in the area of bare sand at the four representative sites. Results of the larger-scale aerial monitoring showed an overall 11% reduction in the area of bare sand between 2007 and 2012, totalling 65.5 hectares.

These decreases in bare sand area are the result of stabilisation planting, forestry planting, reduced grazing pressure, and sand dune recontouring or clay capping (followed by conversion to irrigated pasture). The Council's *Sustainable Land Management Programme* has targeted the coastal sand country, working with landowners to help stabilise and reduce areas of bare sand.

*New forestry planting (in foreground), and less intense grazing have contributed to a decrease in areas of bare sand in the coastal sand country.*

## Find out more

☎ *Changes in Taranaki Coastal Sandblows between 2007 and 2012.*

*Sustainable land use monitoring in the eastern Taranaki hill country and coastal sand country: re-survey 2012.*

📽 *Longview Limited tinyurl.com/TRC2b*

*A Council Land Management Officer discusses a farm plan.*

# Our responses

## Regional Soil Plan for Taranaki

The *Regional Soil Plan for Taranaki* was made operative in 2001 and contains policies, methods and rules to improve sustainability in the eastern hill and coastal sand country.

Currently, policies 1.1-1.4 of the *Regional Soil Plan for Taranaki* encourage adopting sustainable land management practices to reduce accelerated erosion. The Council's preferred approach to sustainable land management is to engage landowners voluntarily in our *Sustainable Land Management Programme*.

The *Regional Soil Plan for Taranaki* is currently under review. In 2015, the Council proposes the current *Regional Soil Plan* and *Regional Fresh Water Plan* will be combined into the *Freshwater and Land Management Plan for Taranaki*. This proposal recognises the interrelated nature of land and water management.

## Sustainable Land Management Programme

Within the *Sustainable Land Management Programme*, the Council prepares comprehensive farm plans for landowners that include property-specific soil conservation solutions. Plans cover all aspects of a farming operation including land and stock management. They specifically address management practices that protect soil and water resources while maximising the productivity of the property. If forestry is seen as part of the property's future viability, this plan can also include an agroforestry plan.

Highlights of the past five years include:

- The preparation of 70 plans covering 20,234 hectares, of which more than 6,066 hectares have a high risk of erosion.
- Council-developed farm plans are in place in 65% of the hill country in private ownership, covering 65% of the region's most erosion-prone land.
- The Council is updating its GIS databases to capture the work implemented through its farm plans and to date, almost half of all plans have been monitored and entered into the GIS database. Planholders

monitored so far are the most active and represent a significant percentage of all works implemented through farm plans.

- Calculations by economic consultants Business and Economic Research Limited (BERL) conservatively estimate hillcountry farmers have invested $1.8 million in moving towards more sustainable land management practices over the past six years.

## Future directions

With a large proportion of the most erosion-prone land now covered by farm plans, part of the Council's future focus in sustainable land management will shift from farm plan development to monitoring implementation of farm plan recommendations to manage erosion, and ultimately reduce sediment generation.

Forestry can be an alternative sustainable land use to pastoral farming in New Zealand's hill country, and is also a soil conservation measure. Currently, the Council permits harvesting of forestry provided, amongst other conditions, the land has a slope of less than 28 degrees. As part of future land management initiatives in the hill country, forest harvest is likely to be a permitted activity, regardless of slope. However, forest harvest occurring on land over 28 degrees in slope will likely require a *Site Erosion and Sediment Control Plan* to mitigate any erosion and sediment discharge as a result of harvesting activities.

## South Taranaki and Regional Erosion Support Scheme (STRESS)

In 2010, the Council successfully secured $1,063,000 of government funding over four years for the South Taranaki and Regional Erosion Support Scheme (STRESS).

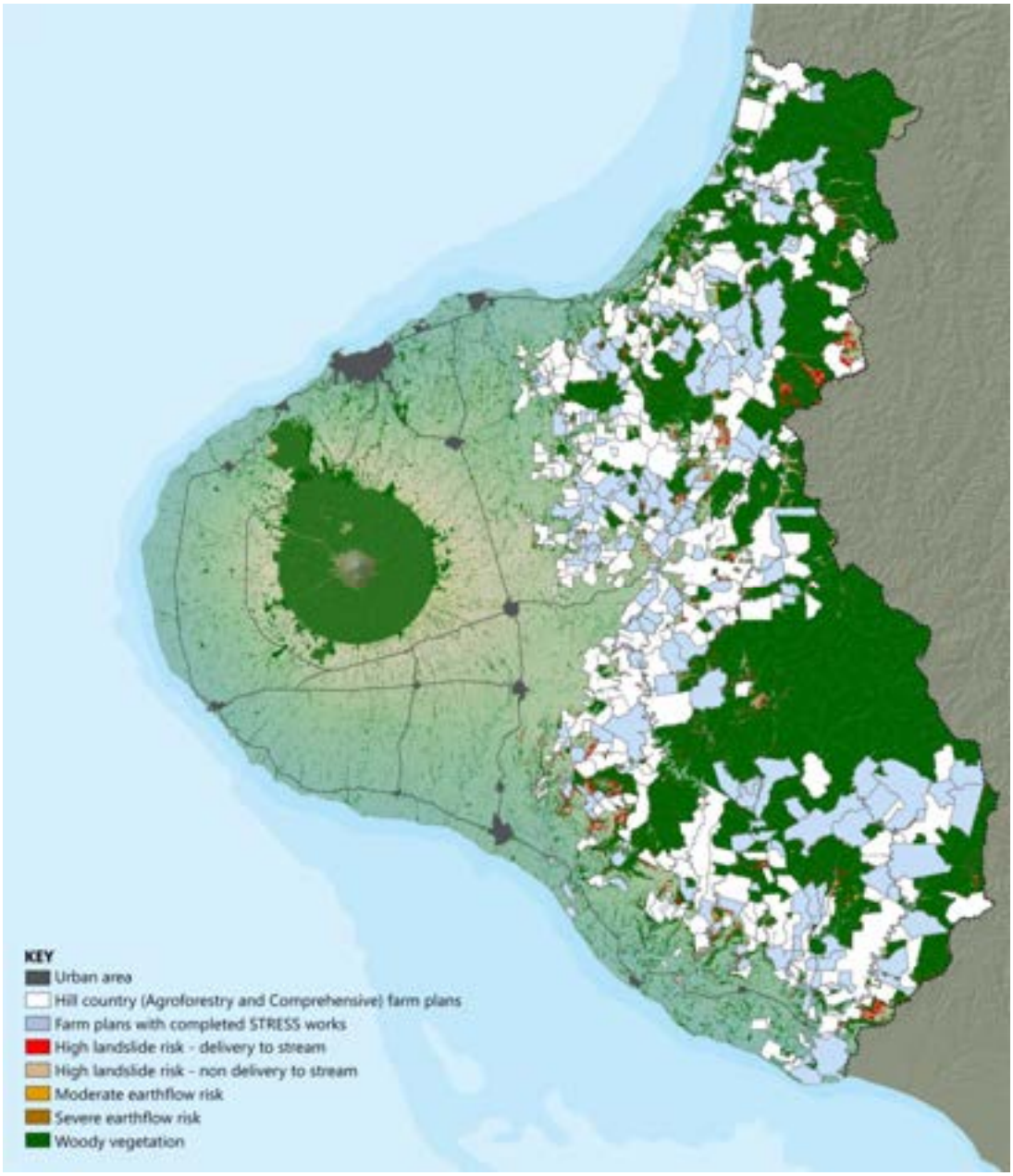
STRESS involves a programme of poplar and willow pole planting, close-spaced planting, retirement and reversion fencing targeting the Waitōtara catchment and other erodible land in the region.

When works are mature, sustainable land use in the hill country will improve, leading to a reduction in sediment generated and delivered to waterways.

Highlights include:

- Investment in STRESS totalling $3.9 million.
- Council's delivery and implementation of $1,063,000 of STRESS soil conservation grants.
- The establishment of 22,757 poplar and willow poles, 257.5 hectares of forestry, and 118.6 kilometres of fencing to retire 3,337 hectares of marginal land.
- Delivery of STRESS through Council's *Sustainable Land Management Programme* over the past five years achieving a significant increase in the implementation of soil conservation works.

*An example of an at-risk area planted with poplars to reduce erosion as part of STRESS.*




*Areas prone to erosion, and farm plans with implemented STRESS works are mostly in the hill country.*

## Afforestation Grants Scheme

The Government introduced the Afforestation Grant Scheme (AGS) to encourage planting forest on Kyoto-compliant land in exchange for carbon credits. Regional councils can deliver a portion of the scheme where forest planting also has environmental co-benefits. Since 2009, 732 hectares of new forestry have been established through the Council's pool of the AGS.

CASE STUDY

*Lyall Bunn (right) with a Council Land Management Officer among pine trees planted on land retired from pasture.*

# **Turning talk** into action

Lyall Bunn knows trees, likes trees and understands their important role in hillcountry stewardship. And for him, the South Taranaki and Regional Erosion Support Scheme (STRESS) is as much about turning talk into action as it is about the financial side of sustainable land use.

"It puts a timeframe around things," Lyall says of the scheme. "I'll have an idea about what I'd like to do next, then the Council Land Management Officer will get on the phone and we'll meet together to tease out the details and see where it all fits in with STRESS. Then all of a sudden the idea has become a plan complete with actions and dates—a move from thinking about it to actually doing it."

Motu Maniapoto at Tarata is the original Bunn family farm, now run by a manager jointly with a neighbouring property Lyall and Andrea Bunn acquired more recently. Together, the two properties total more than 900 hectares. The work is part of a family tradition. Several generations of Bunns have taken a number of sustainable land management initiatives, notably by establishing 34 hectares of production forestry and maintaining 347 hectares of indigenous bush on the original family farm.

Now it's the turn of Lyall and Andrea, who are focused on implementing farm plans developed with the Council for the original property in 2002 and for the new property in 2013.

Plans are afoot to erect a further 420 metres of fences and plant another 4.7 hectares of forestry on the new property, again with STRESS support. In addition to that they are maintaining 12.5 hectares of indigenous bush on the new property.

"It's typical hill country, really," says Lyall. "There are some areas where you know they should be in trees. That's always been the attitude of our family."

*'Several generations of Bunns have taken a number of sustainable land management initiatives ...'*

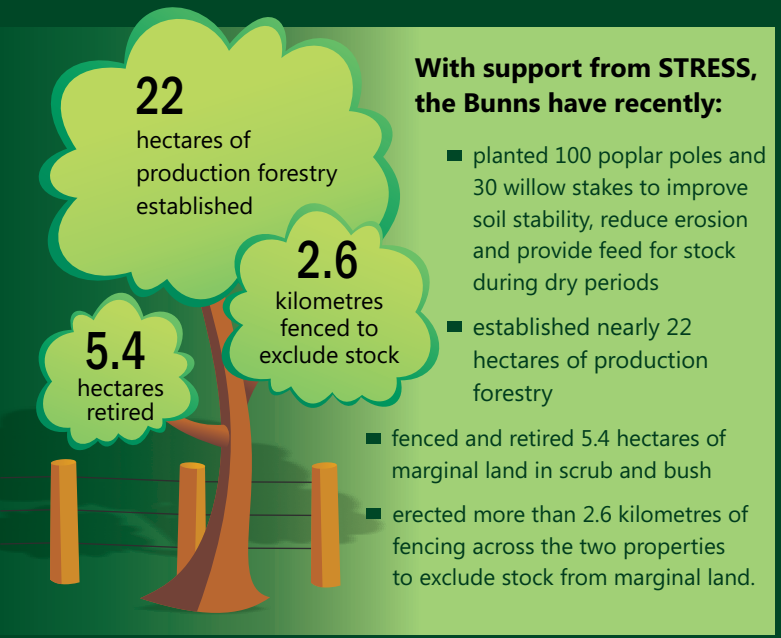
The indigenous bush being maintained on the original family farm covers 48% of the property, and on the new farm it covers 12.5 hectares, accounting for 5.7% of the area.

The Bunns are considering a QEII National Trust covenant on the latter, jointly with a neighbour who has an adjoining bush block. "I'm pro covenants and that sort of thing on land that obviously shouldn't be in production," says Lyall.

Under STRESS, financial assistance is available for soil conservation pole plantings, forestry and retirement fencing on hill country properties. These reduce the risk of accelerated erosion and the subsequent sediment that ends up in waterways and the marine environment.

The scheme has assisted many landowners to implement their farm plans drawn up in conjunction with the Council.

*Bunn family farm tinyurl.com/TRC2h*




**With support from STRESS, the Bunns have recently:**

- planted 100 poplar poles and 30 willow stakes to improve soil stability, reduce erosion and provide feed for stock during dry periods
- established nearly 22 hectares of production forestry
- fenced and retired 5.4 hectares of marginal land in scrub and bush
- erected more than 2.6 kilometres of fencing across the two properties to exclude stock from marginal land.

## Plant provision schemes

The Council operates two plant provision schemes in which quality conservation plants are grown or obtained and made available to property planholders at cost. This is a key component in the success of the Council's soil conservation and riparian management programmes.

Since the scheme began in 1996, the Council has facilitated the supply of more than 3.6 million riparian plants to land owners. In the past five years we have supplied more than two million plants for riparian planting and 54,100 low-cost poplar and willow plants for soil stabilisation.

In 2013/2014 alone, the Council contracted nurseries to supply in bulk 467,328 native riparian plants, reducing the cost of plants for landowners. We also facilitated the supply of 6,850 sand stabilisation plants for four coastal sand country sites. For more information on the riparian planting programme (see Chapter 3—Fresh water, *page* 84).

*Landowners collect low-cost plants from the Council depot at the Stratford A&P Showgrounds.*

## Information, education and advice

Each year the Council receives and responds to numerous requests from the public for information on sustainable land management relating to vegetation clearance, native logging, the implementation rate of the *Sustainable Land Management* and *Riparian Land Management* programmes, aerial photography, planting advice and new property plan enquiries.

In 2013/2014, the Council received and responded to 226 requests for advice and assistance on a wide variety of land management issues. Most of these requests related to land management practices, and, to a lesser extent, information requests from other agencies. Planholders also get information directly from Council officer visits as a part of Council servicing their plans. We also distribute a large number of pamphlets and other educational material to interested individuals and organisations in relation to sustainable land management.

### Find out more

*Community investments in environmental improvements in Taranaki 2008–2014 tinyurl.com/TRC2n*

*Regional Soil Plan for Taranaki tinyurl.com/TRC2d*

*Sustainable land management and plant supply annual report 2013/2014 (TRC) tinyurl.com/TRC2f*

*Transforming Taranaki: Riparian Management Programme tinyurl.com/TRC2g*

*'Since 1995, the Council has monitored the soil quality of different soils used for different purposes in the Taranaki region.'*

# Soil health

Taranaki has very few long-term issues with soil health. Soil quality monitoring aims to track any changes in the region's soils, allowing land users to make well-informed decisions to prevent or minimise the effect of their land use on soil health.

Since 1995, the Council has monitored the quality of different soils used for different purposes in the Taranaki region. Monitoring was initially conducted as part of the nationwide 500 Soils Project and subsequently, through a more extensive region-specific programme. As part of the State of the Environment monitoring programme, soil quality monitoring is now conducted once every five years.

In October to November 2012, the third round of soil quality monitoring was carried out at 20 selected sites around the region. The objective of the programme is to compare soil quality with land use and identify the extent and direction of any changes in relation to samples previously analysed from these sites.

# Soil quality

The 20 sites surveyed during October–November 2012 comprised three plantation forests, seven dairy pastures, six dry stock pastures (pasture grazed predominantly by sheep and beef), two cropping/market garden sites, and two native bush sites.

Seven primary soil properties were measured to assess soil quality—total carbon (TC), total nitrogen (TN), anaerobically mineralisable nitrogen (AMN), pH levels, Olsen phosphorus, bulk density and macroporosity (the soil's ability to retain water and nutrients). Biological functioning to assess the soil's ability to sustain healthy organisms was also measured. To maintain consistency and standards, protocols and analysis of soil samples were based on the protocols established in the 500 Soils Project.

## What's the story?

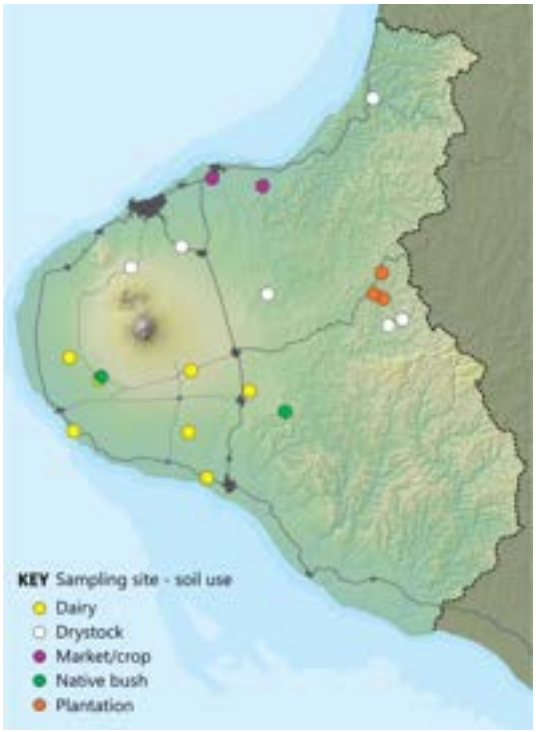
Results from the 2012 survey found that overall, the majority of soil samples met target ranges for soil productivity and health. The number of soil quality indicators meeting targets improved by 3%, from 78% in 2007 to 81% in 2012.

More sites than in the previous survey had only one or no indicators outside of target values. On a site basis, 11% of sites met all targets, 50% missed the target range for only one indicator and 39% missed the target range for two or more indicators.

By comparison, in the 2007 survey, only 45% either met the target range or missed the target range for only one indicator.

Biological functioning in most soils was consistent across the region, with evidence of decreased ecology found only in those soils used for cropping.

Testing for the trace element cadmium was also carried out in the 2012 survey. Generally, cadmium levels were highest on grazed pastures, but there was little distinction in levels between pastoral soils, market gardening soils, and cropping soils.




*Location of soil quality monitoring sites in Taranaki.*

Cadmium levels were lowest within plantation forestry and native bush forestry soils. However, all sites were found to be below 1.4 mg $kg^{-1}$ for cadmium. This is at least two tiers below the levels deemed to be of immediate concern in the Tiered Fertiliser Management System criteria released by the national Cadmium Working Group (2011). Importantly, there was no sign of any increase in cadmium levels in relation to previous surveys.

The survey identified a few regional issues. These include compaction of soils subject to animal grazing, higher than target nitrogen levels in dairy soils, and low nutrient levels or low fertility in the hill country. While it is important to recognise these as issues, they are also aspects of soil quality that can generally be reversed with appropriate soil and land use management.

*'Survey found 81% of soil samples met target ranges for soil productivity and health. '*

When considering the nine sites that have been sampled three times since 1995, the most noticeable trend is a decrease in macroporosity (low macroporosity accounts for 50% of all the indicators that were outside target ranges). Reduced macroporosity can indicate soil compaction, especially in dairying soils where stock treading can compact soil. Decreased macroporosity levels are a concern, especially as a trend. However, it should be noted that Council completes sampling in spring, when compaction is at its worst and most aspects of poor soil quality can generally be reversed with appropriate management.

## National comparison

The general patterns in soil quality for Taranaki are similar to those in other regions.

*A Council Technical Officer collects soil samples at one of 20 sites in the region.*

# Our responses

## Regional Soil Plan for Taranaki

The Council addresses soil health through the *Regional Soil Plan for Taranaki*. The objectives, policies and methods contained within the *Regional Soil Plan* focus on non-regulatory solutions for managing soil health. A current review of the plan will consider the 2012 soil quality survey recommendations and suggestions in relation to soil compaction in pasture, high nitrogen levels in dairy soils, and low nutrient levels in hillcountry and forestry soils. The review is expected to be completed in 2016/2017.

## Resource consent management

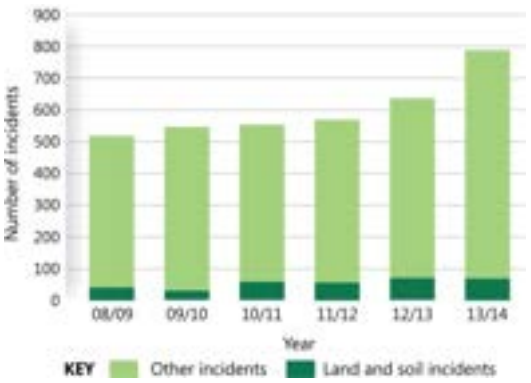
At the end of June 2014, there were 1,560 resource consents granted for discharges to land and land/water. About 61% (950) of those consents were for discharges of effluent on dairy farms. Hydrocarbon exploration and servicing facilities were the second largest activity, with 20% (318 consents). A total of 224 consents were for discharges of stormwater to land.

## Resource consent monitoring

When the Council grants consent for a significant activity, it implements an annual compliance monitoring programme to ensure the consent holders meet the conditions set out in the consent. As of June 2014, there are 16 consent monitoring programmes that have a soil health or soil quality monitoring component.

## Incidents investigated

The number of incidents reported related to land is a small percentage of the total number of incidents reported each year. Over the past six years, the number of incidents reported related to land and soil has increased slightly (mostly related to effluent on dairy farms). Investigation of these reports does not always mean action is required. It can sometimes confirm there is no issue, or that the issue is the result of natural processes.




*Between 2008 and 2014, only a very small proportion of all incidents reported each year were related to land.*

## Information, education and advice

The Council responds to all requests from the public for information on soil health. The Council's provision of information and advice helps raise awareness of issues and problems, provides simple cost-effective solutions, and enables land users to make well-informed decisions to prevent or minimise the effect of their land use on soil health.

### Find out more

*Earthworms, soil microbes and drilling waste muds (Landcare Research 2014, prefaced by TRC memo) tinyurl.com/TRC2i*

*Soil quality in the Taranaki region 2012, (Landcare Research) tinyurl.com/TRC2j*

# Land remediation

The vast majority of sites investigated in Taranaki show no evidence of contamination and those sites that are high-risk have been cleaned up. There was a substantial effort made in the 1990s to identify sites and, where necessary, undertake further investigation and remediation. Sites in the Taranaki region that have the potential to be or could currently be considered contaminated continue to be identified and investigated.

Under the *Resource Management Act 1991 (RMA),* regional councils have a responsibility to investigate and monitor potentially contaminated land. Since 1992, the Council has systematically identified and investigated sites in the region that have the potential to be contaminated because of historical land use. We record any sites and details of investigations in the Register of Selected Land Uses (RSLU) database, which we also maintain, and provide support to the district councils when review of scientific or technical information is required. Information in this database is publicly available.

# Monitoring sites

Contamination of sites can result from historical activities and industries where hazardous substances have been inappropriately stored, used or disposed of, largely because of lack of knowledge or appropriate legislation at the time. Since the early 1990s, the Council has identified and assessed such sites, including, for example, old landfills, sites where in-ground fuel tanks have been removed, and ex-timber treatment plants.

In January 2012, the *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011* (NES), came into effect. The NES uses district council land use consenting processes to ensure potentially contaminated sites are identified and investigated, and if need be, remediated or cleaned up.

During district council consenting processes, five specified activities trigger NES assessments—subdivision, change of land use, disturbing the soil, sampling the soil or repairing/replacing underground fuel storage systems. In such cases, applicants must identify and investigate any area of potential contamination and remediate (or clean up) the site if necessary, before consent is granted. The Council's RSLU database is a starting point for such investigations.

## Site categories

Council categorises sites in the RSLU database using a number of terms set out in the RMA and guidance documents prepared by the Ministry for the Environment:

- 'Contaminated' means that the site poses, or is reasonably likely to pose, an unacceptable risk to public health or to the environment.
- If the site is 'managed' then a strategy is in place to prevent the on-site contamination from causing harm.
- If the site is 'verified HAIL' (Hazardous Activities and Industries List), then the site has been identified as being used (or having been used) by an industry which has or has had the potential to contaminate the land with hazardous substances.
- 'Remediated' means that the site has been cleaned up to satisfy the guidelines or controls relevant to the desired land use.

CASE STUDY

# **Pātea Freezing Works** - the clean up

*Pātea Freezing Works operated for most of the 1900s.*

## Background

The freezing works in Pātea operated for 100 years and was a major employer in Pātea and southern Taranaki generally. The works closed in 1982 with a loss of 800 jobs. The derelict site was left in a dangerous condition with drums of acid, asbestos in the structural cladding and insulation, and polychlorinated biphenyls (PCBs), a type of chemical used in electrical gear. A fire at the works on 6 February 2008 resulted in the evacuation of hundreds of townsfolk because of fears of airborne asbestos in the smoke.

To provide interim protection to the residents following the fire, the site was stabilised with a polymer glue to prevent any dust from leaving the site while investigations were undertaken to assess the extent of the environmental and health concerns associated with the site. During this time the PCBs and drums of acid were removed from site by Council staff.

*Removal of above-ground structures.*

## Site remediation

Following the Council's investigation works the then Minister for the Environment, Trevor Mallard, announced government funding of $1.5 million to help with cleaning up the site, following a joint approach from the Council and the South Taranaki District Council.

The Council developed the scope for the remediation work and, following a tendering process, AECOM was commissioned by STDC to undertake the remediation of the site. A remediation plan was approved by the Council, the appropriate consents sought and granted, and work began in November 2009. AECOM's subcontractor, Nikau Contracting Limited, were contracted to remove the asbestos as well as demolish and dismantle the structures. Air monitoring was undertaken throughout the duration of the works to ensure airborne asbestos fibre levels remained within required public health guidelines beyond the site boundary, while the Council monitored the ecological health of the adjacent estuary.

The demolition and dismantling of all above ground structures was completed by the end of February 2010. Notably, the chimney was brought down by excavators on 19 February, 2010. This involved asbestos (lagging) being removed from the boiler house and the fans and ducting associated with the chimney prior to the chimney coming down.

In March 2010, the excavation of concrete slabs and footings began. Concrete was crushed for reuse as fill material on site and soil was stockpiled and mechanically screened to remove asbestos containing materials. Some soil was removed and disposed of off site. The main concrete reservoir was cleaned of debris and the accumulated rainwater filtered before it was backfilled. Two steel-framed sheds were dismantled for their reuse by part owners of the site.

Remediation was completed according to the Remediation Plan in June 2010. On 30 June 2010, Nikau Contracting Limited submitted a 'clearance statement' to the Council which was approved, signalling the completion of the work and compliance with the resource consents.

*The remediated site, 2014.*

## What's the story?

Overall, the RSLU data indicates that the vast majority of sites investigated in Taranaki show no evidence of contamination, and that those sites that are high risk have been cleaned up.

*'The vast majority of sites investigated in Taranaki show no evidence of contamination.'*

Of the 1,336 sites listed as potentially contaminated in the Taranaki region, none poses an unacceptable risk.

The vast majority, 96% or 1,283, have been found to have no contamination, or some contamination that presents no risk because the site is managed. For example, if a potentially contaminated site is sealed for car parking it would be considered managed, posing no unacceptable risk.

Only 18 sites (or 1.3% of the total number of sites) have required remediation, all of which has been completed to an acceptable standard.

| Site category | 2009 | 2014 |
|---|---|---|
| No contamination found | 757 | 754 |
| Some contaminants present but site meets guidelines–no unacceptable risk | 480 | 529 |
| Remediated to acceptable standard | 16 | 18 |
| Verified HAIL—not yet assessed | 28 | 35 |
| Contaminated—risk unacceptable | 0 | 0 |

*The Register of Selected Land Use database statistics for 2009 and 2014.*

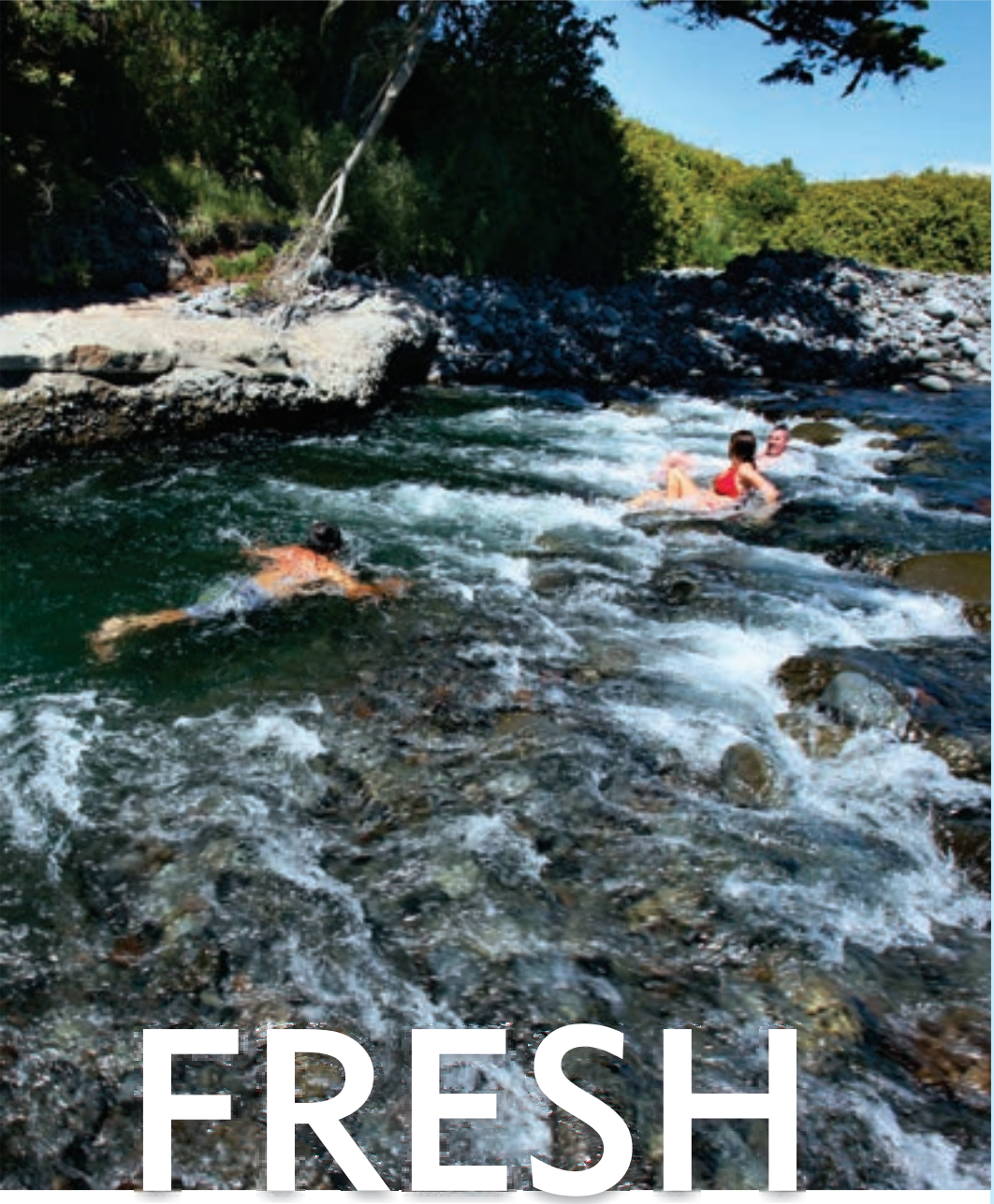
Since 2009, the number of sites with no evidence of contamination has decreased slightly, whilst the number of managed sites has increased by 8%. However, this can be the result of new sites identified when properties are developed or when properties already existing on the RSLU are subdivided.

There has been a small increase in the number of remediated sites and the number of HAIL sites awaiting further assessment since 2009, but the total number is still low. Most verified HAIL sites are historical oil wells. However, the increase in verified HAIL sites since 2009 is the result of an increase in clandestine drug laboratories (P-labs) discovered by New Zealand Police, and subsequently entered on the RSLU.

The 24 historical oil sites that are part of the verified HAIL site category do not currently store hazardous substances. However historical activities could have left a potential legacy or future possibility of soil contamination. Whilst liability rests with current site occupiers, site inspections have revealed no indications of past contamination at these sites. Present day activities are much less likely to result in contaminated land because of stringent rules and regulations under both resource management and hazardous substances legislation.

### Find out more

*Remediated land tinyurl.com/TRC2k*



# FRESH WATER

3

THIS CHAPTER COVERS:

## Surface water quality

- Ecological health
- Physical and chemical state
- Popular swimming spots
- Lake water quality

## Surface water quantity

- Flow characteristics
- Rainfall and water levels
- Surface water allocation
- Allocation by catchment

## Groundwater

- Groundwater abstraction
- Groundwater levels
- Groundwater quality

*Fresh water tinyurl.com/TRC3vid*

*Clean and healthy water is arguably the region's most precious natural resource. Taranaki's rivers and streams are vital for the regional economy, for recreation, and for community water supplies. Ensuring that the quality of the region's fresh water remains excellent is of paramount importance.*

*Maintaining and enhancing the mouri and wairua, or life force and spirit, of water is also a fundamental part of the kaitiakitanga, or guardianship, role that the tangata whenua have in relation to water. The Council and others have managed the region's freshwater resources for more than 40 years to ensure that good quality water is available for the varied needs of the region.*

*'Latest Council monitoring shows the ecological health of our rivers is the best yet measured.'*

# Fresh water

Whatever happens on the land affects the region's streams, lakes and wetlands. Intensive agriculture can affect freshwater quality. Surface run-off can carry soil, excess fertiliser, or dung and urine into waterways. Discharges to waterways from various effluent systems can impact stream health and water quality, as can draining or diverting streams and wetlands to improve land production.

The management of waterways has considerably improved in the past 40 years. Up until the 1970s, untreated dairy farm effluent was routinely discharged directly into the nearest river or stream, turning the waterways green. Many wastewater treatment systems were inadequate compared with today's standards and greatly affected water quality. A number of industrial and municipal wastewaters were discharged directly into small streams without any treatment.

Today, results indicate the best-ever trends in the health of monitored waterways. All farm effluent systems are now licensed and monitored. Long reaches of rivers and streams are fenced and planted. Industrial waste treatment systems have been upgraded and almost all town waste discharges into rivers have been eliminated. The latest Council monitoring shows the ecological health of rivers is the best yet measured. Since trend analysis began in 2005, total nitrogen levels have either reduced or shown no significant change, with reduction becoming more and more widespread. The number of nutrient measures showing a long-term deterioration is steadily declining—down from 32% to 25%. In recent years, only one of 11 sites shows deterioration in any nutrient measure.

*'Today, results indicate the best-ever trends in the health of monitored waterways.'*

These results reflect the effectiveness of the Council's policies and programmes. They also reflect the enormous investment made by the community to protect and enhance the region's waterways—the benefits becoming more and more apparent.

The main pressures on our freshwater quality today still stem from intensive agriculture. However, dairy cow numbers in Taranaki have remained relatively static after reaching a peak about 15 years ago. Today dairy cow numbers total 493,361 cows—an increase of only 2.5% since 1998/1999. Dairy cow densities have also not markedly changed, averaging 2.85 cows per hectare, compared with 2.8 in 1998/1999—below the national average. The quantity of fertiliser being applied has also declined overall in the last 10 years, particularly the quantity of nitrogen fertiliser which peaked in 2006/2007 and has since plateaued. Although the demand for fertiliser tends to reflect milk prices, applications of superphosphate have remained relatively stable with greater use made of imported animal feed. Continuing overseas demand for New Zealand's dairy and beef products means the outlook for agriculture in Taranaki remains strong.

Fresh water is vital to the well-being, livelihood and lifestyle of everyone in the region and the demands on fresh water are large and varied. Taranaki has plenty of rain, but it is also home to a number of large-scale petrochemical, dairy and meat-processing operations. There is ongoing demand from these industries to take and use more water. There is also demand from agriculture for pasture irrigation. This demand for water from agriculture and industry, alongside a growing population, means we must pay careful attention to how water is allocated—particularly during drier periods and droughts, when water resources can be stretched.

For a number of years, the Council has worked successfully with both landowners and industry in the region to improve and enhance water quality. We also work to ensure water allocation is fair and equitable. The results of our programmes make it increasingly clear that what we're doing is working. As a council, we are firmly focused on caring for the rivers, streams, lakes and wetlands in the region in a way that continues to ensure good quality water is available for everyone's needs.

# Surface water quality

The rivers, streams and lakes in the Taranaki region are valued for a wide range of economic, recreational and aesthetic reasons. Measures of water quality look at the plants and animals that live in Taranaki's rivers and streams and the physical and chemical state of the water, including at popular swimming spots and lakes in the region.

Monitoring the ecology and chemistry of the region's waterways can tell us a great deal about water health. Analysing trends also helps us to assess our programmes, and develop plans and strategies for the future. In reporting trends in this chapter, the word 'significant' is used to mean 'a definite and a meaningful shift in the ecological or physicochemical conditions of a stream or river'. Where statistical tests did not attain statistical significance, results are reported as showing 'no statistically significant change'. All statistics are reported at the 95% confidence level and our results show that we are continuing to ensure quality fresh water resources that will sustain our communities well into the future.

# Ecological health

Ecological health is regarded as the primary measure of freshwater quality. To determine the ecological health of the region's rivers and streams, the Council monitors macroinvertebrate communities—the small insects, crustaceans, molluscs and worms that live in rivers and streams. We also monitor algal growth. Because both algae and these animal communities respond directly to water quality, they can tell us a great deal about freshwater health and trends over time.

## Macroinvertebrates

A number of characteristics influence the composition of macroinvertebrates in streams, including water temperature, stream width and depth, bed composition, exposure to light, speed of flow and stream bank habitat. Macroinvertebrate communities can also be impacted by changes in nutrient levels and pollutants.

Since 1995, the Council has analysed thousands of samples from 57 key sites in the region's waterways: 46 sites on the ring plain, six sites in small lowland streams and five sites in larger eastern hillcountry rivers. Seven of these sampling sites are in the upper reaches of rivers or streams, 26 sites are in the mid-reaches and 24 are in the lower reaches.

| Grading | MCI | Code | Stark's (1985) classification |
|---|---|---|---|
| Excellent | >140 | | Excellent |
| Very Good | 120-140 | | |
| Good | 100-119 | | Good |
| Fair | 80-99 | | Fair |
| Poor | 60-79 | | Poor |
| Very Poor | <60 | | |

*The Macroinvertebrate Community Index classifies water quality from 'Excellent' to 'Very Poor'.*

Water quality is classified using the Macroinvertebrate Community Index (MCI) developed by Dr John Stark In consultation with Dr Stark, the Council has adapted the MCI to a six-step classification system with precise MCI score bands that more accurately reflect and differentiate the health of Taranaki's ringplain streams. Using this index, water quality is classified from 'Excellent' to 'Very Poor 'based on the presence of different types of invertebrate in relation to their particular tolerance to organic pollution in stony streams.

Put simply, some species are more sensitive to pollution or nutrients so an abundance of these species would indicate better quality water. A high number of species that are tolerant to pollution or nutrients would indicate poorer water quality, particularly if the numbers of sensitive species are also low. As shown in

the MCI table opposite, the higher the MCI score, the better the grade. Although boundaries between grades can be blurred, the grades are helpful in assessing trends.

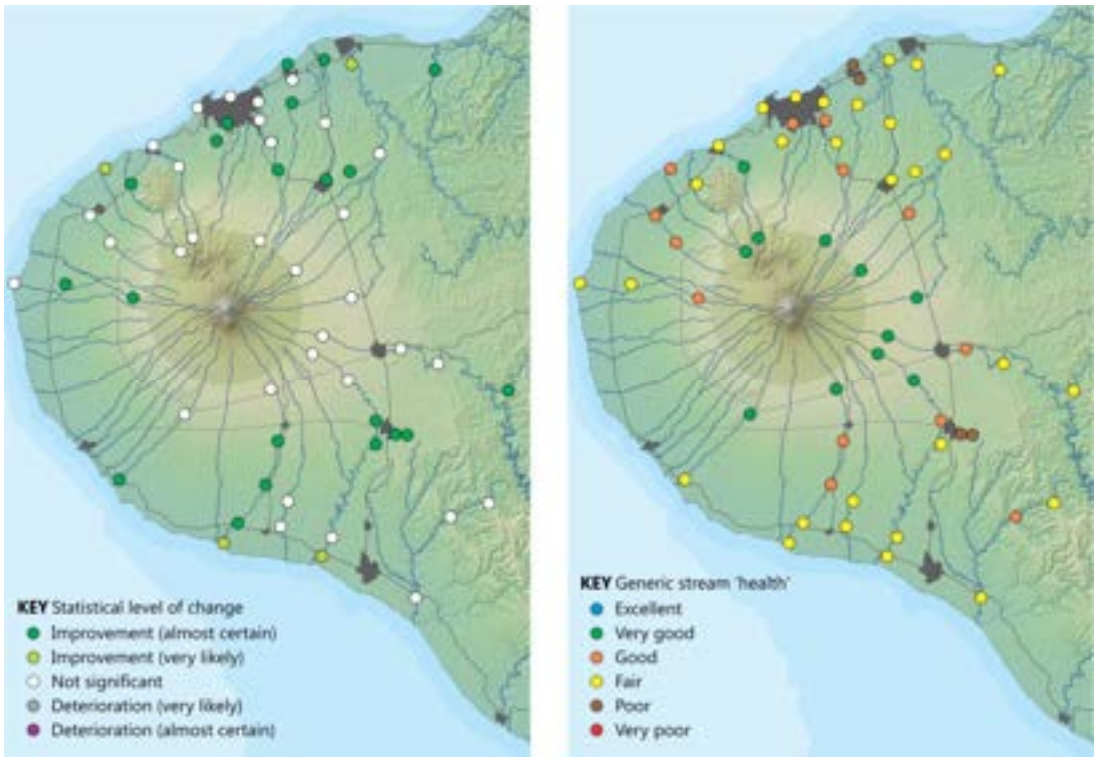
## What's the story?

*'Improving trends at 14 of the 21 sites have become highly significant since 2007.'*

The Council and its predecessors have made freshwater management a significant priority over the past 40 years and long-term data collected reflects this. Measures of ecological health, such as the communities of invertebrates living in streams, are showing the best trends recorded to date, with more sites showing definite improvement region-wide.

Over the 18-year monitoring period since 1995, 44 sites have improving scores, especially in the middle and lower reaches of catchments. In terms of significant trends, 21 sites show a highly significant improving trend. At 14 of these 21 sites trends have become highly significant since 2007.

Of the 44 sites, only eight showed any indication of deterioration. However, in terms of trends no site shows a significant trend of deterioration.




*Over the past 18 years, ecological health has improved at a number of sites, with no significant trend of deterioration at any site (left). Biological stream health is considered 'Good' to 'Very good' in the upper reaches of rivers and fair in the lower reaches (right).*

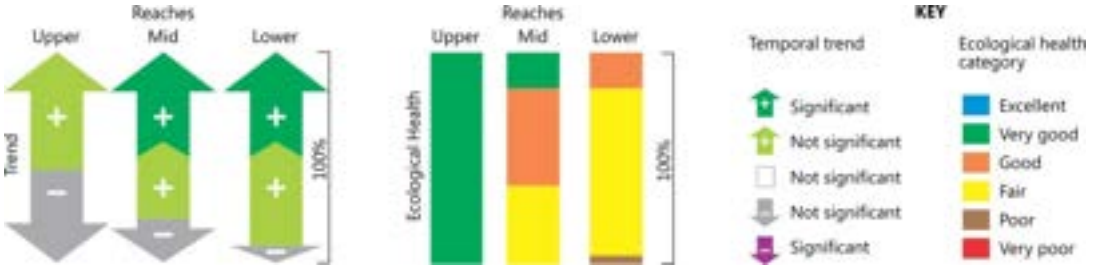
Biological stream health, based on median MCI scores from 1995 to 2013, is classified as 'Good' to 'Very good' in the upper reaches of Taranaki's river catchments, where there is more stream bank vegetation cover. Further down catchments, land use is more intense. Here, the cumulative effects of discharges and diffuse run-off affect MCI scores and biological stream health is 'Fair'. The lower reaches of catchments are typically warmer, wider streams with finer substrates and these changes in stream character also affect MCI scores.

In ringplain streams, MCI scores decrease as the stream flows away from Egmont National Park. The decrease occurs more rapidly near the park boundary where MCI scores exceed 130 units, and then more gradually over distance downstream. By the time the stream reaches the coast, MCI scores are about 85 units. There is

also a strong correlation between altitude and MCI scores. In stony ringplain streams, the higher the altitude, the better the score.

There have been some notable improvements in more recent years (since 2007). Areas that have shown the most certain and emphatic improvements in ecological condition include sites in the Kapoaiaia Stream, where changes to farm practices have resulted in improvements. Riparian planting and fencing has led to improved results in the Huatoki Stream sites, and changes in waste and wastewater management have led to improvements in the mid to lower reaches of the Waingongoro catchment and the Kaūpokonui Stream.

There are likely to be be significant and widespread improvements in ecological health as Council initiatives such as riparian land management, and disposal of dairy wastewater to land are progressed in coming years.



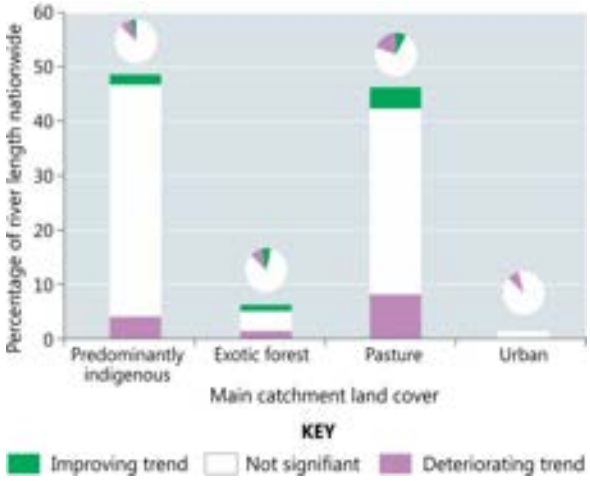

*A summary of ecological health trends at monitored sites from 1995 to 2013.*

## National comparison

It is difficult to compare macroinvertebrate scores between sites nationally because of the differences in habitats across the regions. There are also variations in method of monitoring, processing, and reporting.

Land, Air, Water Aotearoa (LAWA) has calculated trends based on data from 2000 to 2010, and presented MCI scores in relation to the main land cover in each catchment. For comparison, the land cover most relevant to Taranaki is pasture.

Nationally, there are more sites showing deterioration than improvement in agricultural catchments. This is not the case in Taranaki.




*National trend for macroinvertebrates across four land cover classes (www.lawa.org.nz).*

## Find out more

*A user guide for the MCI (Cawthron, 2007) tinyurl.com/TRC3e*

*An approach to the evaluation of temporal trends in Taranaki state of the environment macroinvertebrate data (Cawthron, 2006) tinyurl.com/TRC3c*

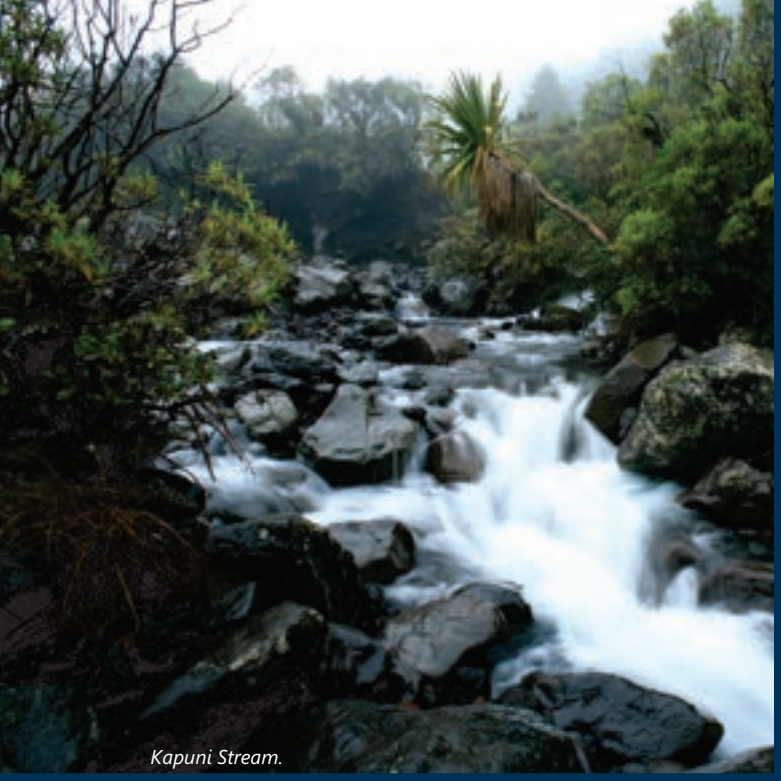
*Freshwater ecological monitoring reports (macroinvertebrate fauna) annual reports 2006 to 2013 (TRC) tinyurl.com/TRC3f*

*A macroinvertebrate community index for stony streams. (Water and Soil Miscellaneous Publication, 1985)*

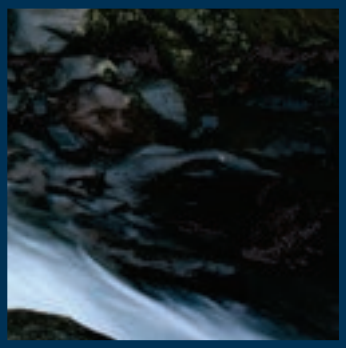
*Macroinvertebrate biomonitoring of the Kapuni Stream (TRC, 2014)*

*Relationships between MCI, site altitude, and distance from source for Taranaki ringplain streams (Stark Environmental, 2009)*

CASE STUDY



*Kapuni Stream.*



# **The Kapuni**—a reference stream

Although the Council collects macroinvertebrate data from streams across the ring plain, there are challenges when it comes to comparisons. No river is exactly the same, or subject to exactly the same influences. A useful reference stream may be the Kapuni Stream which flows from Egmont National Park, across the ring plain to the coast.

The Kapuni Stream has been routinely monitored over a period of about 32 years. Findings show this stream has significantly higher MCI values than those found (or predicted) in other ringplain streams, particularly in the mid and lower reaches of the stream. This suggests the Kapuni is in a better state of biological health than other ringplain streams are (or are predicted to be). The rate of MCI decline as the Kapuni flows away from the National Park boundary is also much lower than what is typical in ringplain rivers and streams. The Kapuni findings could be related to the stream's physical characteristics—the Kapuni is narrow with relatively few tributaries and has a large base-flow of high-quality water originating from Egmont National Park. It also has a relatively low number of consented dairy waste discharges in the catchment.

Trends in data collected from the Kapuni indicate that stream health has improved at most sites along the length of the stream over the past 32 years—often significantly. This is also the trend for the 18-year period that the Council's state of environment monitoring has been conducted. No sites have shown trends of deterioration in this time.

*'Stream health has improved at most sites along the length of the stream over the past 32 years ...'*

In contrast, the lower reaches of two south-western ringplain rivers, the Heimama and Mangatawa streams, show significantly poorer ecological health than the lower reaches of the Kapuni Stream. Both the Heimama and the Mangatawa streams have several pond-treated point-source discharges from dairy farms entering their waters further upstream.

In future, the Kapuni Stream may become a useful reference stream when comparing the biological health of ringplain rivers and streams over time, particularly when assessing the effectiveness of council initiatives such as riparian and dairy waste disposal management.

## Periphyton

Periphyton (algae) is the 'slime' that can be seen from time to time in rivers and streams, especially during long, dry periods where river flows are low and temperatures are warm. It can appear as long strands or filaments, or as thick mats attached mostly to the surface of rocks and boulders.

Periphyton plays a fundamental role within a stream's ecosystem. It absorbs nutrients, converting them into a food source for tiny invertebrates that then become a food source for trout, native fish and birds. Concentrations of nutrients from point-source discharges and/or run-off from land can build up in the rivers and streams and in certain environmental conditions, excessive concentrations of nutrients can create unacceptable levels of periphyton. This is known as 'nuisance' periphyton.

*Periphyton can grow in long filaments (as shown here in the Mangaehu River) or thick mats. Occasionally, 'nuisance' periphyton makes streams uninviting for recreation and can adversely impact stream ecology.*

## Monitoring periphyton

The Council monitors periphyton at 21 sites across 10 catchments in the region. We survey twice a year, once in spring and once in summer, when conditions mean excessive growth is more likely. One method, used nationally, is to undertake a visual survey and compare the results against Ministry for the Environment (MfE) guidelines for aesthetic and recreational use.

Since 2011, we have also taken samples to measure chlorophyll pigment (chlorophyll-a) in the algae. Chlorophyll-a is a measure of the density and mass of periphyton. Periphyton absorbs nutrients; therefore, periphyton that has a high density (high chlorophyll-a levels) is 'well fed'. This could indicate nutrient-enriched water which can, though may not necessarily, lead to excessive algal growth.

### Periphyton guidelines

Developed by MfE, the periphyton guidelines are designed to protect the aesthetic and recreational values of river and streams. The guidelines state that:

- less than 30% of the visible bed should be covered by filamentous algae
- less than 60% should be covered by thick mats.

## What's the story?

Periphyton levels in Taranaki rarely exceed MfE guidelines. Overall 11-year trends show no significant change in the occurrence of both thick mats and filamentous algae.

In the upper reaches of catchments where there is little agriculture, periphyton growth is stable throughout the year. The mass of any periphyton that does grow is also low. In the portions of catchments used for agriculture, there is more likely to be nuisance growth, mostly during the warmer months in spring and summer when water levels in rivers and streams are lower.

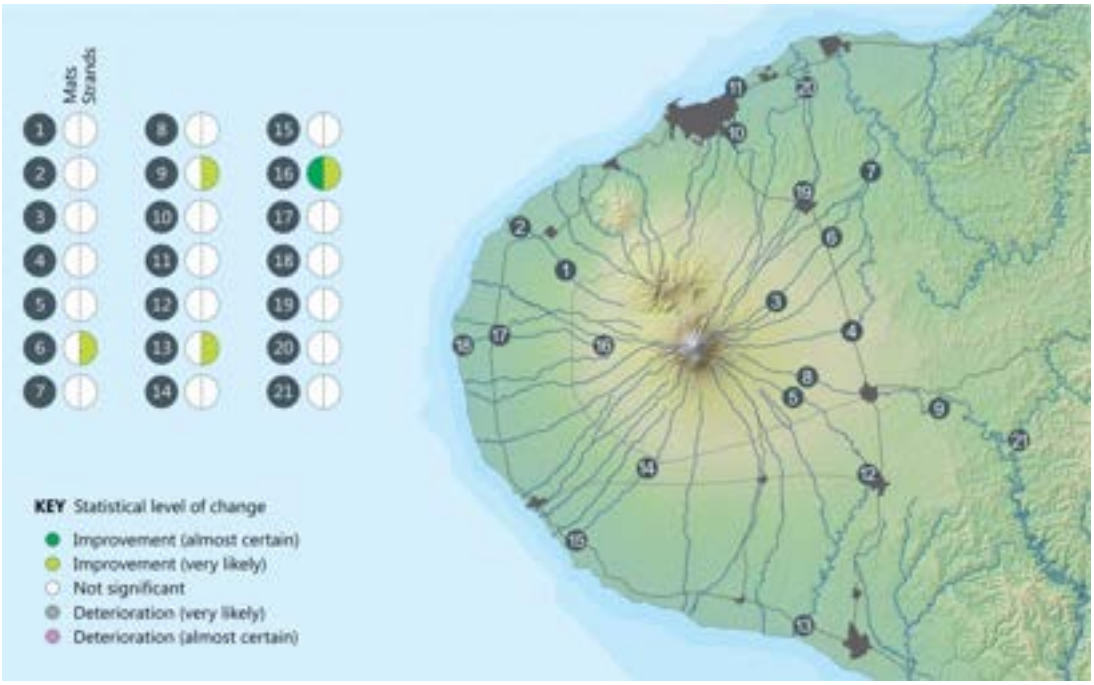
*'Periphyton levels in Taranaki rarely exceed MfE guidelines.'*

In the two surveys conducted in 2012/2013, all 21 sites met MfE guidelines for both thick mats and filamentous forms of periphyton.

Between 2008 and 2013, 20 of the 21 sites met the guideline for thick mats at all times. The one site exceeding the guideline (the Mangaehu River site in the lower reaches of the catchment), met the guideline 90% of the time.

In the same period, 14 sites met the guideline for long filament periphyton 100% of the time. Seven sites located in middle and lower catchment met the guideline between 70 to 90% of the time.

More details, including the monitoring results of individual streams, can be found on our website.




*Long-term trend analysis from 2002 to 2013 shows significant improvements in both types of periphyton at the upper Kapoaiaia River (16). Four other sites showed improvements in filamentous algae, with no significant change in other sites.*

## Find out more

*Freshwater nuisance periphyton monitoring reports (TRC) tinyurl.com/TRC3i*

*New Zealand Periphyton Guideline 2000 (MfE) tinyurl.com/TRC3g*

# Didymo

Didymo *(Didymosphenia geminata),* is a freshwater algae native to Northern Europe that was first found in New Zealand in October 2004. It has spread to numerous rivers in the South Island but has not yet been detected in the North Island, including Taranaki.

*An example of a young colony of didymo.*

Didymo spreads very easily—just one drop of contaminated water could infect a waterway. Didymo attaches to the streambed by stalks and forms a thick brown layer that can smother the substrate and submerged plants. This, in turn, affects native invertebrates, fish and birds.

The Council has monitored didymo in spring and summer for the past eight years, at eight sites in the region. This voluntary surveillance recommended by MPI Biosecurity New Zealand is similar to that carried out in other regions.

In addition to monitoring, the Council coordinates an MPI funded annual educational programme for the Taranaki community to distribute information, provide advice and advocate safe cleaning practices to the public.

Samples from eight sites are sent to Waikato University where DNA is analysed to confirm the presence or absence of didymo.

Didymo has not been detected at any site in Taranaki.


*To date, no didymo has been found at any site in the region.*

## Find out more

*Freshwater algae identification guide (Landcare Research) tinyurl.com/TRC3j*

*Regional Check Clean Dry Programme Evaluation Report 2013 to 2014 (TRC)*

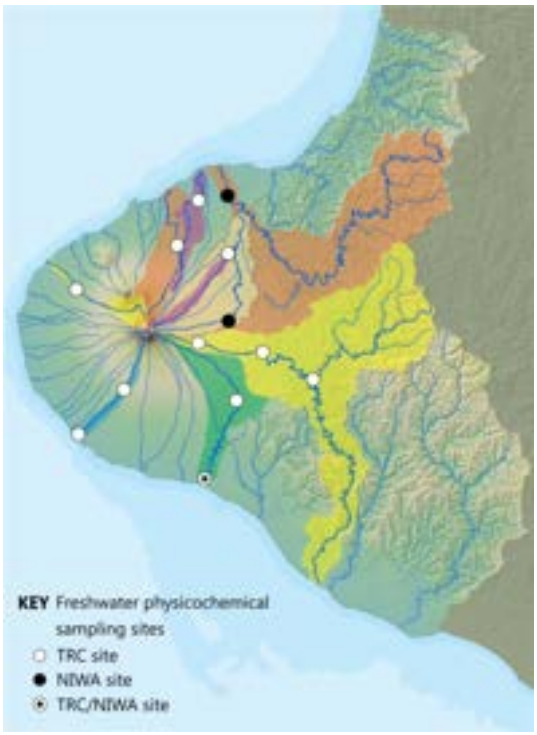
*Taranaki Didymo Regional Action Plan (TRC, 2009)*

# Physical and chemical state

The Council conducts comprehensive monitoring of the physical and chemical state of the region's fresh waters. We test water samples for nutrients, bacteria and organic matter. We also look at aesthetic qualities such as water clarity. To assess quality, we compare results against national water quality guidelines and analyse trends over time. This enables us to effectively focus any remedial or control measures required.

Since 1995, the Council has monitored water quality each month at nine sites in the region. Two more sites (the Waingongoro River at SH45 and Maketawa Stream) have been added since that time, bringing the total number of sites monitored since 2003 to 11.

For the purpose of this report, we have analysed the state of water quality and recent trends using data from the seven years between 2007 and 2014. To determine longer-term trends, we have also analysed data since 1995 when we began monitoring water quality (19 years). Trend analysis is flow-adjusted, meaning that atypical results arising from extreme events such as flooding do not distort the analysis.




*The Council monitors 11 freshwater sites in the region. Since 1989, NIWA has also monitored three sites as part of a national programme, one of which is also a Council monitoring site.*

## What's the story?

Overall, water quality in the region's rivers and streams is good, particularly at sites in the upper reaches of ringplain catchments. Some measurements show some deterioration of water quality further downstream in some catchments. This often coincides with an increase in agricultural land use, where farm run-off and the number of point-source discharges increases. The potential for stock access to waterways also increases further downstream.

In general, our monitoring shows that water quality across the region is either improving or showing no significant change, with more recent data showing stronger improvements in some trends, compared with trends over the entire 19-year period. Over recent years, levels of nitrate, ammonia and/or total nitrogen have improved (reduced) at most sites.

### Water quality guidelines

Various guidelines apply to water quality and relate to the usage and/or values of the waterway. These include the ANZECC (2000), MfE (2003), MoH (2008) and NPSFW (2014). The median data is often the appropriate statistic to use to assess compliance. The guidelines referenced in this chapter are consistent with those used nationally.

## Recent trends

Across all the measures the Council uses to assess water quality, there are 16 significant trends of improvement—15% of all possible trends.

Most improvements are in nutrient levels, particularly in the mid reaches of the Stony (Hangatahua) River and the Pātea River, and the lower reaches of the Mangaehu River. Only one site is showing recent deterioration in some measures—the Waingongoro River above Eltham (the lower Waingongoro shows no deterioration).

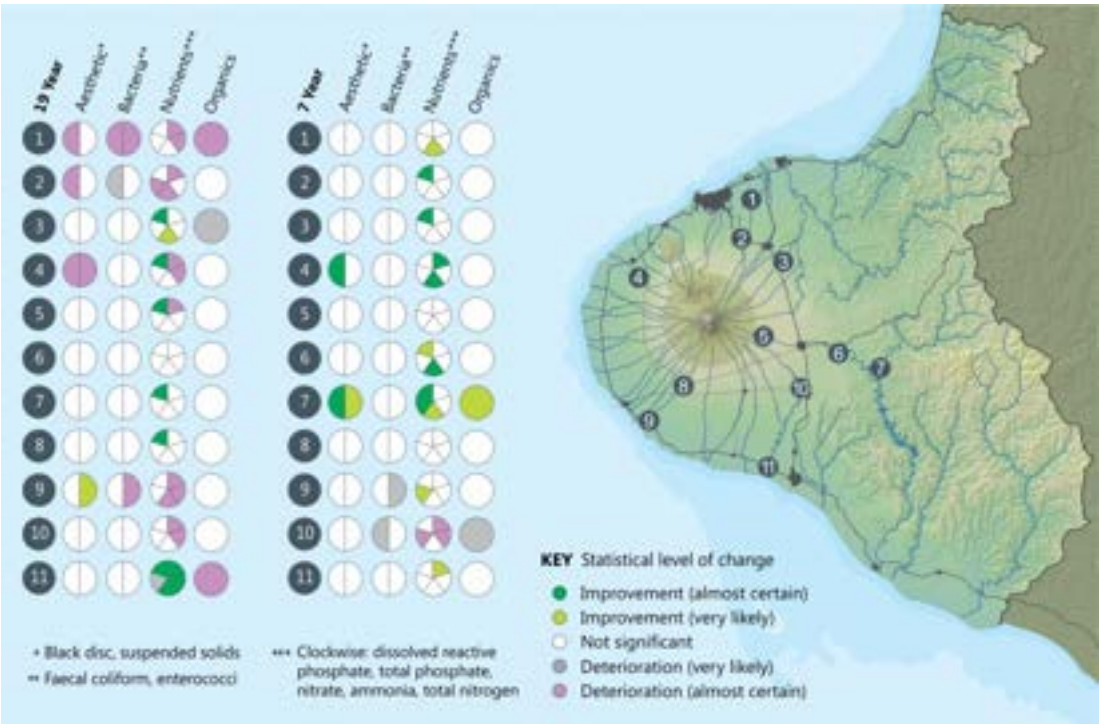
The mid and lower reaches of catchments show the strongest improvements (reductions between 2% to 9% per year) in nitrogen levels.

The mid-Pātea River site has shown significant improvement. This site is downstream of the Stratford wastewater treatment plant, which was upgraded in 2011.

Nutrient levels in the lower Waingongoro River have also improved since Eltham's wastewater was diverted from the lower reaches of the river to the Hāwera wastewater treatment plant in June 2010.

Data from the Stony (Hangatahua) River shows recent improvements in transparency. Previously, severe erosion of this river's headwaters in Egmont National Park has affected aesthetics. Low concentrations of several nutrients in the Stony (Hangatahua) River indicate good water quality. Otherwise, there was no significant change in other measures of water quality.

*'Overall, water quality in the region's rivers and streams is good ...'*




*Long-term trends (1995 to 2014) and recent trends (2007 to 2014) in physicochemical water quality. There has been a greater improvement in some trends in more recent years.*

## Long-term trends

Over the 19-year period that we have monitored rivers and streams, there have been 11 significant trends of improvement in water quality. Most are associated with one site, the lower Waingongoro River, which has improvement in levels of some nutrients. As mentioned above, this site has benefited from advances in Eltham's wastewater disposal.

Five other sites have shown improvement in total nitrogen levels, mainly toward the upper reaches of these catchments. Regionally, the levels of total nitrogen have either improved (shown a reduction) or not significantly changed in the past 19 years, despite substantial increases in the use of nitrogenous fertiliser over this time.

There have been 25 trends of deterioration over the 19-year period (23% of all measures), mostly in levels of phosphate. This is particularly evident in the Mangaoraka Stream and in the lower reaches of the Pūnehu

Stream. As mentioned previously, a longer-term trend of deterioration in the Stony River (Hangatahua) is the result of natural erosion in the headwaters earlier in the 19-year period.

Between 1995 and 2014, 77% of trends (85 out of 110) have either shown improvement or no significant change.

Overall, trends of improvement in Taranaki's rivers and streams have become more apparent in recent years, with fewer long-term trends for nutrients showing overall deterioration as each year passes.

*'The majority of sites in Taranaki have met NIWA guidelines for most water uses.'*

## Guidelines and values

NIWA provides the Council with guideline limits for certain physical and chemical values in relation to water quality. This includes guidelines for different water uses, and for aesthetic values (including excessive algal growth).

| Usage | | Aesthetics | | Avoiding excessive algae | Stock water | Aquatic ecosystems | | | Irrigation | | Drinking water |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site | Locations | Clarity | Organics | DRP | Bacteria | Oxygen | Nitrate | Ammonia | Total nitrogen | Total phosphate | Nitrate |
| 1 | Mangaoraka Stream at Corbett Rd | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 2 | Waiwhakaiho River at SH3 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 3 | Maketawa Stream at Tarata Rd | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 4 | Stony River at Mangatētē Rd | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 5 | Pātea River at Barclay Rd | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 6 | Pātea River at Skinner Rd | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 7 | Mangaehu River at Raupuha Rd | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 8 | Pūnehu Stream at Wiremu Rd | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 9 | Pūnehu Stream at SH45 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 10 | Waingongoro River at Eltham Rd | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 11 | Waingongoro River at SH45 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

Key:
● All results meet usage guidelines
● Majority of results meet usage guidelines
● Minority of results meet usage guidelines
● No results meet usage guidelines

*Between 2007 and 2014, the majority of sites in Taranaki complied with guideline limits for most water uses.*

Data from the past seven years shows the majority of sites in Taranaki have met NIWA guidelines for most water uses most of the time. In recent years, most sites in Taranaki met national guidelines for aesthetic quality. In eastern hillcountry rivers, naturally high erosion rates affect water clarity.

The majority of sites met the guidelines for nutrient levels for most water uses. In the lower reaches of some catchments, phosphate levels are high enough to lead to potential algal growth during periods of low water flow. However, elevated levels of nutrients do not always result in undesirable algal growth. As stated

*Council Technical Officers collect water samples from the Pūnehu Stream at Wiremu Road.*

previously, periphyton in Taranaki streams is assessed against national criteria and seldom becomes 'nuisance' algae.

High levels of dissolved reactive phosphorus occur naturally at the National Park boundary. Levels decrease, or remain relatively stable, further downstream of the park. It is only at the lowest sites that these levels increase again.

All sites met the bacteria guidelines for stock water (irrigation) on all occasions.

All sites also met applicable drinking water guidelines. However, as is the case throughout New Zealand, water from all sites would require treatment to meet much more rigorous bacteriological drinking water consumption standards.

## National comparison

Land, Air, Water Aotearoa (LAWA) has compiled water monitoring data from each regional council in the country over a five-year period up to 2012.

Trend analysis focuses on three nutrient parameters commonly used in agriculture—total phosphorus, dissolved reactive phosphorus and nitrate nitrogen. Results are presented for four types of land cover. For comparisons, the land cover most relevant to Taranaki is pasture.

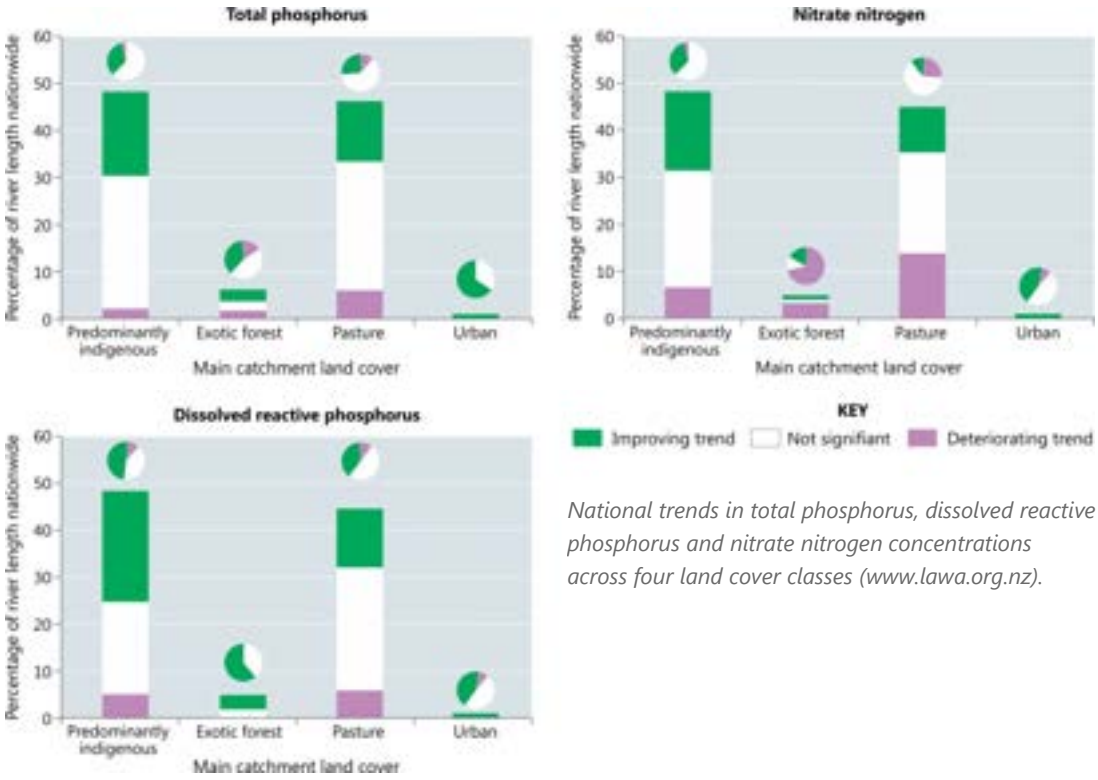
Nationally, approximately 30% of pasture sites show improving trends for total phosphorus, 10% show deteriorating trends and the remaining sites show no significant change.

Forty per cent of pasture sites show an improving trend for dissolved reactive phosphorus. Approximately 11% of sites show a deteriorating trend and the remaining sites show no significant change.

In Taranaki, data from the past seven years shows 18% of pasture sites with improving trends for dissolved reactive phosphorus, with 9% (one site) showing a deteriorating trend in both total and dissolved reactive phosphorus.

National trend analysis for nitrate nitrogen was for a 10-year period. Pasture site results showed more deteriorating trends (30%) than improvement trends (10%).

In Taranaki, seven-year analysis shows 36% (four sites) with improving trends for total nitrogen, with no site showing deterioration. Four sites show improving trends for nitrate while no site shows deterioration.




*National trends in total phosphorus, dissolved reactive phosphorus and nitrate nitrogen concentrations across four land cover classes (www.lawa.org.nz).*

## Find out more

*Environment New Zealand 2007 (MfE) tinyurl.com/TRC3k*

*Freshwater physicochemical monitoring annual report 2006 to 2014 (TRC) tinyurl.com/TRC3m*

*Land Air Water Aotearoa (LAWA) website lawa.org.nz*

*National Policy Statement for Freshwater Management 2014 tinyurl.com/TRC3n*

*Developing water quality limits for Taranaki Regional Council (NIWA, 2013)*

CASE STUDY

# National Policy Statement for Freshwater Management

The National Policy Statement for Freshwater Management (NPSFM) 2014 is an initial step toward improving freshwater management at a national level. It sets objectives and policies for integrated water management and requires that existing water quality is maintained or improved on a regional basis.

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The National Objective Framework (NOF), that comes out of this national policy, sets 'bottom lines' that councils must meet to protect both ecosystem health and human health during secondary contact recreation (this includes activities such as wading or boating, but not swimming). All lakes and rivers must meet the national environmental 'bottom lines' set for these two values, unless an exemption applies. The NPS also requires councils to better account for water takes and sources of contaminants, and to measure how well they are meeting objectives.

When reporting the state of Taranaki's fresh water against the National Objectives Framework, it is important to acknowledge that the very best or worst conditions that could occur are not necessarily identified. Neither are the sites in small streams that are subject to greater cumulative impacts of discharges. However, in terms of ecosystem health and/or human recreation, almost all sites achieve at least a B grade on most occasions. Many meet the A grade. These results are well above the national bottom lines—D grade. Water quality at the majority of sites could be expected to comply with grade A under normal flow conditions.

| Value | Ecosystem health | | | | Human recreation |
|---|---|---|---|---|---|
| Attribute | Nitrate-N ($g/m^3$) | Ammonia-N ($g/m^3$) | | Dissolved Oxygen ($g/m^3$) | E. coli* (nos/100ml) |
| Statistic | Median | Median | Maximum | Minimum | Median |
| Maketawa Stm at Tarata Rd | A | A | B | A | B |
| Mangaoraka Stm at Corbett Rd | A | A | B | B | C |
| Waiwhakaiho River at SH3 | A | A | B | A | A |
| Stony River at Mangatētē Rd | A | A | A | A | A |
| Pūnehu Stm at Wiremu Rd | A | A | B | A | A |
| Pūnehu Stm at Sh45 | A | B | B | A | B |
| Waingongoro River at Eltham Rd | B | A | C | A | A |
| Waingongoro River at SH45 | B | B | B | A | A |
| Pātea River at Barclay Rd | A | A | B | A | A |
| Pātea River at Skinner Rd | A | B | B | A | A |
| Mangaehu River at Raupuha Rd | A | A | B | B | A |
| Manganui River at SH3 | A | A | B | A | A |
| Waitara River at Bertrand Rd | A | A | B | A | A |

*For secondary contact recreation–includes activities such as wading or boating, but not swimming.

*The Waiwhakaiho River is a popular bathing spot in the New Plymouth district.*

# Popular swimming spots

Monitoring data continues to show that water quality at popular river bathing spots is better than a decade ago. Undeniably, it is far better than in the 1960s and 1970s, when waterways were routinely contaminated with partially treated municipal sewage, industrial waste and raw dairy effluent.

## Bacteriological monitoring

The Council monitors freshwater quality at recreational spots every summer between November and April, with slight variations in locations over a three-year cycle. Bacteria levels are measured and compared against the Ministry for the Environment's guidelines for recreational contact (as shown in the table below). Results show the water quality at popular river bathing spots is significantly better than it was a decade ago.

| Category | Acceptable | Alert | Action |
|---|---|---|---|
| Fresh water (E.coli per 100 mls) | 260 | 261-550 | >550 |

*The Ministry for the Environment's 2003 Microbiological Water Quality Guidelines provide guidelines for* E. coli *levels for freshwater contact recreation. Water in the 'Acceptable' and 'Alert' category is considered suitable for swimming. A result within the 'Alert' level means additional monitoring is carried out during the bathing season.*

### What's the story?

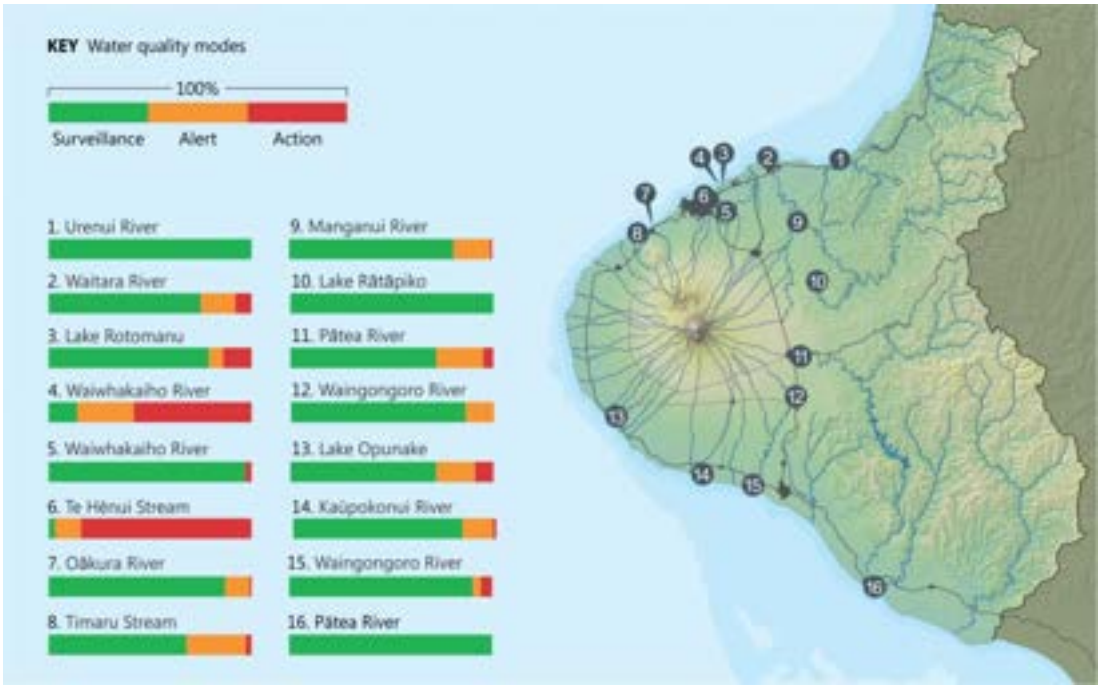
During the 2013/2014 summer, 91% of bathing water samples were within MfE guidelines, with 79% of samples within the 'Acceptable' category guideline and the remainder within the 'Alert' category. A result within the 'Alert' category means the water is suitable for swimming but additional monitoring is conducted throughout the season.

Of the 19 samples that exceeded the 'Action' category guideline, 18 were from two sites—the Waiwhakaiho River mouth (near Lake Rotomanu) and Te Hēnui Stream mouth. Wildfowl and gulls are the major source of faecal contamination at these sites and levels are much lower upstream.

Every instance of annual median counts reaching 'Alert' or 'Action' levels over the past 18 years has been at either the Waiwhakaiho (near Lake Rotomanu) or Te Hēnui sites—urban sites where faecal contamination is generally the result of birdlife. In the past six years, samples have complied with MfE guidelines between 67% and 78% of the time for each season.

*'Water quality at popular river bathing spots is significantly better than it was a decade ago.'*

In terms of trends, the Waiwhakaiho River has shown statistically significant increases in median *E.coli* counts. No sites have shown a significant decrease.




*Results of freshwater monitoring 2008 to 2014 show that the Pātea River boat ramp in the lower Pātea River (16), the Waiwhakaiho River at Merrilands Domain (5), the Urenui River estuary (1), and Lake Rātāpiko (10) have consistently had the best water quality in this period.*

## National comparison

National comparisons of water quality for recreational bathing are based on actual *E.coli* levels. National data for freshwater recreational sites was obtained from the Ministry for the Environment for the 2010/2011 summer season, which is the most recent year for which national data was available.

Across New Zealand in the summer of 2010/2011 there was a high risk of exposure to *E.coli* at 13% of freshwater beach sites; 43% of sites were found to be generally low risk but occasionally high risk; and 44% of sites were almost always low risk. In Taranaki, there was almost always a low risk of contact with *E.coli* at 33% of freshwater swimming sites (below 'Alert' mode at all times). A further 33% of sites had a low risk (below 'Action' mode at all times).

Throughout the 2010/2011 summer, Taranaki complied with MfE guidelines 85% of the time. Nationally, overall compliance was 56%.

CASE STUDY

*Council Technical Officers gather bird excrement samples.*

# **DNA** tool identifies waterway 'culprits'

Popular Taranaki freshwater recreational spots seem unlikely backdrops for CSI-type forensic investigations. But over the past five years, the Council has employed DNA marker analysis techniques to detect the cause of elevated bacteria levels when these are found in rivers and streams in the region. In most cases, these 'crime scene' culprits have proven to be waterfowl (and the prime 'accessories before the fact' are families bearing bread to feed the ducks). But in other cases, the DNA sleuthing has revealed issues requiring even more detective work.

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The scientific legwork started in the summer of 2009–2010 when the Council obtained DNA analyses of faecal bacteria from Waimōku Stream, a small Oākura waterway that consistently exceeds national guidelines for bacteria levels. The analyses confirmed beyond doubt what had already been suspected—that wildfowl were the culprits. Cattle traces were found in a small minority of samples, and there was no sign of contamination by humans. While the actual analyses were carried out by scientists at Cawthron Institute, Taranaki Regional Council officers were the frontline soldiers who collected more than just bacteria samples. To help establish a baseline with which to compare samples, Cawthron needed fresh, uncontaminated specimens of excrement from clearly identified bird species.

This was easier said than done, in most cases. Essential attributes were plenty of patience, good observation skills and the ability to move quickly once a bird had done its duty—samples needed to be collected before they started drying out and reacting with the atmosphere. Eventually, samples from around a dozen bird species were successfully collected and dispatched to Cawthron, where the DNA information they contained is now part of a database for future reference.

Meanwhile, the use of DNA analyses was broadened to samples from other sites. In the subsequent summers, attention was paid to the Waitara River (mainly cattle but occasionally humans and birds), the lower Waiwhakaiho River (primarily seagulls), the Pātea River at Pātea (cattle) and the lower Oākura River, Waingongoro River, Timaru Stream and Kaūpokonui Stream (wildfowl and cattle). In 2014, attention turned to the Huatoki Stream in New Plymouth, where human contamination has been detected and test results from samples taken at series of locations are helping to pinpoint possible sources. Alongside the New Plymouth District Council, we are continuing investigations and further testing will be carried out.

"It could be a crack in a sewage pipe somewhere, it could be something untoward happening on any one of hundreds of properties," says Taranaki Regional Council Director—Environment Quality, Gary Bedford. "It's real needle-in-the-haystack stuff, and the DNA testing is an invaluable tool in narrowing down the area of interest and likely sources."

While the technique does have its limitations—it doesn't do well at indicating scale and proportion of contamination—it does help to provide more precise answers to difficult environmental questions. And as any CSI aficionado will tell you, you need much more than guesswork to solve any cold case—or cold-water case, in this instance.

*Samples were sent to Cawthron Institute for analyses.*

# Cyanobacteria

Cyanobacteria is a naturally occurring bacteria that gets energy from photosynthesis. It appears throughout lakes and rivers of New Zealand in different forms. Benthic or attached cyanobacteria mostly occurs in river beds, attaching to surfaces in dark brown or black mats. Free-living or planktonic cyanobacteria is better known as blue-green algal bloom and mostly occurs in lakes, causing discolouration and giving water a cloudy or thick, soupy appearance. In 'bloom' conditions, some cyanobacteria species produce natural toxins known as cyanotoxins. In high enough concentrations these toxins can pose a threat to human and animal health if consumed or if contact occurs during recreation.

*Attached, or benthic cyanobacteria, adheres to the river bank in think mats (top). Free-living, or planktonic cyanobacteria, floats on the surface of the water (bottom).*

## Monitoring cyanobacteria

Taranaki's rivers and lakes are at times affected by both attached and free-living blooms of cyanobacteria. The Council monitors for cyanobacteria from 1 November through to 31 March each year.

Results are compared with New Zealand Guidelines for Cyanobacteria 'Recreational Fresh Waters' (MfE, 2009), a framework of alerts related to the public health risk of contact recreation in lakes and rivers that have cyanobacteria present. If high volumes of cyanobacteria are recorded, health authorities issue warnings, advising the public not use the affected water.

### Cyanobacteria guidelines

- For blue-green algal blooms, health warnings are issued if cell concentrations exceed 15,000 cells/ml or biovolumes exceed 1.8 $mm^3/l$.
- For attached cyanobacteria, health warnings are issued if coverage of the riverbed exceeds 50% or if mats are exposed on rocks when river levels are low. If volumes get close to MfE thresholds, monitoring is increased.

## What's the story?

The Council's cyanobacteria monitoring programme for rivers began in 2011. Between 2011 and 2014, no health warnings for benthic (attached) cyanobacteria were issued for any site. Small growths were occasionally found, but were well under the risk threshold of more than 50% coverage. In the Council's most recent three-year survey, the Taranaki region complied 100% with MfE's guidelines for benthic cyanobacteria. Most recently, in January 2015 health warnings were issued at three sites where river levels dropped significantly and algal mats were exposed.

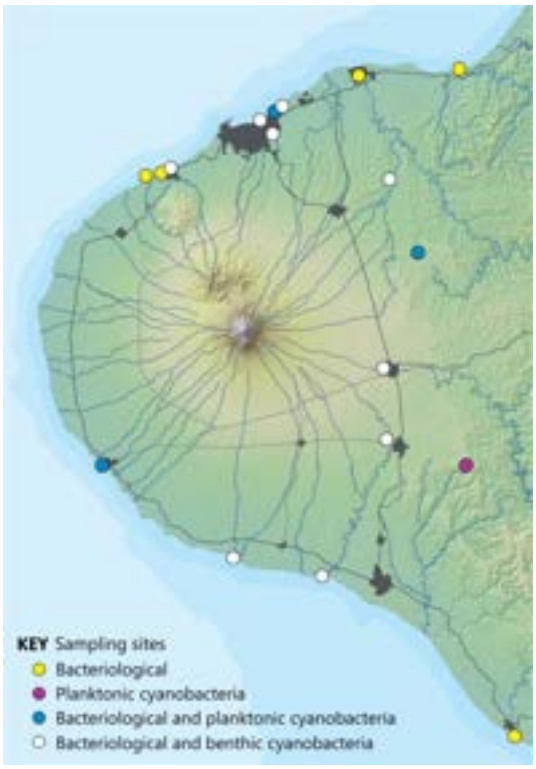
There have been no blue-green algal bloom problems in Lakes Opunake and Rātāpiko in the past five years. One health warning was issued at Lake Rotomanu, between January and April 2009. Since that time, only very low volumes of blue-green algae have been detected there.

Blue-green algal blooms have occurred frequently at Lake Rotokare over the past five years. Health warnings issued have led to closure of the lake each season for varying lengths of time. The 2011/2012 season was the only period when a health warning was not issued.

## Regional comparison

Blue-green algae levels in the lakes of Taranaki, Manawatū-Wanganui (Horizons Regional Council), and Waikato (Waikato Regional Council) tend to exceed MfE guidelines at a higher rate than benthic or attached algae levels in each region's rivers. Even so, in the Council's most recent survey of Taranaki lakes, 86% of samples met MfE guidelines for blue-green algal blooms. In the same period (2011 to 2013), all samples from Taranaki rivers met guidelines for benthic or attached cyanobacteria.

*Rivers popular for swimming, such as the Oākura River, are monitored regularly.*




*MfE guidelines are used to assess public health risks from cyanobacteria associated with contact recreation at four lake sites and nine river sites in the region.*

## Find out more

- *Aquatic ecology of Lake Rotokare, Taranaki, and options for restoration (University of Waikato, 2013) tinyurl.com/TRC3s*
- *Cyanobacteria in Recreational Fresh Waters—Interim Guidelines (MfE, 2009) tinyurl.com/TRC3r*
- *Freshwater contact recreational water quality monitoring annual reports 2005 to 2014 (TRC) tinyurl.com/TRC3q*
- *Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (MfE/MoH, 2003) tinyurl.com/TRC3u*
- *Proposed cyanobacteria incident plan for Taranaki (draft) (TDHB, 2006)*

CASE STUDY

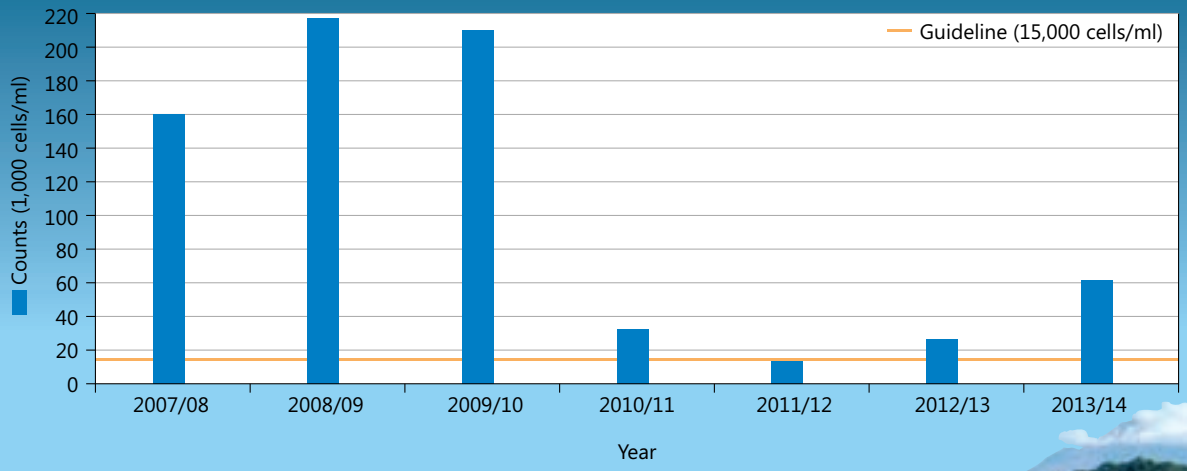
# **Lake Rotokare:** cyanobacteria

Lake Rotokare is a small hillcountry lake in South Taranaki. The catchment that surrounds the lake is an almost totally forested and pest free reserve. Monitoring for cyanobacteria at Lake Rotokare began in the 2007/2008 season. The programme was in response to this small lake's recreational use.

Cyanobacteria in the form of blue-green algae can produce toxins that pose risks to humans and animals during recreational activities. High cyanobacteria counts have been recorded at this lake every season, often in excess of the national health guideline. In recognition of Lake Rotokare's ecological status, the South Taranaki District Council restricts the boating season at the Rotokare Scenic Reserve to between 1 December and 1 May each year. However, it has been necessary to close the lake for recreational use for varying periods every season, except for the summer of 2011/2012.

Simultaneously, monitoring for faecal bacteria throughout the seven seasons has shown the water to be of very high quality. There have been virtually no median *E.coli* counts in excess of either 'Alert' or 'Action' modes.

A recent assessment of aspects of Lake Rotokare's aquatic ecology suggests that high densities of fish (such as juvenile perch) can remove the larger water fleas that would normally control algal blooms. Therefore removing the numbers of perch may be an effective way to manage regular algal blooms at the lake.




*Lake Rotorangi is the largest hydro-generation storage lake in the region.*

# Lake water quality

Many of the lakes in the region are highly valued as wildlife reserves or for recreation, including fishing, boating, water and jet-skiing and picnicking. Four of the region's main lakes—Opunake, Rātāpiko, Mangamāhoe, and Rotorangi—are artificially created hydro-generation storage lakes. Lake Rotorangi is the largest of these. Regular water flow in lakes used for hydroelectricity means they tend to be less susceptible to water quality issues. Except for Lake Rotorangi, these lakes and other small lakes in the region are monitored for bacteria and cyanobacteria in relation to MfE contact recreation guidelines. At the much larger Lake Rotorangi, limited monitoring for bacteria is conducted at two sites used for recreation—Tāngāhoe and near the Pātea dam.

## What's the story?

Limited monitoring at Lake Rotorangi suggests low bacteria numbers overall, well within acceptable contact recreation guidelines.

Under flood conditions, the water entering upper Lake Rotorangi has considerable sediment—particularly from the major eastern hill country Mangaehu catchment—making the water at this entry point turbid or very cloudy. However, as the water slowly moves down the lake, the sediment settles and the water becomes clearer.

Over 28 years of monitoring, Lake Rotorangi appears to have grown slightly more nutrient-enriched. It is currently classified as moderately nutrient-enriched. Levels of nitrate nitrogen are high enough to encourage enriched algal growth, but the relatively low level of phosphorus is a limiting factor. Although levels of dissolved reactive phosphorus and nitrate appear to be increasing, four elements we regularly monitor (chlorophyll-a, clarity, total phosphorus and total nitrogen) have not changed significantly over time. This indicates that the lake chemistry is not significantly changing. The lake is probably increasing in some nutrient levels, but at a very low rate.

With the low levels of phosphorus limiting algal growth, no blue-green algal blooms have occurred in the lake. However, the situation could change if an upward trend in some nutrients continues.

Surveys conducted in autumn 2012 show the oxygen weed *Egeria densa* continues as the dominant aquatic plant in the upper (and more turbid) end of the lake. The oxygen weed *Lagorosiphon major* dominates in the

lower (and clearer) section of the lake. Other types of aquatic plants (macrophytes) are mainly restricted to the edges of steeper banks.

The invasive pest weed hornwort was recorded for the first time in this lake in the water near the ski club area at Tāngāhoe in autumn 2012. NIWA concludes that hornwort is unlikely to have significant impact on the hydro-electric power scheme or the ecology of the lake. However, it may eventually dominate other aquatic plants, potentially spreading to other lakes where impacts could be more severe.

*Lake Rotorangi, a hydro-generation storage lake, was created by the Pātea dam.*

## Find out more

- *Lake Rotorangi: water quality and biological annual reports 2011 to 2014 (TRC) tinyurl.com/TRC3v*
- *Pātea Hydro Electric Power Scheme Reconsenting Project Aquatic Ecology Review. Water Quality Trends in Lake Rotorangi, 1990 to 2006 prepared by Lakes Consulting for Trustpower.*

# Our responses

## Regional Fresh Water Plan for Taranaki

The *Regional Fresh Water Plan for Taranaki* became operative in October 2001 and is currently under review. One of the main objectives of the *Plan* is to maintain and enhance water quality in Taranaki's lakes, rivers and streams. As part of an overall strategy to manage the environmental effects of discharges to land and water, the Council uses a combination of regulatory and non-regulatory approaches.

In June 2008, the Council prepared a report to examine the effectiveness and efficiency of the *Regional Fresh Water Plan*. Feedback from Federated Farmers, the Taranaki/Whanganui Conservation Board, the Department of Conservation, and Fish and Game NZ largely supported the report's conclusions—that overall, the *Regional Fresh Water Plan* is providing the necessary framework for sustainable management of Taranaki's freshwater resources.

Stakeholders also identified areas where improvements could be made, building on progress so far. In response, the Council prepared a range of technical papers (see list *right*).

In response to stakeholder feedback, the Council prepared the following papers:

- ✓ Future directions for the management of gravel extraction in Taranaki rivers and streams (June 2012)
- ✓ Future directions for the management of farm dairy effluent (July 2012)
- ✓ Future directions for the management of river and stream bed modification (August 2012)
- ✓ Managing diffuse source discharges to land and water in the Taranaki region (November 2012)
- ✓ Maintaining indigenous freshwater biodiversity in the Taranaki region (March 2013)
- ✓ Future directions for the management of oil and gas operations in the Taranaki region (November 2013).

## Future directions

The current review of the *Regional Fresh Water Plan for Taranaki* is expected to be completed in 2016/2017. To build on the gains we have made in freshwater quality in the past decade, and meet the demands of the future, the Council proposes a number of major changes to the current *Fresh Water Plan*.

In recognition of the interrelated nature of land and fresh water management, the Council intends to combine the new *Fresh Water Plan for Taranaki* and the *Soil Plan for Taranaki* into the *Freshwater and Land Management Plan for Taranaki*. Major changes likely to be included in the revised plan include:

- ▷ requiring, as a general rule, farm dairy, piggery and poultry effluent to be discharged to land
- ▷ requiring all riparian planting and fencing to be completed on land used for intensive pastoral farming by mid-2020
- ▷ including 'default' minimum flows (the point at which abstraction of water should cease) and allocation limits for rivers to safeguard the ecosystem health and mouri of the water body
- ▷ increased protection of wetlands to arrest incremental loss in wetland area, and to improve the overall condition of wetlands
- ▷ including set-back distances from waterways for plantation forestry to avoid or minimise the adverse effects of harvesting on freshwater quality
- ▷ allowing gravel extraction from river and lake beds to minimise river aggradation—subject to the rate of extraction not exceeding the rate of gravel recharge.

The review will also be guided by changes to the National Policy Statement for Freshwater Management 2014 which came into effect on 1 August 2014. Changes in relation to this policy statement will include introduction of freshwater management units and setting of freshwater objectives and limits.

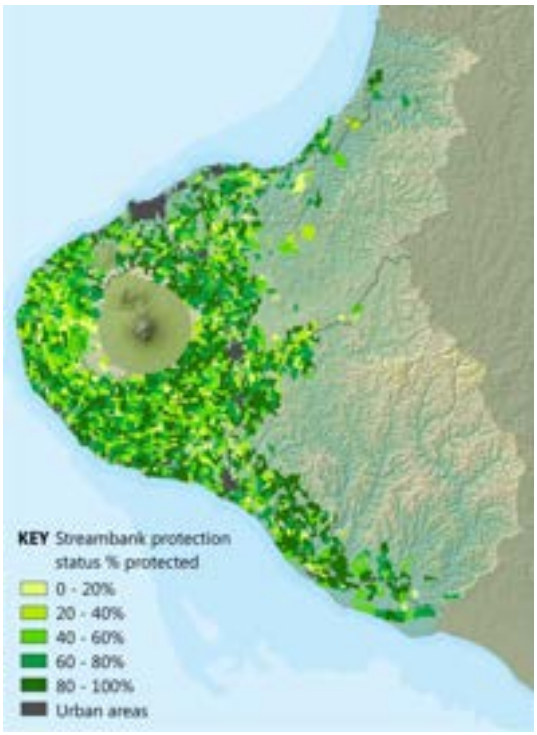
All of these changes will ensure Taranaki is at the forefront of best practice in freshwater and land management and water quality in the region will continue an upward trend of improvement well into the future.

## Riparian Management Programme

Planting and fencing riparian margins is one of the most effective methods of protecting and enhancing our region's waterways. The Council's award-winning *Riparian Management Programme* is believed to be the largest environmental enhancement planting scheme on privately-owned land in New Zealand—and possibly the most successful.

Effective fencing of stream banks keeps stock out of waterways, while properly established riparian vegetation helps to trap and filter run-off from pasture. Planting provides shading, food, and shelter for wildlife and encourages biodiversity in rivers and streams. All these aspects generally support water quality.

Since 1996, the Council has worked with landowners to develop riparian management plans for their properties. Each plan details recommendations for fencing and planting waterways on private land. The plans set targets for implementation and the Council contracts nurseries to supply native plants to farmers at cost. We also arrange planting contractors to undertake the work if required.




*Riparian plan streambank protection in the region to June 2014.*

Taranaki landowners have voluntarily invested an enormous amount of time and money in the programme. In an independent report to the Council in late 2014, economic consultants Business and Economic Research Limited (BERL) conservatively estimated that between 2008 and 2014, close to $19.5 million was invested in riparian protection—a major increase from the $3.6 million invested between 2002 and 2007. So far the programme is making remarkable progress:

- 99.5% of our 1,800 dairy farms have riparian management plans
- 2,483 riparian management plans cover 13,836 kilometres of streambank, mostly on the ring plain
- more than 3.6 million plants have been supplied to landowners
- 80% or 11,093 kilometres of streambank covered by riparian plans is fenced
- 65% or 6,874 kilometres of streambank recommended for vegetation is protected by existing or new plants.

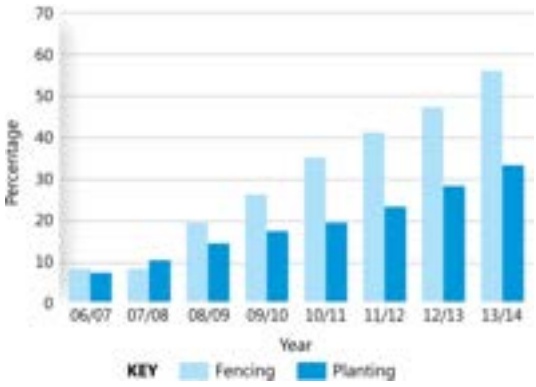
*'The largest environmental enhancement planting scheme on privately-owned land in New Zealand …*

By the end of June 2014, a total of 56.5% of all recommended fencing had taken place—compared with 47% in June 2013. A total of 32.7% of all recommended planting was implemented by June 2014, compared with 27.6% at the same time in 2013.

With the planning phase mostly complete, the Council is now focusing on the implementation of fencing and planting recommendations.

The dairy industry also has in place the *Sustainable Dairying: Water Accord* which came into effect on the 1 August 2013. Whilst the Accord adds to the momentum created by Council policies and programmes, the Council's *Riparian Management Programme* covers 25% more waterways than the Accord, and will be completed sooner.

The proposed *Freshwater and Land Management Plan for Taranaki* will likely include mandatory implementation of riparian fencing and planting recommendations included in riparian management plans. We are aiming for completed implementation by the end of this decade in order for the benefits for fresh water in the region to be maximised well into the future.




*Monitoring shows that landholders are implementing the recommendations of riparian management plans at an increasing rate, although fencing is currently occurring at a greater rate than planting.*

## Transforming Taranaki: an award-winning programme

- In 2011, the New Zealand Resource Management Law Association awarded the Regional Council's *Riparian Management Programme* an annual project award, praising the programme for its "very clear problem definition and practical and collaborative response involving all stakeholders".
- The programme has evolved considerably over time, making heavy use of new and leading-edge technology. Council investment in GIS technology in 2001 resulted in increased capacity to prepare riparian plans, and at the Geospatial World Forum held in India 2011, the Council's *Riparian Management Programme* won an Excellence Award in the Land and Resources Management category.
- In 2013, the cooperative efforts of the region's farmers, the Council, and other partners were recognised when the Council was presented with the Ministry for the Environment's prestigious Green Ribbon Award in the Caring for our Water category. This award honoured the significant impact of the *Riparian Management Programme* and recognised that the Council had "gone the extra mile by developing enduring relationships with dairy farmers to understand the best riparian practices for their land".

*Native planting established along the riparian margins of Taranaki rivers and streams helps to protect and enhance water quality in the region.*

## Find out more

*NRGE Farms Ltd tinyurl.com/TRC3z*

*Transforming Taranaki: The Riparian Land Management Programme tinyurl.com/TRC3w*

*Willcox Farms Ltd tinyurl.com/TRC3x*

## Resource consent management

Any point-source discharge to surface water requires resource consent or permitted activity status to ensure that discharges do not have unacceptable adverse effects on water quality.

Currently a total of 2,627 consents are active—48% allow discharges to land, 40% discharges to water and 12% to land and/or water. There has been a slight decrease in active consents in the last six years, from 2,655 consents in 2008 to 2,627 in 2014.

| Primary Industry | To Land | To Land and/or Water | To Water | Total |
|---|---|---|---|---|
| Agricultural services | 17 | 1 | 2 | 20 |
| Building construction/drainage/flood control | 34 | 12 | 9 | 55 |
| Chemical processing/manufacturing | - | - | 3 | 3 |
| Cleanfill | 17 | 1 | 1 | 19 |
| Composting operation | 2 | 1 | - | 3 |
| Concrete products | 1 | 2 | 4 | 7 |
| Dairy farm | 748 | 202 | 814 | 1,764 |
| Dairy processing/manufacturing | 11 | - | 11 | 22 |
| Distribution or storage | 5 | - | 3 | 8 |
| Fertiliser storage or distribution | 1 | 2 | 4 | 7 |
| Forestry | 9 | - | 5 | 14 |
| Goat farm | 3 | - | 2 | 5 |
| Hydrocarbon exploration and production | 242 | 54 | 31 | 327 |
| Hydrocarbon exploration servicing facilities | 17 | 5 | 9 | 31 |
| Landfill | 5 | 3 | 7 | 15 |
| Local authority | 11 | 3 | 49 | 63 |
| Meat and by-product processing | 15 | 1 | 14 | 30 |
| Metal processing | - | - | 5 | 5 |
| Others | 6 | 2 | 13 | 21 |
| Petrochemical processing | 11 | 3 | 15 | 29 |
| Pig farm | 5 | 1 | 2 | 8 |
| Poultry farm | 39 | - | 3 | 42 |
| Power generation–hydro | 3 | - | 10 | 13 |
| Power generation–thermal | 3 | 2 | 9 | 14 |
| Quarries | 12 | 10 | 14 | 36 |
| Recreation/tourism/cultural | 4 | 1 | 4 | 9 |
| Road/bridge construction or maintenance | 2 | 3 | 2 | 7 |
| Sewage treatment | 18 | - | 8 | 26 |
| Timber treatment or sawmill | 4 | - | 2 | 6 |
| Transport operator | 2 | - | 5 | 7 |
| Truck wash | 3 | - | 3 | 6 |
| Water supply or treatment | 1 | - | 4 | 5 |
| Total | 1,251 | 309 | 1,067 | 2,627 |

*The dairy industry holds the greatest number of consents to discharge to land and/or water in the region, followed by the hydrocarbon exploration and production industry.*

*Council Investigating Officers find consistently high levels of environmental performance.*

## Resource consent monitoring

In the case where consent has been issued with conditions, the Council monitors to ensure compliance with those conditions. Tailored compliance monitoring programmes are generally implemented for more major activities. These programmes can have a range of requirements, including chemical and biological monitoring, inspections, data auditing and annual reporting. As of June 2014, there are 278 compliance monitoring programmes in place—21% for irrigation (mainly pasture).

There have been 1,764 agricultural discharge consents issued to dairy farms—54% of those consents are discharges to land and/or water, or to water alone. The Council monitors agricultural point-source discharges annually to ensure compliance with consent conditions.

Consent compliance rates show consistently high levels of environmental performance, with over 93% showing a high or good level of performance in the 2013/2014 year.

*'Consent compliance rates show consistently high levels of environmental performance ...'*

| 08/09 | 09/10 | 10/11 | 11/12 | 12/13 | 13/14 |
|---|---|---|---|---|---|
| 95.7% | 95.6% | 95.4% | 95.1% | 94.3% | 93.4% |

KEY Consent compliance rate relating to dairy farm discharges

*Most dairy farm effluent systems consistently meet Council requirements, with compliance rates between 93% and 95% over the past six years.*

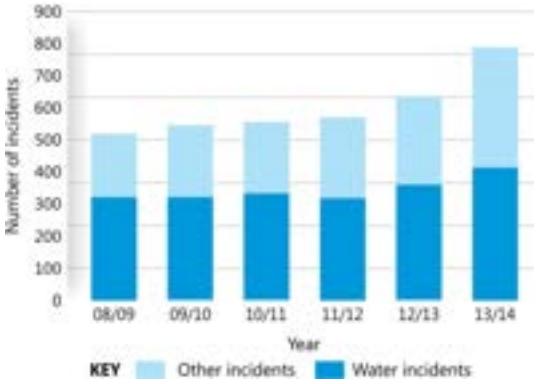
## Incidents investigated

Although Council policies, plans and consent processes work to mitigate the impact of activities on the environment, environmental incidents such as accidental spills can still occur. Consent conditions are also sometimes breached and non-authorised discharges can enter watercourses in the region. An 'incident' does not always involve adverse environmental effects. Of the 788 incidents recorded in 2013/2014, there were 378 or 48% related to fresh water.

Investigation of incidents can lead to enforcement action where appropriate. Abatement notices are issued where there is non-compliance by a consent holder, and require action to remedy the situation. An abatement notice may also be issued where the possibility of future non-compliance is foreseen, so that 32 proactive remedial steps can be taken.

The number of abatement notices related to fresh water issued has increased over the past six years—from 101 in 2008/2009 (71 relating to dairy farm discharges) to 199 in the 2013/2014 year (144 relating to dairy farm discharges). Infringement notices or instant fines relating to fresh water have also increased in the past six years, from 20 in 2008/2009 (15 relating to dairy discharges) to 60 in 2013/2014 (33 relating to dairy farm discharges).

In general, the level of compliance with consent conditions and plan requirements relating to fresh water is high.




*In the 2013/2014 year, a total of 788 incidents were recorded. Almost half of incidents were related to fresh water.*

## Prosecutions

There are occurrences where resource investigations or unauthorised activities lead to court action and prosecution. Between 2008 and 2014, the Council conducted between three and seven prosecutions in relation to fresh water per year. Between 2013 and 2015, the Council brought three cases before the courts, two of which related to dairy farm discharges.

In April 2013, the Council successfully prosecuted Francis John Mullan for illegal dairy effluent discharges for which he was fined $30,000. In January 2015, Mr Mullan was prosecuted for a separate incident on the same farm, for which he was fined $67,500—the largest fine ever imposed for unauthorised discharge of dairy effluent in Taranaki and the third successful prosecution of Mr Mullan since 2002. In May 2015, the Environment Court issued a multi-farm enforcement order, requiring Mr Mullan to significantly improve his compliance level and reduce the environmental effects of his operations across his seven farms—the first multi-farm enforcement order to be issued in New Zealand.

## Contingency plans

In some instances, the Council requires consent holders to prepare contingency plans outlining measures or procedures to avoid pollution in the event of a leak, spillage or failure of plant or equipment.

In total, there are 497 current contingency plans relating to stormwater, some of which also have air discharge components. Of the total, 312 relate to discharges to land and/or water within the oil and gas industry (exploration and production), waste management, the quarry industry, meat processing and engineering industries and transport depots.

The Council has also prepared the *Taranaki Marine Oil Spill Response Plan 2012* to ensure that the region is fully prepared for unauthorised discharge events or spills in inland and estuarine areas.

## Find out more

*Consent processing and administration annual reports 2010 to 2014 tinyurl.com/TRC3ad*

*Community investments in environmental improvement in Taranaki 2008 to 2014 (BERL, 2014) tinyurl.com/TRC3ah*

*Green Ribbon Award for Taranaki Riparian Management Programme (2013) tinyurl.com/TRC3af*

*Regional Fresh Water Plan for Taranaki tinyurl.com/TRC3aa*

*Riparian management (TRC website) tinyurl.com/TRC3ae*

*Sustainable Dairying: Water Accord tinyurl.com/TRC3ag*

*Sustainable land management and plant supply annual reports 2010 to 2014 tinyurl.com/TRC3ac*

*Transforming Taranaki – The Taranaki Riparian Management Programme tinyurl.com/TRC3ab*

*A Council Hydrology Officer gauges a stream during low-flow conditions.*

# Surface water quantity

Water is plentiful in Taranaki. With frequent rainfall and generally stable river flows during drier periods, there is no significant water use pressure on the region's rivers and streams. We use only a small proportion of water available for consumptive purposes in the region. In fact, Taranaki accounts for only 0.5% of the total national allocation of surface water. Throughout the region water is used in industry and agriculture, and for private and municipal supply. Regular monitoring enables the Council to gather valuable information about the region's surface water resources and to develop appropriate water management policies, ensuring water allocation is sustainable and fair. Our data also keeps the community informed about the availability of water during drought conditions and of flood risks in periods of heavy rain.

# Flow characteristics

There are 217 river catchments in Taranaki, 31 originating from within Egmont National Park. Monitoring stations collect data on water levels and stream flow rates in 15 significant catchments. The Council has collected data for at least 20 years in most of these sites. This data enables us to assess the low-flow behaviours of rivers and streams and assess the likely impacts of current and future abstractions. It also enables us to keep the public informed about the flows of rivers and streams in real time, via our website.

## What's the story?

Typically, river flows are high in winter and low in summer. Egmont National Park is estimated to provide up to 80% of the water for ringplain streams and in the summer, base flows in these streams tend to be higher than in hillcountry streams. This is largely because water stored as ice on the mountain and in aquifers located high in the catchment enter mountain-fed streams in warmer weather.

During periods of extreme rainfall, rivers draining the mountain are more dynamic and are prone to flash-flooding. Hillcountry streams do not generally receive the same intensity of rain as the mountain-fed ringplain streams. Therefore, hillcountry streams tend to rise and fall in a much more uniform way and are slower to reach their peak flows. In the absence of rainfall, hillcountry streams tend to recede quite quickly. They also take longer to return to base flows once rainfall occurs.

# Rainfall and water levels

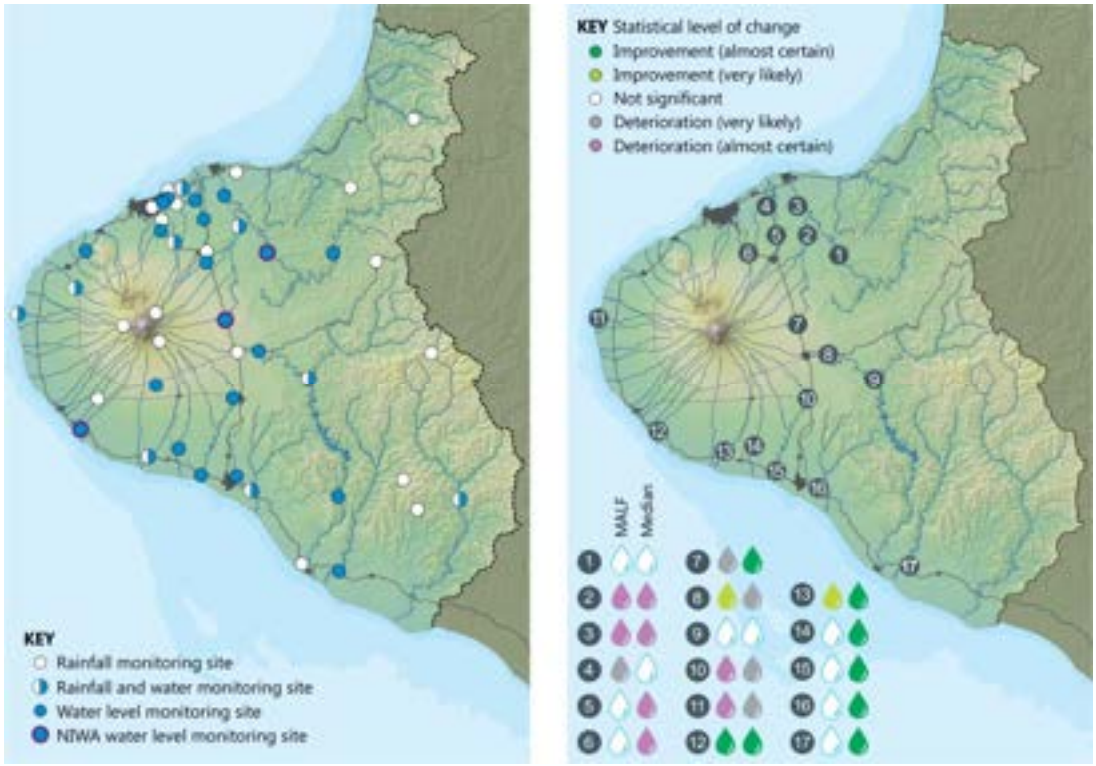
The Council monitors rainfall at 27 locations and water levels at 29 locations throughout the region. NIWA monitors water levels at a further three sites.

## What's the story?

The mean annual low flow (MALF) is the average lowest flow each year, calculated over a number of years. Analysis of data from 25 years shows nine out of 17 sites have significant trends in mean annual low flows—three sites show increases in MALF and six sites show decreases. Although flows in rivers are affected by rainfall and water abstractions, trends in water levels are most likely related to climate variations. In a few instances, changes can possibly be linked to abstractions.

*'Trends in water levels are most likely related to climate variations.'*

In the same 25-year period, the Kaūpokonui (site 13) and the Pūnehu (site 12) increased in both mean annual low flows and median flows. In this area, a number of resource consents for pasture irrigators have been surrendered in the past five to 10 years. In terms of median flow rates, seven sites show increases in median flow and seven show decreases. Two sites show increases in both MALF and median flow rates. Four sites show decreases in both measures of flow. Decreases in flows in the Kapoaiaia Stream (11) are likely to be the result of pasture irrigators taking water over the summer months. Decreases in the Manganui (2) and Waitara (3) may be related to abstractions by the Rātāpiko Trustpower hydroelectric power scheme and Methanex methanol plants. Decreases in the Waingongoro Stream at Eltham Road (10) could be related to the two water abstractions the South Taranaki District Council has further upstream from the recording site.




*The Council and NIWA monitor rainfall and water flows at a number of sites in the region. The majority are Council sites (left). Trends analysis is based on mean annual low flows and median flows from 17 sites over the past 25 years (right).*

# Surface water allocation

Taranaki receives frequent and plentiful rainfall and has generally stable river flows in drier periods. This means there are generally no significant overall pressures on Taranaki's rivers and streams in relation to water allocation. There are some catchments and sub-catchments nearing full allocation. However, water allocated for use in the region is low, at just 4% of the total surface water allocation.

*'Water allocated for use in the region is low, at just 4% of the total surface water allocation.'*

## What's the story?

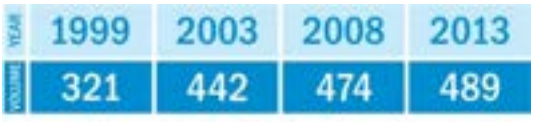
As of 30 June 2013, the total volume of surface water allocated for consumptive use in the region is 489,104 $m^3$ (cubic metres) per day, a slight (3%) increase since 2008 when the allocation for consumptive use was 474,371 $m^3$ per day.

Of the total allocation for consumptive use, 140 active resource consents allow abstraction of 434,804 $m^3$ per day. In addition, an estimated 54,300 $m^3$ per day is abstracted for activities permitted under the *Regional Fresh Water Plan* that do not require resource consent, primarily domestic and farm water supply.

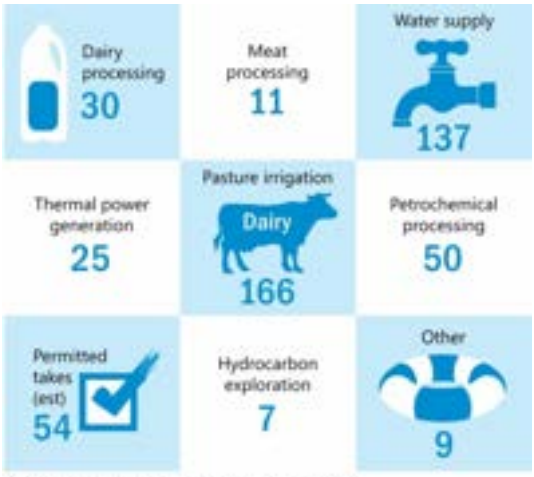
Pasture irrigation is not new to Taranaki and is generally only required during drier periods, particularly in coastal areas with sandy soils. Pasture irrigation has surpassed water supply and treatment as the greatest consumptive use of the region's surface water resources. A total of 166,254 $m^3$ per day is consented for pasture irrigation—34% of surface water allocated for consumptive use. The volume consented for irrigation has increased by 68% since 2008, a total increase of 67,232 $m^3$ per day.

The volume of surface water allocated for municipal water supply and treatment has decreased since 2008, down by 14,997 $m^3$ per day to approximately 137,000 $m^3$ per day.

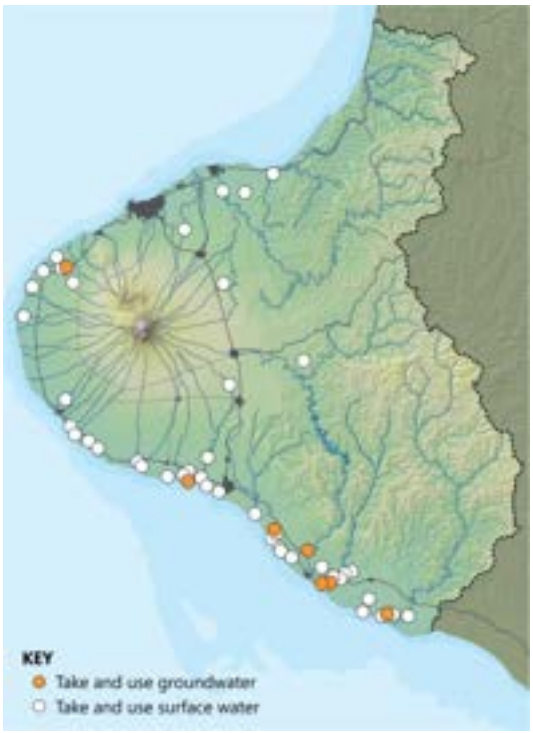
At 19%, petrochemical processing has had the largest decrease in water allocation since 2008, a decrease from 62,239 $m^3$ per day to 50,180 $m^3$ per day. These decreases are the result of changes to consents, or because consents have either lapsed or been surrendered.




*Total surface water allocation (including permitted uses).*




*Current resource consents allow abstraction of a total volume of 489,104 $m^3$ of water per day for a range of consumptive uses.*




*Location of resource consents held for pasture irrigation in the Taranaki region (ground and surface water).*

Although hydroelectric power generation in the region is allocated a far greater volume of surface water than all of the allocations for consumptive use combined, water used for hydroelectric power generation is not considered consumptive. This is because hydroelectric power schemes have a limited amount of storage and the water used is generally returned to the river, often on the same day. Therefore, water allocated for hydroelectric power generation is not generally included in water allocation assessments. When the volume of water allocated for hydroelectric power generation is included in the total surface water allocation data, water allocated for use in the region accounts for only 4% of the total allocation.

Although, water allocated for hydroelectric power generation is not considered consumptive, abstractions for hydroelectric power generation can affect flows downstream of an abstraction site, meaning the river does not experience a normal range of flow conditions. As part of consent conditions, consent holders are required to cease abstraction if either residual flow or minimum permissible flow falls below a certain level downstream of any hydroelectric scheme.

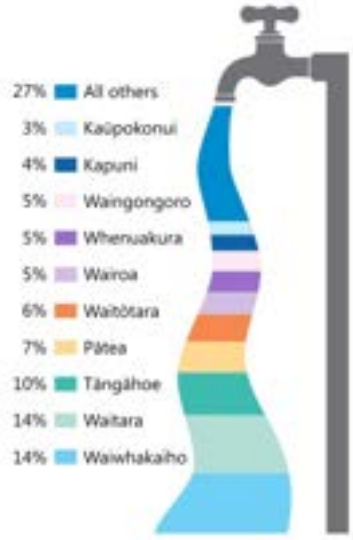
The Council carries out monitoring at sites below each of the hydroelectric schemes in the region to ensure consent conditions are being met. Monitoring also helps to assess if the consent conditions in place are adequate to safeguard ecosystem health, as intended.

# Allocation by catchment

To measure for pressure on rivers and streams as the result of water use, we compare the amount of water allocated for use with the median flow and the mean annual low flow (MALF). The MALF is the lowest flow that could be expected on a year-by-year basis.

## What's the story?

The five catchments with the largest volumes of water allocated are the Waiwhakaiho, Waitara, Tāngāhoe, Pātea and Waitōtara catchments—they account for 51% of all the surface water consented for use. Since 2008 there has been an increased demand for water from smaller catchments (mainly for pasture irrigation) and the overall percentage allocated in the five largest catchments has decreased.




*The majority of water used in Taranaki is taken from several of the larger catchments.*

Overall, a small proportion of total median flow is allocated for use in Taranaki. At 4.8%, there is almost no change since 2008 when it was 4.6%. The proportion allocated is higher when compared with mean annual low flows but even then, water allocation is still low at 14.3% of mean annual low flows.

The *Regional Fresh Water Plan* has general guidelines for maintaining quantities, levels and flows of water in the rivers and streams in the region at a certain level. For example, guidelines state that at mean annual low flow, at least two-thirds of the in-stream habitat should be retained. Many resource consents to abstract water require consent holders to restrict or stop water abstraction altogether in dry or low flow conditions. However, in some catchments there are no restrictions under dry conditions.

In 31 catchments 20% or more of MALF is allocated for use. However, the number of catchments where more than 30% of MALF is allocated has decreased from 19 in 2008 to 16 currently.

The Wairoa Stream, the Manganui River (a tributary of the Waitara River), the Tawhiti Stream (a tributary of the Tāngāhoe River), the Waiokura Stream and the Kapuni Stream have the highest proportion of both their median and mean annual low flows allocated. Because the allocated flows do not meet generic guidelines, the Council further assesses these sites to ensure there are no adverse effects.

Three streams in the region have had water abstractions for a long period of time—the Tawhiti Stream (Fonterra Whareroa's milk processing site), the Manganui River (Trustpower's Rātāpiko hydroelectric scheme) and the Kapuni Stream (STDC's Hāwera water supply). These abstractions are for uses that have benefits for the community and are assessed against specific criteria in the *Regional Fresh Water Plan*. Restrictions and other measures are in place to mitigate any adverse effects of their relatively high allocations.

The Wairoa and Inaha streams are also under some pressure for water abstraction for pasture irrigation. Consents for abstraction from these rivers have residual flow limits at which water abstraction must cease in order to safeguard ecosystem health.

Since 2008, water demand has increased in a number of catchments, largely for pasture irrigation. However, increased demand does not appear to have caused undue pressure on flows in the region's rivers and streams.


*The proportion of MALF allocated for consumptive use in Taranaki varies across catchments. Sub-catchments can have a higher proportion of MALF allocated.*

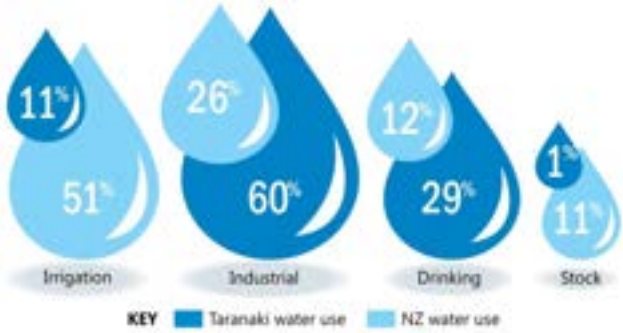
## National comparison

2010 data shows that the number of resource consents throughout New Zealand for consumptive water takes allocated a total volume of 8,763 $m^3$ of water per second and that 29% of the total allocation is from surface water. In Taranaki, 96% of total water allocated is from surface water. Comparatively, water allocation in Taranaki is low. Canterbury and Southland account for 74% of the total allocation. Taranaki accounts for just 0.5% of the national total.

*'Only a small proportion of total median flow is allocated for use in Taranaki.'*

The major pressure on surface water throughout New Zealand is from pasture irrigation, which accounts for 51% of all surface water allocated in the country. Irrigation is particularly significant in Canterbury and Southland, where prolonged dry periods occur regularly.

In Taranaki, a much greater proportion of water is allocated for drinking (including water supply and treatment), and industrial uses. A much smaller proportion than the national whole—11%—is allocated for both irrigation and stock use.




*Water use in Taranaki differs significantly from patterns of water use for New Zealand as a whole. A much smaller proportion is allocated for stock and irrigation use.*

### Find out more

- *Update of Water Allocation Data and Estimate of Actual Water Use of Consented Takes 2009/2010 (MfE) tinyurl.com/TRC3ai*
- *Summary of Consented Water Takes Annual Reports (2008 to 2013) (TRC, 2013)*

*Grant Gopperth (left) and Grant Gibbs.*

CASE STUDY

# Resource managed in **'cooperative spirit'**

High-tech digital data-loggers and telemetry have become the new standard for irrigators as central government regulations are phased in requiring water-take volumes to be measured with pinpoint accuracy and speedily reported to regional councils. But amidst the digital rush, good old-fashioned neighbourliness and cooperation are far from redundant.

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South Taranaki farming couples Grant and Marina Gopperth and Grant and Dinny Gibbs are a case in point. They share one intake to irrigate their dairy units on either side of the Waiokura Stream. And at the height of summer, they need to share the resource carefully to prevent the stream flow falling below the minimum needed to maintain the health of its aquatic ecosystem.

A mix of old and new technology means they know when the stream might be approaching the minimum flow of 125 litres per second stipulated in their Taranaki Regional Council water permits. They can rely on their own observations and experience, a permanent stream-measuring stick (known as a staff gauge) near the intake point, and read-outs on their digital dataloggers. As a backup, they will also get a text from a hydrology officer at the Council, where the water-take data is monitored in real time.

"When we know the stream will fall below the minimum if we both take water at once, we start taking turns—usually day on and day off, but sometimes a few days at a time," says Grant Gopperth, who runs the farm owned by the Walker and McLean Partnership. "To be honest, it's never been a problem. It's just a quick phone call. It might be 'Okay, you go first' or 'Well, we need to irrigate a pasture we're moving stock to, so we'll go first, or 'We're going away, so you can have it for a couple of days'. There are never any dramas." When new staff or sharemilkers arrive at either property, they cotton on quickly and the system has continued to work well.

Grant Gibbs says it was obvious from the start that there was no point competing with each other for the resource. "Dairy farmers are used to being cooperative—it's the ethos of the industry. We're not in competition with each other. What's good for one farmer is good for their neighbour." He says environmental limits are imposed for good reason and wise farmers ensure they remain compliant. "There's just no point in trying to test the limits."

The arrangement at Waiokura Stream has more than environmental benefits. With just one intake point, the two properties are able to share one power feed to the pumps, with the cost split according to how much water each has pumped. "Not having to get a second line in saved a lot of expense at the start," says Grant Gopperth. They are also pleased about the reduction in paperwork and form-filling required now that they have on-site dataloggers keeping electronic records of water abstraction and the data is automatically telemetered to the Taranaki Regional Council.

*'The shared intake at Waiokura Stream is unique in Taranaki and possibly New Zealand ...'*

The shared intake at Waiokura Stream is unique in Taranaki and possibly New Zealand, and Grant Gopperth and Grant Gibbs say it works well. Both say the secret of its success is simple: good communication.

*The benefits of irrigation during a drought are clearly seen on the South Taranaki property owned by the Walker and McLean Partnership—run by Grant Gopperth—which draws water from the Waiokura Stream.*

*The Waiwhakaiho River.*

# Our responses

## Regional Fresh Water Plan for Taranaki

The *Regional Fresh Water Plan for Taranaki* became operative in 2001 and is currently under review. Policies in the plan contain the following key elements for the taking and use of water:

- Up to 50 $m^3$ of surface water per day is permitted for reasonable and necessary farm and domestic water uses without resource consent, provided that certain environmental conditions can be met.
- No water may be taken from the entire Stony (Hangatahua) River catchment and parts of the Maketawa and Manganui rivers, except for minor takes for stock watering and domestic water uses. These provisions aim to protect high-value rivers in the region.
- Limited water may be taken above existing levels from the Kapuni, Kaūpokonui, Mangorei, Pātea, Waiongana, Waingongoro and Waiwhakaiho rivers; applications will be assessed on a case-by-case basis. This recognises the high natural and recreational values of these rivers and existing pressures on abstraction.
- To assist in proposals for the taking and use of surface water, the *Plan* incorporates guidelines to assess if a proposal will ensure at least two-thirds of the habitat of the river at its mean (average) annual low flow is retained.
- Resource consent assessment criteria vary depending on the natural, ecological and amenity values of the waterbody, the relationship of the tangata whenua with the waterbody, hydrological characteristics, and the reasonably foreseeable future need for water.
- The likely benefits of the water use are assessed, along with mitigation measures, including minimum flows or flows regimes, maintenance of fish passage and riparian planting, and the degree of community or regional benefit, as distinct from individual or private benefit.

## Future directions

The review of the *Regional Fresh Water Plan for Taranaki* is expected to be completed in 2016/2017, when it will be replaced by a combined *Freshwater and Land Management Plan for Taranaki*. The new plan is likely to include revised default minimum flows and allocation limits (the point at which abstraction of water should cease). Although existing consents will remain as they stand, new consents will likely be subject to the revised limits which are designed to further safeguard the ecosystem health and the mouri of the water body.

## National Environmental Monitoring Standards

The Ministry for the Environment's National Environmental Monitoring Standards (NEMS) were developed in consultation with electricity generation industry representatives, NIWA, and regional and unitary councils across New Zealand.

NEMS prescribe technical standards, methods and other requirements associated with the continuous monitoring of a number of environmental parameters. So far, NEMS have been developed for monitoring and reporting dissolved oxygen, open channel flow, soil water, rainfall recording, turbidity, water meter data, water temperature and water level. NEMS are to be reviewed on a two-yearly cycle.

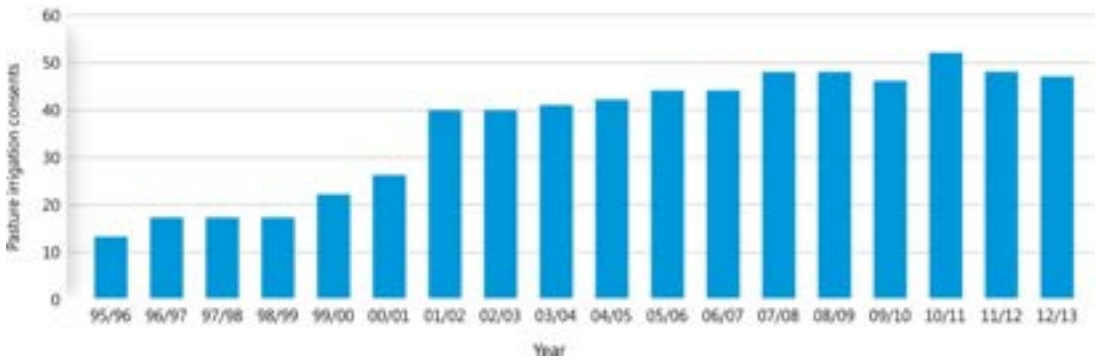
## Resource consent management

Resource consents are generally required before surface water can be abstracted for irrigation, municipal potable supply, industrial and manufacturing works and other activities. The Council assesses consents on a case-by-case basis according to the policies, guidelines and criteria in the *Regional Fresh Water Plan*. There are currently 140 current surface water take consents and 35 consents to divert and use surface water. Smaller volumes of water can be allocated under permitted activity rules, provided certain criteria are met.

Consent conditions may specify the volumes of water that can be abstracted, the rate at which it can be abstracted, the minimum flow requirements beyond which abstraction must cease and other circumstances under which water can be abstracted.

## Resource consent monitoring

Consent monitoring involves regular inspections and data collection on abstraction to ensure ongoing compliance with these consent conditions. In the 2012/2013 monitoring period, the Council had 67 tailored monitoring programmes for water takes. These were associated with municipal and rural water supply schemes, pasture irrigation, horticulture, golf clubs and hydroelectric power generation schemes.




*The total number of resource consents held for pasture irrigation has been relatively stable since 2008.*

Monitoring of these consents in 2012/2013 showed a significant need for consent holders to improve administrative performance, particularly in relation to supplying records. There were also instances where allocations were breached. However, a large portion of these did not result in significant adverse environmental effects. The Council took appropriate enforcement action in each case.

## Standard operating procedures

The Council's hydrological monitoring is a critical part of both flood and water shortage management procedures. In 2000, the Council adopted standard operating procedures for flood and water shortages. These are procedures the Council must take to avoid or reduce the risk of flooding to life and property. It also includes operating procedures that allow the Council to take steps to reduce environmental and other effects during water shortages or droughts.

In extreme situations, the Council may issue a water shortage direction under section 329 of the *Resource Management Act 1991* to restrict water use. In the past five years the Council has been close to issuing a water shortage direction on two occasions, during the 2009/2010 and 2012/2013 summers.

## Information, education and advice

The Council operates a network of 44 monitoring stations that continuously record rainfall, wind, water level, water temperature, air temperature and soil moisture and temperature. The data is available on the Council's website and is updated as regularly as every 30 minutes, which means that the public can access live information about river flows and the weather in and around the region.

*'Data available on the Council's website ... means the public can easily access live information about the state of rivers and the weather in and around the region.'*

The Council also provides consent holders and applicants for consents with information and advice on water allocation and the effects of water use. At times, we also give advice on water conservation, water harvesting and the efficient use of water to avoid or minimise adverse environmental effects. In 2005, we published guidelines to inform water users or those planning to take and/or use water about the location and volume of water available in the region.

### Find out more

*For more on hydrological monitoring go to: www.trc.govt.nz*

*Irrigation water compliance monitoring annual reports (2006 to 2013) tinyurl.com/TRC3aj*

*National Environmental Monitoring Standards (LAWA website) tinyurl.com/TRC3ak*

*Regional Fresh Water Plan for Taranaki tinyurl.com/TRC3aa*


*'Water levels in all nine aquifers have remained generally stable in the past five years.'*

# Groundwater

Although groundwater use is relatively low in Taranaki, there is demand for extraction of water from the ground for public, private domestic and stock drinking purposes. Many industries rely on the supply of good quality water for use in their respective processes, including water beneath the Earth's surface that supplies wells and springs. The level and composition of groundwater resources in the region are monitored to ensure that water in the ground is not adversely affected by human activity. Groundwater quality programmes assess the chemical composition of the groundwater and the presence of any nitrates, pesticides, or other contaminants as part of consent and consent compliance monitoring. Overall, the news for groundwater in the region is good.

## Groundwater characteristics

Groundwater aquifers vary according to their geology and depth, and tend to be named after the geological formations in which they are encountered. They are classified as shallow or deep. Taranaki has five principal groundwater systems: the Matemateāonga Formation aquifers, the Whenuakura Formation aquifers, the Marine Terrace aquifers, the Tāngāhoe Formation aquifers and the Taranaki Volcanics aquifers.

*'There is little pressure on Taranaki's groundwater resources.'*

The true size and capacity of the region's aquifers is highly complex, although the geology and characteristics of the formations in which they are encountered has been extensively studied. Aquifers are recharged or re-filled by rain percolating through the soil and into the groundwater or through streambed losses. The geological formation of aquifers in the Taranaki region mean they have relatively low yields compared with other regions in New Zealand.

## Groundwater abstraction

A high volume of rainfall across the region means that Taranaki's aquifers are regularly recharged. In addition, water from rivers and streams in the region are the generally preferred water supply for most activities because it is more accessible and cost efficient to abstract. The *Regional Fresh Water Plan for Taranaki* allows up to 50 $m^3$ per day of groundwater to be abstracted, providing certain conditions are met, at a rate not exceeding 1.5 litres per second. Resource consent is required to abstract any groundwater above these limits. The Council keeps a database of current consents, which is used to assess the demand for groundwater in the region.

We also allow abstraction of small volumes of 'produced' water, which is highly saline water recovered from deep underground during hydrocarbon production. This 'produced' water has no feasible use and is injected back underground at depths well below the base of the region's fresh groundwater aquifers. The data presented in this chapter refers only to the abstraction of fresh groundwater.

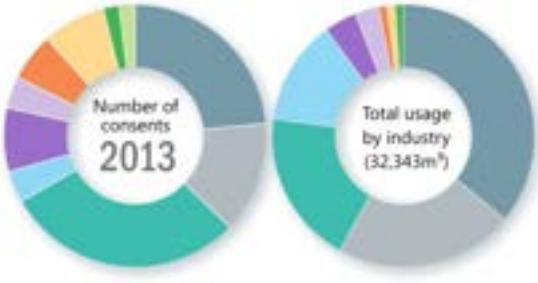
### What's the story?

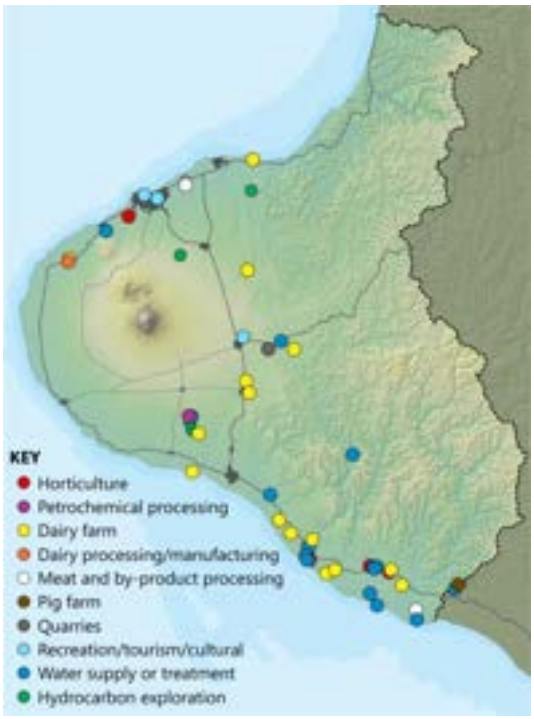
The demand for groundwater across the region has not significantly changed over the past five years and overall, there is little pressure on Taranaki's fresh groundwater resources. At June 2013, the volume of groundwater consented for allocation across the region totalled 32,343 $m^3$ per day.

Domestic and municipal water supply accounts for the highest use of groundwater across Taranaki, representing 36% of the total volume of groundwater authorised for abstraction per day.

Other high volume consent-holders include petrochemical processing (22%), dairy farming (19%) and meat and by-product processing (13%). The number of consents issued to abstract groundwater increased very slightly (4%) between 2008 and 2013—from 49 to 51. However, while the total number of resource consents increased, the total volume of groundwater authorised for abstraction has actually decreased during the same period, from 44,022 $m^3$ per day to 32,343 $m^3$ per day. This is due to some larger-scale abstraction consents expiring or being surrendered between 2008 and 2013.

Overall, there is limited pressure on groundwater resources within Taranaki.




*At June 2013, there were a total of 51 resource consents authorising abstraction of groundwater in the region.*

| Type of industry | No of consents | | Volume $m^3$ | % of total usage |
|---|---|---|---|---|
| | 2008 | 2013 | | |
| Water supply or treatment | 13 | 12 | 11,784 | 36% |
| Petrochemical processing | 4 | 7 | 7,150 | 22% |
| Dairy farm | 14 | 15 | 5,995 | 19% |
| Meat and by-product processing | 2 | 2 | 4,300 | 13% |
| Hydrocarbon exploration | 7 | 4 | 1,300 | 4% |
| Dairy processing/manufacturing | 1 | 2 | 916 | 3% |
| Recreation/tourism/cultural | 1 | 3 | 436 | 1% |
| Horticulture | 6 | 4 | 282 | 1% |
| Pig farm | 1 | 1 | 180 | 1% |
| Quarries | 0 | 1 | N/A | 0% |
| Total | 49 | 51 | 32,343 | 100% |

*Domestic and municipal water supply accounts for 49 of the 51 consents—the highest use of groundwater in the region. The total number of consents authorising the abstraction of groundwater increased only slightly between 2008 and 2013.*

## Find out more

*Regional Fresh Water Plan for Taranaki tinyurl.com/TRC3aa*

*Resource Management (Measurement and Reporting of Water Takes) Regulations (2010) tinyurl.com/TRC3am*

*Water metering information (TRC) tinyurl.com/TRC3an*

*Summary of Consented Water Takes Annual Report (2013) (TRC, 2013)*


*'Variations in water levels appear to be related to climate, rather than to water abstraction.'*

# Groundwater levels

The Council monitors groundwater levels at nine sites across the Taranaki region. While there are no specific management guidelines for groundwater levels in Taranaki, water level data gathered is used to assess if abstraction is having an adverse effect on groundwater resources.

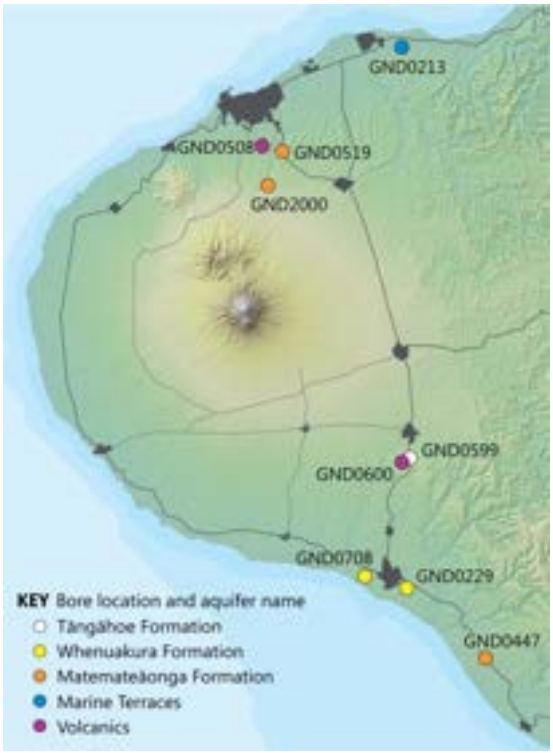
## What's the story?

Data gathered over the course of the monitoring programme indicates that water levels within the region's major aquifers remain relatively stable.

As expected, the region's shallow aquifers (such as on the volcanic ring plain) are replenished with rainfall more quickly than deeper aquifer systems. In shallow aquifers, high rainfall results in high groundwater levels within a week or two.

Over the course of monitoring, there has been very little change in average water levels across shallow Taranaki aquifers. Water levels in all nine aquifers have remained generally stable in the past five years.

Any variations in water levels appear to be related to climate, rather than to water abstraction.




*The Council monitors the water levels of underground aquifers at nine Taranaki sites.*

## Find out more

*Groundwater levels monitoring report 2005 to 2008 (TRC) tinyurl.com/TRC3ap*

# Groundwater quality

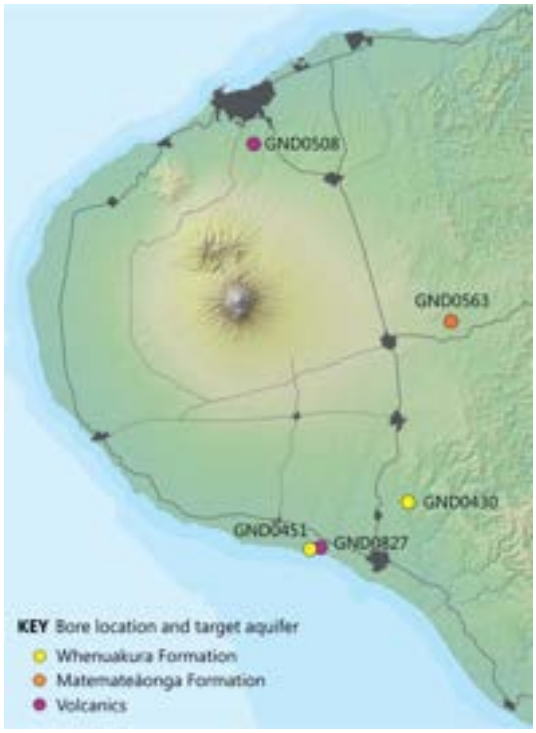
The Council recognises the importance of protecting and maintaining groundwater quality across the region in our policy, consenting and compliance monitoring functions. Although the chemical composition of groundwater is largely determined by the geology of the aquifer through which it flows, various activities on the surrounding land can also affect water quality. To assess groundwater quality, the Council examines the chemistry of the water and monitors for contaminants such as nitrates and pesticides that are associated with land use.

## Groundwater chemistry

The Council monitors the chemical quality of groundwater by participating in the *National Groundwater Monitoring Programme*, operated in conjunction with GNS Science. As part of this programme, we sample groundwater at five sites at quarterly intervals throughout the year. Where applicable, results are compared against the 'maximum acceptable' values for health, and the guideline values for 'aesthetics', as specified in the Ministry of Health Drinking-water Standards for New Zealand (2005).

### What's the story?

Overall, the results indicate there is good quality groundwater across the sites monitored. The chemical composition of groundwater across all sites remained relatively unchanged over the reporting period. However, nitrate concentrations at shallow groundwater sampling sites in the volcanic aquifers indicate that agriculture is having a minor influence on water quality.




*Groundwater chemical monitoring sites represent the region's three main aquifers—Taranaki Volcanics, Matemateāonga and Whenuakura.*

*'Results indicate there is good quality groundwater across the sites monitored.'*

Concentrations of manganese exceeded 'maximum acceptable' values for health at site GND0827 in the volcanics area on several occasions over the course of the monitoring period. Across the region, four sites—GND0563, GND0508, GND0827 and GND0451—exceeded 'aesthetics' guidelines for pH, iron and manganese. However, as is common throughout the region, these breaches are primarily the result of natural processes, where the water dissolves naturally occurring minerals from within the geological material of an aquifer itself. Evidence of this process is more pronounced in deeper groundwater systems, including the Whenuakura and Matemateāonga Formation aquifers.

## Find out more

*Drinking-water Standards for New Zealand 2005 (revised 2008) (MoH) tinyurl.com/TRC3ar*

*Groundwater chemical quality monitoring annual report 2007 to 2013 (TRC) tinyurl.com/TRC3ax*


*Headworks of a groundwater bore.*

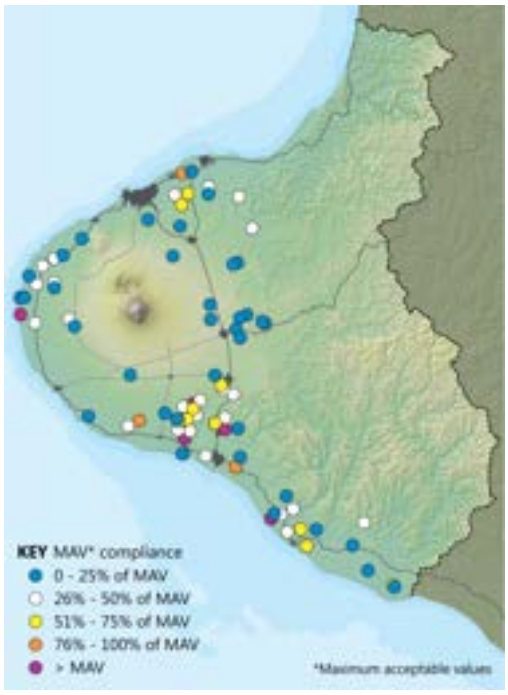
# Nitrates in groundwater

Excess nutrients as a result of land use pose a pollution threat to freshwater resources in some areas in New Zealand, including Taranaki. An excess of nitrates in groundwater has been linked primarily to agriculture, particularly the expansion and intensification of the dairy industry. The results of groundwater samples collected by the Council are compared against the maximum acceptable values (MAV) for nitrate in drinking water (11.3 milligrams per litre) set out in the Ministry of Health Drinking-water Standards for New Zealand (2005).

## What's the story?

Overall, nitrate concentrations in Taranaki groundwater showed no change between 2002 and 2012—a positive result given the increase in farm productivity over the same period. In addition, peak nitrate concentrations have shown indications of improvement—reducing over the same period.

In the 2011/2012 survey, we collected 272 samples from 74 wells. Of the 272 samples collected at various times, 96% were within the MAV for nitrates in drinking water. Nitrate concentrations across all samples ranged from 0.005 milligrams per litre to 26.1 milligrams per litre.




*Spatial distribution of maximum nitrate concentrations measured during 2011/2012 as a percentage proportion of the MAV.*

Of the 74 wells sampled, only six had one or more samples that exceeded MAV for nitrates in drinking water.

*'96% of samples were within the maximum acceptable values for nitrates in drinking water.'*

Trend analysis of the 56 sites sampled during each of the three nitrate surveys between 2002 and 2012 showed that there was no change in concentrations of nitrates measured at 41 sites:

- eight sites showed a trend of decreasing nitrate concentrations, indicating improvement
- the number of sites where the maximum acceptable values were exceeded has reduced in each survey
- the number of individual samples exceeding the maximum acceptable values has reduced in each survey
- the number of samples exceeding the maximum acceptable values, as a percentage of the number of all samples collected in each survey, has reduced across the three surveys
- the majority of sites had their highest nitrate concentrations measured in the first survey (2002/2003), with a clear pattern emerging of fewer sites having their peak nitrate concentrations recorded in more recent surveys.

| Period | 2002/2003 | 2006/2007 | 2011/2012 |
|---|---|---|---|
| Number of sites sampled | 56 | 56 | 56 |
| Number of samples | 307 | 214 | 220 |
| Annual mean nitrate (mg/L) | 4.00 | 4.20 | 3.81 |
| Annual median nitrate (mg/L) | 2.68 | 2.39 | 2.67 |
| Number of sites with a MAV exceedance | 10 (18%) | 9 (16%) | 6 (11%) |
| Number of samples exceeding MAV | 26 (8%) | 25 (12%) | 11 (5%) |
| Survey when a site's maximum nitrate nitrogen concentration as measured | 28 (50%) | 16 (29%) | 12 (21%) |

*This table shows the summary statistics of the three nitrate monitoring surveys conducted since 2002.*

## National comparisons

Trend analysis compares favourably with the results of recent groundwater surveys carried out in other areas of New Zealand, including Waikato and Canterbury. In Taranaki, instances of relatively high nitrate concentrations are very localised and related to specific sites (such as sites near waste irrigation) rather than related to regional land use.

## Find out more

*Nitrates in shallow groundwater monitoring reports 2002 to 2012 (TRC) tinyurl.com/TRC3as*

# Pesticides in groundwater

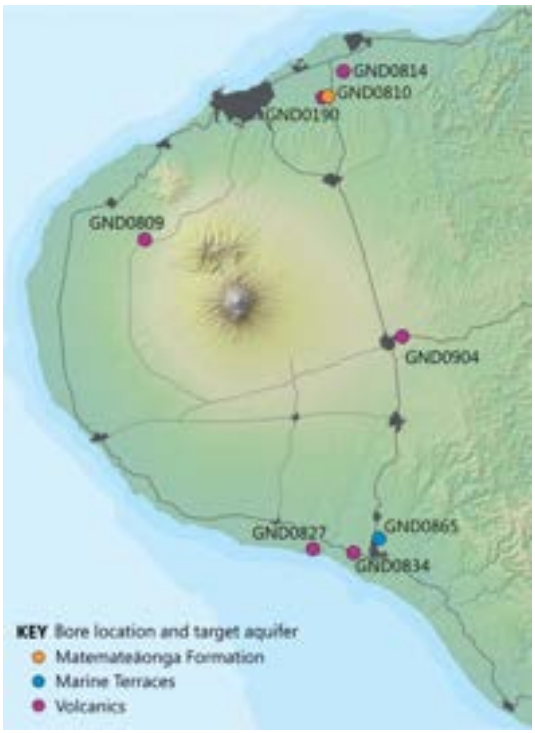
In conjunction with Environmental Science and Research (ESR), the Council carries out a survey for pesticides in groundwater every four years. The most recent survey was carried out in 2010. Samples are taken at eight sites across the region where there is potential for pesticides to be used regularly.

## What's the story?

No traces of any pesticides were detected in any of the samples obtained as part of the 2010 survey. This follows similar results in all pesticide surveys the Council has conducted since 1998.

Taranaki's groundwater has been tested for pesticides five times since 1995. Pesticides were detected in two of the five years—1995 and 1998. Since then, no pesticides have been detected.

*'No traces of any pesticides were detected in any of the samples obtained ...'*




*No pesticide traces were detected in any of the eight wells sampled during the 2010 pesticides survey.*

## National comparisons

In 2010, a total of 162 samples from all regions in New Zealand were taken. Twenty-two different pesticides were detected in the sampled wells. A total of 38 wells were found to contain at least one type of pesticide and 15 wells tested positive for the presence of two or more types of pesticides.

Along with Taranaki, no pesticides were detected in samples from six wells sampled in the Bay of Plenty, 11 wells sampled in Hawkes Bay, 17 wells sampled in Marlborough, and five wells sampled in Canterbury.

## Find out more

- *Pesticides in shallow groundwater monitoring reports 2007 and 2011 (TRC) tinyurl.com/TRC3at*
- *Report on an investigation of pesticides in shallow groundwater in Taranaki (TRC, 1995)*

# Our responses

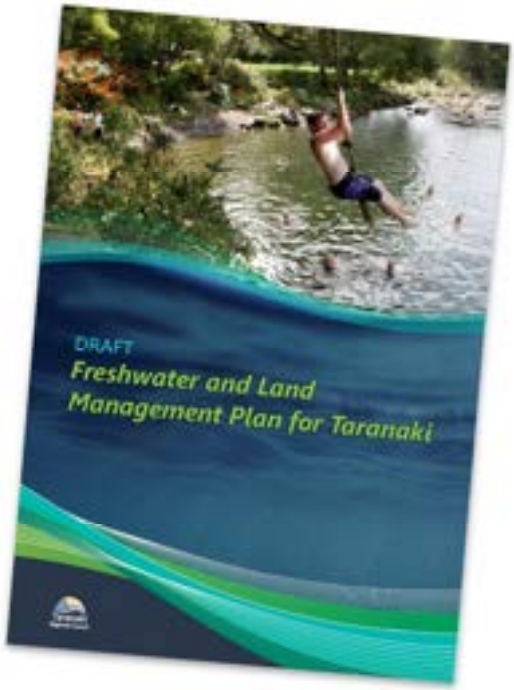
## Regional Fresh Water Plan for Taranaki

The *Regional Fresh Water Plan for Taranaki* contains policies, methods and rules to maintain and enhance groundwater quality in Taranaki. In accordance with the plan up to 50 $m^3$ of surface water per day is permitted for reasonable and necessary farm and domestic water uses without resource consent, provided that certain environmental conditions can be met.

Council officers regularly monitor for compliance with the plan and resource consents, undertaking enforcement action where necessary. Whilst the plan is currently under review, no major changes are anticipated in relation to groundwater.

Highlights of our management responses in the past five years include:

- In October 2011 Pattle Delamore Partners (PDP) carried out an audit of the Council's State of the Environment Monitoring Programmes. The audit concluded that "the programmes are generally considered to be robust and effective for state of the environment monitoring". The PDP audit report also outlined a number of areas where each programme could benefit from changes. Where practical, the changes were implemented immediately, with further changes to be made over the course of the next monitoring period.
- Pressure transducers were installed at each of the sites included in the groundwater level monitoring programme. The pressure transducers can measure water levels at 15-minute intervals, building a much more comprehensive and continuous record of water levels at each site.
- The Council invested significantly in groundwater sampling equipment to ensure that sampling methodologies remain consistent with current best practice.
- The Council also conducted extensive surveys and site-specific groundwater monitoring of shallow aquifers in the vicinity of hydrocarbon extraction and production facilities (well sites, production stations, and landfarms). The surveys found no evidence of any effects of these facilities on aquifers, and only less than minor localised groundwater effects beneath a few particular facilities. Where these minor effects were identified, remedial interventions have been successfully implemented.




### Find out more

*Regional Fresh Water Plan for Taranaki tinyurl.com/TRC3aa*

*Regional Policy Statement for Taranaki tinyurl.com/TRC3au*

*Resource Management Act 1991 tinyurl.com/TRC3av*

*Audit of Taranaki Regional Council State of the Environment Groundwater Programmes (PDP, 2011)*


# COAST

4

THIS CHAPTER COVERS:

## Coastal water quality

- Beach bathing water quality
- Rocky shore ecology
- Shellfish

*Coast tinyurl.com/TRC4vid*

*Taranaki's 300 kilometres of coastline is exposed to the west, with high-energy wave and wind conditions. Dominated by cliffs and boulder reefs, the coastline also includes river mouths, estuaries and Taranaki's famous black sand beaches.*

*The coast carries the rich cultural history of the region—battle sites, burial sites and areas that formed part of a complex defence network both before and after Europeans arrived in Taranaki.*

*The coast has enormous value, both in its natural character and as a place where people play, gather food and relax. As an essential and valued part of Taranaki's environment and quality of life, it is vital that the coastal marine environment is protected from the impact of both human and natural processes.*

*'The Council has worked with teachers and school children to raise awareness of coastal and freshwater issues ...'*

# Coast

Coastal management has progressed enormously since the 1970s. The number of coastal point source discharges has decreased significantly in Taranaki. Where once there were around 25 major dairy factory, industrial and municipal waste discharges to the coast, today there are only three. These are to coastal waters off Waitara, New Plymouth, and Hāwera. Each is carefully monitored and a high level of environmental performance is expected.

In some cases, the standard of waste treatment has also improved significantly. For example, wastewater from Waitara previously underwent only primary treatment and disinfection before being discharged. It is now piped to New Plymouth's upgraded wastewater treatment plant where it undergoes primary, secondary and tertiary treatment before being discharged to sea.

Taranaki's natural environment—an exposed coastline with strong currents and high-energy waves—in combination with very few point source discharges and advances in wastewater treatment, means the quality of marine waters in Taranaki has continued to improve over the past 35 years.

*'The quality of marine waters in Taranaki has continued to improve over the past 35 years.'*

Rivers and streams flowing to the sea can also influence coastal water quality because they can contain sediments, urban stormwater or agricultural run-off. In some places, this can have a significant impact on adjacent coastal water quality.

Over the past few years, there has been an increase in urban growth and subdivision along the coast. Correspondingly, sea walls and other structures that are designed to protect against erosion have been built, potentially changing the character of the coastline. All of these activities must be managed.

There are more than 20 agencies with policy and operational functions in relation to the region's coastal environment. As a whole, these organisations and agencies manage activities on the land, coast and sea, working to maintain the region's high-quality coastal marine environment and coastal waters.

The Council has a *Regional Coastal Plan for Taranaki*, with objectives, policies and rules governing activities from the mean high water spring mark out to 12 nautical miles offshore. The Regional Council also monitors beach water quality, the ecology of rocky reefs and estuaries, and resource consent compliance. District councils in the region manage land use on the landward side of the sea. Other agencies include the Department of Conservation (responsible for mammals and marine reserves), Maritime New Zealand (responsible for navigation safety and national marine oil spill response), the Ministry of Business, Innovation and Employment (responsible for prospecting, exploration and mining permits), and the Ministry for Primary Industries (fisheries management and biosecurity).
Each of these organisations details their key policies and operational functions in relation to Taranaki's coastal environment on their website.

In this chapter, we outline the results of the Council's monitoring programmes, including the current state and trends of coastal water quality and ecological health. Details of coastal marine biodiversity in Taranaki can be found in Chapter 6—Biodiversity.

*The New Plymouth coastline.*

# Coastal water quality

For people to enjoy many of the popular activities based around the Taranaki coast, good water quality is a must. This is especially true for water-based recreation and shellfish gathering. Good quality water is also a prerequisite for a healthy and productive marine ecosystem. Over the years, the Council and other agencies have worked to ensure the high quality of Taranaki's coastal waters is maintained or improved.

The Council's *State of the Environment Monitoring Programme* assesses coastal water quality and ecological health. We monitor microbiological water quality, the diversity of intertidal rocky reef communities and contaminants in shellfish. To assess the state of coastal water quality, results are compared against national and international guidelines.

Over the past 20 years, the Council has collected extensive databases, enabling the evaluation of the current state of the coastal environment and any changes and trends that occur over time. We use this information to assess the influence of human and natural processes on the coast, to guide management decisions, and to take effective measures to mitigate adverse impacts on the coastal environment.

## Beach bathing water quality

Every spring and summer, the Council monitors popular bathing beach sites for concentrations of faecal indicator bacteria. Our reporting focuses on enterococcus, which is considered to have the closest correlation with health risks in coastal waters.

If there is faecal contamination, it is possible that disease-causing bacteria, viruses and protozoa are present. These organisms may pose a health hazard for recreational activities such as swimming, surfing and other water-contact activities. A high concentration of faecal indicator bacteria means that it is more likely that disease-causing organisms are present. It does not mean that anyone swimming in the water at the time will actually be affected. The Council uses the Ministry for the Environment guidelines for enterococci counts to assess bathing water quality.

| | Surveillance | Alert | Action |
|---|---|---|---|
| Enterococci (cfu/ 100ml) | No single sample >140 | Single sample >140 | Two consecutive single samples >280 |

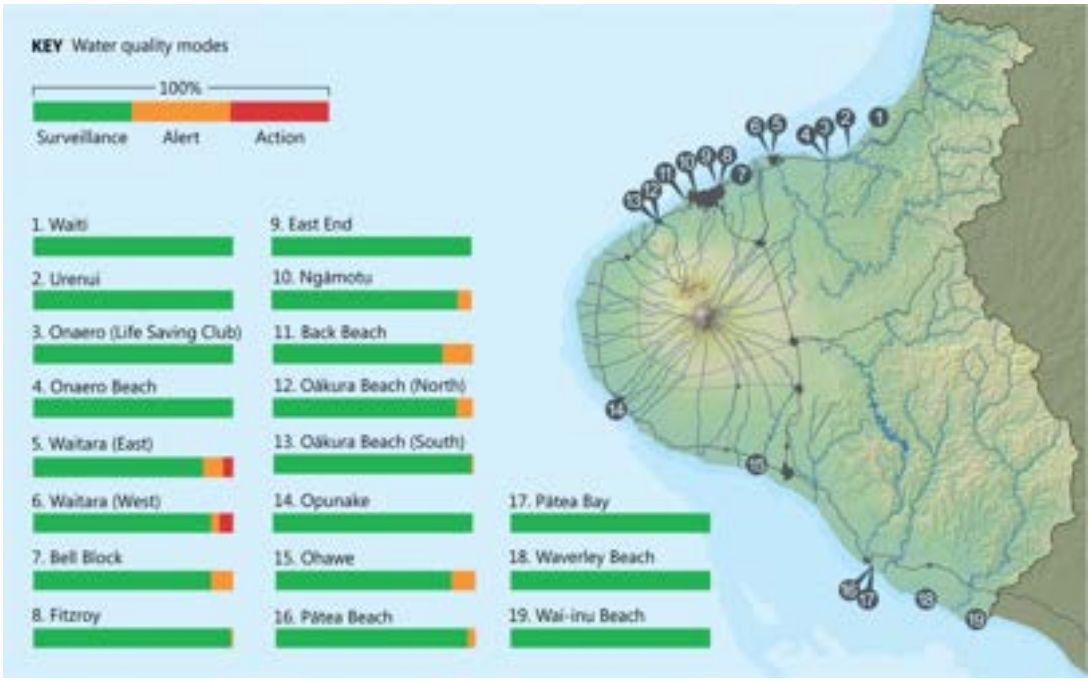
*The Ministry for the Environment's 2003 Microbiological Water Quality Guidelines provide guidelines for* enterococci *counts for marine water contact recreation.*

## What's the story?

Overall, Taranaki beach bathing water quality results are very good. A high percentage of 'Surveillance' category results combined with low median enterococci counts, indicates that the microbiological water quality of the region's bathing beaches is generally high.

Of the 962 samples collected throughout the region between spring 2008 and the end of summer 2014, 99% of samples were below the 'Action' guideline—95% of samples were suitable for swimming in that they were within the 'Surveillance' category and 4% were in the 'Alert' category. Only 1% of samples were in the 'Action' category. This indicates that under dry weather conditions the risk of becoming ill as a result of faecal contamination of sea water during water contact is very low—less than 2%.

In the event of an 'Action' category result, public health warnings are issued by the Taranaki District Health Board.




*Between 2008 and 2014, 95% of all beach bathing water samples were within the 'Surveillance' category of the Ministry for the Environment guidelines (2003).*

An analysis of the data gathered since the mid-1990s shows a statistically significant improvement, or decrease in enterococci counts, at Fitzroy and Ngāmotu beaches, with no statistically significant changes at Onaero, Waitara, Oākura, Opunake and Ohawe.

Some of the beach sites monitored, including Waitara, Ohawe and Oākura, are located close to stream or river mouths, which can be a source of contamination, particularly after heavy rainfall (see the case study on *page* 77, Chapter 3—Freshwater to find out how birds can be the primary contamination culprits).

All Council beach monitoring results can be found on the Council's website.

*Opunake Beach has consistently maintained the highest water quality since beach bathing monitoring began in the spring of 1995.*

The health risks from norovirus at coastal sites that are near wastewater treatment plant discharges are predicted using Quantitative Microbial Risk Assessments (QRMA). QMRA analysis shows the average risk of illness from norovirus for recreational water-contact is low—less than 0.5% at sites closest to the discharges during normal operation of the plants (see case study *opposite*).

## National comparisons

Different regions monitor microbiological water quality differently, making national comparisons difficult. However, the Ministry for the Environment gathers regional data and produces national reports that can give an indication of how bathing beaches in the Taranaki region compare with the rest of New Zealand.

To provide a snapshot of recreational water quality of coastal beaches across New Zealand during 2011/2012 and 2012/2013, the Ministry for the Environment used Suitability for Recreation Grades. These grades were determined using both the qualitative risk grading of an area and the quantitative enterococci results.

During the 2011/2012 period, coastal sites in Taranaki compared favourably with national results—90% of Taranaki sites were considered generally satisfactory for swimming, based on 'Very good', 'Good' and 'Fair' grades, compared with 86% nationally.

In the 2012/2013 period, 89% of Taranaki beaches were considered generally satisfactory for swimming, compared with 87% nationally.

*'Between spring 2008 and the end of summer 2014, 95% of samples were suitable for swimming.'*

### Find out more

*Bathing beach water monitoring annual reports 2003 to 2014 (TRC) tinyurl.com/TRC4a*

*Coastal water quality live monitoring data tinyurl.com/TRC4b*

*Microbiological guidelines for recreational areas (MfE, 2003) tinyurl.com/TRC4d*

CASE STUDY

# Stacking the odds *against nasty norovirus*

No story about norovirus is complete without mention of Monte Carlo casinos and the atom bomb—but not for the reasons the lay person may initially think.

Most people know about norovirus, the hardy and highly contagious bug that even in the very tiniest of doses can have explosively messy consequences for human digestive systems. It regularly hits the headlines as the 'cruise-liner virus' that literally strikes down shiploads of people, ruining their holidays.

It's also a significant potential health risk in seawater where treated wastewater is discharged. But unlike relatively easily measured bacteria, it is difficult to detect norovirus in seawater samples, and thus assess the risk it might pose. Tests are expensive at about $1000 a pop, and may not detect the virus at the very low concentrations that potentially pose a human health risk.

Enter Polish mathematician Stanislaw Ulam, whose claims to fame include work on the atom bomb. He came up with a statistical technique called the Monte Carlo method, which uses random numbers and probability to calculate 'risk profiles'. The technique's name is a nod to an uncle of Stanislaw who spent too many hours in Monaco's casinos.

The Monte Carlo method feeds into the Quantitative Microbial Risk Assessment (QMRA). Taking into account factors like the time people spend in or on the water, how much water might be swallowed or raw shellfish consumed, and how much norovirus is leaving the wastewater treatment plant, QMRA calculates an 'Individual's Illness Risk' at sites potentially influenced by wastewater discharges.

NIWA has crunched the QMRA numbers for discharges from the New Plymouth and Hāwera wastewater treatment plants, and assessed that at both sites, average risk of illness from norovirus for recreational water users are low—less than 0.5% at the highest.

Calculated risks are higher for raw shellfish consumption. At New Plymouth, the illness risk from shellfish consumption only decreases below 2% east of Bell Block and west of Fitzroy Beach. For this reason, the Taranaki District Health Board has shellfish warning signs in place at the Waiwhakaiho River mouth and Bell Block.

*'The average risk of illness from norovirus for recreational water users is low—less than 0.5% at the highest.'*

Analyses of mussels from both the north and south of Taranaki have confirmed the QMRA results, with no norovirus detected in mussels close to the Hāwera outfall but higher levels in those from the Waiwhakaiho Reef and Bell Block, particularly during the upgrade of the New Plymouth Wastewater Treatment Plant. Since completion of the upgrade, norovirus levels are decreasing.

As Stanislaw's gambling uncle would have doubtlessly agreed, if you want to beat the odds you have to know them first.


*Sign notifying of health risk from consuming raw shellfish in the proximity of the discharge from the New Plymouth Wastewater Treatment Plant.*

*'Along the Taranaki coastline there are many intertidal rocky reefs.'*

# Rocky shore ecology

Along the Taranaki coastline there are many intertidal rocky reefs. The organisms that live on these reefs form a significant component of the region's marine biodiversity and provide an important food source for humans, birds and fish. It is important to determine if any changes in communities are the result of natural processes, human activities or a combination of the two.

In Taranaki, naturally occurring sand accumulation has a profound effect on intertidal rocky reef environments. Those communities that colonise under rocks can be affected by sand scouring, reduced water movement between rocks, or temporary burial—all resulting in reduced diversity.

The Council has run a long-term rocky shore ecological monitoring programme for over 20 years. This programme measures the substrate type and reports on two simple measures of diversity: the number of species, and the Shannon-Weiner diversity index, which takes into account both the number of species present and the relative abundance of those species.

*'Sand accumulation has a profound effect on intertidal rocky reef environments.'*

Our monitoring programme takes place at six intertidal rocky reef sites twice a year (spring and summer).

*Left: Council scientists monitor the number of different rocky shore species. Right: On the underside of a boulder are examples of three species of chiton (from top to bottom: variable, green and violet), the tubeworm* Spirobranchus *(top right) and the sea slug, lemon nudibranch (middle right). Scattered across the surface are small circular tube worms,* Spirorbis.

## What's the story?

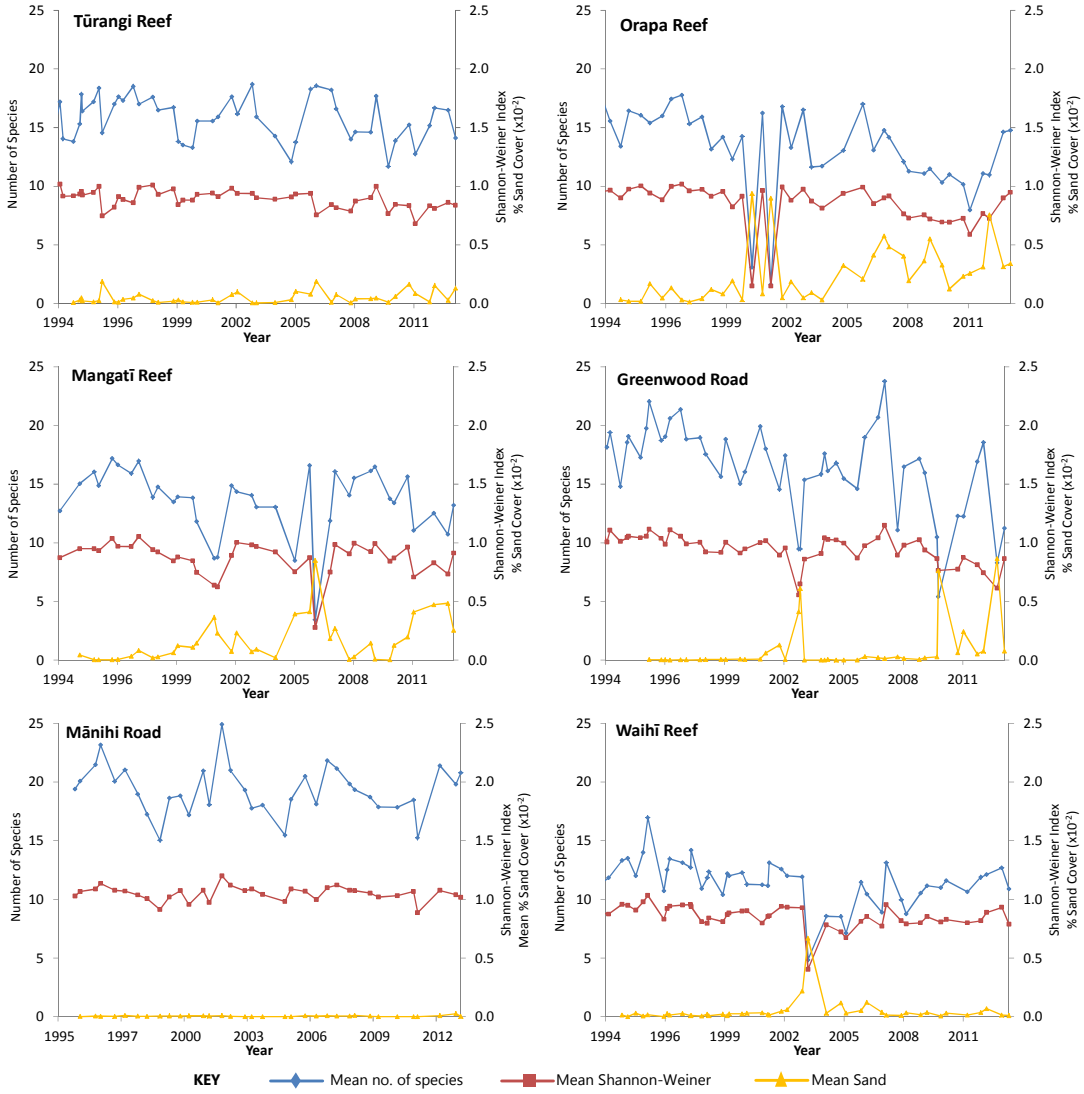
Of the six sites surveyed, communities at Mānihi Road were the most diverse. With many rock pools and very little sand accumulation, this area provides a stable environment with many ecological niches.

Intertidal communities on the Waihī Reef were the least diverse. This reef provides a less stable environment, with high-energy waves, a lack of stable habitat and a high load of suspended sediments. The reef is also periodically inundated with sand.

In Taranaki, the Orapa, Mangatī, Greenwood Road and Waihī reefs are more prone to sand accumulation than the Tūrangi and Mānihi Road reefs.

Data collected over 20 years shows a significant decrease in the number of species and/or Shannon-Weiner diversity index at Orapa, Mangatī, Greenwood Road and Waihī reefs.

Sand-adjusted trend analysis suggests that increased sand cover is responsible for decreased diversity at these sites.




*Overall results of monitoring at six rocky reef sites from 1994 to 2014. Results include the mean number of species per quadrat, the mean Shannon-Weiner diversity index per quadrat and the mean percentage sand cover per quadrat (0.25 $m^2$ quadrat used).*

Variations in communities between monitoring sites and between monitoring years can be attributed to natural changes in rocky shore habitats. In particular, sand cover is shown to have a significant impact on diversity.

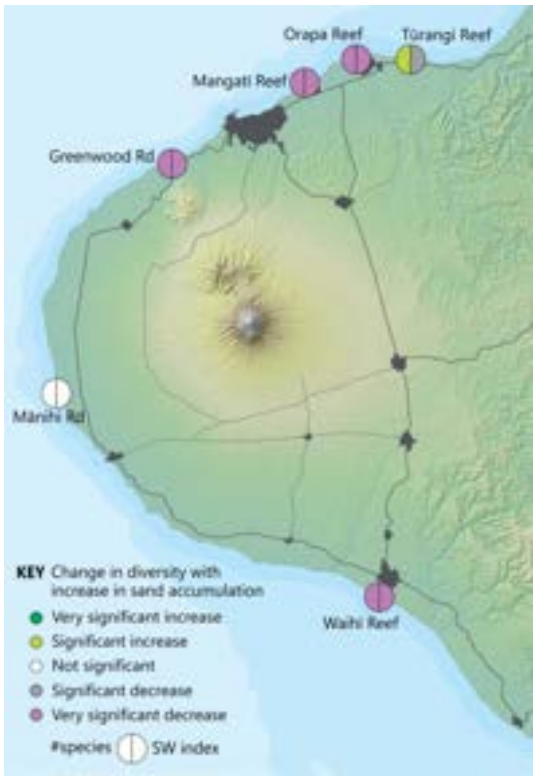
The variety of species in Taranaki's intertidal communities is described in the Coastal and Marine section of Chapter 6—Biodiversity.

## National comparison

National comparisons of rocky shore ecology are difficult because there are no national guidelines for monitoring or reporting on intertidal rocky reef ecosystems, and there is no national rocky reef monitoring database.

A comparison of the ecology of representative intertidal ecosystems around New Zealand, including specific regional examples, can be found in Morton's *Seashore ecology of New Zealand and the Pacific*.

In general, Taranaki's high-energy coastal environment, combined with sand accumulation and the effects of suspended sediments from rivers and streams, does not support the development of stable biological communities along the intertidal region of the coastline (Clark et al., 2013).




*Periodic high sand accumulation at Orapa Reef, Mangatī Reef, Greenwood Road and Waihī Reef significantly reduces diversity.*

*An example of periodic sand accumulation at Greenwood Road Reef, pictured inundated with sand in September 2013 (left), and post sand inundation in February 2014 (right). Sand cover has a significant impact on rocky shore diversity.*

## Find out more


*Clark, D, Barter, P, Clement, D, Tremblay, L, Forrest, R (2013) Whareroa Marine Outfall ecological investigation 2012. Cawthron Report No. 2348*

*Morton, J (2004) Seashore ecology of New Zealand and the Pacific.*

*Walsby, J.R. (1982) Marine ecological baseline programme NZSFC Synthetic Petrol Plant Motunui.*

*Rocky shore ecology state of the environment monitoring report (TRC, 2015)*

# Shellfish

Many of the reefs around the Taranaki coastline support an abundance of shellfish, which are collected recreationally and highly valued by tangata whenua.

Shellfish species can accumulate contaminants in their tissues, even when background concentrations are relatively low. This is particularly true for species like mussels that feed by filtering particles out of the sea water.

Consuming shellfish that contain contaminants at levels above recommended guidelines can have a direct impact on human health. Therefore, maintaining high standards of water quality around shellfish reefs is an important human health issue.

Shellfish can also be used as 'bio-monitors' to assess the presence of contaminants at particular sites. Heavy metals and other contaminants can negatively impact the health of marine organisms and degrade water quality.

The Council monitors for heavy metal, bacterial and viral contaminants in shellfish tissue. Where appropriate, results are referenced against the guidelines provided by the Australia New Zealand Food Standards Code.


*The Council monitors for heavy metal, bacterial and viral contaminants in shellfish tissue at a number of sites in the region.*

## Shellfish metal concentrations

Green-lipped mussel flesh is monitored for heavy metals at 16 sites around the coastline, typically every other year. Specifically, we monitor for metal contaminants arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.

### What's the story?

From spring 2008 to summer 2014, concentrations of all metals that have recommended standards (mercury, cadmium, lead and arsenic) were found to be well within guidelines (see table *below*).

| Metal | Shellfish guideline maximum limit (mg/kg wet weight) | Metal concentrations in green lipped mussels, Taranaki, 2008 to 2014 (mg/kg wet weight) | |
|---|---|---|---|
| | | Mean[#] | Maximum[+] |
| Mercury | 0.5* | 0.013 | 0.016 |
| Cadmium | 2* | 0.036 | 0.077 |
| Lead | 2* | 0.072 | 0.208 |
| Arsenic (total) | 86** | 1.260 | 1.700 |

* Australia New Zealand Food Standards Code, 2008

** United States Food and Drug Administration estimated guideline, 1993 (N.B. Australia New Zealand Food Standards Code guideline for inorganic arsenic = 1 mg/kg and inorganic arsenic is estimated to be 10% of total arsenic)

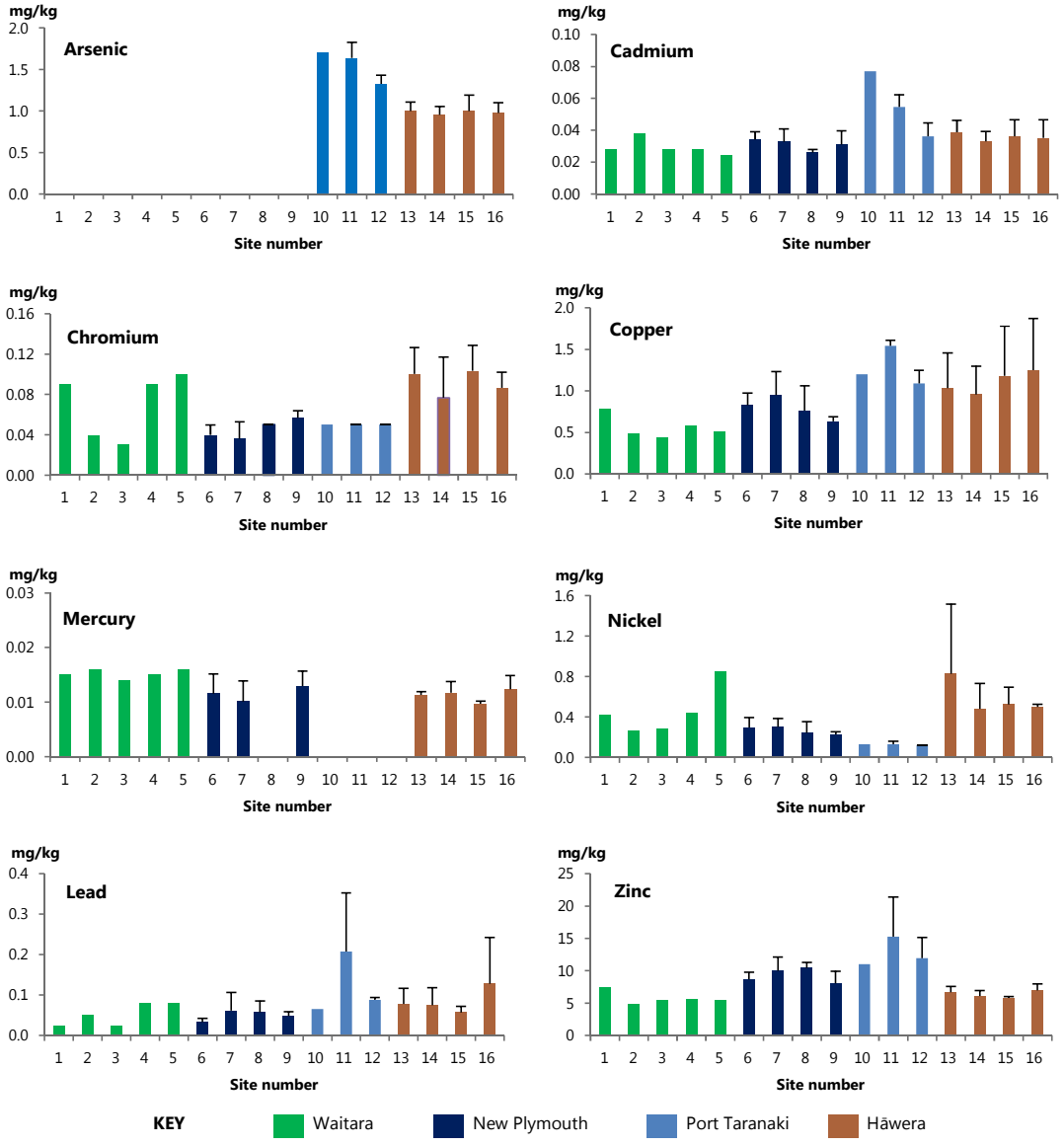
[#] Mean: Mean concentration between sites [+] Maximum: Site with highest mean concentration

For those metals without recommended standards (chromium, copper, nickel and zinc), concentrations were either comparable or lower than those reported by other regional councils (see 'National comparisons', *overleaf*).

Slightly elevated zinc concentrations in mussels from the New Plymouth area compared with other sites monitored around Taranaki may be the result of urban run-off in the area, including stormwater discharges.

Higher copper concentrations found in mussels at sites around Port Taranaki may be the result of copper leaching from antifouling paints on vessel hulls.

*'Concentrations of all metals with recommended standards were found to be well below guidelines.'*




*Mean metal concentrations (and standard deviation) in mussel flesh (wet weight) 2008 to 2014 (see the map* opposite *for site number location).*

While there is currently insufficient data to provide robust long-term trend analysis of metal contamination in shellfish flesh, more data will become available as Council programmes continue.

## National comparisons

Environment Canterbury, Greater Wellington Regional Council and Auckland Council also report on metal concentrations in shellfish flesh. Because different shellfish species concentrate metals differently, only the results available for mussels are compared. Metal concentrations in mussels from the Taranaki sites were either comparable or lower in concentration than those reported by the Auckland and Wellington councils. Results from all regions are well within the Australia New Zealand Food Standards Code guidelines for metals in shellfish flesh. With the exception of lead, results from all regions are typically less than 10% of the maximum allowable concentration.

| Metal | Metal concentrations in mussels (mg/kg wet weight) | | | | | |
|---|---|---|---|---|---|---|
| | TRC Green-lipped mussels 2008 to 2014 | | AC Green-lipped mussels 2009 to 2011 | | GWRC Blue mussels 2006 | |
| | Maximum* | Minimum+ | Maximum* | Minimum+ | Maximum* | Minimum+ |
| Arsenic (inorganic) | 1.70 | 0.95 | 1.72 | 1.06 | - | - |
| Cadmium | 0.08 | 0.02 | 0.12 | 0.06 | 0.20 | 0.10 |
| Chromium | 0.10 | 0.03 | 0.23 | 0.03 | 0.60 | 0.33 |
| Copper | 1.55 | 0.44 | 1.81 | 0.58 | 1.34 | 0.55 |
| Mercury | 0.02 | 0.01 | - | - | 0.01 | 0.01 |
| Nickel | 0.85 | 0.12 | - | - | 0.30 | 0.12 |
| Lead | 0.21 | 0.03 | 0.28 | 0.08 | 1.48 | 0.22 |
| Zinc | 15.3 | 4.90 | 15.0 | 11.0 | 61.2 | 28.0 |

*Metal concentrations in mussels from the Taranaki sites were either comparable or lower in concentration than those reported by the Auckland Council (AC) and Greater Wellington Regional Council (GWRC).*

*Maximum: Site with the highest mean concentration  +Minimum: Site with the lowest mean concentration

# Shellfish microbiology

In addition to heavy metal monitoring, the Council monitors mussel flesh for faecal coliform bacteria at four sites off the Hāwera coastline six times per year. There are no specific guideline criteria for recreationally gathered shellfish so the Council uses the 2006 New Zealand Food Safety Authority commercial shellfish limits for *E.coli* counts. Although *E.coli* is only one type of faecal indicator bacteria, available data indicates that *E. coli* accounts for most of the faecal coliforms present in the mussel flesh at the sites monitored.

## What's the story?

From spring 2008 to summer 2014, results at all sites were within the New Zealand Food Safety Authority (2006) *E.coli* guidelines. Median counts for each site did not exceed the 230 faecal coliform MPN/100g and not more than 10% of samples exceeded 700 faecal coliform MPN/100g.

*'From spring 2008 to summer 2014, results at all sites were within the New Zealand Food Safety Authority (2006)* E.coli *guidelines.'*

Occasional high counts along this stretch of the South Taranaki coast are typically associated with discharges from the Tāngāhoe River and small coastal streams, particularly after heavy rainfall. However, there has been no significant change in mussel flesh faecal coliform concentrations at these four sites over the past 17 years. More detailed analysis can be found in the *Hāwera municipal oxidation ponds monitoring reports* and the *Shellfish contaminant state of the environment monitoring report* (see 'Find out more').

The Council also monitors shellfish flesh for norovirus contamination at coastal sites in proximity to wastewater treatment plant discharges. The levels measured reflect QRMA results, which predict a greater risk of norovirus-related illness from consuming raw shellfish than from recreational bathing.

*A Council scientist collects mussels off the New Plymouth coastline.*

## Find out more

- *Contaminants in shellfish flesh. Environmental monitoring and investigations (Greater Wellington Regional Council, 2006) tinyurl.com/TRC4i*
- *Hāwera municipal oxidation ponds monitoring reports 2005 to 2014 (TRC) tinyurl.com/TRC4f*
- *Heavy metals in fish and shellfish 2012 survey (EOS ecology/ Environment Canterbury) tinyurl.com/TRC4h*
- *Marine outfall consent compliance monitoring reports (TRC) tinyurl.com/TRC4e*
- *Shellfish animal product specifications (NZFSA, 2006) tinyurl.com/TRC4j*
- *Shellfish contaminant monitoring programme: status and trend analysis 1987 to 2011 (Auckland Council 2013) tinyurl.com/TRC4m*
- *O'Connor, T.P. (1992) Mussel watch: Recent trends in coastal environmental quality. National Oceanic and Atmospheric Administration*
- *Shellfish contaminant state of the environment monitoring report (TRC, 2015)*

CASE STUDY

*Former Taranaki Regional Councillor, Aila Taylor pictured with former Council officer Maggie Bayfield at the Waiongana River in the 1990s.*

# 'Without that, our table is nothing'

The words ring out across three decades: "The cultural value of kaimoana is therefore important, not only because it satisfies the traditional palate and sustains the way of life of the individual, but because it maintains tribal mana and standing."

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They are as true today as they were in 1983, when they surfaced in a uniquely Taranaki context as part of a story which has continued to unfold 32 years on.

The statement is from *Wai 0006*, the sixth finding of what was then the new Waitangi Tribunal, on a claim by Aila Taylor of Te Atiawa prompted by alarm at the prospect of a wastewater outfall from the Think Big petrochemical plant under construction at Motunui at that time.

Setting the scene for later rulings on Māori resource rights, the Tribunal was unequivocal about the physical and cultural importance of reef-gathered kaimoana: "There can be no doubt that in the Taranaki area, the various reefs along the coastline were and still are a valuable source of seafood. They are used today for the harvesting of kuku, kina, kōtoretore, four genera of pūpū (karikawa, mitimiti, kōrama and ngāruru or mākiritai), rore, karengo, pāua, wheke (octopus), starfish, the waiwhakaiho crab, limpets, crayfish, starfish and fish generally.

"The harvesting of seafood from the reefs was and is not only for the purpose of survival. Kaimoana also has an intrinsic cultural value manifested in manaaki (token of the esteem) for manuhiri (visitors).

"That attitude is expressed in the statement before the Tribunal—'... mātaitai (seafood) is very valuable, more valuable than meat; without that our table is nothing ...' It is a matter of tribal prestige and honour, not only that guests should never leave hungry, but that guests should be suitably impressed by an abundance of traditional foods prepared for them.

"The hākari (feast) associated with the numerous Māori tangi and hui is an important part of Māori culture, and as we were to witness for ourselves, it is important that the supply should exceed the guest's needs. (The residue is not wasted, but is divided amongst the host hapū).

"In Māori terms it would not be valid to contemplate the destruction of some reefs by assessing the individual needs of the local people and the resource necessary to meet that need. It is necessary to assess the tribal need."

*Wai 0006* lent considerable weight to arguments against a marine outfall at Motunui and eventually the decision was made to instead pipe the new petrochemical plant's wastewater to Waitara for treatment and discharge through the marine outfall.

The rest isn't quite history yet, however. The Waitara option was labelled a 'temporary' solution and remained so until the completion in 2014 of a New Plymouth District Council project to divert wastewater from Waitara to an upgraded New Plymouth Wastewater Treatment Plant. The Waitara outfall is still used to discharge highly treated production water and stormwater (on a contingency basis) from the Motunui petrochemical plant.

Whatever ensues in the future, however, it is clear that *Wai 0006* was a landmark ruling for Taranaki and New Zealand, for its ringing declaration on the cultural value of kaimoana, and for much more besides.

E ngā rau rangatira, tēnei te mihi nui ki a rātou.

*To those kaumātua and kuia who first took this kōrero to the Tribunal, we acknowledge your aroha and kaha.*

*The region's marine environment is pristine.*

# Our responses

## Regional Coastal Plan for Taranaki

The *Regional Coastal Plan for Taranaki* contains policies, methods and rules to sustainably manage the natural and physical resources of Taranaki's coastal marine area. Highlights of the management of Taranaki's coastal resources over the past five years include:

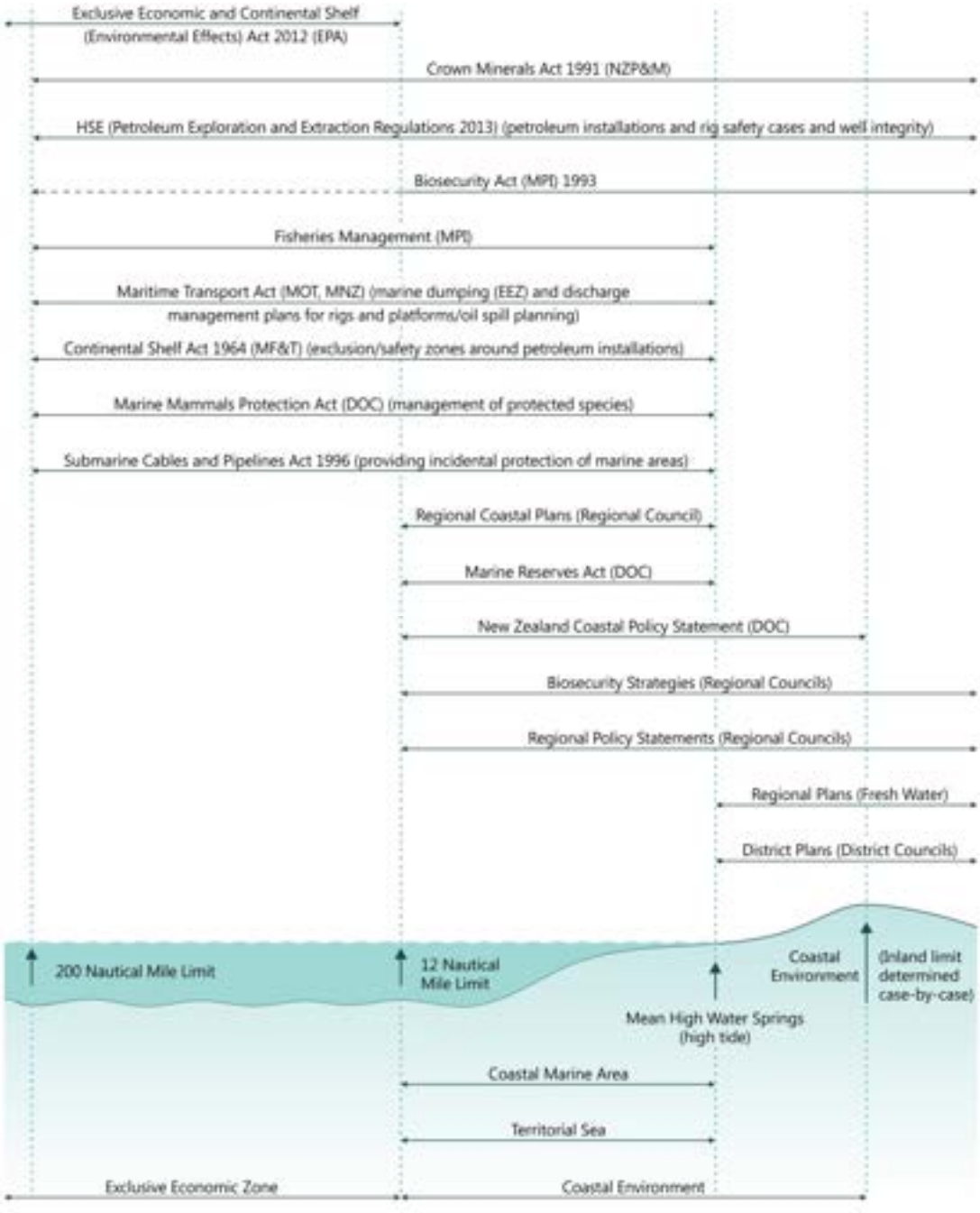
- A 2012 aerial survey of the region's coastline that captured digital imagery to assist the Council and other agencies, including iwi and the district councils, with identifying and managing significant coastal landscapes and features.
- An end to treated sewage discharges to coastal waters from the Waitara outfall, with the Methanex Waitara Valley plant installing an onsite sewage treatment and disposal facility, and the New Plymouth District Council diverting Waitara wastewater to the upgraded New Plymouth Wastewater Treatment Plant in 2014.
- Improved collaboration with iwi in managing coastal resources including increased involvement in resource consent compliance monitoring programmes and enforcement proceedings.
- Substantial involvement in the Trans-Tasman Resources Limited marine consent application to undertake sand mining off Pātea. The submission and evidence Council presented was largely based on regional planning documents, including the *Regional Policy Statement for Taranaki* and *Regional Coastal Plan for Taranaki,* reflecting local community values and aspirations for managing Taranaki's coast.
- The introduction of new virus analysis technology to assess potential public health risks for major wastewater discharges.

## Future directions

The *Regional Coastal Plan for Taranaki* is currently under review. However, the Council does not anticipate any significant changes to the current regulations and protocols in relation to coastal management.

## Working together

A number of other agencies operate under legislation to protect the coastal marine area in Taranaki. For example, district councils manage land use on the landward side of the sea, the Department of Conservation manages marine reserves and marine mammals, and the Ministry for Primary Industries is responsible for biosecurity, fish stocks and fishing.




*The multiple agencies involved in caring for the coastal marine area of Taranaki.*

## Resource consent management

As at 30 June 2014, the total number of active consents relating to the coast in Taranaki has decreased, from 280 in 2012/2013 to 238.


## Resource consent monitoring

The Council undertakes resource consent monitoring to ensure consent holders meet the terms of consents granted. Sixteen monitoring programmes with a coastal water quality component were carried out in 2013/2014. These programmes include monitoring consents granted for municipal sewage, oil and gas exploration, dairy processing and general industry. Shellfish monitoring is part of our consent compliance monitoring programmes.

*An intertidal survey being conducted in South Taranaki.*

## Incidents investigated

In the 2013/2014 year, the Council recorded 33 incidents relating to the coast, accounting for 4% of the total incidents reported in that year. No incident resulted in the issue of an abatement notice. In the same period, there were four infringement notices (fines) issued.

## Prosecutions

In some cases, when there is a serious risk or potential risk to environmental quality, prosecution action is warranted. In 2015, fines of $45,000 were issued on each of two charges against ship operator Fairmont Shipping (Canada) Ltd and $33,750 on each of two charges against ship owner Tri-View Shipping Private Ltd (total fines $157,500). The fines related to the grounding of the ship MV *Lake Triview*, 400 metres from the mouth of the Waiwhakaiho River in May 2014. Both companies pleaded guilty.

This case set an important precedent, as it was the first prosecution under Section 12 of the *Resource Management Act 1991* which related to an incident's likely effects on the environment. In this case the ship's hull was breached in 24 places and a potential oil/cargo spill, with serious consequences for the Taranaki environment and community, was only narrowly avoided. The reef itself was affected at the point of impact.

## Information, education and advice

Over the past 15 years, the Council has actively worked with teachers and school children to raise awareness of coastal and freshwater issues and encourage the sustainable use of the region's resources. As part of these long-running foundation programmes, we deliver a rocky shore school education programme including field trips to selected coastal areas around Taranaki.

In 2013/2014, the Council Education Officer undertook 23 class, syndicate or school lessons about rocky shore communities, involving 1,062 pupils. Following on from these lessons, the Education Officer led 12 field trips to the rocky shore, mostly at the Kāwaroa rock pools in New Plymouth. He also conducted two professional development sessions for teachers during 2013/2014. These rock pool sessions are designed to assist schools in developing their own rocky shore education programmes.

*The Council's Education Officer conducts professional development sessions for teachers of local schools.*

### Find out more

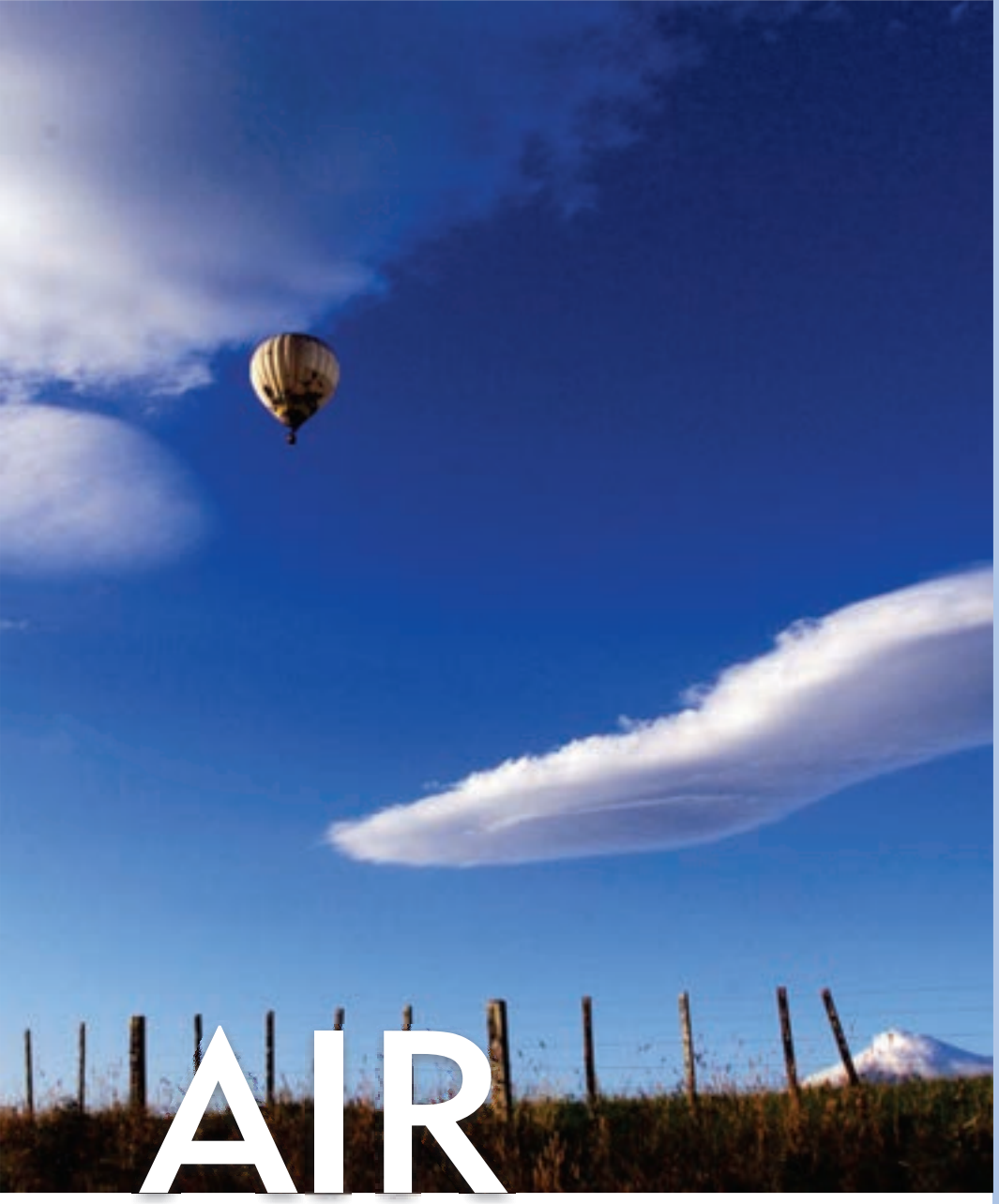
*Coastal study unit for schools (TRC) tinyurl.com/TRC4p*

*Hāwera municipal oxidation ponds monitoring reports 2005 to 2014 (TRC) tinyurl.com/TRC4f*

*New Plymouth Wastewater Treatment Plant monitoring reports 2006 to 2012 (TRC) tinyurl.com/TRC4s*

*Regional Coastal Plan for Taranaki tinyurl.com/TRC4n*

*Rocky shore study unit for schools (TRC) tinyurl.com/TRC4q*



# AIR

5

THIS CHAPTER COVERS:

## Air quality

- Air quality monitoring
- Particulate matter
- Nitrogen oxides
- Volatile organic compounds
- Carbon monoxide

*Air tinyurl.com/TRC5vid*

*Clean, unpolluted air is essential to the well-being of Taranaki's communities and to the environment as a whole.*

*Taranaki can be proud of its excellent air quality that contributes to the attraction of the region as a safe place to live with an enviable lifestyle and all the great outdoors has to offer.*

*'The overall quality of air in the Taranaki region is excellent.'*

# Air

The combination of a windy and exposed environment, a dispersed and small population, relatively light industry and a low number of vehicles means the overall quality of air in the Taranaki region is excellent. With air discharges from industry and agriculture well regulated and no widespread change in the nature of regional emissions, there are no significant pressures upon the quality of air in the region.

Taranaki is one of only two regions in New Zealand that have never exceeded national air quality standards. Therefore, we have never been required to create a 'gazetted airshed' in response to air quality issues. Because the Council has continued to demonstrate that the region does not generally experience issues with air quality, Ministry for the Environment monitoring is not compulsory in Taranaki, as it is in other parts of New Zealand with air quality issues.

Most emissions to air in Taranaki are diffuse emissions from natural sources—from vegetation, landcover, farm animals and sea-spray drift. They also come from industry, homes and motor vehicles. Point source discharges (from a single large source) are more obvious than diffuse emissions and generally come from industry and farms with housed livestock (such as piggeries and poultry sheds).

*'Taranaki is one of only two regions in New Zealand that have never exceeded national air quality standards ...'*

The potential effects of air emissions range from amenity effects (such as haze, smoke, or offensive odours) to potential or actual negative impacts on human and ecosystem health. Increased levels of poultry farming and hydrocarbon exploration and production have resulted in increased resource consents for air discharges in the region. However, effective regulations and monitoring mean there has been a negligible impact on local air quality.

The Council monitors air quality as part of resource consent compliance programmes to ensure resource consent conditions are met in industry and agriculture and also in residential areas (for things such as backyard fires). Council officers also undertake regular testing of air quality in areas determined to be 'worst-case scenario' checkpoints, such as urban areas of high traffic flow. In this way, we can be sure that activities have no adverse effects and the high quality of air in the region is maintained.

*Taranaki's excellent air quality is highly valued.*

# Air quality

The overall quality of air in the Taranaki region is excellent. Nonetheless, the Council keeps a close eye on air quality as part of State of the Environment monitoring, and as part of resource consent compliance.

Air quality data has been gathered and maintained for more than 20 years at up to 20 representative sites, including urban, industrial, rural, coastal and pristine areas. In general, we use screening methods to monitor air quality at locations that have the most potential for adverse impacts as a result of surrounding land use. This methodology is very useful for giving an indication of the state of the region's air quality and for determining whether there is any justification for further investigation using much more expensive techniques stipulated in the National Environmental Standards. Consistently good results from our air quality monitoring programme confirm that the screening approach is justified and cost effective.

## Air quality monitoring

The Council looks at key indicators of ambient air quality, including inhalable particulates; chemicals such as nitrogen oxides, benzene, carbon monoxide, sulphur oxides and formaldehyde; and suspended particulates and deposition. We also monitor visibility.


*MfE uses an environmental performance indicator to categorise air quality across the country. These categories describe air quality and have recommended actions where necessary.*

Results of our programmes are compared with Ministry for the Environment (MfE) national ambient air quality guidelines and National Environmental Standards (NES) as appropriate. MfE uses indicators of environmental performance to categorise air quality across the country (see figure *above*). These categories are used to describe the air quality within airsheds (defined bodies of air) or regions. Each category has a recommended management action relevant to the degree of air pollution identified.

# Particulate matter

One aspect of air quality the Council measures is the $PM_{10}$ concentrations (airborne particulate matter of less than 10 micrometres in diameter per cubic metre of air). $PM_{10}$ comes from sources such as burning coal, oil, wood, petrol and diesel in domestic fires, transportation and industrial processes and from natural sources, including sea salt, dust, pollens and volcanic activity. $PM_{10}$ is associated with health issues ranging from respiratory irritations to cancer.

The Council also measures $PM_{2.5}$ concentrations around the region. These finer particles, commonly derived from incomplete combustion, pose a greater public health risk than $PM_{10}$. Currently, there is no NES for $PM_{2.5}$. However, all $PM_{2.5}$ monitoring results are well within World Health Organisation guidelines.

The NES for $PM_{10}$ is 50 micrograms per cubic metre ($\mu g/m^3$) over a 24-hour average period. The NES allows one sample per site to exceed this limit per year.

In 2009, $PM_{10}$ monitoring at a range of representative sites showed that on a regional basis, Taranaki has no significant air quality issues in relation to $PM_{10}$. Since 2009, two further surveys have been conducted.

The first survey took place in the five months between January–May 2010. To ensure a 'worst-case' scenario for air quality (high traffic movements and marine influence), Council officers surveyed between two main roads in the New Plymouth CBD that are close to the foreshore. The second survey, conducted in February–March 2012, was taken at Port Taranaki, a site also subject to heavy vehicles and marine influence.

## What's the story?

In the Port Taranaki survey, 97% of $PM_{10}$ daily average results were within the MfE's 'Excellent' or 'Good' categories. Only one result was within the 'Acceptable' category.

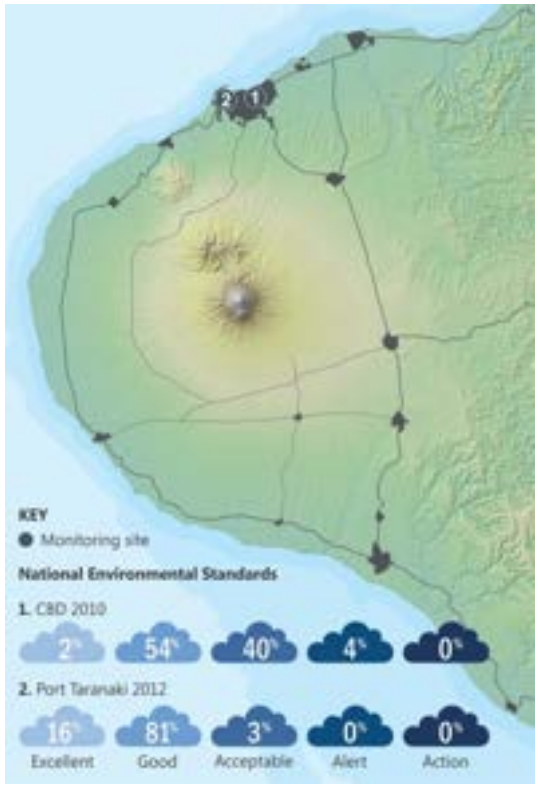
In the New Plymouth CBD survey, 56% of the daily average results were within the MfE's 'Excellent' or 'Good' categories, with 40% of results meeting the 'Acceptable' category. The highest daily mean for the entire New Plymouth CBD survey was 46.5 $\mu g/m^3$, with an overall mean of 16.2 $\mu g/m^3$.

No survey results entered the 'Action' category, meaning no result exceeded the NES of 50 $\mu g/m^3$.

Traffic flows were found to have no discernible effect. However, onshore winds were found to be a major influence upon air quality, with airborne salt causing $PM_{10}$ concentrations to double.

A limit of 50 micrograms per cubic metre ($\mu g/m^3$) is the equivalent of two teaspoons of dust floating in the air within Yarrow Stadium.

*A $PM_{10}$ monitoring site on Bayly Road towards Port Taranaki.*




*All results from surveys of the New Plymouth CBD (1) and of Port Taranaki (2) were within NES guideline limits.*

## National comparison

If NES air quality criteria are exceeded in any region in New Zealand, the regional council is required to create a 'gazetted airshed'. This means the area must be legally defined as an airshed (similar to a water catchment), and identified by government notice. The regional council must then conduct further monitoring and reporting on the airshed, taking measures to ensure air quality meets NES guideline values. Taranaki is one of only two regions in New Zealand that have not exceeded NES guidelines and where no 'gazetted air shed' has ever been necessary (the other being the Gisborne region).

In 2012, the Ministry for the Environment reported that 50% of the gazetted airsheds around New Zealand breached the NES 24-hour standard for $PM_{10}$ on at least two days per year, with 10% of gazetted airsheds exceeding the standard for 21–50 days.

In much of New Zealand, the highest $PM_{10}$ results occur over winter, with residential heating using wood and coal adding to traffic-related emissions. This is not the case in Taranaki because there is a comparatively low use of solid fuels in the region. The exposed environment also means there are few periods of calm weather in winter.

### Find out more

*Ambient air quality survey at Bell Block bypass (TRC, 2014) tinyurl.com/TRC5b*

*Inhalable particulates monitoring at Port Taranaki (TRC, 2012) tinyurl.com/TRC5c*

*Inhalable particulates ($PM_{10}$) regional monitoring report (TRC, 2010) tinyurl.com/TRC5d*

*Is there something in the air? (TRC) tinyurl.com/TRC5a*

# Nitrogen oxides

Nitrogen oxides ($NO_x$) are a group of gases that typically comprise mainly nitric oxide (NO) and nitrogen dioxide ($NO_2$), and a small proportion of nitrous oxide ($N_2O$).

Nitrogen oxides are produced from soil, vegetation and other natural sources. They also come from motor vehicles and other fuel combustion processes. Indoor domestic appliances such as gas stoves, or unflued gas heaters can be significant sources of nitric oxide and nitrogen dioxide. These gases can accumulate, particularly in poorly ventilated areas. It is widely accepted that nitrogen dioxide can aggravate asthma and reduce lung defences against bacteria.

The National Environmental Standard in New Zealand sets the limit of nitrogen dioxide concentration at 200 $\mu g/m^3$ for a one-hour period.

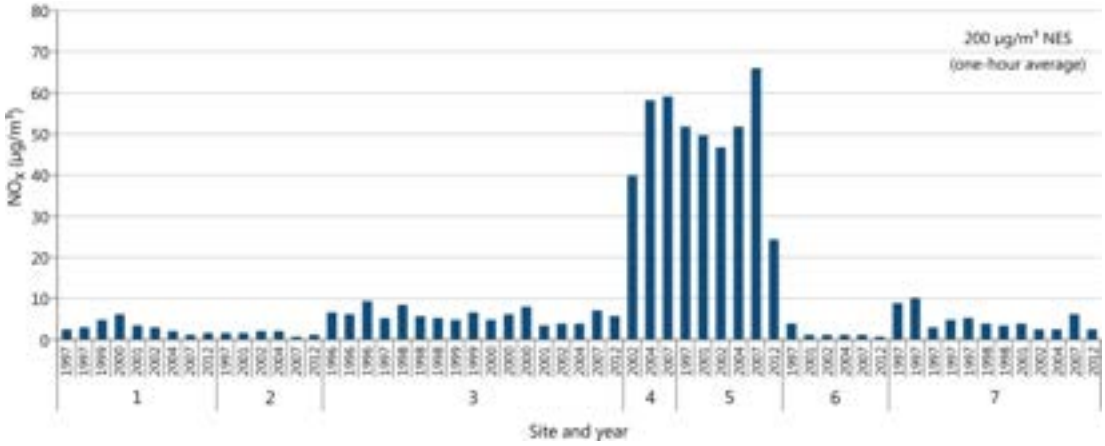
Since 1997, the Council has surveyed nitrogen oxides at seven sites throughout the region as part of state of the environment monitoring. In this programme, passive absorption discs that capture target gases are placed at each site. Samples are sent to an external laboratory for analysis, and the results converted to the equivalent exposures for a one-hour period. We also monitor $NO_x$ at other sites in the region as part of consent compliance monitoring.

## What's the story?

Since 1997, nitrogen dioxide concentrations at all state of the environment monitoring (SEM) sites have been well within the relevant NES values, with no upward trend in nitrogen oxide concentrations observed.

Five of the SEM sites monitored were consistently within the 'Excellent' category of the MfE Environmental Performance indicator, with nitrogen oxide concentrations less than 10 $\mu g/m^3$.

In the 2011–2012 survey, the theoretical maximum nitrogen oxide concentrations (calculated for a one-hour period) ranged from 0.7 $\mu g/m^3$ to 24.7 $\mu g/m^3$, well below NES limits. The highest result of this survey (24.7 $\mu g/m^3$) was from near a busy traffic intersection in New Plymouth's urban area (site 5), and still well below limits.




*Since 1997, results from all surveys at SEM sites throughout the region have shown good air quality with consistently low levels of nitrogen oxides (calculated one-hour average). See map* below *for SEM site locations.*

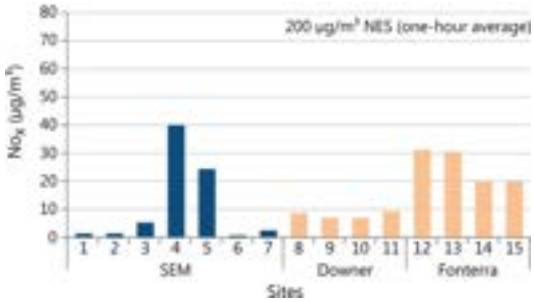
In 2012, the Council also monitored two industrial sites as part of consent compliance monitoring: Fonterra's Whareroa dairy factory generation plant and Downer EDI's asphalt and bitumen plant. Four samples were taken at each site.

Results from this monitoring found that $NO_x$ concentrations at the Fonterra site were comparable with SEM monitoring sites located near major roads. Samples from the Downer site were also well within NES guidelines.

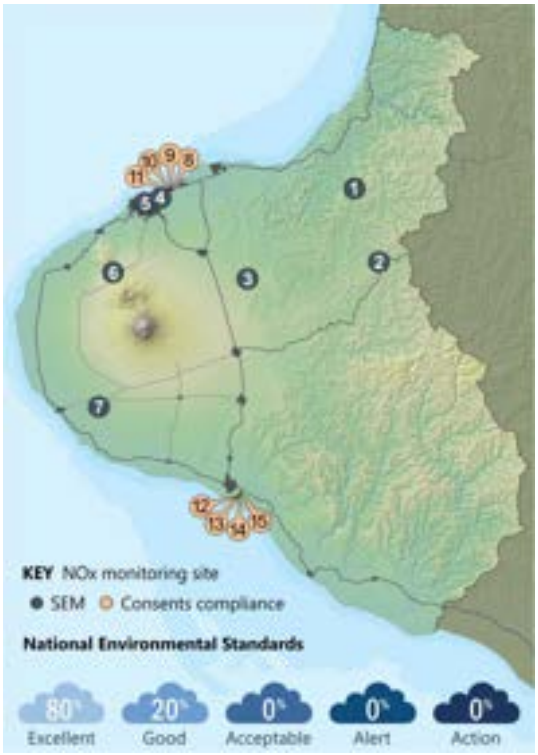
## Overall results

Overall, 80% of results from all Council monitoring have been within the Ministry's 'Excellent' category of the environmental performance indictor table. The remaining 20% were within the 'Good' category.

These results indicate that $NO_x$ levels are consistently well below the National Environmental Standard. There is no evidence that $NO_x$ concentrations in the region are increasing.




*Results of $NO_x$ monitoring for SEM and consent compliance monitoring in 2012 (calculated one-hour average). See map for the location of monitoring sites.*




*Monitoring results for SEM and consents compliance are consistently well below the $NO_x$ NES, indicating there are no significant pressures on air quality in the Taranaki region from $NO_x$ sources.*

## Find out more

*Air emissions consents monitoring reports (TRC )tinyurl.com/TRC5g*

*Monitoring of nitrogen oxides ($NO_x$) levels in Taranaki 2011/2012 (TRC, 2013) tinyurl.com/TRC5e*

*'National air quality standards have never been exceeded in Taranaki.'*

# Volatile organic compounds

The Council also monitors air quality for gases that are classified as volatile organic compounds (VOCs). The four most common VOCs are benzene, toluene, ethylbenzene and xylenes—often found together and referred to as BTEX. These volatile gases occur naturally as a component of crude petroleum and vegetable oils (in small amounts). They are also produced during the combustion of organic matter such as petroleum products. Other common sources of exposure are solvents (including paints and glues), and petrol and diesel fuels.

Short-term or acute exposure to high levels of BTEX components has been associated with skin and sensory irritation, central nervous system depression and adverse effects on the respiratory system. Prolonged or chronic exposure to high levels of these compounds can affect the kidney, liver and blood systems. Studies by the United States Environmental Protection Agency show long-term exposure to benzene can be carcinogenic for humans.

## What's the story?

In April 2012, the Council conducted an air quality survey to monitor BTEX at four sites in Taranaki. Results were converted to the equivalent exposures for a one-hour period. All results from the 2012 survey were within the recommended National Ambient Air Quality guidelines (2000).

The theoretical maximum concentrations (calculated one-hour equivalent) of benzene ranged from 7.06 µg/m$^3$ to 14.5 µg/m$^3$.

The theoretical maximum concentrations of toluene ranged from 11.4 µg/m$^3$ to 36.8 µg/m$^3$.

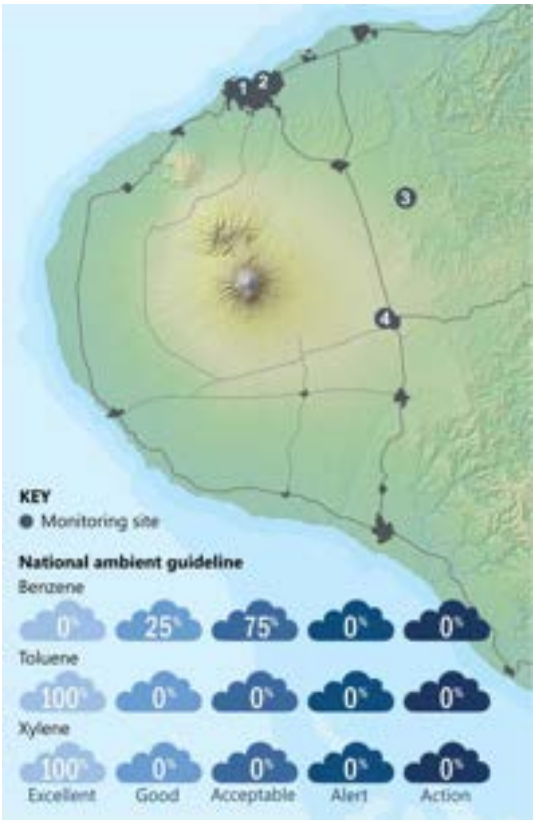
The theoretical maximum concentrations of xylene ranged from 10.8 µg/m$^3$ to 19.3 µg/m$^3$.

Levels of toluene and xylene were found to be far below National Ambient Air Quality guideline values. All toluene and xylene results fell into the MfE 'Excellent' air quality category. Three of the four benzene results were within the MfE 'Acceptable' category. One result fell within the 'Good' category.

The Council also monitors for VOCs around significant potential sources, such as gas production stations, as part consent compliance programmes. Results always fall well within guideline values.

Because there is no NES for any volatile organic compound, the Council uses the National Ambient Air Quality guidelines detailed in the Ministry for the Environment (MfE) internal document *Health Effects of Eleven Hazardous Air Contaminants and Recommended Evaluation Criteria* (October 2000). These guidelines suggest one-hour average values of:

- 22 µg/m$^3$ for benzene
- 500 µg/m$^3$ for toluene
- 1000 µg/m$^3$ for xylene.

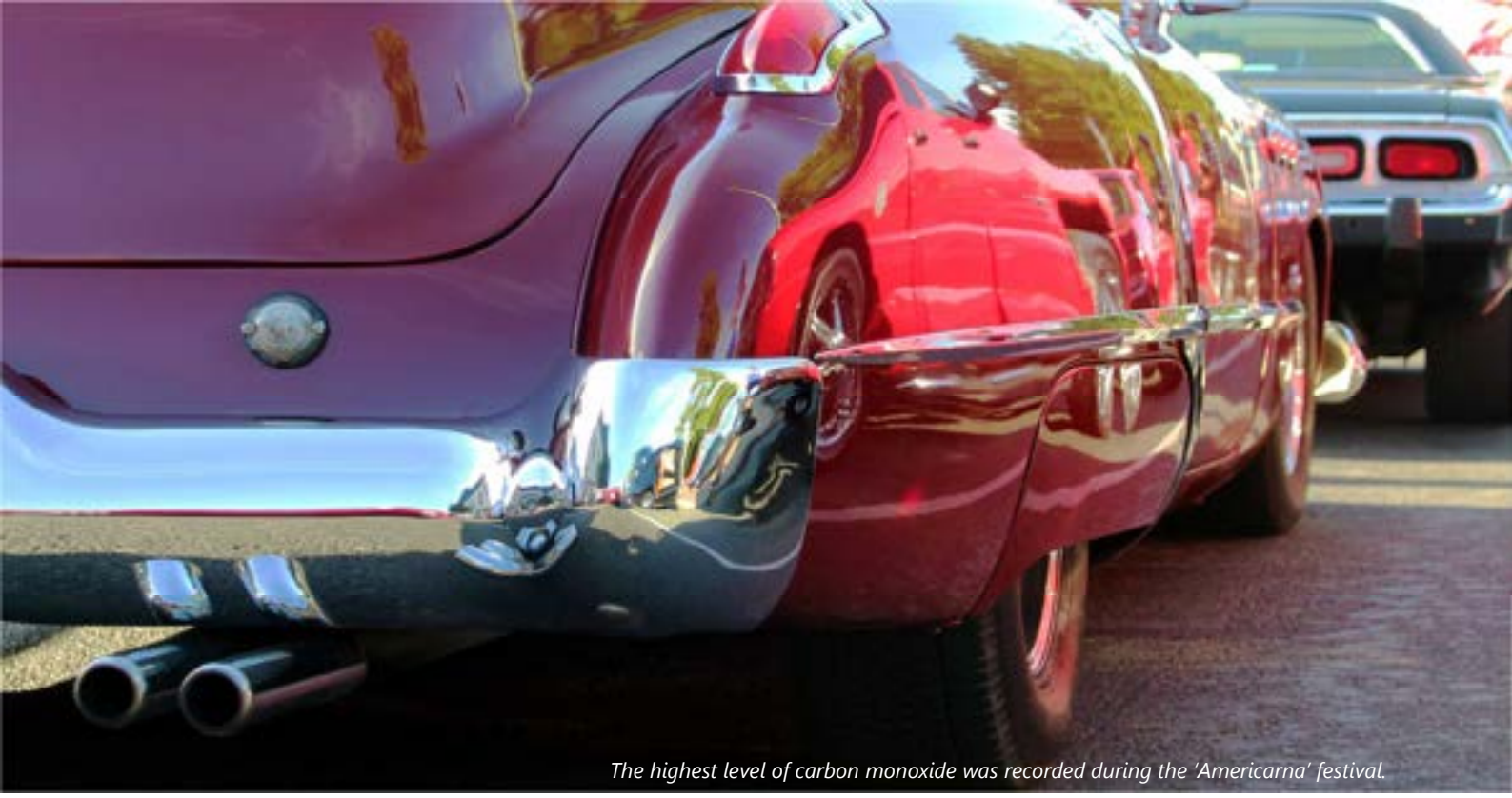



*VOC monitoring results are measured against MfE's National Ambient Air Quality guidelines. The highest results were from the site located in New Plymouth's urban area near a busy traffic intersection (site 2).*

## Find out more

*Air emissions consents monitoring reports*
*tinyurl.com/TRC5g*

*Air monitoring survey of hydrocarbon compounds (BTEX) in Taranaki region (TRC, 2013)*
*tinyurl.com/TRC5h*



*The highest level of carbon monoxide was recorded during the 'Americarna' festival.*

# Carbon monoxide

Carbon monoxide (CO) is the result of incomplete fossil fuel combustion. For example, it comes from motor vehicle emissions and from burning wood or coal for home heating or industrial purposes.

In high concentrations carbon monoxide can cause dizziness or aggravate heart conditions. It can be fatal. In New Zealand, the NES for carbon monoxide is 10 mg/m$^3$ (calculated as an eight-hour average).

In February 2012, the Council conducted one month of continuous monitoring for carbon monoxide in central New Plymouth. The monitoring was carried out to determine the 'worst-case scenario' for air quality associated with vehicle emissions. To assist in interpreting survey results, traffic count data was obtained from the New Plymouth District Council.

## What's the story?

Carbon monoxide concentrations in New Plymouth met the NES, with monitoring results showing low levels of CO in the area most of the time.

The highest one-minute level of carbon monoxide recorded during the one-month survey was 10.6 mg/m$^3$. This was detected on a Friday night during the 'Americarna' festival. This relatively high carbon monoxide emission rate is a reflection of the high number of vehicles with large engine capacities running at low revolutions per minute in the streets at that time. The highest eight–hour concentration over the same evening was 0.6 mg/m$^3$, or only 6% of the NES.

We also routinely undertake consent compliance monitoring for carbon monoxide in Taranaki around significant potential sources such as gas production stations. Results are reported publicly in individual annual monitoring reports. Results never reach more than a trivial level of either the National Ambient Air Quality guidelines or NES guideline values.

CASE STUDY

*Air quality monitoring at an exploration site.*

# Flare investigation **clears the air**

A Taranaki Regional Council investigation has found that flaring of hydraulic fracturing (fracking) fluids has minimal effects on air quality even very close to well sites.

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More than 95% of fracking fluids are simply water and an inert 'proppant' such as sand or ceramic beads that are injected into a fractured zone to keep the newly created micro channels open. The fluids also contain a mixture of other substances in small quantities. The return flow from a fractured well can also contain produced hydrocarbons.

Usually hydrocarbon exploration operators recover fracking fluids for reuse or for off-site disposal. Sometimes, for the safety of workers or equipment, disposal via a flare is required. This process of 'flaring' involves combusting and vaporising the recovered fluids.

Previous examination of the effects of flaring on air quality at well sites found that beyond 100 metres downwind of a flare, there is no elevation of risk to public health over normal everyday exposure. Despite this, with increased fracturing activity in Taranaki, and for the sake of certainty, the Council decided to further evaluate air emissions.

These investigations tested emission and ambient air samples collected both at and downwind of a flare in the process of combusting/vaporising recovered fluids. The fluids included biocides, gelling and gel breaking agents, inert proppants such as sand or microscopic beads, and 'slicking agents'. The samples were tested for tiny particles known as particulate matter (PM); dioxins and furans; polyaromatic hydrocarbons; aldehydes, volatile organic compounds (including benzene) and methanol. More conventional measures of combustion efficiency—oxygen, carbon dioxide, carbon monoxide, nitrogen oxides, and sulphur dioxide—were also investigated. Results showed:

- no elevation of dioxins or furans concentrations
- PM levels at or below those generally found throughout the region
- polyaromatic hydrocarbon levels lower than those found in central city areas
- volatile organic compounds (including benzene), aldehyde and methanol levels well within Ministry for the Environment guidelines
- no trace of carbon monoxide, and minimal levels of the other conventional products of combustion.

"It's important to note that on some measures, the air quality downwind of the flare was better than that found in most New Zealand cities," says the Council's Director—Environment Quality, Gary Bedford. "In simple terms, mowing your lawns with a two-stroke mower would have more effect on the quality of the air you're breathing than standing downwind beyond the boundary of a flare and well site. While we have previously investigated emissions from flaring, this is the first time we have looked specifically at the compounds associated with fracking. The results are reassuring, and will be very useful for us as we set standards for future activity by the industry." Mr Bedford says that while exploration and production companies endorsed and cooperated with the project, its design and implementation were completely independent of any influence or direction from the companies. The design of the investigation and reporting of results were also subject to peer review.

The results of the study are consistent with others overseas. The Barnett shale area of Texas, with 16,000 producing wells within 13,000 square kilometres, found shale gas production activities have not resulted in community exposure to volatile organic compounds at levels that would pose a health concern.

A similar density of hydrocarbon production in Taranaki would mean 8,000 producing wells in the region, instead of just the 37 producing wells existing. According to these studies, even if hydrocarbon production in the region was to expand significantly, public health would not be compromised. The full report can be found online at www.trc.govt.nz/hydraulic-fracturing/.

*Flaring tests were conducted on fracking fluids on site to ascertain the impacts it has on air quality.*

*Regional Air Quality Plan objectives maintain high standards of ambient air quality in Taranaki.*

# Our responses

## Regional Air Quality Plan for Taranaki

The *Regional Air Quality Plan for Taranaki* was reviewed in 2010 and became operative in July 2011. In the plan the Council set an objective to "maintain the existing high standard of ambient air quality in the Taranaki region and to improve air quality in those instances or areas where air quality is adversely affected, whilst allowing for communities to provide for their economic and social well-being".

The reviewed plan included two main changes: a prohibition on 'backyard burning' on residential properties in urban areas (outdoor fires excluding hāngī and barbeques), and provision for 'reverse sensitivity' (protecting existing rural activities such as poultry broiler sheds from encroachment by lifestyle development).

In developing the plan, the 14 air quality standards introduced in the Government's National Environmental Standards were taken into account. These include:

- seven activity standards that ban various activities that discharge unacceptable contaminants into the air (landfill fires, burning of tyres in the open, bitumen burning for road maintenance, burning of coated wire in the open, burning of oil in the open, high temperature hazardous waste incinerators, and school/healthcare incinerators unless consented)
- five ambient air quality standards for carbon monoxide (CO), fine particulate ($PM_{10}$), nitrogen dioxide ($NO_2$), sulphur dioxide ($SO_2$) and ozone ($O_3$)
- a design standard for new small-scale domestic wood-burning appliances, and the prohibition of discharge from certain woodburners
- a requirement for landfills over one million tonnes of refuse to collect greenhouses gas emissions.

## Future directions

In March 2015, the Parliamentary Commissioner for the Environment called for the government to amend the National Environmental Standards by including a standard for $PM_{2.5}$ (a subset of $PM_{10}$ fine particulate), for both any 24-hour period and also as an annual average. As already mentioned (see Particulate matter *page* 131) the Council already conducts routine monitoring for $PM_{2.5}$. Results show that the region's air quality is well within the World Health Organisation (WHO) guideline of 25 µg/m$^3$ (24-hour average) and

in all likelihood would be well within the WHO annual guideline of 10 µg/m$^3$. Therefore the Council and region are already well positioned in the event of future changes to the NES.

## Resource consent management

In addition to the conditions related to specific permitted and non-permitted activities detailed in the *Regional Air Quality Plan*, the Council assesses the effects of air discharges on a case-by-case basis when considering resource consent applications. To regulate the potential effects on the environment, some air discharge resource consents are granted with consent conditions.

As at 30 June 2014, the total number of air discharge consents held in Taranaki was 332. This is an increase of 6% since 2008/2009, when there were 306 resource consents.

Within this total, the number of air discharge consents for emissions from hydrocarbon exploration and servicing facilities has increased over the past five years, from 145 in 2008/2009 to 206 in 2013/2014.

The number of resource consents held for emissions from industry such as landfills (dust, odour, landfill gas) and from chemical and metal processing (odour) has reduced in the past six years.

## Resource consent monitoring

When the Council grants resource consent for a significant activity, it implements an annual compliance monitoring programme to ensure the consent holders meet the conditions set out in the consent. These conditions usually relate to the manner of operation, the quantity and quality of the discharge, and the permitted extent of effects in the receiving environment. In the 2013/2014 year, the Council undertook 140 individual resource consent monitoring programmes that had an air quality monitoring component. Sites included sewage plants, petrochemical and petroleum production facilities, landfills, composting sites, dairy processing and manufacturing factories, metal smelting and galvanizing plants, meatworks, fertiliser storage, pig and poultry farms, quarries and abrasive blasters.

| Year | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 |
|---|---|---|---|---|
| Number of consents with air quality monitoring | 122 | 135 | 139 | 140 |

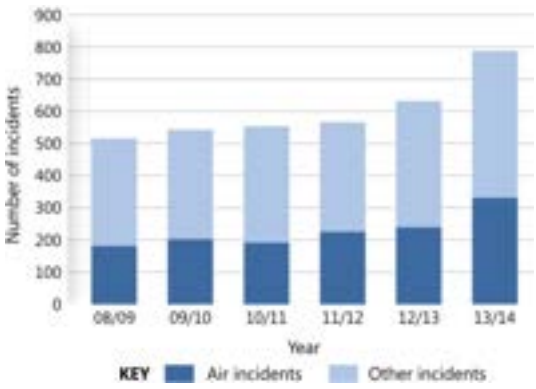
*The number of consent monitoring programmes with an air quality component has increased since 2010/2011.*

## Incidents investigated

The Council records the number of complaints received from the general public on air quality including complaints of odour.

In the 2013/2014 year, the Council recorded 325 air incidents, accounting for 42% of the total incidents reported in that year.

The majority of air quality complaints relate to offensive odour. Complaints about air quality and odour came mostly from dairy farms, meat and by-product processing, municipal waste treatment, private housing, and pig and poultry farms. The number of air incidents reported has increased over the past five years, from 177 incidents in 2008/2009 to 325 incidents in 2013/2014. This can partly be attributed to a 2011 change to regulations which resulted in an increase in reported incidents in relation to backyard burning.




*Air quality complaints 2008 to 2014. Investigations can find a complaint to be unsubstantiated.*

All complaints are investigated and enforcement action is taken where appropriate. However, a complaint does not necessarily constitute further action and in some cases, investigation can find a complaint to be unsubstantiated. In the 2013/2014 year, the Council issued 19 abatement notices and 33 infringement notices relating to air quality incidents.

## Prosecution

Regrettably, there are times when monitoring or resource investigations require further action, and on the rare occasion prosecution is warranted. In the 2013/2014 year, the Council brought two cases relating to air quality (odour) before the courts.

Glencore Grain (NZ) Ltd pleaded guilty to three charges relating to odour discharges from a palm kernel extract storage facility at Port Taranaki in November 2013. The company was fined $67,500.

The South Taranaki District Council also pleaded guilty to a charge relating to odour discharges from the Eltham Wastewater Treatment Plant between March and May 2014, following the unsuccessful treatment of waste buttermilk. STDC was fined $115,000.

## Information, education and advice

The Council provides information and advice to the public relating to air quality in the region. Highlights of the past five years include:

- producing a guide to the requirements of the *Regional Air Quality Plan for Taranaki* (2011) for all farmers in the region. The guide covers effluent disposal, burning, spraying, fertiliser applications and pig and poultry farming
- inclusion of information on air quality in the Council's *Environmental Management Guide* for businesses and industries
- 2012 distribution of a flier to all households in Taranaki providing information on the ban of backyard burning in the urban areas of Taranaki, together with advice and guidance on how to dispose of household waste.


*In the past five years, the Council has produced informative fliers on the backyard burning ban in Taranaki's urban areas, and on the disposal of household waste.*

### Find out more

*Air domain report (MfE 2014) tinyurl.com/TRC5k*

*Regional Air Quality Plan for Taranaki tinyurl.com/TRC5i*

*TRC consent processing and administration annual reports 2010 to 2014 tinyurl.com/TRC5j*


6

THIS CHAPTER COVERS:

## Biodiversity on land

- Indigenous vegetation
- Indigenous species

## Freshwater biodiversity

- Wetlands
- Freshwater fish
- Fish passage
- Macroinvertebrates

## Coastal and marine biodiversity

- Coastal habitats on land
- Rocky reef communities
- Estuarine communities
- Protected areas

*Biodiversity tinyurl.com/TRC6vid*

# BIODIVERSITY

*New Zealand's indigenous biodiversity contributes to a distinct national identity and has important social, recreational and cultural values. In particular, the relationship tangata whenua have with indigenous plants, animals, and their habitat has been woven into Māori culture and traditions for centuries.*

*New Zealand's indigenous biodiversity was radically changed by the arrival of humans, including the Taranaki region, which is now a highly modified landscape. Nonetheless, Taranaki is still a biologically diverse region with species unique to this area.*

*Protecting the region's plants, animals and ecosystems is important for Taranaki and for New Zealand as a whole. Biodiversity management in the Taranaki region is part of a national effort to safeguard the indigenous biodiversity in New Zealand's land, freshwater and marine environments.*

*'Local community groups and organisations play an important part in managing biodiversity in the region ...'*

# Biodiversity

Biodiversity, or biological diversity, describes the variety of all biological life, large and small. It includes micro-organisms, fungi, ferns, trees, plants, insects, and the ecosystems to which they belong. It includes genetic diversity within species and between species. It encompasses ecosystems on land, in freshwater, within the coastal margins, and offshore.

The arrival of humans radically changed New Zealand's indigenous biodiversity when introduced plant and animal species and human activity changed the landscape. Just over half of Taranaki's land area has less than 20% of its original vegetation remaining and these areas are considered to be acutely or chronically threatened ecosystems. However, the Taranaki region is still biologically diverse. The iconic mountain, enveloped by a national park, is home to species such as *Powelliphanta 'Egmont'*, a native land snail found only on the slopes of Mount Taranaki. Substantial areas of indigenous vegetation in east Taranaki provide significant habitat for kiwi, a number of native fish live in the region's many rivers, and the coast has an interesting and diverse range of coastal and marine habitats. The general condition of the remaining biodiversity across the region's land, water and coastal ecosystems is very good and in many cases is improving as a result of the active management of Council's targeted programmes.

*'In 2013/2014 the Council's biodiversity spend was almost $1.2 million...'*

While national policy for managing biodiversity has been under development for some time, the Council has led the biodiversity charge by working with landowners to improve and protect indigenous biodiversity on private land in the Taranaki region. In 2008, in conjunction with the community, the *Biodiversity Strategy* was developed. This strategy established priorities for the Council, including working with landowners to make a difference in those areas that have important biodiversity values—our Key Native Ecosystems (KNEs). Identifying KNEs (which is ongoing as new information comes to hand) has been an important first step in targeting our efforts to ensure our limited resources are applied where they are most needed. A series of structural reviews saw the Environmental Services Department created, comprising a dedicated team of officers to drive a coordinated approach to biodiversity and pest management operations. In the past six years, we have made significant investment in biodiversity. In 2013/2014 the Council's biodiversity spend was almost $1.2 million—including working with others through biodiversity enhancement grants.

The Council's biodiversity management approach is largely about balancing production with protection, particularly in areas such as the intensively farmed ring plain. For example, a number of Council programmes support landowners to restore and enhance biodiversity within a successful and sustainable farming business. Initiatives such as protecting wetlands and forest remnants, planting riparian buffer zones, fencing streams, and controlling weeds and pests have benefits for the landowner and all help to preserve native biodiversity.

A number of agencies, local community groups and organisations also play an important part in managing biodiversity in Taranaki's land, freshwater and marine environments. The Council works alongside these groups and the region's district councils to protect and restore remnant bush, wetland, and dune systems, and control land, freshwater and marine pests. The Council has also initiated and facilitated the Taranaki Biodiversity Forum Accord and the Taranaki Biodiversity Trust, the 19 signatories of which set annual priorities for biodiversity management in the region.

These relationships, and the Council's existing programmes and initiatives, mean that together we are making positive progress towards the biodiversity priorities of the region and the Council will easily align with any national policies and frameworks that are developed in the future.

*Indigenous forest once made up much of the land cover in the region.*

# Biodiversity on land

Biodiversity on land, or terrestrial biodiversity, includes the plants, animals and ecosystems that are based on land. The arrival of humans radically changed New Zealand's indigenous biodiversity. Introduced animals have preyed on or competed with native species, or degraded their habitat. Exotic plants also became widespread as settlement progressed. Natural ecosystems and indigenous species have also been affected by human activities such as land development and clearing of native vegetation.

A number of Council programmes are helping to protect forest remnants and control pests to encourage indigenous terrestrial biodiversity in the region. We work alongside private landowners, providing practical initiatives to protect and enhance biodiversity on private land. To ensure we are protecting significant habitats in the region adequately, we also monitor the condition of prioritised ecosystems and biodiversity sites across the region. Our pest control operations focus on controlling introduced animals and plants that threaten prioritised biodiversity sites. As a result, the condition of significant biodiversity sites across the region is generally good or very good.

*'The arrival of humans radically changed New Zealand's indigenous biodiversity.'*

Forty percent of Taranaki's land area is currently in indigenous forest and shrubland. Whilst the region's native forest has greatly reduced since the arrival of humans, Taranaki compares well to the rest of New Zealand, which has about 24% native forest cover.

It is estimated that since the arrival of humans, around 60% of Taranaki's indigenous forest and shrubland has been cleared, particularly on the intensively farmed ring plain and coastal terraces. In these areas today, terrestrial ecosystems are fragmented and exist in pockets that are largely separated from each other. Many ecosystems are greatly reduced in area and the habitats of many threatened and at-risk species are now found only on private land.

As part of our work, we monitor the amount of indigenous vegetation remaining in the region, and assess how much of that vegetation has formal protection. We also assess the condition of selected forest remnants.

# Indigenous vegetation

Taranaki's indigenous vegetation ranges from alpine herb fields to temperate rainforests. It also includes coastal turf and dune vegetation. Like most of New Zealand, Taranaki would once have been covered in thick and diverse forest and shrubland, with smaller areas of wetland vegetation and turf communities.

Throughout New Zealand, much of the land cleared for development was in low-lying and coastal areas. Such is the case in Taranaki where approximately 60% of the pre-human native forest and shrubland has been cleared. The remnants of indigenous vegetation on the ring plain and marine terraces are but mere fragments of what they once were. Whilst small, these remnants are highly important for biodiversity.

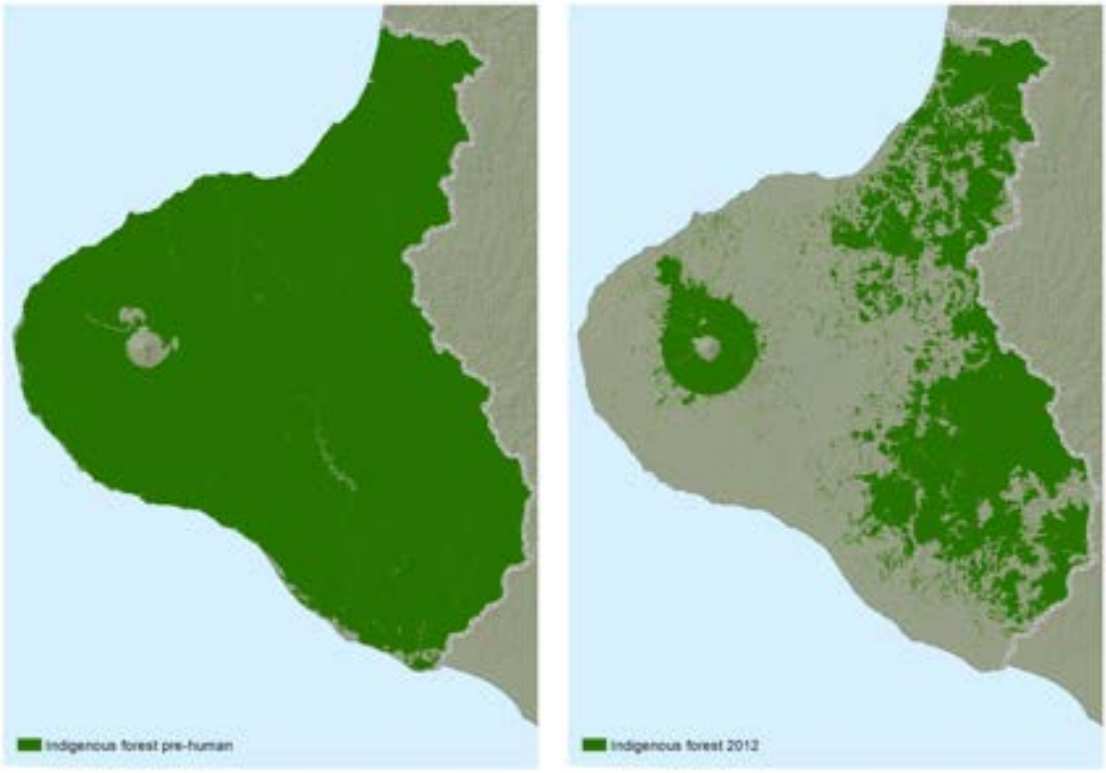
## What's the story?

The largest concentrations of indigenous forest remaining in the region are confined to Egmont National Park, the steeper parts of north Taranaki and the eastern hill country.

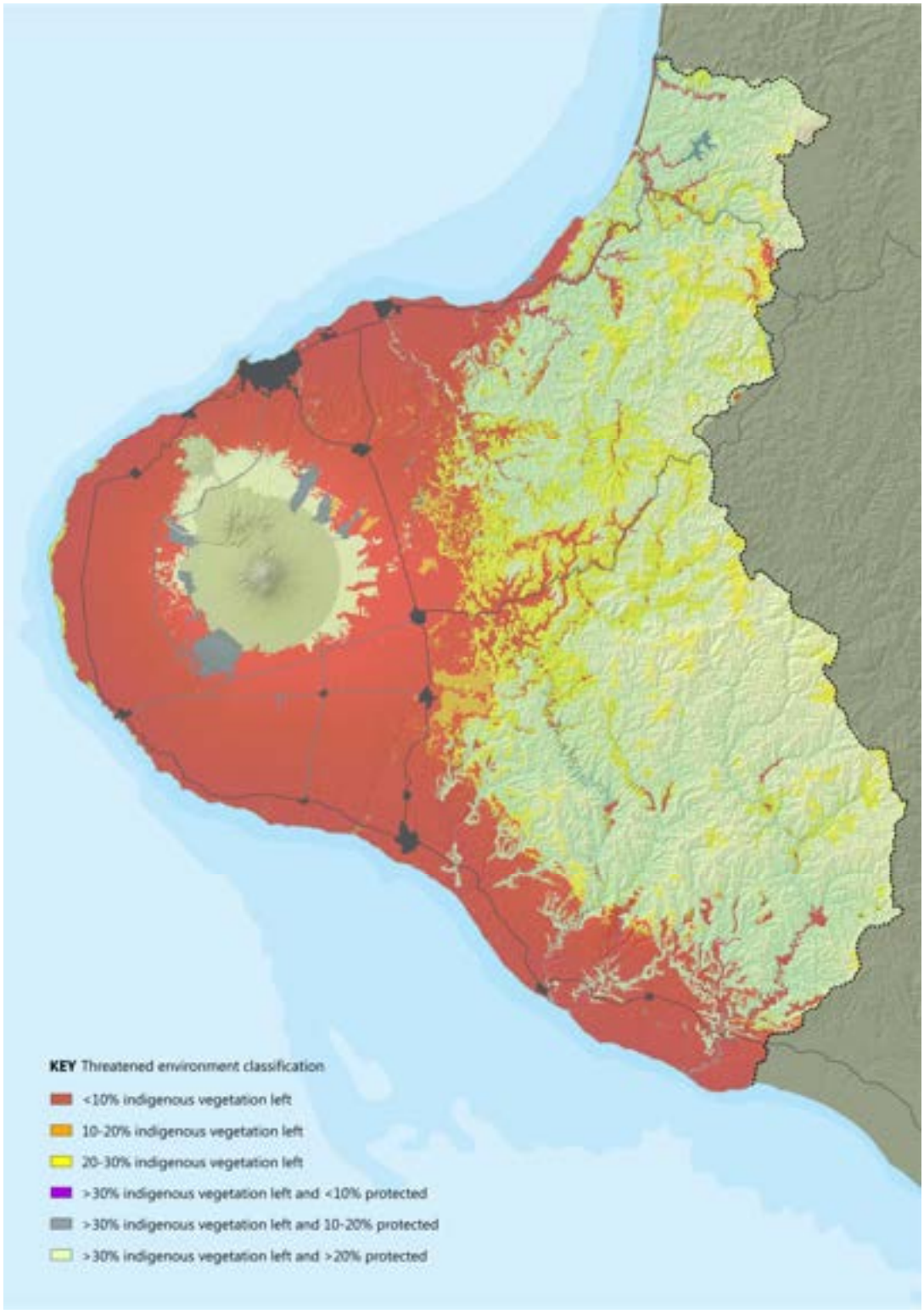
Between 2008 and 2012, Taranaki saw a net loss of around 3,700 hectares of indigenous forest and shrubland, despite around 430 hectares of new shrubland being regenerated. Most of the lost vegetation area was converted to grassland.

By comparison, between 2001 and 2008, a total of 2,370 hectares of indigenous vegetation was lost in the region.

Just over half of Taranaki's land area has less than 20% of its original native vegetation remaining. The native habitats that remain in these areas are important and are considered acutely or chronically threatened. As most are on private land, they are targeted as a high priority for protection under Council's biodiversity programme.




*It is estimated that prior to human settlement most of Taranaki was covered in native forest, shrubland and wetland vegetation (left.) Today, about 40% of the region's land area is indigenous vegetation (right).*




*Approximately 52% of the region is classified as acutely or chronically threatened in that there is less than 20% of indigenous vegetation remaining in the area. The most threatened environments are located on the ring plain and coastal terraces, areas prioritised for protection in the Taranaki Biodiversity Forum Accord and the Council's Biodiversity Strategy.*

## Protecting habitats

Approximately 21% of Taranaki's total land area has some form of legal protection, including Department of Conservation (DOC) reserves, local purpose reserves and Queen Elizabeth the Second National Trust (QEII) covenants. This equates to approximately 50% of all native forests and shrublands being legally protected in Taranaki.

*'Loss of habitat and the effects of invasive plants and animals are the greatest threats to the region's remaining biodiversity.'*

Loss of habitat and the effects of pest plants and animals are the greatest threats to the region's remaining indigenous biodiversity. Animals such as possums, feral goats and deer eat native vegetation and damage habitats that are important to other native species.

Many introduced plant species have become or have the potential to become weeds. They threaten indigenous biodiversity when they compete with native plants for space and resources. Climbing species such as old man's beard and climbing spindleberry can smother areas and prevent new native plants from growing. This can change native habitats and lead to further biodiversity losses.

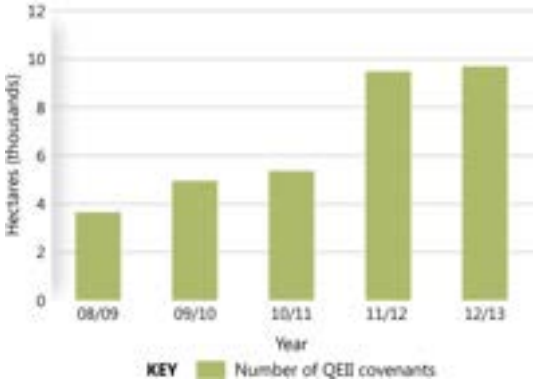
Of the region's acutely and chronically threatened habitats about 17.5% is formally protected. In terms of Key Native Ecosystems across the region (the sites that the Council focuses much of its effort for protection and active management), 95% have some form of legal protection.

Private landowners can choose to legally protect native vegetation and habitats within their land in a number of ways. A covenant issued by DOC is one option. Another is to have the area recognised under the QEII Trust.

In addition to the protection afforded by regional and distict plans, 151,054 hectares are formally protected in the DOC estate, or under a under a QEII or DOC covenant. This is an increase since 2008 when 145,900 hectares of Taranaki's land area was formally protected.

QEII covenants have become increasingly popular with private landowners in Taranaki. The number of covenants in the region has increased from 249 covenants covering 3,647 hectares in 2008, to 344 covenants covering 9,723 hectares in 2013. This amounts to 7.8% of the total QEII protected land area in New Zealand (a total of 125,138 hectares), which is a relatively high percentage given Taranaki makes up only 2.7% of New Zealand's total land area.

In the 2013/2014 year, there were 31 new covenants registered in the Taranaki region—the largest number registered in any region in that year.




*Land protected by covenants in the Taranaki region.*

## Forest condition

Although clearing vegetation directly affects biodiversity, the condition of indigenous vegetation is mostly impacted by grazing stock and feral animals such as possums, goats, deer and pigs. We target these threats as part of our biodiversity management programmes.

Initiatives such as the *Self-help Possum Control Programme* involving 4,374 properties covering 235,464 hectares keep possum numbers at low levels over at least 32% of the Taranaki region, including roughly 9,278 hectares of largely acutely threatened indigenous vegetation.

Over the past five years, the Council has also gathered baseline information about the ecological health of remnant forest ecosystems around the region by considering a number of factors. This includes the size and shape of the remnant, and its proximity to other remnants.

We also assess the state of the indigenous vegetation, noting the presence and abundance of indigenous fauna, any evidence of pest plants and animals, and the condition of any fencing. We also take into account any formal protection status.

*'Of the 64 forest remnants assessed … more than half were found to be in 'Good' or 'Very good' condition.'*

Each factor is each given a 'condition' score. The scores are then used to rate the overall state of the remnant, from 'Excellent' to 'Poor'.


*Of the 64 forest remnants assessed between 2008 and 2014, more than half were found to be in 'Good' or 'Very good' condition. A very small percentage of forest remnants were considered to be in 'Poor' condition.*

*The Rowan Road forest remnant KNE (above) has a biodiversity plan.*

## Find out more

*Hitchmough, R.: Summary of changes to the conservation status of taxa in 2008–11 New Zealand Threat Classification System listing cycle. (DOC, 2013) tinyurl.com/TRC6r*

*QEII National Trust covenants tinyurl.com/TRC6b*

*Neil and Jackie Whitehead in one of the bush blocks on their property.*

CASE STUDY

# **Bush guardians** find many rewards

Efforts by private landowners to protect and enhance native bush and wildlife are paying valuable dividends for biodiversity in Taranaki—but for Tikorangi dairy farmers Neil and Jackie Whitehead, there's even more to the story.

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The Whiteheads, whose 128 hectare farm's bush blocks are recognised by the Taranaki Regional Council as a Key Native Ecosystem, plunged into an intensive programme of predator and weed control, monitoring, planting and track-building after two kiwi were sighted on their property in 2008.

And as well as a resurgence of native bush and birdlife on their property, they say the work has brought another, unexpected benefit.

"It's such a great release from farming's day-to-day stresses and pressures, to be able to go up to one of the bush blocks to do some different sort of work, or to just soak up the atmosphere," says Jackie. "That's a reward in itself. And you can see the native trees are now flowering and fruiting much more heavily, and the birds are fantastic."

The bush blocks contain kahikatea, rimu (including one giant with a trunk circumference of 7.8 metres and diameter of 2.8 metres), rata, king ferns, tōtara, nīkau palms and a host of other native plants. Besides the kiwi, the property has tūī, kūkupa (kererū), grey warblers, fantails, silvereyes, morepork, New Zealand falcon and harrier hawk (kāhu).

Since late 2008, the Whiteheads and their helpers have:

- laid more than 100 traps and bait stations
- eliminated more than 1,150 predators, including possums, stoats, weasels, rats, feral cats and hedgehogs
- targeted woolly nightshade and Darwin's barberry, two pest plants in some of the bush areas
- undertaken riparian and bush-enhancement planting
- formed tracks through two of the three larger bush blocks, including bridges and hundreds of steps to share the bush with their supporters
- started installing discreet interpretative signage at significant points in the bush
- extended the area under QEII covenant (the first covenants were made in 2005)
- established a website (www.kererukeep.org.nz) to keep sponsors and supporters up-to-date with progress.

*'You can see the native trees are now flowering and fruiting much more heavily, and the birds are fantastic.'*

The Whiteheads bush blocks were added to the Council's *Inventory of Key Native Ecosystems* in 2009. Council staff have since prepared a Biodiversity Plan at no cost to the Whiteheads, and worked with the couple to implement it. Council staff have:

- provided traps and bait stations, and education and advice on their use
- organised the supply of 1,450 plants
- undertaken monitoring
- provided advice and assistance with track construction
- organised the signage for the bush.

*Bush on the Whitehead property.*

# Indigenous species

New Zealand has an estimated 80,000 indigenous species. Roughly two thirds of these species have been identified and less than half have been formally described. As of 2012, the conservation status of approximately 15% of the country's indigenous species has been assessed. Of those, 3,540 were considered threatened or at-risk. A further 3,940 species were considered 'data deficient', meaning too little information was available to adequately assess the status of the species.

Many introduced plants and animals have a considerable impact on indigenous species and even threaten the survival of some native species. Animals such as stoats, rats and feral cats prey directly on indigenous animal species. As mentioned previously, animals such as possums and feral goats eat native vegetation and damage habitats that are important to native species. Invasive plants can overtake native species in forest remnants, wetlands, cliffs and riparian zones.

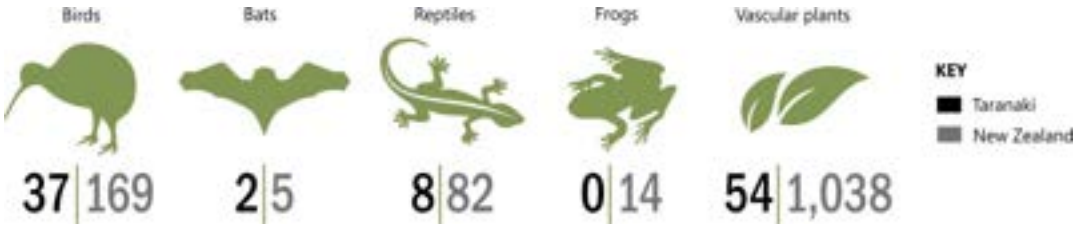
DOC is responsible for managing threatened species. Regional councils and territorial authorities contribute by protecting significant habitats of some of these species on private land.

## What's the story?

While Taranaki makes up only 2.7% of New Zealand's land area, 17% of the 270 threatened or at-risk terrestrial fauna species, subspecies, or unique populations in New Zealand are known to be in the region. Data from 2014 shows that in Taranaki there are currently 37 of New Zealand's threatened or at-risk native bird species, two bat species, eight reptile species, and 54 plants.

The region also has six species of threatened or at-risk terrestrial invertebrates, including the Notoreas moth (*Notoreas perornata*), which is considered 'nationally vulnerable'. One endemic large land snail species (*Powelliphanta* '*Egmont*') is found only in Taranaki.

Some species are considered 'regionally distinctive', either because Taranaki is the national stronghold for the species; the species is particularly uncommon in the region; or the species does not exist either further north or further south of Taranaki. Regionally distinctive species are not necessarily nationally threatened.




*A number of species and subspecies are listed as threatened or at-risk in New Zealand.*

It is likely that both the North Island kōkako and the brown teal (pāteke) have become regionally extinct in the past 30 years. Although small numbers of these birds are present in other parts of the country, DOC advise that the last known kōkako in Taranaki was rescued in 1999 and since then there have been no confirmed sightings.

DOC also estimate Taranaki's surviving breeding populations of species such as the North Island kākā and yellow crowned parakeet (kākāriki) to be very small and unsustainable. Species such as the North Island robin (toutouwai) and both species of bat (pekapeka) are now less widespread in the region than they were in the 1970s. In western parts of the region, including Egmont National Park, these species are either rare or absent.

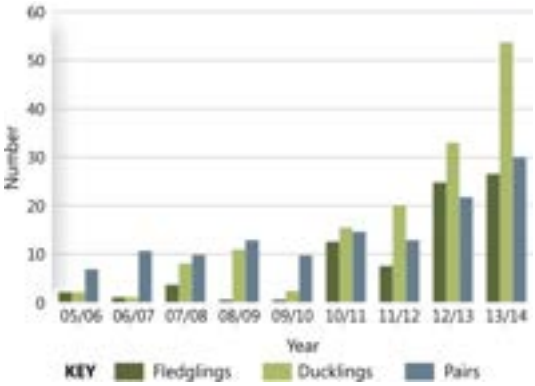
A major DOC project covering around 7,000 hectares of Egmont National Park has proven successful, with the reintroduction of whio (blue duck) to the region. Annual monitoring by DOC has shown this population to be steadily increasing.

There have also been other successes with bird species in the region.

Since the arrival of humans in New Zealand, the number of kiwi has substantially declined. Western North Island brown kiwi were once widespread in the central-west North Island, including Taranaki. Today, DOC research shows that these kiwi occupy less than 17% of their former range, largely because of habitat loss and predators. In 2007, DOC reported an estimated a 20% decline since the 1970s.

Together, community groups and DOC have been working to reverse this decline in the region. Intensive predator control over thousands of hectares and a 'Kōhanga kiwi' project that allows young kiwi to grow up in a safe environment until they are big enough to look after themselves, have both had inspiring results. Work by the East Taranaki Environment Trust (ETET) has resulted in an increase in kiwi call activity in northern Taranaki.

In South Taranaki, intensive management of 243 hectares around Lake Rotokare, led by the Rotokare Scenic Reserve Trust, includes fencing and pest eradication that has seen the return of the tīeke (saddleback) to Taranaki.




*Number of whio pairs, ducklings and fledglings observed within the study area of the Egmont National Park Recovery site 2005 to 2014.*


*Actions by the ETET have resulted in an increase in kiwi calls in north Taranaki since 2011.*

DOC data shows that 80% of skinks and geckos found in Taranaki are considered threatened or at-risk. However, the at-risk goldstripe gecko (*Woodworthia chrysosiretica*) is more widespread in Taranaki than in any other region.

There are no native frogs currently in Taranaki, although they are likely to have been present prior to the arrival of humans. Three introduced Australian frog species are common and widespread in the region.

Three plant species are likely to have become regionally extinct in the past 30 years. These are *Amphibromus fluitans, Alepis flavida* and *Schoenus carsi.* The nationally vulnerable *Dactylanthus* (pua o te ringa) is still in Taranaki, although greatly reduced in abundance. Clearing indigenous vegetation has meant loss of habitat for this parasitic plant. Possums have also been destructive but possum control is helping to slow the decline of this plant species.

Several nationally and regionally rare plants are found in the region. For example, the endemic species *Crassula manaia* is confined to the South Taranaki coastline and not found elsewhere in New Zealand.

To find out more about New Zealand's threatened and at-risk flora and fauna, visit the DOC website.

## Find out more

*Department of Conservation tinyurl.com/TRC6c*

*The nationally at-risk goldstripe gecko is more widespread in Taranaki than in any other region.*

CASE STUDY

*The rare tīeke (saddleback).*

# **Iconic project** wins region's support

One of Taranaki's iconic biodiversity projects marked a historic milestone in May 2014 with the release of a number of rare and regionally extinct tīeke (saddleback) at Lake Rotokare.

The release followed the successful establishment of a kiwi crèche, followed by kiwi breeding programme or 'kōhanga kiwi' in partnership with Taranaki Kiwi Trust at Lake Rotokare Scenic Reserve. The projects underscore the tremendous value the programme brings as a strategically located haven for endangered native species and a key educational resource for the region.

The Council has been one of the many organisations and people involved in the journey, which started 10 years ago with the formation of the community-owned and community-led Rotokare Scenic Reserve Trust.

The Trust was born of community concern about the reserve's declining state. Its first priority was eliminating the threat of predators, for which two key strategies were used. First was the installation of an 8.4 kilometre high-tech predator-proof fence that now completely surrounds the lake and its 230 hectare bush-clad catchment. Fundraising for and construction of this fence was a testament to the drive of the Trust and the support of the community. The Council became an early partner in this work, providing funding and expertise for the second phase—three aerial control operations targeting possums and rats. The Council continues to support the Trust with advice and practical assistance relating to biosecurity, plus an annual grant of $30,000, and is also likely to become involved in monitoring population levels of native skinks.

Lake Rotokare Scenic Reserve is part of the Council's inventory of key native ecosystems, having been identified as having regionally significant indigenous biodiversity values.

"The release of the tīeke highlights how the Trust and its volunteers are making an important contribution to community efforts to enhance indigenous biodiversity and amenity values in the region," says the Council's Environment Services Manager Steve Ellis. "The tīeke hasn't been seen in the region for 150 years.

"The Trust's vision and determination were apparent from the beginning. They received a Taranaki Regional Council Environmental Award in 2005 and again in 2014, which says a lot about how their work was regarded early on in the piece."

The Trust's Sanctuary Manager Simon Collins says support from across the region, from individuals and organisations like the Council, is a major reason for the Trust's successes so far.

"The region has got on board with the vision, and that's been vital," he says. "It's this sort of support that's helped us to eliminate a dozen predator species, ensure existing native flora and fauna flourish, establish a kiwi breeding population and bring the tīeke back to Taranaki.

"There's still a lot more to do, and it's good to know the regional support is there."

The reserve's status as a regional taonga is beyond question. Its mature tawa, rewarewa and mahoe-dominated forest is home to long-tailed bats, kiwi, rūrū (morepork), kārearea (New Zealand falcon), tūī, korimako (bellbird), kūkupa (kererū or wood pigeon), riroriro (grey warbler), miromiro (tomtit), tīeke (saddleback), popokate (whitehead)—which was also recently reintroduced—toutouwai (North Island robin), plus a variety of other bird species. The lake-edge habitat consists of raupo, flax, and pukatea/kahikatea swamp forest, which is home to notable fauna such as mātātā (fernbird) and pūweto (spotless crake) and two species of tuna/eels and banded kōkopu in the streams and lake.

Half of the tīeke released in May were sourced from Te Hauturu-o-Toi (Little Barrier Island) and the rest from Bushy Park in Whanganui. It is thought that tīeke would have once been found throughout New Zealand; however, after pressure from introduced mammalian predators, such as rats, and the reduction of their habitat, tīeke were soon found only on a single island (Hen Island) in the Hauraki Gulf.

*Members of the Rotokare Scenic Reserve Trust releasing 59 rare and regionally extinct tīeke (saddleback) at Lake Rotokare.*

*A Council Technical Officer conducts ecological monitoring at Lake Kaikura.*

# Our responses

## Regional Policy Statement

The *Regional Policy Statement for Taranaki* sets out a policy framework for managing biodiversity in the region. This framework recognises the importance of protecting indigenous vegetation on land. It also has policies for pest animals and plant management, particularly in areas with regionally significant indigenous biodiversity. The *Regional Policy Statement* recognises the need for remnant habitats to be connected more closely.

## Biodiversity Strategy

Biodiversity management is woven into many of the Council's day to day functions and operations. The Council's *Biodiversity Strategy*, was created in 2008 and focuses on implementing actions to manage biodiversity. In the past five years the Council has established a dedicated biodiversity team, including an ecologist, and in the past two years we have developed the Environmental Services Department which combines pest plant and animal management and further streamlines our operations.

There are four priorities for biodiversity management identified in the current strategy:

- Develop and implement an integrated and coordinated biodiversity and protection and enhancement programme with private landowners on prioritised Key Native Ecosystems.
- Acknowledge the biodiversity component of existing Council programmes, particularly the provision of education and advice, and bring an increased biodiversity focus to these programmes, especially as they relate to national priorities.
- Where appropriate, facilitate improved coordination of biodiversity work undertaken by different agencies, trusts and community groups across Taranaki in order to build capacity in the community for the efficient and effective maintenance and enhancement of indigenous biodiversity. This will include the development of community-based partnerships to achieve success with a small number of 'iconic' biodiversity projects.
- Contribute to the management and development of biodiversity information systems relevant to Taranaki to ensure management decisions are based on sound scientific information and to enable the monitoring of outcomes for biodiversity in the region and the revision of priorities as necessary.

## Future directions

Over the next five years we will build on existing biodiversity initiatives to further incorporate biodiversity into strategy and plan reviews. The biodiversity strategy will focus on the Key Native Ecosystem programme, with the aim of adding more key native ecosystems on private land in the region, and working with landowners to develop biodiversity plans for those areas. We also intend to implement a comprehensive monitoring programme, focusing on the condition of biodiversity in the region.

*The Bushy Park Key Native Ecosystem.*

## Department of Conservation

DOC is the principal central government agency involved in the conservation of biodiversity. Its role is broad and multifaceted operating under a number of different statutes, including the *Conservation Act 1987,* the *National Parks Act 1980,* the *Wildlife Act 1953* and the *Reserves Act 1977.* DOC is responsible for managing the public conservation estate, which includes national parks, marine reserves and other conservation areas. DOC is also responsible for protecting native plants and animals. All native animals are Crown property and the department has considerable experience and expertise in wildlife management, including threatened species recovery. DOC has a strong advocacy role, promoting conservation and administering funding grants.

In Taranaki, DOC is responsible for 146,973 hectares of Crown land (or 21% of the region). It has a range of projects focused on protecting and enhancing biodiversity and conservation values across the region, including invasive plant and animal control on the public conservation estate. This includes possum control, at a level designed to preserve the forest canopy within Egmont National Park, as part of a regular 1080 treatment rotation. It also includes feral deer and goat control involving both the public conservation estate and private land.

DOC also undertakes threatened species recovery programmes in Taranaki, including recovery of the Western North Island brown kiwi and the whio (blue duck) in Egmont National Park and adjacent farmland. Part of the DOC species recovery programme is to support the re-establishment of kōkako in Taranaki.

*'DOC is responsible for managing the public conservation estate …'*

Major weed control programmes include controlling giant gunnera on the South Taranaki coast, spartina in the Pātea estuary, climbing asparagus at Lucy's Gully, and climbing spindleberry at various sites between Oākura and Tongaporutu.

## District council policy and plans

In addition to the *Regional Policy Statement* and other regional plans and strategies, each district council in Taranaki has a district plan. Amongst other things, these plans address Significant Natural Areas (SNAs) and/or have general vegetation clearance rules. The district councils also have a range of voluntary programmes and initiatives.

In the New Plymouth District, SNAs are eligible for grants for fencing and other enhancements. NPDC also provides landowners who decide to place native bush under a QEII covenant with rates relief for that land. Landowners can also be allowed an additional subdivided lot as part of consent for subdividing any land that

includes a QEII covenanted area. NPDC's Landowner Engagement Project takes a strong collaborative approach between landowners, the Regional Council, DOC, and the Royal Forest and Bird Protection Society of New Zealand to help retain significant areas of native biodiversity.

The Stratford District Council also provides rates relief for landowners with land in a QEII covenant.

In the South Taranaki district, areas of indigenous vegetation and habitats of indigenous fauna are eligible for funding from the Council's Significant Natural Areas Fund. The funding is most commonly used as a contribution towards the cost of fencing the areas for stock exclusion and usually forms part of a larger project involving funding from other organisations. A condition of the funding grant is that the area must receive on-going formal, legal protection, which is usually through a QEII covenant. The SNA Fund is also available for areas that are not listed as SNAs in the South Taranaki District Plan.

The South Taranaki District Plan has general vegetation clearance rules which help retain areas of biodiversity that are not formally, legally protected. Landowners in South Taranaki receive rates relief for any formally, legally protected areas of land.

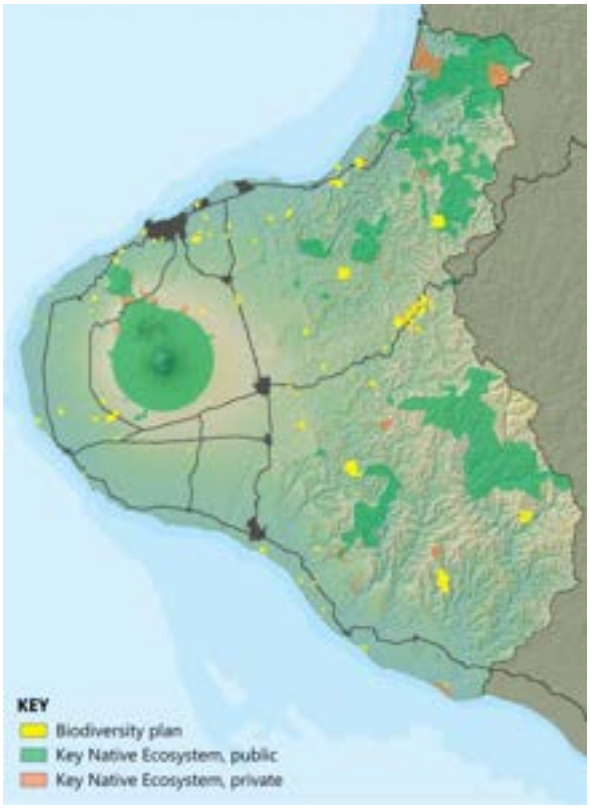
## Key native ecosystems

In 2006, the Council began identifying natural areas with regionally significant indigenous biodiversity values including remnant wetlands, native forests, dunelands and other indigenous habitats.

Collectively known as Key Native Ecosystems (KNEs), a KNE is considered significant because it is home to threatened or regionally distinctive flora and fauna, it is covered in indigenous vegetation, or it connects or buffers other sites of value. The KNE programme focuses on maintaining and improving the biodiversity values of a specified site.

Since 2009, there has been a substantial increase in the number of KNEs identified in the region, with KNEs being identified on an ongoing basis.

As of June 2014, there are 178 remnant native habitats in the KNE programme, amounting to 119,103 hectares. Of these, 132 are either totally or partly on private land and cover 9,277 hectares.




*Key Native Ecosystems managed by Council-developed biodiversity plans (in yellow).*

Under certain conditions, when a KNE falls wholly or partly on private land, landowners can receive free advice and assistance for protecting and enhancing indigenous biodiversity in the site. This can include a Council-developed biodiversity plan.

Recommendations in biodiversity plans usually cover actions such as fencing and planting, and controlling pest plants and animals. Plans can also recommend areas for additional formal protection. To date, 64 biodiversity plans have been prepared, covering 2,528 hectares of private land. This equates to 48.5% of the 132 privately-owned KNEs.

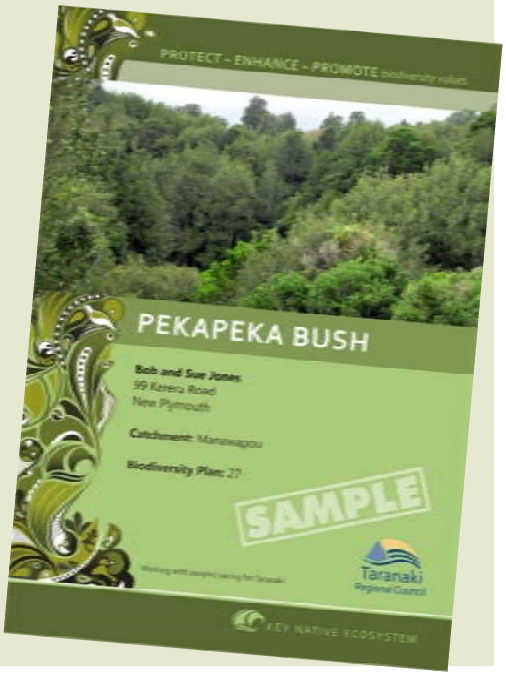
Since 2010, the Council has also contributed over 20,000 native plants for enhancing KNEs in the region. In 2013/2014 the Council invested $639,000 in the KNE programme.

## Biodiversity plans

Planning the management of Key Native Ecosystems is important to ensure that all aspects of management are considered—it's no good killing the predators if meanwhile old man's beard is smothering the canopy. The Council's biodiversity plans are prepared at no cost to interested landowners (when an area meets the criteria for a plan).

A biodiversity plan is developed in consultation with the landowner, providing them with a clear idea of what is required to sustainably manage the site for biodiversity purposes. It also details tasks a landowner can perform, and areas where council staff or other groups can assist.

Many biodiversity plans are used to access funds from the various funding pools available—QEII, the Council's Environmental Enhancement Grant, district council heritage funds, the Taranaki Tree Trust and the Biodiversity Condition Fund.




## Pest management strategies

The Council's pest management strategies for plants and animals identify programmes to eradicate, control and monitor a range of pest plant and animal species. These strategies also include rules for landowners relating to pest control.

### Pest animals

The Council's *Pest Management Strategy for Taranaki: Animals* identifies 23 pest animal species. These include possums, feral goats and cats, rabbits, hares, magpies, rooks, argentine ants, three species of mustelids (ferrets, stoats and weasels), four species of freshwater pest fish, and seven species of feral deer. All of these pests have the potential to severely damage indigenous biodiversity.

Possums are a major threat to both the agricultural industry and to native flora and fauna. Much of the Council's pest control operation is focused on possum control.

The Council's award-winning *Self-help Possum Control Programme* is the largest programme of its type in the country. Effectively a joint programme between the Council and landowners to maintain possums at low levels, this dual approach achieves a greater level of control than would otherwise be achieved by a single party.

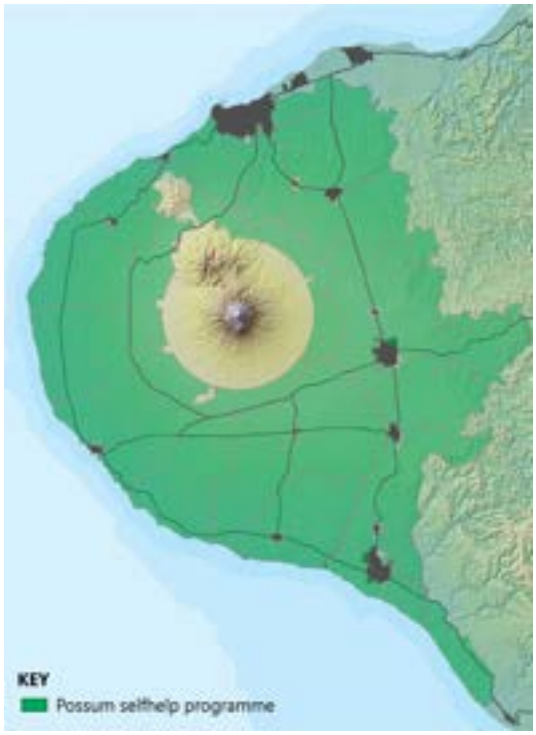
In the programme, the Council completes an initial possum control operation within a target area, reducing possum numbers to below a 5% residual trap catch rate (RTC). Landowners are then required to keep the possum numbers below 10% RTC.

The number of landowners involved in the self-help programme has increased, from 3,753 properties in 2008 to 4,374 in 2014. This has resulted in an increase of the land area covered by the programme, from 227,000 in 2008 to 235,464 in 2014—approximately 32% of the region. The RTC percentage rate has steadily decreased since 2008 and is generally below 5% RTC.

Highlights of possum control include:

- In 2008, approximately 9,017 hectares of largely acutely threatened indigenous vegetation was covered by the *Self-help Possum Control Programme*. In 2014, it had increased to 9,278 hectares.

- The programme now covers almost all private land on the ring plain (except for that in urban areas), as well as significant parts of the coastal terraces and frontal hill country.
- In 2014, the Council also began possum control within urban New Plymouth to protect indigenous biodiversity within the urban setting.
- The Council, landowners and DOC undertake possum and other predator control on a regular basis in large areas of the region outside of the self-help area including Egmont National Park and large parts of the eastern hill country.



*By June 2014, the Self-help Possum Control Programme covered approximately 32% of the region.*

Unlike other parts of New Zealand, Taranaki has low rabbit numbers and there have only been two rook sightings since 2009. However, Argentine ants, first recorded in Taranaki in 2006 are now established in the region. These ants and other recent arrivals, such as plague skinks, are often accidentally transported by people and are becoming established in urban areas.

The numbers of other pests vary across the region, depending on the habitat and the level of control in the area. Specific predators are controlled at different sites around the region to protect key species and habitats. This is often in conjunction with other agencies or groups.

Economic consultants BERL Ltd estimate hillcountry farmers invested $2.9 million in pest and weed control between 2009 and 2013. Some of this investment will benefit biodiversity.

## Pest plants

The Council's *Pest Management Strategy: Plants* identifies 27 pest plant species. At least 19 of these are a threat to biodiversity and landowners have obligations to control them. The Council, DOC, landowners and other agencies control many other pest plants on a site-by-site basis, depending on the particular threat to each site.


*A significant amount of work is still required by urban land occupiers to adequately control wild ginger, such as in the example above where plants grow along an urban verge.*

Old man's beard is considered the most damaging invasive climbing weed in New Zealand. Landowners are required to control this species where it occurs on their property, with the exception of three areas (Kaūpokonui Stream, Pātea River and Waingongoro River), where it is considered too widespread for effective landowner control. The Council has recently begun a control operation targeting old man's beard in the Kaūpokonui River catchment area (see case study on *page* 161).

The Council directly controls five terrestrial pest plant species identified by the *Pest Management Strategy*. These are: climbing spindleberry, Darwin's barberry, giant reed, mignonette vine and Senegal tea.

## Working together

In Taranaki, many agencies, community groups and individuals have an interest in biodiversity and the Council works to coordinate biodiversity management with others.

Along with other agencies, the Council provides funding to private landowners or to trusts for biodiversity projects on private land. Between 2008 and 2013, the Council allocated a total of $1,857,295 through the Environmental Enhancement Grant. The New Plymouth District Council also allocated $138,083 through its Natural Heritage Fund and DOC allocated $882,646 through the Community Conservation Partnerships Fund (formerly the Biodiversity Condition Fund).

Since 2008, the Council has supported several 'iconic' biodiversity projects, including providing ongoing technical and logistical support for community ecological restoration projects. These include the Tiaki te Mauri O Parininihi Trust, which we have supported in intensive possum and rat control in order to benefit kiwi and improve the potential return of kōkako to the region.

We have also provided technical and financial support to the Rotokare Scenic Reserve Trust in South Taranaki, whose work (as mentioned previously) has included eradicating introduced mammals and constructing a predator-proof fence around 230 hectares of remnant forest and wetland around Lake Rotokare. This has led to an improvement in many indigenous plant and animal populations. The tīeke (saddleback) and whitehead, previously lost from the area, have both been reintroduced.

We also work with the East Taranaki Environment Trust (ETET), which targets possums, goats, and stoats on more than 13,000 hectares in north-eastern Taranaki in efforts to improve conditions for the Western North Island brown kiwi. A core area of more than 1,000 hectares is extra-intensively controlled for ship rats and possums. This is to prepare a habitat suitable for the return of kōkako to the region.

The Council's programmes support the work of DOC which has more than 1,100 stoat trap boxes within Egmont National Park aimed at protecting kiwi and whio (blue ducks). DOC also manages feral goats within Egmont National Park through a programme that was started in 1925. This is one of the longest running and sustained programmes to control vertebrate pests in the world.

The Council, private landowners and DOC also control feral goats in areas where they are having a significant impact on biodiversity values, mostly in northern Taranaki and in the eastern hill country.

*Opening ceremony of the kiwi kōhanga at Rotokare 2012.*

*Council Environment Officer working with Conrad O'Carroll from Tiaki te Mauri O Parininihi Trust.*

### Find out more

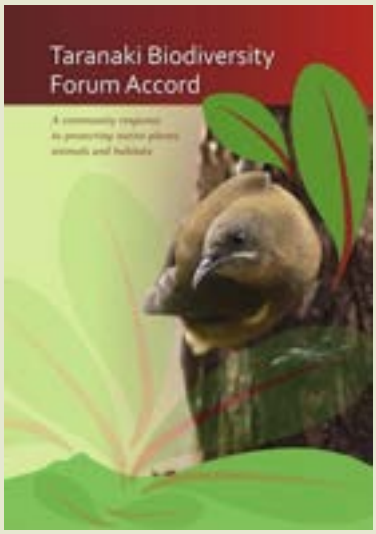
*Tiaki Te Mauri O Parininihi Trust tinyurl.com/TRC6e*

*Taranaki Kiwi Trust tinyurl.com/TRC6f*

## Taranaki Biodiversity Forum Accord

In 2008, the Council led the first Taranaki Biodiversity Forum to provide a vehicle for interested parties to meet, share information, discuss common issues and advance biodiversity in the region. Since 2008, the annual forum has been attended by a large number of trusts and care groups, non-government organisations such as the Taranaki Fish and Game Council, the Queen Elizabeth II National Trust and the New Zealand Royal Forest and Bird Protection Society (north and south branches). It is also attended by local iwi, individuals actively involved in regional biodiversity projects, DOC and the three territorial authorities in Taranaki. In 2012, the Taranaki Biodiversity Forum Accord was born. The signatories of the Accord have recently formed the Taranaki Biodiversity Trust, and have agreed to work together to set a strategic vision, desired outcomes, and biodiversity priorities and actions that will:

- raise the profile of biodiversity generally and increase awareness and understanding of the issues
- provide a vehicle for dialogue, including information sharing, between like-minded but diverse interests
- identify common ground and establish a publicly agreed policy position and partnerships
- make a commitment to positive action
- establish a collaborative framework to better work together and identify opportunities for obtaining the best results from finite resources.




The Accord is a non-statutory document. As such it does not override regulatory functions, roles and responsibilities, including statutory strategies and plans. However, it allows signatories (Accord partners) to look beyond their own sectoral interests and identify opportunities to do what is best for Taranaki. While the vision, outcomes and plan of action focus on maintaining and enhancing biodiversity generally, Accord partners also agree that there is a need for an immediate focus on Taranaki's most valuable, yet vulnerable, biodiversity assets.

The Accord was signed on 27 August 2012, in the presence of the Minister of Conservation, the Hon Kate Wilkinson. It is a living document and current signatories welcome the involvement of further groups.

Current Accord signatories have agreed on key priorities for 2015.

*Signatories for the Taranaki Biodiversity Forum Accord.*

## Information, education and advice

The Taranaki Regional Council website has a series of factsheets and media releases highlighting the region's rare and distinctive flora and fauna, and information about Council-led biodiversity initiatives. We also facilitate a number of open days and workshops informing the public about biodiversity and biosecurity issues, and giving practical advice on topics such as predator control.

The Rainforest School at Pukeiti was developed by the Taranaki Regional Council in 2013 with 15 activity options including walks and studies focusing on identifying indigenous plants, birdlife and fish. Led by the Council Education Officer and regional gardeners, the programme is available for teachers and classes visiting Pukeiti and encourages students to explore concepts such as sustainability and conservation.

In addition, the annual Taranaki Regional Council Environmental Awards recognise and celebrate the efforts of individuals, groups and organisations to protect and enhance the environment, including contributions to biodiversity.

*The Council's Education Officer leads students on a journey of conservation discovery as part of the Rainforest School at Pukeiti.*

### Find out more

*Community investments in environmental improvements in Taranaki 2008–2014 tinyurl.com/TRC6ab*

*Pest Management Strategy for Taranaki: Animals tinyurl.com/TRC6s*

*Pest Management Strategy for Taranaki: Plants tinyurl.com/TRC6t*

*Proposed National Policy Statement on Indigenous Biodiversity (MfE, 2011) tinyurl.com/TRC6j*

*Protecting our Places: introducing natural priorities for protecting rare and threatened native biodiversity on private land (MfE/DOC, 2007) tinyurl.com/TRC6k*

*Regional Policy Statement for Taranaki tinyurl.com/TRC6g*

*Taranaki Biodiversity Accord tinyurl.com/TRC6h*

*Taranaki Biodiversity Strategy tinyurl.com/TRC6i*

*Old man's beard.*

CASE STUDY

# One woman's war on **old man's beard**

Hanna Padrutt has seen first-hand why old man's beard is classified as a pest plant in Taranaki. "I saw it smothering mamaku and realised all the ferns would die if nothing was done," she says. "So I started thinking about what I could do."

That was in 2003. And for the past dozen years she has been waging war on the unwelcome invader at the family's 80-hectare dairy farm, even though the property is in the Kaūpokonui catchment—one of three where control requirements have been waived for landowners because of the severity of the problem. The Taranaki Regional Council has been using biological control in some of these areas.

Hanna destroys dozens of the plants every year, hand-pulling the seedlings and lightly spraying the tops of the bigger plants with glyphosate or metsulfuron. "It's best to get them before they start seeding, but there are always some you miss," she says.

She's also learned from experience that it's important to recheck any infestation a few weeks after spraying.

Old man's beard is a woody, perennial climber that can grow up to 25 metres high if left unchecked, competing with and smothering native plants. "The good thing is that even if an infestation looks big, it's probably made up of only a few plants, and you can deal with them," says Hanna.

A major bugbear of the plant is that it seeds prolifically, and the seeds are easily carried down catchment waterways. The Council's approach under its current *Pest Strategy for Taranaki: Plants* has been to require landowners to destroy it wherever it is found, except if it is within 50 metres of the Kaūpokonui, Waingongoro and Pātea Rivers.

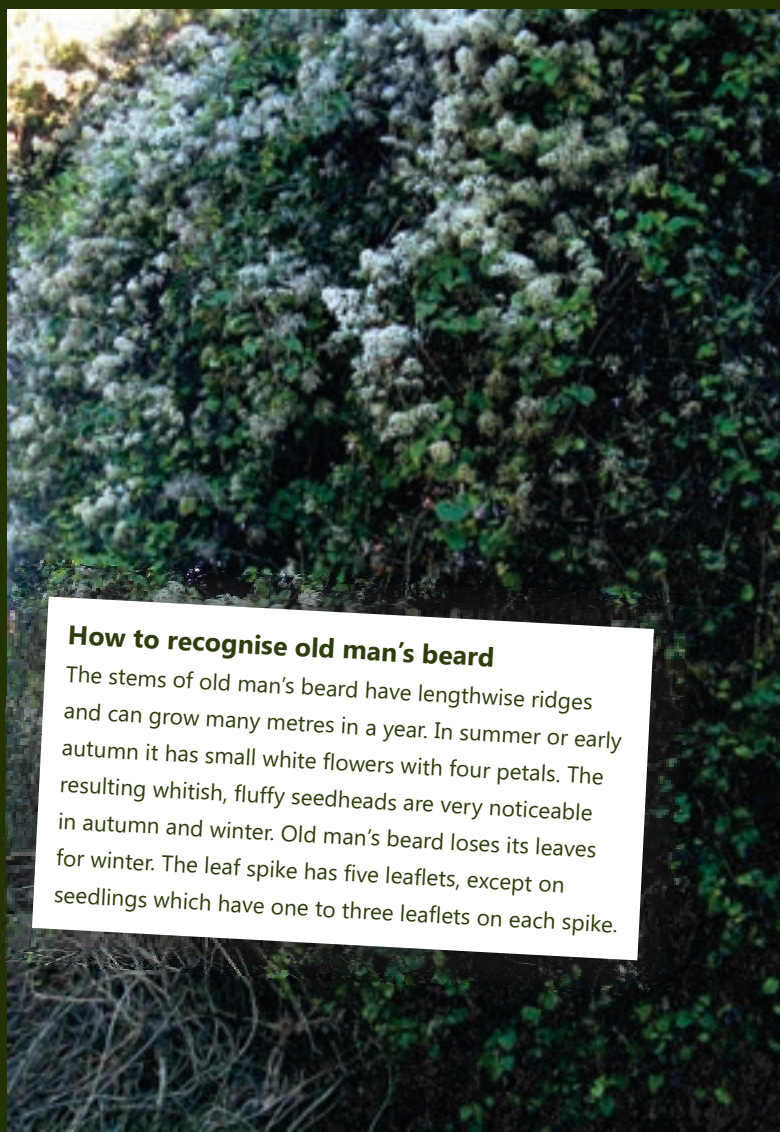
However, in 2014 a trial scheme was introduced in the Kaūpokonui catchment and in the first stage, the Council engaged contractors to cut and treat all old man's beard vines from Opunake Road to Skeet Road, then from Skeet Road to the coast, with the aim of reducing infestation by more than 95%. The Council will fund re-treatment in these areas for up to three years, to catch any regrowth. Following this, landowners will be required to continue to control old man's beard in the area.

Hanna believes old man's beard is such a problem that it should be destroyed wherever it is found. "We need to prevent old man's beard threatening the good work done with riparian planting," she says.

She also believes education is vital. "Let the young people see native bush that hasn't got pest plants, and then let them see what pest plants can do. And teach them how to recognise native plants and pest plants—that is important."

The Council's Environment Services Manager, Steve Ellis, says Hanna's efforts demonstrate that commitment and a consistent, methodical approach can defeat persistent pest plants such as old man's beard.

"Her achievements are impressive and she is a good example for other landowners to follow, and an inspiration to the Council officers who work with her."



### How to recognise old man's beard

The stems of old man's beard have lengthwise ridges and can grow many metres in a year. In summer or early autumn it has small white flowers with four petals. The resulting whitish, fluffy seedheads are very noticeable in autumn and winter. Old man's beard loses its leaves for winter. The leaf spike has five leaflets, except on seedlings which have one to three leaflets on each spike.

*Julian's Pond, south-east of Opunake has a range of indigenous species, including nationally threatened plants.*

# Freshwater biodiversity

Taranaki's rivers, streams and wetlands support a diverse array of plants and animals. Some of New Zealand's most threatened species depend on healthy freshwater habitats for their very survival.

Pollution has a devastating effect on life forms that are dependent on waterways. Harvesting fish species, draining wetlands and building structures within waterways can also impact habitats and freshwater biodiversity. If left uncontrolled, invasive pest fish, aquatic plants and algae can have a considerable impact on the biodiversity and community health of freshwater systems. People often unintentionally spread freshwater weeds by leaving fragments on recreational equipment. Aquatic weeds can displace native freshwater species or generally disrupt the structure and functions of the ecosystem. The often deliberate introduction of pest fish species may also impact on freshwater biodiversity with pest fish preying on, competing with, and displacing indigenous aquatic plants and fish species.

The Council has major operational programmes in place to manage significant wetlands and keep track of the extent and condition of the remaining wetland areas in the region. Initiatives to enhance freshwater quality are also in place, and with better control of point-source pollution and diffuse run-off, freshwater quality is improving. Each year, we measure freshwater biodiversity through a number of programmes, particularly as part of our freshwater quality monitoring. Additionally, we collate data on built structures within waterways and on any modifications to waterways and require fish passage to be installed where there are in-stream barriers to fish. As part of resource consenting processes, we periodically collect data on freshwater fish in streams and rivers.

# Wetlands

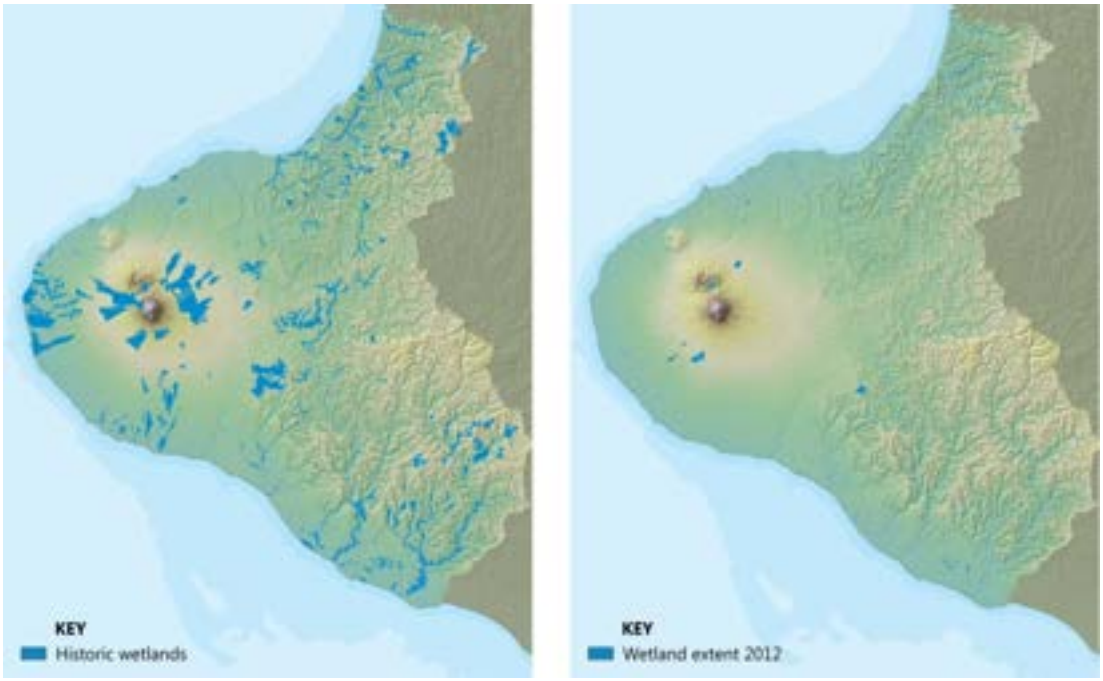
Wetlands, such as swamps, marshes, and bogs are the meeting ground of land and fresh water. They are some of the most diverse ecosystems in the world and support a huge variety of life. An important characteristic of wetlands is that they filter out nutrients and sediment from farm run-off. This is important in controlling water flow and improving water quality.

The wetlands of Taranaki are home to a variety of native species, including rare and threatened species. As with land species, a reduction in habitat also affects wetland species, often leading to a reduction in biodiversity.

## Wetland extent

Since the time of human settlement of New Zealand, much of the region's original wetland area has disappeared. Estimates are that as of 2007, only about 10.1% of New Zealand's original wetland remains—less than 5% throughout the North Island. In Taranaki, about 8.1% or 3,291 hectares of wetland habitat remains.

The Council manages wetlands in the region in a range of programmes. To monitor the extent of remaining wetlands in Taranaki, we periodically map changes to the extent of wetlands using aerial photography.




*Wetland areas in the region prior to human settlement (left) compared to those mapped in 2012 (right).*

## What's the story?

Results of the latest wetland mapping show a significant reduction in the rate of loss to the areal extent of wetlands in Taranaki. This reduction can be attributed, in part, to the Council's wetland programme and effective application of the rules contained in the *Regional Fresh Water Plan for Taranaki (2001)*.

Between 2001 and 2007, an estimated 121 hectares of wetland in the region was lost. However, between 2007 and 2012, only 42 hectares or 1.3% of our total wetland areas was lost—a 60% reduction in the annual rate of loss to wetland area.

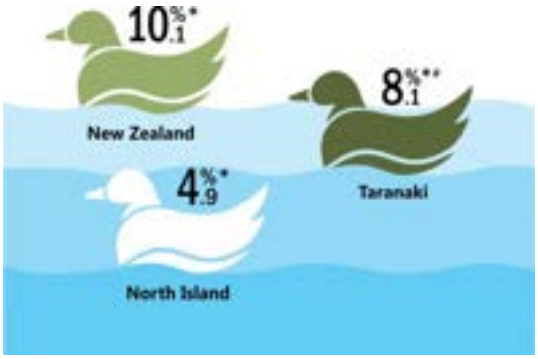
The greatest loss occurred in areas of palustrine wetland, covered with rushes and sedges, which are the most common wetland in the region.

*'A 60% reduction in the annual rate of loss to wetland area.'*

## Condition of wetlands

Every two years, the Council conducts a basic ecological assessment of the condition of regionally significant wetlands. A more comprehensive biodiversity assessment for sites that are also KNEs occurs every five years.

Council officers also record the presence of threatened or regionally distinctive species whenever they are sighted. Some wetland bird species are informally monitored using call surveys. We also work with landowners to improve habitat and predator control where these species are found.




*The percentage of original wetlands that remain in Taranaki and in New Zealand overall. Note: Data from*Ausseil et al., 2008 and #Newsome and Sutherland, 2014. Figures exclude Lake Rotorangi.*

## What's the story

In 2007, only 39 regionally significant wetlands had additional formal protection (in full or part) outside of *Regional Fresh Water Plan* rules, either by DOC (if the wetland lies wholly or partly on DOC land) or under a covenant or caveat on the title. As of June 2014, that number had risen to 58 or 76% of all regionally significant wetlands. The Council continues to work on securing additional formal protection for the remaining 18 regionally significant wetlands.

To assess the basic ecological state of wetlands, we examine the indigenous vegetation and the presence and abundance of indigenous fauna. We also look at protection measures, such as fencing, weed and predator control, and any evidence of drainage. The area is given a basic 'condition score', from 'Poor' to 'Excellent' which is used to rate the overall state of the wetland.

A snapshot of 40 wetlands assessed between 2010 and 2012, showed 76% of wetlands assessed were in 'Excellent', 'Very good' or 'Good' condition. Only 5% were found to be in 'Poor' condition.

Reassessment of these sites has been underway since 2013 and to date, 27 sites have been reassessed. Of those 27, preliminary results show an improvement in 72% of wetlands that are managed with a Council-developed biodiversity plan, compared with only 31% of wetlands not managed by a plan.

The main improvements in sites with plans are in the dominance and condition of native vegetation in and around the wetland—the result of improved fencing and weed/pest control.


*Out of the 40 wetlands assessed between 2010 and 2012, 76% were in 'Good' condition or better. Of those 20% were considered to be in 'Excellent' or 'Very good' condition.*

## Find out more

☎ *An inventory of regionally significant wetlands of Taranaki (TRC, 2005)*
*Newsome, P.F. and Heke, H.A. 2010: Mapping wetlands of the Taranaki Region 2001–2007. Landcare Research report prepared for Taranaki Regional Council.*
*Newsome, P.F. and Sutherland, A. 2014: updates to Taranaki Wetlands layer to 2012.*

*David and Marie Russell tinyurl.com/TRC6n*

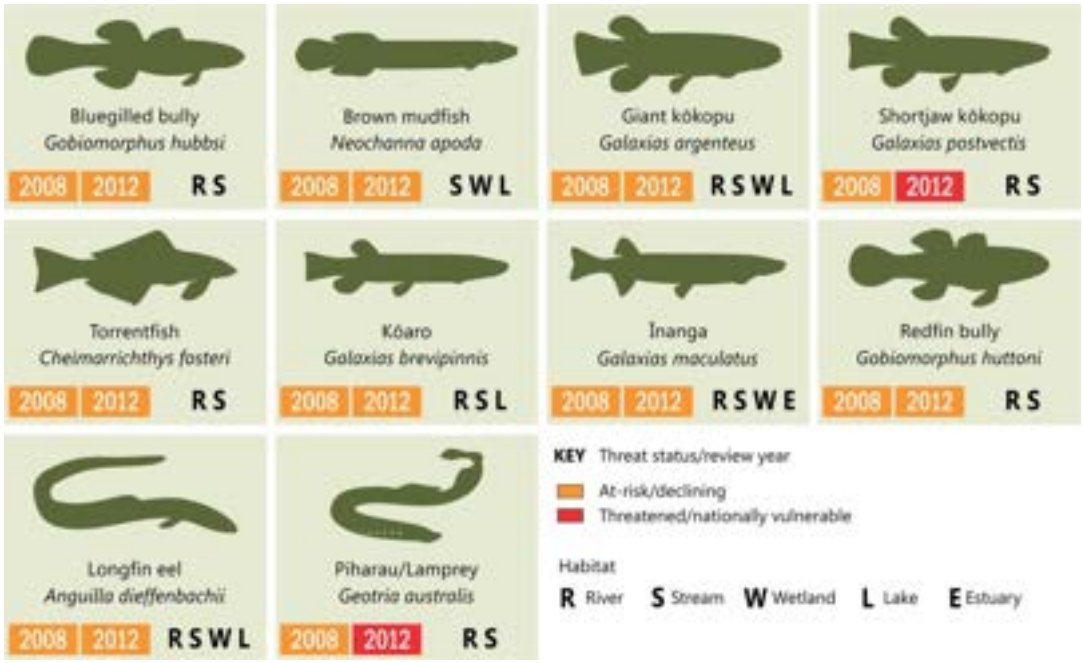
# Freshwater fish

Taranaki has 20 recorded species of indigenous freshwater fish. When processing resource consent applications to construct dams, weirs and culverts on the region's fresh waters, the Council considers the provisions for fish passage as part of the assessment and implements subsequent monitoring. We also consider freshwater fish and other species when assessing consents for water abstraction. DOC monitors the number and abundance of species of freshwater fish in the region.

## What's the story?

Of the species of freshwater fish in the region, more than half are nationally at risk or under threat. The young of five species found in Taranaki make up the typical whitebait catch in North Island West Coast rivers, including one threatened and three at-risk/declining species. Piharau (or lamprey) and the shortjaw kōkopu have been declining nationally and are classified as threatened/nationally vulnerable.

Also at-risk/declining on a national scale is the longfin eel, which breed only once in their lifetime and live for a long time—some are recorded at more than 100 years old. Nationally at risk from overfishing, loss of habitat and the construction of barriers such as large dams, these native eels also appear to be declining in Taranaki. Two catchments surveyed in 2012 showed very few juveniles and a lack of large adult females.




*About 50% of Taranaki's 20 recorded species of native freshwater fish are considered threatened or at-risk nationally.*

## Find out more

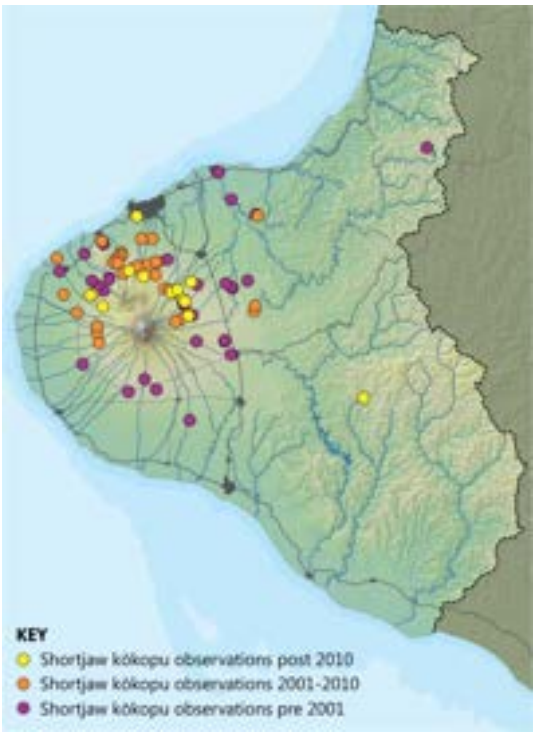
*Status and management of the longfin eel tinyurl.com/TRC6p*

*Summary of changes to the conservation status of taxa in 2008–11 New Zealand Threat Classification System listing cycle (DOC, 2013) tinyurl.com/TRC6r*

DOC surveys of 24 sites undertaken in 2011 and 2012 highlighted eight streams as important sites for large galaxiids, either because there was a high abundance of a large galaxiid species or there was good species diversity.

No large galaxiids were found in six catchments, despite at least one of the four large galaxiid species having been found in those catchments in prior surveys. In six other catchments a new large galaxiid species was found that had not been seen there before.

*Shortjaw kōkopu.*




*Known locations of shortjaw kōkopu in the Taranaki region.*

## Taranaki's unique mudfish

The native brown mudfish is a remarkable creature in that it is able to survive the summer months when its wetland habitat completely dries out. The mudfish becomes active again when the water returns, getting on with the business of breeding.

The resilient brown mudfish (*Neochanna apoda*) can be found in Taranaki's wetlands. Three sites have been monitored for its presence since 1994, with a further two sites added in 2002.

Juvenile mudfish are observed frequently at four of the monitored sites, showing that breeding is occurring and that the current populations of fish are healthy. Three new populations of brown mudfish have been found in the region in the past five years. We are currently working with the landowners in an effort to protect these newly discovered populations.

*Taranaki wetlands are an important habitat for the native brown mudfish.*

*Lamprey.*

CASE STUDY

# Calling on all its strength

If the legendary strength of the piharau, or lamprey, is not quite enough to meet the challenges which today classify it as a 'nationally vulnerable' species, then it has some determined friends on its side.

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Adult lamprey (*Geotria australis*) spend most of their life at sea but migrate up freshwater rivers to spawn in autumn and winter. Reputations are often made in epic migrations and the lamprey is no exception, starring in its own whakataukī (proverb/saying): "He manawa piharau", which means "one with sustained strength". This is based on stories, factual and otherwise, of the species climbing waterfalls and other seemingly impassable barriers in its quest to reach its spawning grounds.

Juvenile lamprey don't display any hint of their future prowess. When very young they are muddy brown in colour and look a bit like small eels, except they have seven gill openings and no eyes. As they approach the time to migrate out to sea, they develop eyes and change to a bright silvery-blue colour, just like the adults. However, they are only about 10 cm long at this stage—they will grow to 40 cm as ocean-going adults.

Adult piharau have long been a great delicacy and a taonga species for Māori, who developed special harvest methods such as the "pa or utu piharau" and the "whakaparu" during their migration upstream. Historically, a number of Taranaki rivers were known as harvesting hot spots and even today are protectively guarded by individual whanau who maintain the fishing rights.

In times past, vast numbers were harvested. According to a 1922 report (Phillips and Hodgkinson), "several tons of this species were captured at a spot near New Plymouth" while at the Waitara River, in "a single night's netting during a fresh in June, three large sacks were filled". But anecdotal evidence indicates that fish stocks have declined markedly, and continue to do so. It's now a good haul to get a dozen where hundreds were reported a decade ago.

The piharau was the subject of a recent hui at Kairau Marae in Waitara, attended by whanau representatives from around the country along with scientists and other interested groups. They lent their weight to a research project by NIWA looking at lamprey spawning, range and navigation. They also decided to support research into a condition called lamprey reddening syndrome which is killing the species in Murihiku (Southland). The hui also decided to record the Mātauranga Māori (knowledge) attached to the piharau, and to hold similar gatherings in future.

*'The Council has been undertaking monitoring to increase understanding of the lamprey ...'*

Meanwhile, the Taranaki Regional Council has been undertaking monitoring to increase understanding of the lamprey and which catchments it inhabits.

Since 2005, lamprey have been recorded at seven sites, including one (Tāngāhoe River) where it had not been recorded before. Very small numbers were recorded at most sites except at the Kurapete Stream near Inglewood, and the Matau Stream near Matau, where good numbers of juvenile lamprey were found. These streams will be considered for inclusion in a more extensive monitoring programme.

*Lamprey mouth.*

# Fish passage

A number of indigenous species rely on Taranaki's more than 20,000 kilometres of rivers. Rivers and streams are also a significant spawning habitat for whitebait species such as īnanga.

Historically, land development such as stream realignment has contributed to a loss of freshwater habitats and reduced biodiversity. A huge effort to fence and plant riparian margins of rivers and streams in the region has been made over the past two decades, largely on the intensively farmed ring plain and coastal terraces. These efforts have greatly benefited freshwater quality and habitats.

Structures such as dams, and poorly-constructed culverts and weirs can also impact biodiversity. Fifteen of the 20 known freshwater fish species in Taranaki are diadromous, meaning that as part of their lifecycle they migrate to and from the sea. Barriers such as dams and culverts can restrict or completely prevent the upstream migration of some of these species, interrupting the breeding cycle.

*Incorporating a clear passage for fish when constructing the Kapuni water intake channel earned the South Taranaki District Council a TRC Environmental Award in 2014.*

The Council collates data on stream and river bed modifications in the region to determine the state and trends in freshwater habitats for indigenous biodiversity and the need for intervention. In 2001, the Council compiled an inventory of known or potential barriers to fish passage. Over time, we have worked with stakeholders to investigate and/or resolve the barriers registered in the inventory, which are often 'orphaned' (remnants of an historical activity for which no-one has responsibility).

## What's the story?

Since 2001, when the Council began investigating barriers to fish passage in rivers, the number of known structures with the potential to present barriers, including culverts, fords, dams and weirs has steadily decreased. In 2001 there were 61 structures requiring further action and or monitoring. In 2014 the number had reduced to 44. This includes 'orphaned' structures.

The number of consented structures registered in the inventory as requiring no action (where adequate fish passage is provided) has increased from 37 in 2001 to 53 in 2014.

As part of resource consent compliance, the Council has recently implemented a monitoring programme for culverts and access structures (such as fords) that includes monitoring the consideration of fish passage. This is expected to further improve fish passage in Taranaki with increased awareness also likely to lead to better reporting from the public regarding barriers that are not currently known to the Council. As part of *Regional Fresh Water Plan* regulations, resource consent for any structure or activity taking place on a river bed now requires consideration of fish passage.

In terms of modifications to streams, between 2008 and 2014 the Council granted 83 consents to pipe streams, totalling 23.2 kilometres of stream in the region.

In the same period, just less than seven kilometres of stream was realigned, under 44 consents. Although more consents to realign streams were granted between 2008 and 2014 than between 2003 and 2008—44 compared with 28 consents, fewer kilometres of stream were actually realigned—6.8 kilometres between 2003 and 2008 compared with 6.7 kilometres between 2008 and 2014.

# Macroinvertebrates

The small freshwater insects, crustaceans, worms and snails that live in fresh water are collectively known as freshwater macroinvertebrates. The Council monitors the diversity of freshwater macroinvertebrates as part of water quality monitoring programmes because the composition of these communities gives the best indication of water quality and habitat health.

## What's the story?

The diversity of macroinvertebrate species tends to be higher in ring plain streams that drain Egmont National Park than in lowland coastal streams or hillcountry streams, particularly in the number of different types of caddisflies, crustaceans, stoneflies and mayflies.

In general terms, the stonefly, caddisfly and mayfly prefer harder substrates (such as rock) and good water quality at higher altitudes where the temperature is cooler. Trueflies, dipterans, and worms tend to be more tolerant of nutrient enriched water, warmer temperatures and other factors that affect water quality, so are more abundant further downstream from the mountain.

The most diverse macroinvertebrate class in the region's fresh waters is trueflies, with 30 different varieties. Second is caddisflies with 27.

For more information on how these species help us determine the ecological quality of water, and trends in the ecological health of the region's streams, including biodiversity, see Chapter 3—Fresh water.

*Stoneyfly nymphs generally prefer good-quality water.*

| | Large east hill country | Lowland coastal stream | Ring plain rising in National Park | Ring plain rising outside National Park | Small (lowland) hill country | TOTAL |
|---|---|---|---|---|---|---|
| Worms | 4 | 3 | 3 | 2 | 2 | 4 |
| Beetles | 7 | 6 | 7 | 7 | 7 | 7 |
| Crustaceans | 15 | 10 | 16 | 11 | 11 | 17 |
| Trueflies | 22 | 25 | 29 | 27 | 26 | 30 |
| Mayflies | 13 | 7 | 15 | 13 | 10 | 15 |
| Bugs | 3 | 4 | 4 | 4 | 4 | 4 |
| Molluscs | 7 | 9 | 9 | 9 | 11 | 11 |
| Dragonflies | 2 | 6 | 5 | 5 | 7 | 7 |
| Flatworms | 3 | 3 | 4 | 4 | 4 | 4 |
| Stoneflies | 6 | 3 | 10 | 7 | 7 | 10 |
| Caddisflies | 22 | 16 | 26 | 24 | 21 | 27 |
| Neuroptera | 0 | 0 | 1 | 1 | 0 | 1 |

*Streams arising from Egmont National Park generally have the greatest variety of caddisflies, stoneflies and mayflies.*

*'Our aim is that all riparian planting and fencing will be completed by the end of the decade ...'*

*The Umutekai Wetland on the outskirts of New Plymouth.*

# Our responses

## Regional Fresh Water Plan

The *Regional Fresh Water Plan for Taranaki*, made operative in 2001, contains objectives, policies and rules for managing freshwater biodiversity. These include the protection of regionally significant wetlands (as listed in Appendix II and III of the plan), the requirement of resource consent to drain any wetlands greater than five hectares in size and provision for fish passage past man-made structures.

The Council first reviewed the effectiveness and efficiency of the *Regional Fresh Water Plan for Taranaki* in 2008. In response to concerns raised by DOC and Fish and Game New Zealand, a technical discussion document *Maintaining indigenous freshwater biodiversity in the Taranaki region* was prepared in March 2013, and the Council is working with key stakeholders on options that will better protect our remaining wetlands and other indigenous biodiversity values. This is part of the review of the *Regional Fresh Water Plan for Taranaki* currently underway.

## Future directions

In addition to a review of the *Regional Fresh Water Plan for Taranaki*, the Council's *2008 Biodiversity Strategy* is currently under review. The future strategy will further develop the Council's current biodiversity programmes and initiatives. It will also include implementation of a comprehensive State of the Environment monitoring programme for palustrine wetlands—freshwater wetlands fed by rain, ground water or surface water but not directly connected to estuaries, lakes or rivers. Palustrine wetlands are the most common wetland in the region and under the greatest pressure.

## Wetland protection

Council spending in protecting wetlands has doubled from $287,550 in 2008/2009 to $555,622 in 2013/2014. The Council has a range of programmes that protect wetlands across the region, including the *Regionally Significant Wetland Programme,* the *Key Native Ecosystem Programme* and the *Riparian Management Programme*. Combined, these programmes cover 2,194 hectares of the 3,249 hectares of wetland area in the region, or 67.5%.

## Regionally Significant Wetland Programme

The *Regionally Significant Wetland Programme* targets the 76 wetlands or groups of wetlands identified in the Inventory of Regionally Significant Wetlands of Taranaki (2005). These areas are considered regionally significant wetlands (RSW) because they are greater than five hectares in area and/or because there are threatened, at-risk or regionally uncommon indigenous species present. All RSWs are protected by regional rules contained in the *Regional Fresh Water Plan for Taranaki*.

The Council advocates for the protection of these wetlands with a particular focus on fencing, weed control, and supplementary planting. Grants are provided to landowners and occupiers to help with the costs of enhancement and protection. Over the past few years, the Council has worked hard to ensure regionally significant wetlands also have additional legislative protection (such as a QEII covenant).

## Key Native Ecosystem Programme

The Council actively manages a selection of wetlands via the *Key Native Ecosystem (KNE) Programme* and will continue to focus on adding wetland areas on private land to the KNE programme. We will also continue to focus on implementing biodiversity plans for wetlands that meet KNE programme criteria.

This will lead to continued improvements in the condition of wetland areas in the region, as shown in the majority of wetlands with a biodiversity plan that have been assessed since 2013.

## Riparian Management Programme

To date, we have made significant strides in riparian management in the region, with 2,483 Council-prepared riparian plans covering the fencing and planting of 13,836 kilometres of stream bank (see Chapter 3—Fresh water for more detail).

Long promoted as an effective measure to protect and enhance the quality of waterways, riparian management also has positive biodiversity spin-offs. The Council's own research has shown riparian fencing and planting to be a biodiversity success in Taranaki. Among other things, the research has found the diversity of native and introduced bird species to be higher in planted sites than in non-planted sites, and in older plantings than in younger plantings. Overall research indicates that planting of riparian margins is creating new habitats for native plant and bird species where none existed previously, leading to an improvement in the biodiversity of the region.


*Riparian management plans covering almost all of the ring plain and coastal terraces create potential wildlife corridors in the region.*

Currently 665.7 hectares of wetlands (individually larger than 0.5 hectares) that are mapped on our database are covered by riparian plans. Many smaller wetlands will be identified and captured by riparian plans over time. The Council expects that all riparian planting and fencing of wetlands and stream banks will be complete by the end of the decade, and that implementation of plans will become mandatory.

## Pest management

The Council's pest management strategies identify a number of fish and aquatic plants as pests in Taranaki and we work with DOC, the Ministry for Primary Industries (MPI), and the National Institute of Water and Atmospheric Research (NIWA) to prevent these pests from establishing or spreading in the region.

Small populations of koi carp, rudd and gambusia are present in the region. The pest fish, gambusia, has currently been found at only five sites in Taranaki. In conjunction with DOC, the Council has recently worked to eradicate gambusia from one site in Kaimata. Routine monitoring of Lake Rotorangi, conducted by both the Council and NIWA, shows fluctuations of invasive oxygen weeds from year to year. Egeria (*Egeria densa*) is usually the most dominant oxygen weed species.

In 2012, the invasive hornwort was detected for the first time in Lake Rotorangi, most likely spread by recreational boats. Subsequent surveys of Lake Rātāpiko, Lake Rotomanu, Lake Opunake and Lake Rotokare did not detect any further infestations.

The Council works with MPI to raise awareness of the invasive algae didymo, conducting an annual awareness campaign in the region. Eight years of monitoring have found no evidence of didymo in Taranaki.


*Pest fish in Taranaki from top: gambusia, rudd and koi carp. Council staff work with DOC to eradicate gambusia at Kaimata (bottom).*

### Find out more

*Biodiversity in Taranaki (TRC website)*
*www.trc.govt.nz/Biodiversity*

*Proposed National Policy Statement on Indigenous Biodiversity (MfE, 2011)*
*tinyurl.com/TRC6j*

*Regional Fresh Water Plan for Taranaki*
*tinyurl.com/TRC6u*

*Regional Policy Statement for Taranaki*
*tinyurl.com/TRC6g*

*'The 300 kilometres of Taranaki coastline is dominated by coastal cliffs and rocky shores ...'*

# Coastal and marine biodiversity

The Taranaki coastline is rugged and exposed, and its marine habitats include intertidal and subtidal reefs, estuaries and mudflats, coastal cliffs, sandy beaches and dune systems. The region's coastal waters are home to a range of species, including the critically threatened Māui dolphin. Human activities and natural processes both impact on coastal and marine biodiversity in the region to varying degrees, depending on particular zones and habitats.

The Council undertakes representative monitoring of intertidal communities and coastal dune vegetation and some marine pest control. With relatively few marine pests currently in Taranaki's waters, it is important to prevent the spread of invasive species into the region. The organisations with main responsibility for marine pests are DOC and the Ministry for Primary Industries (MPI). As part of their surveillance programmes, MPI and NIWA survey Port Taranaki twice a year for foreign marine organisms that could threaten the marine environment.

Other aspects of biodiversity are managed by a number of other agencies, including DOC and MPI.

# Coastal habitats on land

The 300 kilometres of Taranaki coastline is dominated by coastal cliffs and rocky shores. There are also smaller areas of sand dunes and estuaries. The coastal cliffs and dune systems support many of the region's threatened and uncommon species, including rare and fragile plant communities. Coastal habitats in Taranaki are vulnerable to many natural processes that can occur on an exposed and rugged coast, and in places they have also suffered as a result of vegetation clearance, erosion and development.

## What's the story?

As at 2011, there were an estimated 15,669 hectares of sand dunes in Taranaki, including coastal beaches and uplifted areas above coastal cliffs. Almost 12,000 hectares or 76% of these dunes are used for agriculture or horticulture. Less than 2,000 hectares (12%) are still considered indigenous or partially modified. Nationally, patterns are similar. Estimates in 2003 determined that only 11.6% of New Zealand's sand dunes had retained some degree of natural character.

In terms of coastal birdlife, 19 species of seabird are known to use the protected islands and waters around Ngāmotu or the Sugar Loaf Islands, off New Plymouth. Taranaki has one confirmed mainland breeding colony of grey-faced petrels, the southern-most known mainland breeding site in New Zealand. Little blue penguins, the smallest penguins in the world, are nationally considered at-risk/declining and nest along accessible parts of Taranaki's coastline. Breeding attempts have been recorded for the threatened New Zealand dotterel on the dunes around Sandy Bay.

Rare and threatened coastal herb fields grow along the cliffs of South Taranaki. They are home to threatened local species such as the regionally distinctive coastal herb *Limosella* or 'Manutahi' and the endemic day-flying moth *Notreas* or 'Taranaki'. Natural coastal dune systems in Taranaki, which are rare, support at-risk coastal dune plants, such as pīngao.

*New Zealand dotterel.*

# Rocky reef communities

The diversity of intertidal communities at different reefs around Taranaki depends on a range of largely natural factors including substrate stability, exposure to waves and sand cover. Taranaki's intertidal area is dominated by rocky reefs that provide a wide range of habitats and ecological niches. Some organisms are adapted to living on top of boulders, able to endure extreme temperature ranges, exposure to waves and the risk of drying out. However, the undersides of boulders offer a more stable habitat less prone to these extremes and as a result, more diverse communities can be found here.

The results of the Council's monitoring of intertidal rocky reef sites, including the effects of sand accumulation, are discussed in Chapter 4—Coast. The biodiversity of species in intertidal rocky reef habitats is discussed here.

## What's the story?

The dominant fauna found on the surface of reef boulders include snails, limpets, barnacles and tube worms. These organisms are well adapted to the fluctuating extremes of their environment.

Under-boulder communities are relatively diverse across Taranaki's intertidal region. Communities include at least four species of anemone, eight species of chiton, six species of nudibranch and five species of starfish.

Coralline turf is the dominant seaweed cover at the majority of Council rocky shore sites, which are located between the mid and low-shore. This hardy algae is relatively resistant to sand cover and provides valuable habitat for juvenile cat's eyes (*Turbo smaragdus*).

*Juvenile cat's eyes (*Turbo smaragdus*) begin their journey within the hardy coralline turf before moving further down shore at about 18 months old.*

Natural sand accumulation impacts the diversity of intertidal communities in Taranaki. One of the more sand tolerant species in the region is the colonial tube worm *Neosabellaria kaiparaensis*. This tube worm thrives in sand rich environments, such as the Orapa Reef, and can dominate as a species, preventing other rock dwelling organisms from colonising the area. The impact of sand accumulation on rocky shore diversity is discussed in Chapter 4—Coast.

The stability of the substrate also impacts on the diversity of intertidal communities in Taranaki. For example, on parts of the Waiwhakaiho Reef, encrusting organisms struggle to settle on the moving cobble. As a result, diversity is low and the community is dominated by the half crab (*Petrolisthes elongatus*), which is able to scuttle and filter-feed between the rounded cobbles.

Typically in Taranaki, the areas of intertidal reef with the most diverse communities have a range of stable habitats with minimal sand accumulation. At such reefs, for example Mānihi Road Reef, the mean number of species can exceed 20 per 0.25 $m^2$ quadrat.

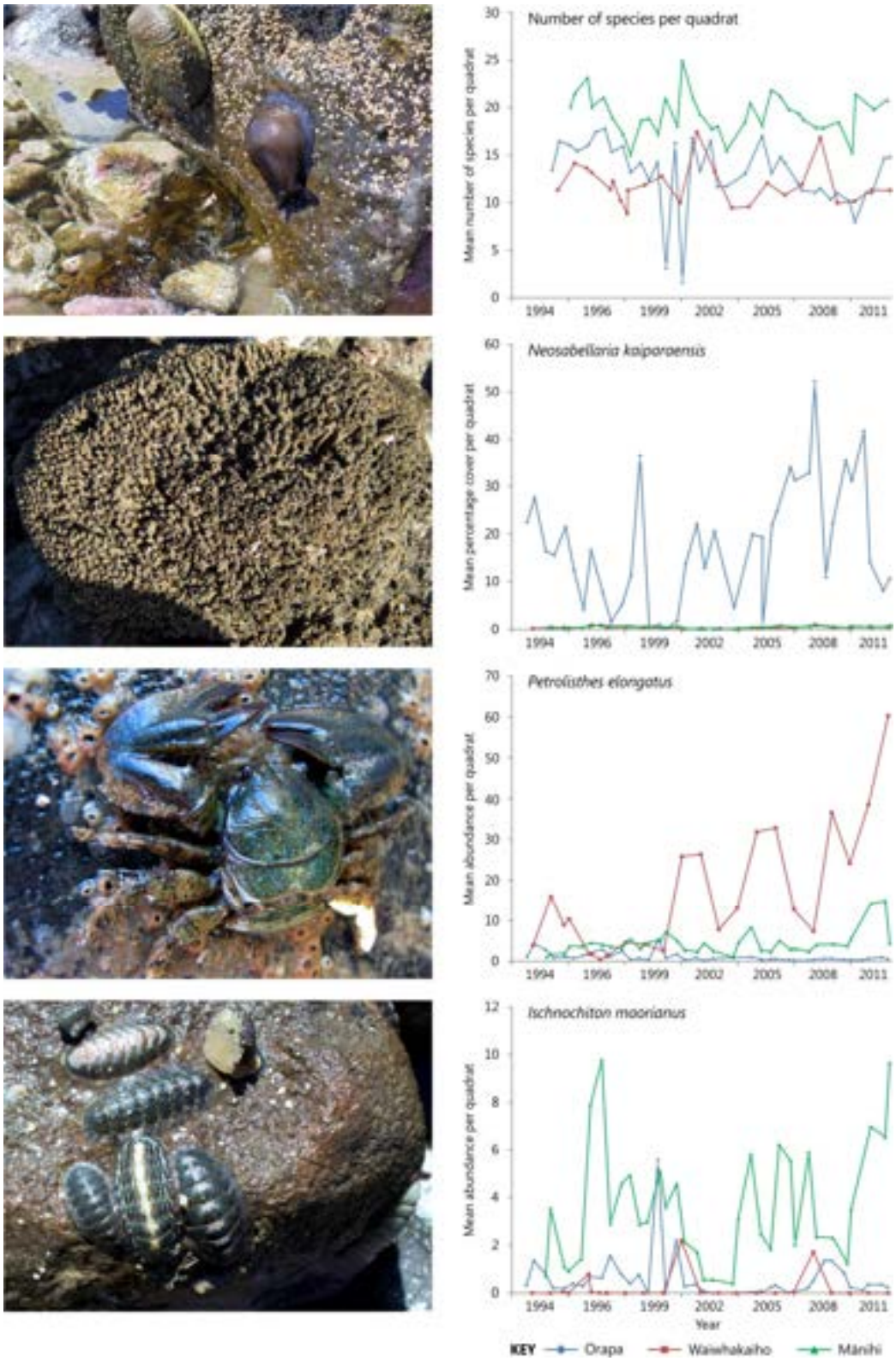
## Find out more


*Morton, J. (2004) Seashore ecology of New Zealand and the Pacific.*

*Paulin, C. and Ryan, P. (2014) Taranaki's Rocky Shore.*

*Walsby, J.R. (1977) Population variables in the grazing turbinid Lunella smaragda (Mollusca: Gastropoda). New Zealand Journal of Marine and Freshwater Research, 11:2, 211-238*

*Rocky shore ecology state of the environment monitoring report (TRC)*




*Examples of diverse rocky reef communities include sea slugs* Scutus breviculus *and pāua* Haliotis iris *(top). The colonial tube worm* Neosabellaria kaiparaensis *(second from top) is tolerant of high sand accumulation typical of the Orapa Reef; the half crab* Petrolisthes elongatus *(third from top) is well adapted to shifting cobble substrate such as that of the Waiwhakaiho Reef and the variable chiton,* Ischnochiton maorianus *(bottom) requires stable under-boulder habitat, such as that of the Mānihi Road Reef.*

*Colourful marine molluscs found around the Taranaki coastline include (clockwise from top left) common New Zealand octopus* Pinnoctopus cordiformis*; seaslug* Alloiodoris lanuginata; *chiton* Notoplax violacea*; seaslug* Archidoris wellingtonensis*; pāua* Haliotis iris*; and seaslug,*Tularia bractea.

*Council scientists collect samples from the soft sediments of the estuary.*

# Estuarine communities

Although we do not monitor water quality in the region's estuaries, it is generally understood that water quality is good and that biodiversity in Taranaki's estuaries is more impacted by natural processes than by other activities. The region's estuaries are well flushed with fresh water, making them a harsh environment for marine life. As a result, the number and diversity of fish and shellfish is low. Burrowing fauna such as worms, sand-hoppers, cockles and pipis, can survive these conditions and are a valuable food source for the juvenile fish and wading birds that take refuge in estuaries.

*'Biodiversity in Taranaki's estuaries is more impacted by natural processes.'*

In South Taranaki, the Waitōtara and Whenuakura rivers have been highly modified over time, with large areas of land being cleared for farming. They also drain mudstone catchments and frequently flood. This means that the level of silt is high in these rivers, a factor which reduces the number and diversity of species in the lower estuaries. The Tongaporutu and Mimi catchments in north Taranaki are not as extensively modified. The Council monitors communities annually at two estuaries—Tongaporutu and Waitōtara.

## What's the story?

Typical of other estuaries in New Zealand, both the Tongaporutu and Waitōtara estuaries are dominated by sandhoppers, pipi, cockle, trough shells, marine bristle worms and mud snails.

In February 2004, severe flooding of the Waitōtara River led to significant silt movement in the catchment. As a result, very few marine organisms were detected in the April 2004 survey. Typically, estuarine communities recover from flooding and increase in number within a year, particularly sandhoppers. Between 2008 and 2014, the dramatic deviation seen in 2004 was not repeated. However, some years, such as 2009, exhibited dips in the number of organisms due to natural variations in sediment levels. For further information about New Zealand estuaries, see the NIWA research website.

### Find out more

*Estuaries—education material (NIWA website) tinyurl.com/TRC6v*

*'A clown nudibranch spotted in Parininihi marine reserve ...'*

# Protected areas

Within the Taranaki coastal marine area there are two marine reserves—Parininihi and Tapuae, established in 2006 and 2008, respectively. There is one marine protected area—Ngāmotu or the Sugar Loaf Islands Marine Protected Area, established in 1983. All reserves and marine protected areas are managed by DOC.

## Ngāmotu/Sugar Loaf Islands

Just offshore of New Plymouth, Ngāmotu or the Sugar Loaf Islands are semi-sheltered—unique along a coastline that is generally very exposed. Subtidal marine habitats around these islands include spectacular canyons, caves, rock faces with crevices and overhangs, large pinnacles, boulder fields and extensive sand flats. Distinct from the rest of Cape Egmont, the sea stacks and islands provide the most firm and stable substrate on the Taranaki coast.

The Sugar Loaf Islands are important for 19 species of seabird, with approximately 10,000 seabirds nesting annually. There are also at least 89 species of fish, 33 species of encrusting sponges, 28 species of bryozoans and nine species of nudibranchs. In 1992, the first evidence of New Zealand fur seals breeding on the Sugar Loaf Islands was observed and they now host the largest New Zealand fur seal rookery on the west coast of the North Island.

*Ngāmotu (the Sugar Loaf Islands) is a Marine Protected Area, established in 1983.*

## Parininihi Marine Reserve

The Parininihi Marine Reserve in the south-eastern reaches of the North Taranaki Bight comprises the Pariokariwa Reef and surrounding sand and mud areas. The reserve provides a home to a variety of fish species including the blue cod, blue moki, red moki, gurnard, John Dory, leatherjacket, kahawai, red cod, tarakihi, trevally and snapper. The reserve is also a valuable habitat for rock lobster. However, what makes it unique is its collection of rare and exotic sponges, which are spread in a vividly coloured carpet across the ledges of the Pariokariwa Reef.

*Kina, or sea urchins, are found in Tapuae Marine Reserve.*

## Tapuae Marine Reserve

The Tapuae Marine Reserve adjoins Ngāmotu/Sugar Loaf Islands Marine Protected Area and is home to approximately 400 species of fish. Many fish species are associated with the reef areas of the Tapuae Marine Reserve, including triplefins, red moki, leatherjackets, butterfly perch, scarlet wrasse, spotty, blue cod and short-tailed stingray. Ocean species such as John Dory, kingfish, kahawai, gurnard, snapper, trevally and mullet are also commonly seen here. The Tapuae Marine Reserve is also home to a diverse range of invertebrates, including rock lobster, kina, sponges, molluscs and starfish. Killer, humpback, and southern right whales have all been observed within the reserve area.

*Around 400 species of fish live in the waters of the Tapuae Marine Reserve.*

## DOC monitoring within protected areas

Between 2008 and 2014, DOC conducted two seasons of predatory fish monitoring in each marine reserve (Tapuae 2011 and 2013, Parininihi 2012 and 2014). Currently, there is still insufficient data to determine the effectiveness of the no-take areas on the marine communities living within and adjacent to the marine reserves.

## Subtidal reefs

Some of Taranaki's subtidal reefs are considered 'areas of outstanding natural character'. These include the North and South Traps, two distinctive pinnacle reefs off the South Taranaki coast, and the Pariokariwa Reef, which lies within the Parininihi Marine Reserve.

The Pariokariwa Reef is internationally valued for its sponge garden. These dense assemblages cover about 75% of available reef surface and are among the densest and most diverse communities in New Zealand. A report by Battershill and Page (1996) provides evidence that, in terms of biodiversity values, sites on Pariokariwa Reef are important on a national and global level, with diversity comparable to sites in Antarctica.

*Some of Taranaki's subtidal reefs are considered areas of outstanding natural character.*

### Find out more

*Marine reserves and protected areas (DOC website) tinyurl.com/TRC6w*

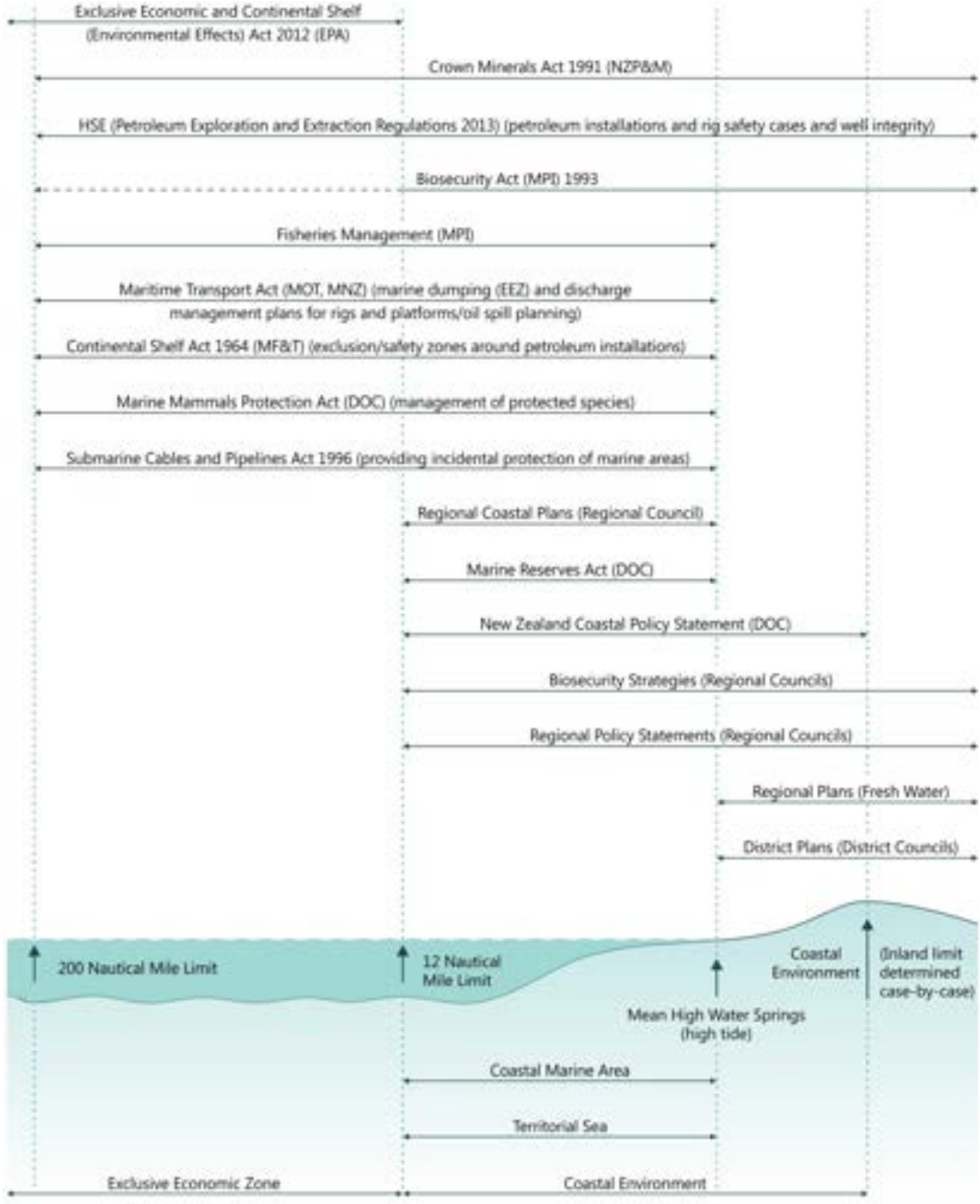
*Ballantine, B. (2014) Fifty years on: Lessons from marine reserves in New Zealand and principles for a worldwide network. Biological Conservation, 176, 297-307*

*Battershill, C.N. and Page, M.J. (1996) Preliminary survey of Pariokariwa Reef North Taranaki. NIWA Report: 1996/10-WN, Prepared for Department of Conservation Wanganui*

# Our responses

## Regional Coastal Plan for Taranaki

The *Regional Coastal Plan for Taranaki* was made operative in 2001 and contains objectives, policies and rules to manage Taranaki's coastal marine area sustainably is currently under review. These policies, methods and rules govern activities from the mean high water spring out to 12 nautical miles. A number of agencies have responsibility for the coastal and marine area of Taranaki:




*A large number of agencies and organisations have jurisdiction in various aspects of coastal marine management.*

*Grey-faced petrel.*

CASE STUDY

# Biodiversity buzz **benefits birds**

Grey-faced petrels (*Pterodroma gouldi*), or ōi, are native seabirds that frequent the coastal waters around New Zealand. Once widespread throughout the North Island, breeding colonies are now limited to offshore islands and a few scattered mainland sites, such as the one at Rapanui near Tongaporutu.

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The Council's Biodiversity team works closely with the Rapanui Grey-Faced Petrel Trust, which is a small organisation achieving big results—and not only for the bird species whose habitat it cares for. Since the Trust erected a predator-proof fence a decade ago, bird numbers have increased at what is the region's only remaining mainland colony for grey-faced petrels—once an abundant species throughout Taranaki.

*'The Council team is enthusiastic and that rubs off on everyone.'*

Although not a threatened species, the petrels can pose challenges for those working to protect and enhance their breeding ground. Occasionally, for example, birds are caught short if nest burrows have not been finished and lay their eggs right at the entrance. And birds are not only nesting in the main colony, but also on a small cliff stack just off the mainland. Here, they can be heard being very active after dark.

The colony is classified as a Key Native Ecosystem and the Biodiversity team has assisted with pest plant control, pest animal control, and revegetation and enhancement planting. New plantings have included the at-risk and vulnerable coastal plant species *Euphorbia glauca*, or sea spurge, and *Hebe speciosa*, both grown especially for the Council by Moturoa School pupils in their propagation unit. Hollard Gardens has also grown plants for the colony. During 2011/2012, the Rapanui Grey-Faced Petrel Trust also made significant improvements at both ends of the predator-proof fence, near the cliff face. This was made possible with a Biodiversity Condition Fund grant obtained through the Council.

Trustee Evan Lobb, who owns the land where the colony is sited, is delighted with progress. "Having the Biodiversity team on board means a lot to a small group like ours, and between us all we've really upped the ante over the past year," he says. "The Council team is enthusiastic as well as knowledgeable, and that rubs off on everyone."

The respect is mutual, with Biodiversity team members saying they are motivated by the work put in by trustees.

*A Council Environment Officer makes the finishing touches on a trial nesting box at Rapanui.*

## Biosecurity

Multiple agencies or organisations have responsibility for marine biosecurity, with MPI and DOC being the key parties. The Regional Council has limited functions in marine biosecurity.

Two pest seaweed species have been found in Port Taranaki: the Japanese seaweed Undaria (*Undaria pinnatifida)* and the red algae *Grateloupia turutu*. Of these, *Undaria pinnatifida* is currently listed in the Council's *Pest Management Strategy for Taranaki: Plants*.

During winter or early spring of each year, the Council works with DOC and Port Taranaki Limited to remove *Undaria* from around the wharves and pontoons on the Lee Breakwater. This is when the individual plants are large enough to be easily identified and are not releasing many spores. Typically, spores are released later in the spring.

The algae *Grateloupia turutu* is difficult to distinguish from many native red algal species and there is currently no feasible or cost-effective option for control or eradication of this pest species.

*The Council works with DOC and Port Taranaki Limited to remove* Undaria *from structures around the breakwater.*

## Information, education and advice

As part of implementing the *Regional Coastal Plan for Taranaki*, the Council provides advice and assistance to landowners and care groups to protect and enhance estuaries and the lower reaches of rivers that play an important role in the lifecycle of īnanga and whitebait species.

We also provide advice and assistance to landowners and care groups to protect and enhance sand dunes on private land.

The Marine Biosecurity Portal, jointly operated by MPI and NIWA, has information about marine pests and other non-indigenous marine organisms that have been recorded in New Zealand coastal and marine waters. The website provides information on ways to minimise the risk of marine pests and includes a project map comparing different ports across New Zealand.

### Find out more

*Inventory of coastal areas of local or regional significance in Taranaki (TRC) tinyurl.com/TRC6y*

*Marine Biosecurity Portal tinyurl.com/TRC6z*

*MPI Biosecurity Website tinyurl.com/TRC6aa*

*Regional Coastal Plan for Taranaki tinyurl.com/TRC6x*

*Taranaki Biodiversity Accord tinyurl.com/TRC6h*

*Ballantine, B. (2014). Biological Conservation, 176, 297-307*

*Ballantine, B. (2014) Fifty years on: Lessons from marine reserves in New Zealand and principles for a worldwide network. Biological Conservation, 176, 297-307*

7

# HERITAGE AND PLACE

*For many people in the region, Taranaki's historic heritage, magnificent landscapes and amenity values contribute enormously to their quality and enjoyment of life. These features or values hold important social, emotional, historical, or cultural significance for Taranaki communities and attract large numbers of domestic and international visitors to the region.*

*Each of the councils in the region identifies those heritage sites, landscapes and amenity values in their boundaries that have significance for their communities and make plans to preserve and maintain these features and values. In turn, this protects and enhances the values and lifestyles of the region as a whole. All councils also work to ensure the public enjoy free, unprohibited access to the region's rivers, lakes and other public spaces.*

THIS CHAPTER COVERS:

## Historic heritage

- Heritage buildings and structures
- Archaeological sites

## Significant landscapes

- New Plymouth district
- Stratford district
- South Taranaki district

## Amenity values

- Regional values
- Community feedback
- Awards

## Public access

- Public access to fresh water
- Public access to the coast

*Heritage and place*
*tinyurl.com/TRC7vid*

*'Heritage buildings and structures can tell a part of the region's story.'*

# Heritage and place

Heritage features refer to the wide range of archaeological, architectural, cultural or scientific resources that contribute to an understanding or appreciation of Taranaki history and culture. There are a number of such features in Taranaki that tell a part of the region's story. There are also a number of significant landscapes in the region that form an integral part of the region's identity, natural character and appeal. Features defined as amenity values across the region also contribute to people's enjoyment of the environment. Amenity values are wide and varied, including factors such as open spaces, peaceful surrounds, or access to walkways, playgrounds, or cultural events.

Various activities can impact on the heritage, landscape and amenity values in the region. Specific developments can affect heritage sites such as wāhi tapu, archaeological sites or historic buildings. Development such as subdivision and building, quarrying and roading, and logging and grazing can all affect the landscape. It can also affect neighbourhood amenity values. To what degree the impact affects the landscape depends on the environment itself and the scale and location of the activity.

*'One of the challenges of effectively managing historic heritage, significant landscapes and amenity values is that they are often hard to define.'*

In some cases development can actually enhance historic and amenity values by protecting or improving those values. For example, developing a town centre can make the area more accessible and convenient for residents to use, improving its amenity value.

One of the challenges of managing historic heritage, significant landscapes and amenity values is that they are often hard to define. There can also be a lack of information and awareness about important sites or values. For example, private landowners may not be aware of archaeological sites on their land, or sites may not be easily detected under vegetation. Perspectives on whether something has amenity value or not can also vary.

It is important to have good information about heritage sites, valued landscapes and amenities in the region so that they can be protected. Public access to the coast and to our rivers and lakes is an integral part of people's enjoyment of the environment. It is therefore also important that councils are informed about what their communities value to ensure public access is maintained.

Each district council in the region assesses the heritage features, significant landscapes, amenity values and public access options in its district to ensure these features and values are protected and maintained for generations to come.

*St Mary's Cathedral Church, New Plymouth, is New Zealand's oldest stone church.*

# Historic heritage

Taranaki has a long history stretching back to early Polynesian settlement and the subsequent arrival of Europeans. Many of the buildings, structures and archaeological sites in the region reflect this history, adding to the richness and vibrancy of the Taranaki region.

Historic buildings, structures, places, wāhi tapu and other sites have historic, archaeological, architectural and cultural value. For example, many pre-European archaeological sites include middens, ovens, village or pā sites and urupā (burial grounds). Reminders of early European history include features associated with timber extraction, railway construction, land wars and dairying.

Under the *Resource Management Act 1991* (RMA), the protection of historic heritage from inappropriate subdivision, use, and development is a matter of national importance. The culture and traditions of Māori, in relation to their ancestral lands, water, historic sites, wāhi tapu and other taonga, are also a matter of national importance that councils must recognise and provide for.

## Heritage buildings and structures

Heritage buildings and structures include houses, churches, towers, memorials and commercial buildings. This also includes items that are identified as having historic heritage which may be architectural, cultural, historic, scientific or technological in nature.

Not all heritage buildings, structures or items are listed by Heritage New Zealand, which targets heritage at a national level and has only limited funds to purchase heritage buildings or structures. Therefore, identifying and protecting locally significant heritage is the domain of local councils. The three district councils in the region identify heritage buildings, structures and items within their area and protect them using controls and regulations in their district plans.

In total, 1,140 heritage buildings, structures and items have been identified in the Taranaki region. Although this is a decrease since 2009, the number protected in district plans has risen from 193 in 2009 to 212 in 2014—an increase of 19. The number of buildings, structures or items listed with Heritage New Zealand has also increased by 10, from 150 in 2009 to 160 in 2014.

| District | Historic heritage buildings, structures or items | | |
|---|---|---|---|
| | Number identified (1) | Listed in district plans | Listed on Heritage NZ List (2) |
| New Plymouth | 795 | 102 | 89 |
| Stratford | 79 | 29 | 8 |
| South Taranaki | 266 | 81 | 63 |
| Totals | 1,140 | 212 | 160 |

*The number of heritage buildings, structures or items protected in district plans has increased since 2009.*

*(1) By district councils (2) Includes historic places, historic areas, wāhi tapu and wāhi tapu areas*

## New Plymouth district

Heritage sites within the New Plymouth district include those from early European settlement, the 1860s land wars, and the dairy and energy industries. The New Plymouth District Council (NPDC) has three heritage categories: A, B and C. Category A items are regulated in the *New Plymouth District Plan*.

## What's the story?

The *New Plymouth District Plan* currently identifies 795 heritage items—a slight decrease since 2009. Of these, 102 are Category A items listed in the district plan. In addition, there are also 17 heritage character areas in the district.

Although the total number of heritage items has decreased since 2009, the number of Category A items afforded protection in the district plan has increased by 22. This increase is largely the result of a district plan change that added 18 public monuments and memorials to the category, mostly related to World War I and World War II.

Category A items in the New Plymouth district include early colonial houses and commercial buildings, including the White Hart Hotel and St Mary's Cathedral Church and grounds. They also include Bertrand Road suspension bridge, the Inglewood railway station and the town hall.

No Category A structures have been demolished in New Plymouth since 2009, although the Honeyfield drinking fountain on the Coastal Walkway suffered significant damage as a result of a car accident. The fountain has since been removed, repaired off site and reinstated. An investigation into earthquake strengthening of St Mary's Cathedral Church is currently underway.

Of the 17 heritage character areas in the New Plymouth district, seven are residential, five are commercial and five are baches—none are regulated in the *New Plymouth District Plan*. NPDC notes that the integrity of some has been compromised in areas such as Hine Street, where residential buildings interface with businesses.

Heritage New Zealand lists 89 buildings, structures or items in the New Plymouth district on its Heritage List—an increase of 14 since 2009. Sixteen of these have a Category 1 listing (including St Mary's Cathedral Church, the White Hart Hotel, the Gables Colonial Hospital building, the Te Hēnui Vicarage and Richmond Cottage). The majority of sites listed by Heritage New Zealand are included as Category A items in the *New Plymouth District Plan*.

Earthquake strengthening has become a significant issue for heritage buildings since the 2010 Christchurch earthquakes. As part of the current district plan review, NPDC will seek feedback from the community on options for earthquake strengthening of affected heritage buildings in the New Plymouth district.

CASE STUDY

# A grand old lady comes **back to life**


PHO2007-078

She's known the destitute, the desperate and the drunk over the past 150-plus years. Now she's being reborn as a decorous, debonair and distinguished addition to the New Plymouth cityscape.

Sitting majestically on the corner of Devon Street West and Queen Street, the iconic White Hart Hotel is a good example of how a seriously decaying heritage building can be restored to its former glory.

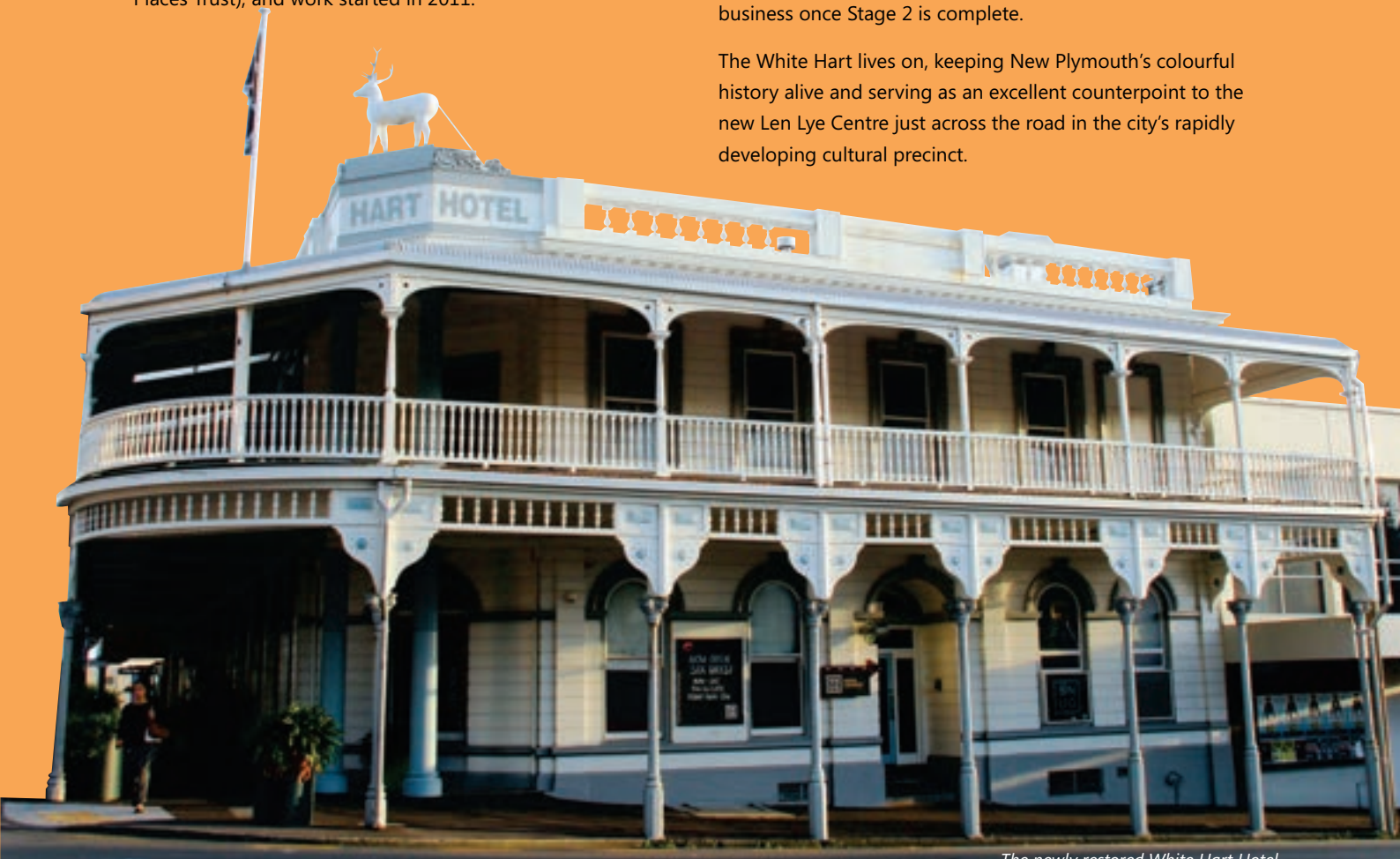
Built in 1886, the traditional Victorian building declined into serious deterioration in the second half of last century, and at one stage it looked likely that parts of it would be demolished. Although listed as a Heritage New Zealand Category 1 building, restoration costs seemed prohibitive.

But in 2005 the building's owner Renaissance Limited and Wellington firm Atelierworkshop began planning to restore the facade. Their aim was to retain as much of the building's character as possible, while replacing derelict parts with modern additions. They won financial support from the New Plymouth District Council (with a contribution of $124,668) and Heritage New Zealand (formerly known as the Historic Places Trust), and work started in 2011.

This first stage of the White Hart's restoration is now complete and the ground floor is open for business. The anchor tenant is the Snug Lounge, which retains "the feel of its former existence as the Red Lounge; it's a bit rock 'n' roll, maintaining intimacy and with the faint air of debauchery that one might hope for in a place like the White Hart" (Architecture Now – Issue 5, September 2012 ). The external facade adorned by the original white stag captures the grandeur of the hotel as it was.

In 2015, the developers announced Stage 2, a six-month project that will include strengthening the building, glazing the upstairs verandas, and incorporating part of the upstairs veranda into the building to create a new floor. Five new business spaces, already leased to tenants, will be created. Plans also include expanding the King and Queen Hotel suites above the former public bar. Two ground-floor retail spaces created during Stage 1 will house a kitchen and fashion retail business once Stage 2 is complete.

The White Hart lives on, keeping New Plymouth's colourful history alive and serving as an excellent counterpoint to the new Len Lye Centre just across the road in the city's rapidly developing cultural precinct.



*The newly restored White Hart Hotel.*

# Stratford district

Key features of historic heritage values in the Stratford district relate to early attempts at coal mining and farming, war memorials and community or commercial buildings. These sites include the Douglas brickworks downdraught kiln, the Municipal Chambers (including the Hall of Remembrance), the Kings Theatre in Stratford, and the memorial gates at Victoria and King Edward parks.

*The memorial gates in at the Fenton Street entrance to King Edward Park in Stratford.*

## What's the story?

The Stratford district has an inventory of approximately 260 historic heritage sites (including archaeological sites). Seventy-nine historic heritage items have been identified, 29 of which are listed in the *Stratford District Plan*. These items (including bridges and other structures) are protected by a range of rules, standards and assessment criteria from all activities, whether the activity is permitted or not.

In 2014, the inventory was re-examined with the intention of identifying items that may considered for inclusion in future district plan reviews.

Heritage New Zealand lists eight historic places in the Stratford district, including the Douglas brickworks downdraught kiln, which has a Category 1 listing. All eight are included in the district plan.

*The Ngāere dairy factory, founded in 1814, became well known for its 'Triumph' brand cheese.*

## South Taranaki district

South Taranaki has a range of heritage sites, many dating from early European settlement. They include private dwellings, banks, town halls, churches, courthouses, the Cape Egmont Lighthouse, the World War I Memorial Band Rotunda in Manaia and the old library in Kaponga.

*Built in London, shipped to New Zealand, and first erected on Mana Island, the Cape Egmont Lighthouse was relocated in 1881. A target of the passive resistance of the people of Parihaka in response to land disputes, the lighthouse was constructed under armed guard. Still operational, it marks the westernmost point of the Taranaki coast.*

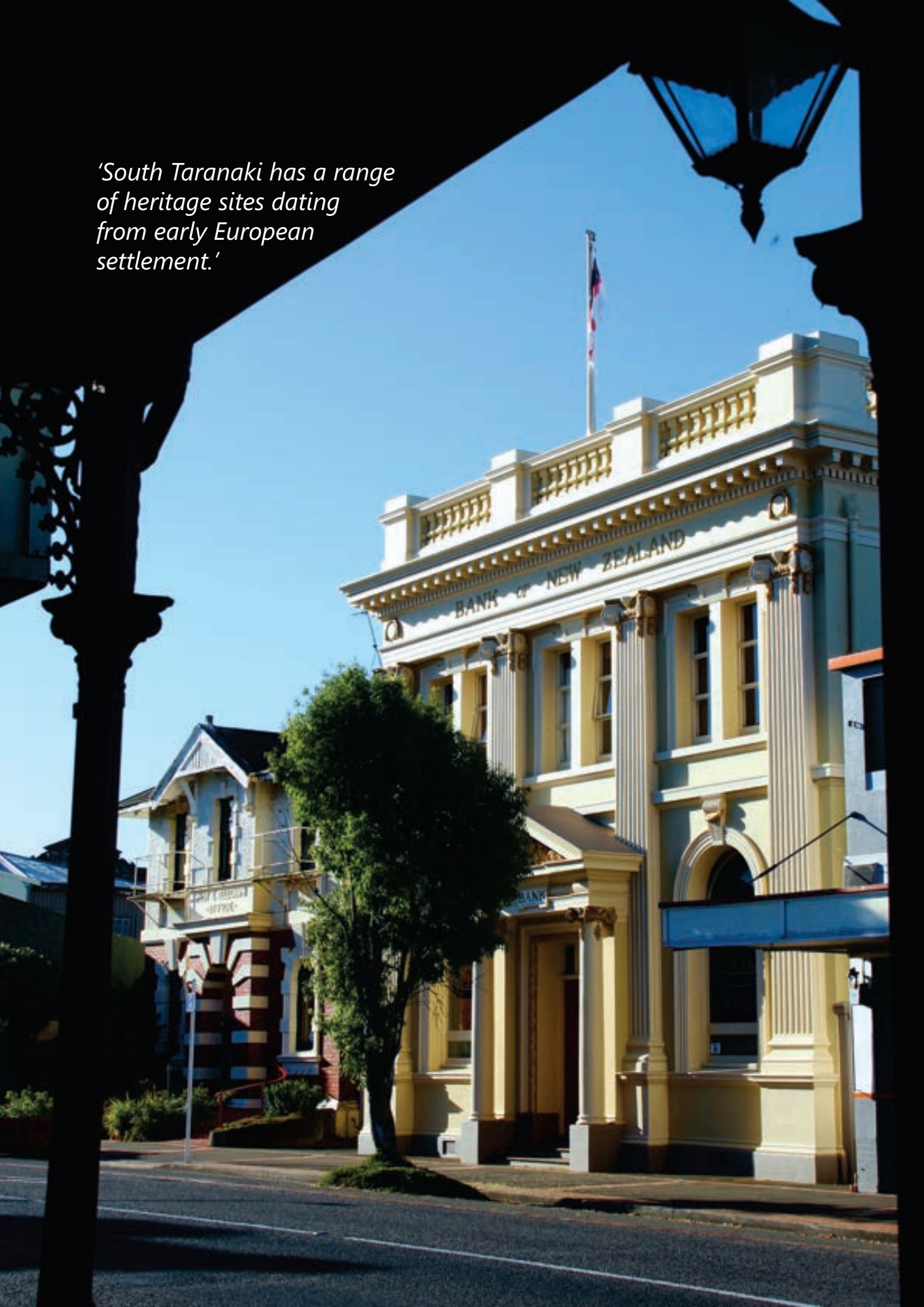
### What's the story?

At 266, the number of heritage items identified by the South Taranaki District Council (STDC) has increased slightly, up from 256 in 2009. Of these, 81 are listed in the *South Taranaki District Plan*. Heritage New Zealand lists 63 buildings, structures or items from within the South Taranaki district. Three have a Category 1 listing—the Hāwera Water Tower, St George's Anglican Church in Pātea and the Waverley Railway Station.

STDC has identified that awareness of earthquake-prone buildings as a result of the Christchurch earthquakes is impacting on heritage buildings in South Taranaki. For example, potential tenants are increasingly aware of health and safety obligations and are choosing not to rent older buildings unless they are satisfied that the building has been earthquake strengthened. Additionally, many banks and insurance companies are reluctant to lend money or to insure buildings unless they are proven earthquake safe. Earthquake strengthening can incur great costs for a landlord, and is not always a viable option.


*The Waverley Railway Station is a good example of a modified Vogel Class Four Railway Station.*

In Hāwera, where many buildings have heritage value, there is increased interest in redeveloping the town centre which could result in loss to some heritage values (see case study on *page* 211). In other town centres in the district where populations are declining, there is less interest in redevelopment and many heritage buildings are likely to sit unoccupied without being maintained until they become dangerous.




*'South Taranaki has a range of heritage sites dating from early European settlement.'*

# Archaeological sites

Archaeological sites are historic sites that pre-date 1900. They include sites from early Māori settlement, such as middens, pits, ovens, horticultural sites, defensive pa sites and burial grounds as well as sites from early European settlement such as flour milling, historic settlements and shipwrecks. The New Zealand Archaeological Association Site Recording Scheme was established in 1957 and is an important database of information for planning and legal decision-making.

## What's the story?

The New Zealand Archaeological Association Site Recording Scheme database includes 1,899 archaeological sites in Taranaki—an increase of 125 since 2009. However, this can never claim to be a complete list of archaeological sites within the region as sites continue to be discovered during road works or other excavations and added to the database. The most common archaeological sites in Taranaki are pā sites (746 sites), pits or terraces (518 sites) and middens or ovens (178 sites).

- Of the 1,899 total, 815 archaeological sites are in the New Plymouth district, 717 of which are listed in the *New Plymouth District Plan*.
- Of the 108 sites in the Stratford district, all are protected in the *Stratford District Plan*. Most archaeological sites in the Stratford district are in rural areas in the eastern part of the district on land used for grazing or forestry or within areas of regenerating native bush. As previously mentioned, SDC has a further inventory of historic heritage, which includes archaeological sites. Investigation of the items in this inventory may mean more archaeological sites are considered in future district plan reviews.
- The greatest number of archaeological sites identified is in South Taranaki. These 976 sites are shown individually on STDC district planning maps but no specific information about the sites is included in the *South Taranaki District Plan*.

The majority of archaeological sites in Taranaki are on private land and the condition of sites varies. A number of sites (particularly pā sites) have robust features. However, many others have suffered some degree of damage from activities such as bulldozing of farm tracks or quarrying for gravel. Some sites have been levelled to make way for more productive grazing areas, or infilled or smoothed to varying degrees by repeated cultivation. Coastal erosion poses a significant threat to archaeological sites in the New Plymouth and South Taranaki districts.

All three district councils are currently renewing their archaeological site records as part of a review or change to their district plans.

*The Turuturu Mōkai reserve is situated on Turuturu Road, Hāwera. Originally the site of three pā grouped together, the area had a population of about 400 people.*

| Archaeological Site | New Plymouth district | Stratford district | South Taranaki district | Total |
|---|---|---|---|---|
| Pā | 406 | 12 | 328 | 746 |
| Pit/terrace | 121 | 7 | 390 | 518 |
| Midden/oven | 66 | 50 | 62 | 178 |
| Military (non-Māori) | 57 | 0 | 31 | 88 |
| Māori horticulture | 13 | 0 | 61 | 74 |
| Artefact find | 10 | 14 | 19 | 43 |
| Unclassified | 38 | 0 | 0 | 38 |
| Historic–domestic | 29 | 1 | 6 | 36 |
| Burial/cemetery | 12 | 1 | 11 | 24 |
| Working area | 1 | 17 | 3 | 21 |
| Flour milling | 7 | 0 | 11 | 18 |
| Transport/communication | 11 | 1 | 3 | 15 |
| Health care | 4 | 0 | 8 | 12 |
| Shipwreck | 9 | 0 | 3 | 12 |
| Art | 3 | 0 | 7 | 10 |
| Agricultural/pastoral | 5 | 0 | 2 | 7 |
| Industrial | 4 | 2 | 0 | 6 |
| Religious | 4 | 0 | 2 | 6 |
| Source site | 4 | 1 | 1 | 6 |
| Traditional site | 1 | 0 | 5 | 6 |
| Flax milling | 0 | 0 | 5 | 5 |
| Pā–island/swamp | 0 | 0 | 5 | 5 |
| Botanical evidence | 1 | 2 | 1 | 4 |
| Marae | 1 | 0 | 3 | 4 |
| Commercial | 0 | 0 | 3 | 3 |
| Administrative | 1 | 0 | 1 | 2 |
| Cave/rock shelter | 1 | 0 | 1 | 2 |
| Fishing | 0 | 0 | 2 | 2 |
| Pā–gunfighter | 1 | 0 | 1 | 2 |
| Educational | 1 | 0 | 0 | 1 |
| Historic–land parcel | 1 | 0 | 0 | 1 |
| Mining–gold | 1 | 0 | 0 | 1 |
| Mission station | 0 | 0 | 1 | 1 |
| Timber milling | 1 | 0 | 0 | 1 |
| Whaling station | 1 | 0 | 0 | 1 |
| Total | 815 | 108 | 976 | 1,899 |

*The types of archaeological site in each district. The most common archaeological sites in Taranaki are pā sites, and pits or terraces.*

*Mount Taranaki, and the Kaitake and Pouakai ranges are undeniably significant landscapes.*

# Significant landscapes

A striking feature from any viewing point, Mount Taranaki dominates the landscape in the region. Alongside the region's hillcountry landscapes, coastal and marine features, and rivers and lakes, the mountain is a significant and valued part of Taranaki's identity.

Natural landscapes have considerable character and appeal—many having cultural significance for Māori. Landscape incorporates not only natural and physical features but also includes social and cultural factors. Various studies, surveys and public consultations conducted in the region show that many of Taranaki's natural features and landscapes are highly valued for their scenic, visual or aesthetic appeal. They also have social, cultural and historical associations.

While the RMA states that protecting the region's outstanding natural features and landscapes from inappropriate use and development is a matter of national importance, people value things differently based on their social and cultural perception. There is no universally accepted definition of what makes a natural feature or landscape outstanding. Landscape architects and other experts in the field have developed some recognised techniques to assess and evaluate landscapes and features of value. Councils in Taranaki use these techniques to identify outstanding landscapes and natural features within their boundaries in order to preserve their value.

# New Plymouth district

The New Plymouth District Council identifies Mount Taranaki and the Kaitake and Pouakai ranges within Egmont National Park as outstanding landscapes within the New Plymouth district.

They also identify the coastal terrace between Mōhakatino and Whitecliffs; Whitecliffs and its associated conservation forest; Ngāmotu and Paritūtū; and eight river mouths—Mōhakatino, Tongaporutu, Mimi, Urenui, Onaero, Waiongana, Tapuae and Stony (Hangatahua)—as regionally significant landscapes.

## What's the story?

In the New Plymouth district no significant landscapes identified are currently under threat from any development activities.

In 2006, NPDC identified that new development and scattered buildings had begun to affect the landscape up to the bush line of Mount Taranaki and the northern slopes of the Pouakai and Kaitake ranges. The area was noted as showing signs of becoming a 'threshold area'—in transition from being of rural character to something else. As a result, NPDC initiated a district plan change aimed at regulating the scale, location, density and land use of subdivision in the rural environment.

In response, there was a significant spike in rural subdivision applications in 2010/2011 before the plan change was due to come into effect, but many of these subdivisions have not subsequently been built on. After the plan change, rural subdivisions reduced dramatically.


*In the Stratford district, a range of mountain views are considered significant.*

# Stratford district

Mount Taranaki and the Egmont National Park also dominate the landscape in the Stratford district. Of particular significance are views of Mount Taranaki from State Highway 3, Pembroke Road, Monmouth Road, Opunake Road, Manaia Road north of Opunake Road, and Sangster's Hill. Also included are views from the Strathmore, Pohokura, Whangamōmona and Tahora Saddles along State Highway 43. The eastern hill country also has significant scenic natural features and landscapes, particularly views of the hill country along State Highway 43 (the Forgotten World Highway).

## What's the story?

In the Stratford district, there have been no developments within the district that have significantly impacted overall landscape qualities in the past six years.

*State Highway 43, also known as the Forgotten World Highway, runs 158 kilometres from Stratford to Taumarunui.*

# South Taranaki district

Mount Taranaki is visible from many parts of the South Taranaki district and is regarded as a significant landscape feature. The South Taranaki District Council identifies a further 35 significant natural areas within its boundaries including:

- Egmont National Park, noted for its significant indigenous forest and associated habitat
- the volcanic ring plain surrounding the mountain, including the distinctive lahar mounds in the northern part of the district
- the coastal strip that runs the entire length of the western and southern boundaries of the district and includes dunelands and uplifted marine terraces
- the rivers flowing from the mountain in a distinctive radial pattern
- the rugged eastern hill country comprising strongly rolling to steeply dissected hills.

## What's the story?

Since 2008, interest in coastal subdivision has reduced in the South Taranaki district. This can be attributed to district plan controls introduced in 2005 and unfavourable economic conditions over the past five years.

An increase in landfarming has impacted coastal dune systems. Currently, this impact is very localised rather than district-wide. Otherwise, there has been little change in pressure on significant landscapes in the South Taranaki district in the past six years. As part of its district plan review, STDC is undertaking a landscape assessment of the district to help enhance natural landscapes and protect them from adverse environmental effects of future activities.

*Coastal areas in the South Taranaki district are highly valued landscapes.*

## Find out more

*Grand makeover nears end (Taranaki Daily News, February 2015) tinyurl.com/TRC7f*

*Heritage New Zealand website tinyurl.com/TRC7d*

*New Plymouth District Plan tinyurl.com/TRC7a*

*South Taranaki District Plan tinyurl.com/TRC7c*

*Stratford District Plan tinyurl.com/TRC7b*

*White Hart Hotel (Architecture Now, October 2012) tinyurl.com/TRC7e*

# Amenity values

Each of the district councils in the region works to ensure Taranaki residents and visitors enjoy a pleasant and enjoyable natural and built environment. Feedback from the public continues to be positive.

Amenity values are those natural and physical qualities and characteristics that contribute to people's appreciation and enjoyment of the environment. Taranaki residents and visitors enjoy very high levels of amenity values, characterised by the region's quiet, pleasant environment and the relative absence of noise, odours and dust. Taranaki has maintained an uncluttered, rural feel with well maintained and accessible parks, reserves and walkways; outstanding landscape features; and community and recreational facilities.

# Regional values

People have different ideas about what constitutes a pleasant and enjoyable environment, which makes the management of amenity values challenging. A 2008 survey of Taranaki residents helped to identify the region's amenity values by asking what residents liked and disliked about where they live.


*In 2008, residents of Taranaki identified the factors and values that they liked or disliked about where they live.*

The survey revealed that 32% of New Plymouth residents most liked the close proximity to sea and beaches. In comparison, 27% of Stratford residents and 28% of South Taranaki residents liked the quiet, peaceful and relaxing environment, and lack of overcrowding. In all districts, one of the top three aspects residents liked most about where they live was the proximity to Mount Taranaki.

Almost a third of residents in each district said there was nothing they disliked about where they live. Aside from the weather and climate, most disliked in the New Plymouth district were traffic issues and the state of roads and footpaths (8% disliked these aspects the most). In the Stratford district (8%) and the South Taranaki district (10%) residents most disliked the shopping environment (lack of shops and/or late closing hours).

# Community feedback

To assess community satisfaction with community services in their districts, the New Plymouth District Council and the South Taranaki District Council commission the National Research Bureau (NRB) to undertake community surveys. The Stratford District Council conducts its own research on community satisfaction in the Stratford district.

## New Plymouth district

The New Plymouth district community has identified the spacious, low-density character of rural areas, pleasant urban environments and the natural character of the coast as having high amenity value in the New Plymouth district. The community also identifies vegetation and trees; landscapes, parks and reserves, recreational areas; and walkways and other open spaces as important, alongside traffic and pedestrian issues, and public views. Particular adverse effects such as light overspill, glare, noise and traffic are controlled to ensure the appropriate amenity values in the district are maintained.

The 2014 National Research Bureau survey showed residents of the New Plymouth district were highly satisfied with community services in the district, with 90% of respondents very/fairly satisfied that the quality of the district's living environment is being maintained (both natural and human environment).

*'Amenity values ... contribute to people's appreciation and enjoyment of the environment.'*

A large proportion—96%—was very/fairly satisfied with the quality of parks and reserves, including the Coastal Walkway and Pukekura Park, with 95% very/fairly satisfied with access to the natural environment, including the rivers, lakes, mountain and coast.

When asked abut the library and museum at Puke Ariki, 80% and 85% of people respectively were very/fairly satisfied with these services. Within the district, 87% were very/fairly satisfied with the quality of entertainment, cultural and sporting events and 93% were very/fairly satisfied with the quality of venues for entertainment, cultural and sporting events.

Maintenance and presentation of urban landscapes and streets, particularly flowerbeds and displays, rated well, with 95% of people very/fairly satisfied. A total of 83% of respondents were also very/fairly satisfied with the ability to drive around the district quickly, easily and safely. Eighty-four per cent were satisfied with the quality of roads overall.

The number of notable trees protected in the *New Plymouth District Plan* exceeds 1,750. Many of these trees are good examples of their type, or have visual, landscape, heritage or botanical value that adds to the amenity values of the district.

The New Plymouth district has been the recipient of a number of high-profile awards, including the 'Best and most liveable community in the world' (population 20,001–75,000) at the 2008 International Awards for Liveable Communities. In recent times the district has also received the following accolades:

2014 Pukekura Park Green Flag Award: an international award that recognises well-managed, high-quality green spaces and good-quality public parks that are managed in environmentally sustainable ways.

2014 TSB Bank Festival of Lights was a finalist in the Community Event of the Year category.

2014 Bike Wise's 'NZ's Favourite Places to Cycle' competition: Coastal Walkway was voted third.

2012 Living Streets Aotearoa's Best Walking Facility Award for the Coastal Walkway extension to Bell Block, including Te Rewa Rewa Bridge.

2011 New Zealand Recreation Association's Outstanding Project Award to the Coastal Walkway extension.

2011 Roading NZ Excellence Awards Supreme Award and Minor Road Project category for the extension of the Coastal Walkway to Bell Block (comprising the pathway and Te Rewa Rewa Bridge).

The New Plymouth district has also received a range of awards recognising the outstanding aesthetics and engineering of Te Rewa Rewa Bridge.

*Te Rewa Rewa Bridge was built over the Waiwhakaiho River in New Plymouth in 2010 and has received a number of awards.*

## Stratford district

The residential areas within Stratford district have a high standard of amenity based on spaciousness and access to daylight and sunlight, private outdoor space and off-street parking. The community also values maintaining a 'country feel' for rural/residential areas, with the density of development a significant contributor to amenity satisfaction in a predominantly rural district. The rural/residential areas of the district are also characterised by a low density of development, which contributes to a generally open landscape and an important buffer between residential and rural areas. Within Stratford's commercial centre, the visual and physical links created by the pedestrian areas are an important amenity feature.

*Children make their way to school in a 'safe and healthy' community environment.*

SDC conducts an annual survey to gauge the satisfaction of ratepayers and residents with community services and asset management. In the 2013/2014 year, residents were asked if they felt Stratford was an attractive, safe and healthy place to live. Overall, the response was positive—93% of respondents were satisfied with the attractiveness of the district, and 97% felt the district was both a safe and healthy place to live. Residents were also asked to rate the amenities in the district from 1=poor to 10=excellent. Parks in the district received a rating of 7.4 out of 10, roads 6.3 out of 10 and footpaths 6 out of 10.

There are 484 notable trees protected in the *Stratford District Plan*, unchanged since 2009. Management plans for notable trees are integrated with consent conditions. This management plan prompts landowners to annually assess the amenity and safety of the trees. Trees that are removed are replaced with the same species.

## South Taranaki district

The *South Taranaki District Plan* notes that the South Taranaki community places considerable value on the character and quality of the residential and recreational environments in the district. The community perceives a number of factors as important for the enhancement of amenity values. These include reserves, protection of natural values, ecology, landscapes and the margins of lakes and rivers. Other important amenity issues in the district are the control of the adverse effects of signs and the control of noise emissions and industrial development which reflect the amenity values of surrounding environments.

A 2014 survey of residents in the South Taranaki district showed that 94% were satisfied with the appearance and maintenance of the district's parks and reserves; 77% were satisfied with local roads and 73% were satisfied with footpaths in the district. Overall results of the 2014 survey show most respondents are fairly or very satisfied with council services in the district.

There are 72 notable trees protected in the *South Taranaki District Plan*. Similar numbers of native and introduced species are identified and selected for protection on the basis of their condition (health), amenity (community benefit) and notability (distinction).

*King Edward Park in Hāwera.*

### Find out more

*New Plymouth District Council community survey tinyurl.com/TRC7g*
*South Taranaki District Council community survey tinyurl.com/TRC7j*
*Stratford District Council community survey tinyurl.com/TRC7i*

CASE STUDY

# **Len Lye** gives New Plymouth a new gleam

Pioneer filmmaker and kinetic artist Len Lye was a colourful and unorthodox personality who couldn't be pigeonholed. Visually and architecturally, the new Len Lye Centre in New Plymouth is set to live up to the reputation.

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Construction began in 2013, after years of community discussion and argument over funding, and the centre is due to open in July 2015. Even during construction, the futuristic sculptural building in gleaming stainless steel has been attracting much attention and comment.

It's a safe bet that Christchurch-born Lye would be delighted. According to Wikipedia, he was a maverick, never fitting any of the usual art historical labels. He is also remembered for his offbeat personality, amazing clothes and highly unusual lecturing style (he taught at New York University for three years).

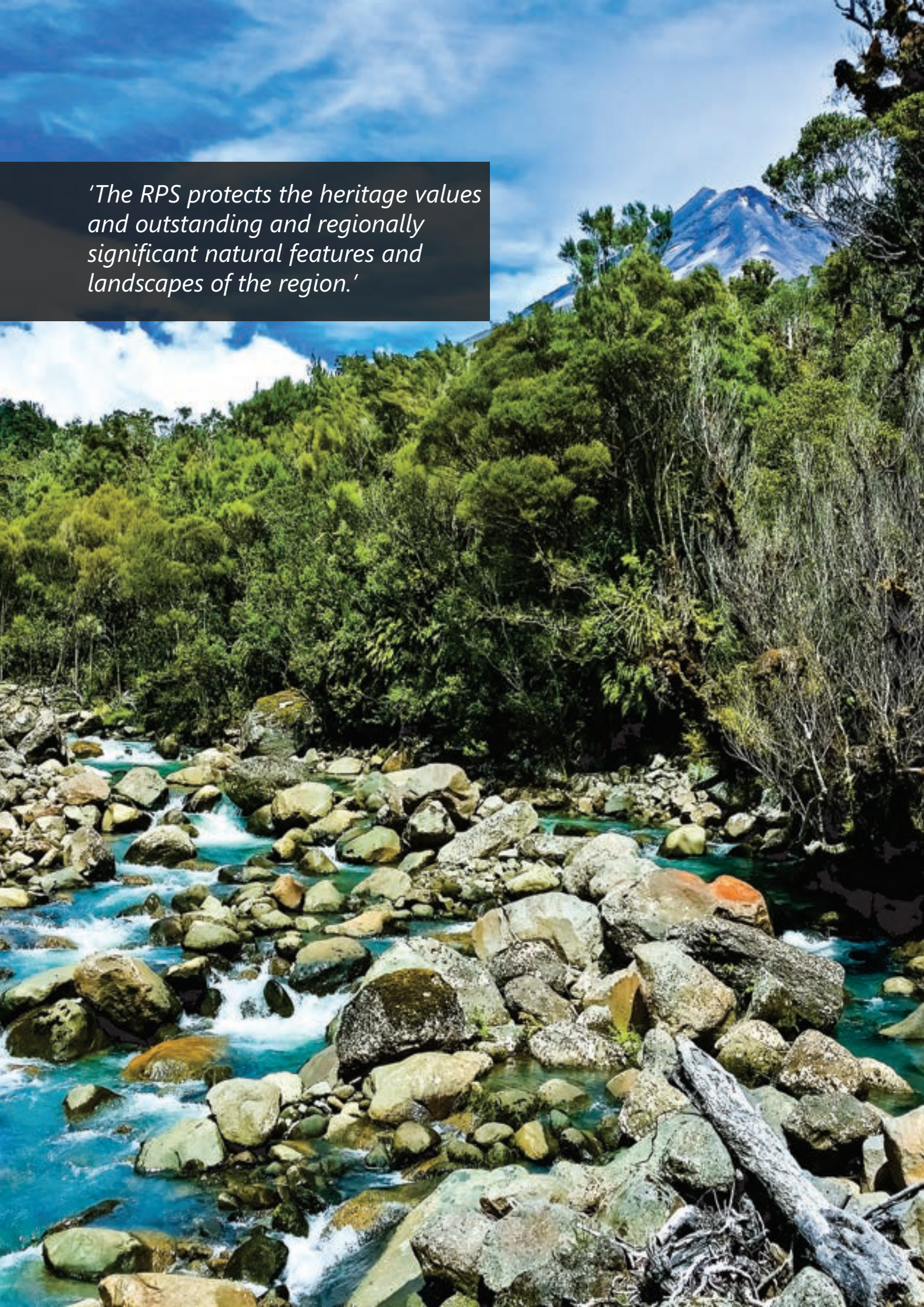
Although he did not become a household name while alive, his work is familiar to many filmmakers and kinetic sculptors. He was something of an 'artist's artist', and his innovations have had an international influence. In 1977, he returned to his homeland to oversee the first New Zealand exhibition of his work at the Govett-Brewster Art Gallery in New Plymouth. Shortly before his death in 1980, he and his supporters established the Len Lye Foundation, to which he gave his work. The gallery is the current repository for much of this collection, employing a full-time curator to ensure its preservation and appropriate exhibition.

The new Len Lye Centre will be New Zealand's first art museum dedicated to a single artist, and is set to be an iconic New Plymouth attraction. It will display some of the world's most spectacular pieces of kinetic art, offering extraordinary experiences with art that provoke new ideas and enrich the imagination. It will be a unique point of difference for New Plymouth and Taranaki and a catalyst for further development of the surrounding precinct. It will also bolster the regional economy—an independent economic assessment estimates that visitors to the Centre will spend up to $9.5 million a year in Taranaki.

Offering a focal point for creative and engineering excellence, the Len Lye Centre supports NPDC's strategic intent to offer 'an attractive living environment that compares favourably nationally and internationally' and will help Taranaki take even more advantage of a major growth in art and museum tourism. For example, 48,000 tourists visited art galleries and museums in Taranaki in 2010, compared with 10,000 in 2000.

New Plymouth Mayor Andrew Judd has told the *Taranaki Daily News* he believes that the double attraction of the Govett-Brewster ("a cornerstone of contemporary art globally") and the Len Lye Centre will make New Plymouth "a key destination in the arts landscape".

*'The new Len Lye Centre is set to be an iconic New Plymouth attraction.'*



*'The RPS protects the heritage values and outstanding and regionally significant natural features and landscapes of the region.'*

# Our responses

## Regional policies and plans

The *Regional Policy Statement for Taranaki* (RPS) contains objectives, policies and methods to manage historic heritage, significant landscapes and amenity values in the region—namely to protect the heritage values and outstanding and regionally significant natural features and landscapes of the region. The RPS also has objectives to maintain and enhance the amenity values of the Taranaki environment.

The Council's regional plans and resource consent processes also recognise and provide for landscape protection and for protection of heritage and amenity values in relation to the Council's functions and responsibilities. These plans include the *Regional Fresh Water Plan for Taranaki,* the *Regional Coastal Plan for Taranaki* and *Regional Air Quality Plan* (the *Regional Fresh Water Plan* and the *Regional Coastal Plan* are both currently under review).

## District policies and plans

The New Plymouth, Stratford and South Taranaki district councils are responsible for managing land use. They play an important role in the protection of Taranaki's heritage, natural features and landscape, and amenity values through provisions in district plans and related land-use and subdivision consents.

The district councils also provide information, and are engaged in environmental education initiatives to raise awareness of these issues.

### New Plymouth District Council

The *New Plymouth District Plan* (currently under review) contains rules relating to structures, earthworks, outdoor storage of materials, vegetation and subdivision of land to provide for the protection of historic heritage landscape, and amenity values. The plan also provides criteria for, or explanation of, the selection of Category A heritage buildings and items, wāhi tapu and archaeological sites in the region. It also outlines the selection of outstanding and regionally significant landscapes and notable trees in the district.


The New Plymouth District Council considers rates relief for historic heritage protection initiatives. NPDC is also currently reviewing wāhi tapu and archaeological sites in the district to ensure information is accurate. In the current plan review, sites not already in the *New Plymouth District Plan* are also being considered for inclusion.

A coastal policy area has been defined to protect the natural character and amenity values of the coast. Other non-statutory provisions include education, provision of information and advice, and advocacy.

In relation to broad amenity values, the New Plymouth District Council has identified different areas within their plan and established standards for each area (such as residential, industrial, open space). These standards specify requirements in relation to building height and coverage, light and noise, signage, landscaping, hours of operation, traffic generation and parking.

In early 2014, work commenced on the Len Lye Centre. Facilities such as this contribute to the amenities enjoyed by the people of Taranaki and visitors alike, and promote the economic and social well-being of the community.

NPDC has also developed a number of strategies relating to community development and amenity values:

*'NPDC has developed a number of strategies relating to community development and amenity values.'*

The draft *Open Space, Sport and Recreation Strategy* has six goals for open spaces, including locating spaces appropriately. The overall goal is to promote an active and healthy community, ensuring NPDC provides usable, sustainably managed spaces, well connected to other amenities and services. The draft strategy has been released for consultation.

In 2013, NPDC prepared the Central Area Urban Design Framework, a 30-year shared vision for New Plymouth's central area. The Framework draws on public feedback on improvements residents want in the city's central area gathered in 2012 and 2013. The Framework will give greater confidence to landowners, developers and NPDC in decision-making which should, in turn, lead to good urban design outcomes, including increased vibrancy, efficiency and accessibility in the central area.

To deliver on the New Plymouth District Mayor's Shaping our Future Together vision for New Plymouth, the NPDC is developing a long-term 'big picture' 30-year strategic plan, the *Shaping our Future Together Blueprint*. NPDC will use the *Blueprint* as a starting point for reviewing the NPDC District Plan, to help determine where and how New Plymouth district develops and grows. The *Blueprint* will be a key strategic tool in delivering more integrated social, economic and environmental outcomes for the community.

## Let's Go—New Plymouth District Council

In June 2010, the New Plymouth and Hastings district councils were recipients of a combined $7 million (over two years) to develop walking and cycling initiatives to encourage people out of their cars and onto the city's shared pathways and streetscapes. NPDC branded their project 'Let's Go'. Funding has been used to run events, and for travel planning, training programmes and infrastructure projects. Some significant recent initiatives are:

- Brougham Street Shared Space—various design concepts and materials were used to create an environment where pedestrians and motorists share the space equally.
- Pendarves Street upgrade—a resident-led street makeover designating the area a 'people first' street.
- Te Hēnui Bridges—two bridges have been constructed to make walking and cycling easier. Previously, users had to negotiate steps and a narrow pathway.

*Pedestrians and motorists share the Brougham Street space equally.*

- 30 kph speed zone—speed lowered from 50 kph to 30 kph in certain streets in the New Plymouth CBD to encourage pedestrians and motorists to better share the space.

## Stratford District Council

The *Stratford District Plan* controls adverse effects on landscape, heritage and amenity values through rules, and standards resource consent conditions relating to structures, excavation, filling planting, noise, vegetation clearance, and lighting and glare close to important heritage or amenity sites. The Plan is currently under review.

In recognition of what is required to maintain heritage features, some owners of heritage buildings receive rate remissions for land with heritage structures. This includes the Whangamōmona Hotel, the Douglas School, the Douglas Boarding House, and the McCluggage Brothers General Store in Whangamōmona.


*The Whangamōmona Hotel, the second hotel on the site, was built in 1911.*

*'Some owners of heritage buildings receive rate remissions for land with heritage structures.'*

SDC promotes awareness of historic heritage, encouraging landowners and developers to take into account historic heritage, significant landscapes, and amenity values in the planning and design phases of proposals. SDC also maintains public parks and spaces such as King Edward Park and the Percy Thomson Arboretum on Cloten Road.

*King Edward Park in Stratford.*

*Sandy Bay, near Opunake, is one example of the rich beauty of the Taranaki landscape.*

## South Taranaki District Council

The *South Taranaki District Plan*, currently under review, includes a schedule of heritage items (buildings, objects and areas and notable trees) for protection and a range of regulatory and non-regulatory methods to protect the district's heritage resources. These include district plan rules, education and information, rates relief and the ability to waive fees for heritage order requirements that may have community benefit.

STDC has adopted a number of methods for maintaining and enhancing amenity values. This includes the use of district plan performance standards and requirements for landscaping, provision of yards and controls on noise, lighting and signage. The district plan also identifies a defined pedestrian area with standards that encourage the development and retention of retail and business activities. The South Taranaki coastline and Lake Rotorangi have been identified as areas where significant amenity values exist, and protection of these areas has been addressed in the plan.

*'STDC has adopted a number of methods for maintaining and enhancing amenity values.'*

- Over the past five years the South Taranaki District Council and Community Boards have approved $70,000 for the protection of the district's heritage.
- STDC is also investigating reasonable incentives to offer the owners of earthquake-prone buildings that could ease some of the pressure on heritage and amenity values in South Taranaki towns.
- STDC is currently working on redeveloping the Hāwera town centre.
- To ensure the retention of coastal dune areas in the district, in the *South Taranaki District Plan* review (2015) intends to address the issue of landfarming affecting coastal dune systems. As part of this plan review STDC is likely to include a landscape assessment and initiate some form of regulation of control over earthworks in coastal areas.

CASE STUDY

# Facing the facts and **fixing the CBD**

What do you do if your CBD is dying? In the case of Hāwera, the South Taranaki District Council has firmly faced the facts and figured out what to do about them.

In late 2014, the South Taranaki District Council adopted the *Hāwera Town Centre Revitalisation Strategy*, following a year of work that saw the public, the business community and planning experts offering opinions, input and expertise.

"We know that the current town centre is just not meeting the needs of retailers or residents," says project manager John McKenzie. "It was essentially developed over 100 years ago and our community's social and retail needs have changed considerably over that time.

"We have seen this with some retailers moving out of the town centre, which has left a number of vacant buildings. This has been exacerbated by the growing trend in online retail and now we also have earthquake-prone buildings impacting on the commercial sector," he says.

"However, we aren't alone. These are issues facing town centres all around New Zealand and we are no exception. The great news is we have the opportunity to do something about it, and we are taking that opportunity."

**Some of the key proposals include:**

- ✓ development of a new library/cultural/civic centre and green space in the CBD
- ✓ improved pedestrian access and car parking facilities
- ✓ lighting improvements that will highlight heritage buildings
- ✓ redevelopment of the existing town square for retail and office development
- ✓ measures to encourage people to visit the town centre
- ✓ guidance for heritage preservation
- ✓ improved district plan provisions to guide new development
- ✓ better support and information for those planning events and activities in the CBD.

Mayor Ross Dunlop says implementing the strategy will benefit the whole district and will also be a model for future upgrades in smaller communities.

"Significant community developments such as this town centre development not only benefit the local community, adding significant amenity value, but they also provide real potential to attract new residents, businesses and visitors to South Taranaki," he says.

*An artist's impression of a possible future Hāwera town centre.*

## Working with others

The Department of Conservation (DOC) plays an important role in managing landscape, historic heritage and amenity values through its management of national parks and other conservation land in Taranaki. Under a number of acts, the Department of Conservation manages 146,973 hectares of public conservation land in Taranaki—21% of the total land area of the region. Management plans are prepared for these areas and activities within them controlled to manage natural and historic resources for conservation purposes or for purposes consistent with the *National Parks Act* or the *Reserves Act*.

Established under the *Heritage New Zealand Pouhere Taonga Act 2014,* Heritage New Zealand has a number of functions in the area of historic heritage. This includes responsibilities to identify, record, investigate, assess, list, protect, and conserve historic places, historic areas, wāhi tūpuna, wāhi tapu, and wāhi tapu areas, and to advocate the conservation and protection of these areas. It also includes fostering public interest and involvement in historic places protection. Heritage New Zealand manages historic places, buildings and other property owned or controlled by the Trust or vested in it.

All archaeological sites are afforded protection under the *Heritage New Zealand Powhere Taonga Act 2014* and it is unlawful for anyone to destroy, damage or modify an archaeological site without first gaining approving from Heritage New Zealand.

## Community development

All district councils are involved in providing, developing or upgrading community facilities within their districts. The development of such facilities contributes to the amenities enjoyed by the people of the Taranaki and visitors alike. It also promotes the economic and social well-being of the community.

Over the past six years there have been continuing upgrades of business districts or streetscapes in New Plymouth with construction of the Huatoki Plaza and the Brougham Street shared space development, and commencement of the Len Lye Centre (see case study on *page* 205). The TSB Showplace was earthquake-strengthened in 2012. The *Hāwera Town Centre Revitalisation Strategy* is set to add significantly to the amenity values of the town and will be a model for future upgrades of smaller communities in the South Taranaki district (see case study on *page* 211). The Stratford District Council completed the Broadway streetscape beautification with landscaping throughout and new public toilets. In the next five years, Prospero Place, in Stratford, will undergo further development including an extension to the community facilities within the area.


*Broadway in Stratford has undergone streetscape beautification and landscaping.*

*TET MultiSports Centre in Stratford hosted the Oceania Hockey Tournament in 2014.*

There has also been ongoing community investment in recreational and cultural facilities over the reporting period, including further development of the Coastal Walkway in New Plymouth. In 2010 the walkway was extended from New Plymouth to Bell Block with the Te Rewa Rewa Bridge picking up a number of awards. The most recent development, opened in late 2014, has seen the Coastal Walkway extended from the Taranaki velodrome across Hickford Park to Bell Block beach. The total length of the walkway is now 12.7 kilometres with plans for further extensions in future.

New Plymouth's Todd Energy Aquatic Centre was upgraded over the summer of 2014/2015, including replacing the tiles of the indoor pools and other aesthetic or operational upgrades. The King Edward sporting area in Stratford received four new tennis turfs and a new water-based hockey turf of international standard. The area has been tidied up and the car parking capacity increased. In addition, the Whangamōmona Camp Ground received a new playground and the facilities upgraded.

*'All district councils are involved in providing, developing or upgrading community facilities within their districts.'*

The Hub, South Taranaki District Council's $21 million MultiSports, leisure and events centre located at Hicks Park, Hāwera, was completed in March 2010. Alongside Hāwera's King Edward Park and the PowerCo Aquatic Centre, the facility gives an intensive sport, recreation and leisure and events focus for the South Taranaki district. The Hub has also hosted international level events such as Davis Cup tennis, when New Zealand played host to Pakistan in 2010, and the Philippines in 2011.

While serving the sporting, recreational and cultural needs of their local communities, the TET MultiSports Centre in Stratford, and the Sandford Events Centre in Opunake, have both hosted national events in recent years. Stratford's TET MultiSports centre has also hosted international events.

The Taranaki Regional Council has made significant investments in the internationally recognised Pukeiti Gardens since taking over ownership of the gardens in 2010. Continual improvements by the Regional Council have also been made to Hollard Gardens (including a new visitor's centre) and to Tūpare in

*Pukeiti is an internationally recognised garden renowned for its rhododendron collection. Pictured is 'Lemon Lodge' rhododendron.*

New Plymouth, further cementing their place as gardens of national significance. The Taranaki Regional Council has also continued to financially support Puke Ariki, New Plymouth's regional museum and library complex. In 2013 it agreed to provide funding for the ongoing development of Yarrow Stadium as one of New Zealand's premier regional sporting stadiums and venue. The Taranaki Regional Council and the New Plymouth District Council formed a joint venture arrangement over Yarrow Stadium, with the Taranaki Regional Council assuming effective ownership of the asset and the New Plymouth District Council retaining operational management to ensure Yarrow Stadium is retained as a first class regional facility.

The public transport services contracted by the Taranaki Regional Council are also important for development of the region's communities. These services ensure people continue to have a reliable and convenient yet affordable public transport system that connects people with where they want to go. Together with its funding partner the New Zealand Transport Agency, the Regional Council spends about $3.5 million each year on public transport services, providing daily, scheduled urban bus services in New Plymouth, Waitara, Bell Block and Oākura. A rural once-a-week bus service operates between many of the towns in the region and the daily Connector bus service operates between Hāwera and New Plymouth, along State Highway 3 (see case study *opposite*). The Regional Council also financially supports the Total Mobility Service—a taxi or driver-based service offering discounted fares for people with impairments who cannot drive or who do not have access to a motor vehicle or have difficulty using buses.

The development of such facilities and services contributes to the amenities enjoyed by the people of Taranaki and visitors alike, and promotes the economic and social well-being of the community.

## Find out more

*Len Lye Centre project (NPDC website) tinyurl.com/TRC7m*

*Len Lye (Wikipedia) tinyurl.com/TRC7n*

*New Plymouth District Plan tinyurl.com/TRC7a*

*NPDC Draft Open Space, Sport and Recreation Strategy 2015 tinyurl.com/TRC7r*

*Regional Policy Statement for Taranaki tinyurl.com/TRC7k*

*South Taranaki District Plan tinyurl.com/TRC7c*

*Stratford District Plan tinyurl.com/TRC7b*

*STDC Hāwera Town Centre Strategy tinyurl.com/TRC7s*

*The Let's Go project (NPDC website) tinyurl.com/TRC7q*

CASE STUDY

# **Rochelle rides Connector** on journey to her dream

For Rochelle Jakeman, the launch of the Hāwera-New Plymouth Connector bus service couldn't have come at a better time.

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The daily service allows the Hāwera mother-of-two to attend WITT in New Plymouth as she pursues her dream of being a registered nurse.

The first-year nursing student is an enthusiastic Connector commuter who appreciates both the flexibility allowed by the service's four return trips daily, and the fact that WITT students can travel for free.

"I was coming to WITT before to do some pre-university courses, and I had to use a school bus service from Hāwera to New Plymouth. It was expensive and it wasn't flexible—there was only one trip a day, before and after school," she says.

"The Connector service started as I began the three-year nursing course. It really does make it possible for me to study at WITT, while allowing me to stay in South Taranaki."

She says she enjoys the commuting and has established a good rapport with the drivers. "They are friendly, and they will wait if you're a bit late and running down the road."

She also thinks it's good that she can email the operator, Pickering Motors, if she knows she's not going to make the trip on one of her usual days.

WITT is one of the funding partners for the Connector service, along with the Taranaki Regional Council, Taranaki District Health Board and the New Plymouth, Stratford and South Taranaki district councils. The service is also sponsored by Contact Energy.

*'I think it's a great thing, not only for students but the whole community.'*

Rochelle has already sent feedback to WITT saying how much she appreciates the new service, and also promotes it to fellow students. "I think it's a great thing, not only for students but the whole community."

Rochelle has had her heart set on nursing since having her two children. She has been awarded one of two 2014 Māui Pomare Nursing Scholarships, for academic excellence and potential contribution to Māori health.


*Rochelle Jakeman, an enthusiastic user of the Hāwera—New Plymouth Connector bus service.*


*'Access to beaches, rivers and lakes in Taranaki is one of the key factors influencing recreational habits.'*

# Public access

Taranaki's coastal waters, rivers, streams and lakes are used for a wide range of recreation, with research showing the level of public access to coastal and freshwater resources in the region is "about right".

Under the *Resource Management Act 1991*, maintaining and enhancing public access to the region's rivers, streams and lakes is a matter of national importance. Formal public access to the region's coastal and fresh waters is largely provided through the *Regional Policy Statement for Taranaki*, the district plans of each of the three councils in the region, and the *Regional Coastal Plan for Taranaki*. However, much of the access to beaches, rivers and lakes in the region is informal and occurs by arrangement with neighbouring landowners. Public access to the most popular spots in the region is already provided for by district council or DOC parks and reserves, and esplanade strips.

# Access to the coast

The Taranaki coast is important for a range of recreation including fishing and diving, boating and swimming, board sports such as surfing and kitesurfing, and walking. Access to beaches, rivers and lakes in Taranaki is one of the key factors influencing recreational habits.

## Formal access

Public roads offer the greatest degree of public access to the coast and, along with the creation of reserves and strips, are formal access options. The New Plymouth and South Taranaki district councils both have policies and methods in place to set aside land for public access purposes or to negotiate public access arrangements with developers or coastal land occupiers. In most circumstances, district councils consider the creation of esplanade reserves and esplanade strips to ensure continued public access to the coast at the time of subdivision. Public access through the provision of esplanade reserves or esplanade strips is believed to have increased over time.

The single most significant factor constraining public access to coastal areas of local or regional significance in Taranaki is that few formal public access routes have signs or formed roads, making it difficult to distinguish public from private access. While some of the larger reserves are signposted, smaller reserves, such as esplanade strips giving access to the coast, are often unmarked and their existence not well known.

Unformed roads or 'paper roads' (land set aside and owned by the relevant district council for roading purposes but not maintained by the council) have the potential to provide public access to the coast. However, paper roads are usually only identified on survey maps and their existence is often not well known. The actual pathway can be difficult to identify.

In some cases, even if public access is provided or known, access may be difficult because of the rugged coastline or topography.

## Informal access to the coast

Informal public access over privately-owned land is also an important part of providing access to the coast in Taranaki, although access is reliant upon the goodwill of adjacent landowners. Generally, most private landowners are happy to allow people to cross their land. However, changing social conventions, increased responsibilities on landholders in relation to occupational health and safety, as well as changes in land use and recreational patterns, often mean that informal public access to previously accessible beaches, surfing or fishing spots is becoming increasingly restricted.

## What's the story?

The Regional Council survey, *Recreational Use of Coast, Rivers and Lakes in Taranaki 2007–2008,* found that of 69 identified coastal sites in the region, 29 sites (or 42%) were evaluated as having excellent public access, including most of the main recreational beaches in New Plymouth and other coastal settlements (such as Ōākura and Opunake).

*Ngāmotu beach is easily accessible for recreation such as sailing.*

A further 11 (16%) coastal areas were identified as having good public access. These sites were only a short walk from a formed public road, along a clearly defined and traversable track (this is important as access is sometimes constrained by tides), and connected by reserves or clear public access points.

The remaining 29 coastal areas (or 42%) were rated as having poor public access. Access to these sites usually involved a long walk from the nearest formed road, with unclear pathways, rough or difficult topography, or required permission to cross privately-owned land. However, the survey also found that relatively few respondents (10%) had not been able to gain access to parts of the coast in Taranaki that they wanted to. The main reasons people could not gain access was because the access or entrance was closed, too difficult or too dangerous. Only 1% had been denied access by the landowner or occupier. In 2014, the New Plymouth District Council commissioned an NRB Communitrak community survey, which showed that 95% of New Plymouth district residents are either very or fairly satisfied with public access to the natural environment, including the coast.

The *Recreational Use Survey* found that most swimming in the region occurs at major recreational beaches where surf lifesaving patrols are operating. There is good public access to these major recreational beaches. At other beaches access requires the permission of a private landowner.

*Opunake beach, a popular and patrolled swimming beach in South Taranaki, has excellent public access.*

*Walking and cycling are increasingly popular activities along New Plymouth's Coastal Walkway.*

Boating, fishing and surfing occur at a number of locations on the coast. There are a number of public boat ramps in the region and three boat ramps where permits are required to occupy the coastal marine area—Middleton Bay, Bayly Road and Warea. An increase in the number of surfers in the region has resulted in increased pressure for infrastructure at popular breaks. In many cases, access to these areas requires landowner permission.

*'There is good public access to major recreational beaches.'*

Walking and cycling are increasingly popular activities along Taranaki's coastline, especially with the development of the Coastal Walkway in New Plymouth. As previously mentioned, the Coastal Walkway currently extends 12.7 kilometres, with further development planned. Counters set to record people movements on the walkway showed an average of 65,000 movements in September 2014, an increase of 22% in the number of people movements recorded in September 2008. Although the counters record people movements rather than numbers, it is likely the increase in numbers is the result of increased walkway use.

Development activity can adversely affect other recreational experiences on the coast. For example, development in remote areas can affect walkers seeking solitude or the 'wilderness' effect. In some cases, development may lead to a gradual loss of the scenic and natural character of that part of the coast, reducing its amenity value.

## Constraints to public access

Access along the coast can be physically constrained by natural features. In such areas, the provision of public access may not be practicable or appropriate and the relevant agencies may wish to discourage public access because of public health and safety considerations. In areas that are ecologically or culturally sensitive (such as marine protected areas or heritage sites) public access needs to be managed and, in some cases, restricted.

*Relaxing, picnicking and swimming are popular at the Audrey Gale Reserve.*

# Access to fresh water

People in the Taranaki region enjoy a range of freshwater recreation including swimming, fishing and boating. They also enjoy traditional activities such as walking, sitting or having picnics alongside waterways. The Council has limited power to provide public access to and along streams, rivers and lakebeds where the adjoining land and riverbeds are privately owned. However, the *Regional Policy Statement for Taranaki* and *the Regional Fresh Water Plan for Taranaki* both contain objectives, policies and methods that encourage district councils to provide for public access in district plans. The district plans of the region's three district councils provide for the creation of esplanade reserves and strips to ensure public access to and along the region's most important streams, rivers and lakes.

## Formal access

Public access to and along rivers and lakes is often provided by public roads, esplanade strips, esplanade reserves and access strips. The three district councils in the region are responsible for a number of walkways within their districts, 20 of which are adjacent to rivers, streams and lakes in the region. Key walkways in the region that encourage people to access fresh water include the Stony River walkway, the Huatoki walkway, the Te Hēnui walkway, and the Carrington walkway along the Pātea River in Stratford.

In the Taranaki area, the Department of Conservation is responsible for 300 kilometres of actively managed tracks, a large number of which provide access to waterways. The tracks cater predominantly for short-stop travellers, day visitors and backcountry adventurers.

Of the 10 major lakes (more than eight hectares in size) in the Taranaki region, four are either within reserves or have esplanade reserves along their shores. The region's largest lake, Lake Rotorangi, formed by the damming of the Pātea River for hydroelectric power generation, has 200 hectares of esplanade reserve around its edge. In 2014, 95% of New Plymouth district residents surveyed said they were very/fairly satisfied with public access to the natural environment, including rivers and lakes.

# Informal access

*Whitebaiters try their luck at the Kaūpokonui River mouth.*

Approximately half of the beds of rivers, streams and lakes in Taranaki are in private ownership. This means that access to many rivers and lakes in the region is largely through the goodwill and cooperation of landowners and often via the creation of esplanade strips and reserves. Generally most private landowners are happy to allow people to cross their land as long as property rights are respected and permission is sought first.

There are very few situations where public access to and along streams, rivers and lakes is restricted because of existing structures or operations that present a potential risk to public safety. In these cases alternative access can be provided.

## What's the story?

The Council's *2008 Recreational Use Survey* found that 90% of respondents thought public access to such rivers and lakes was "about right". Only 10% of respondents had not been able to gain access to rivers, lakes or parts of the coast in Taranaki that they wanted to in the last year. The main reasons people could not gain access was because the access or entrance was closed, too difficult or too dangerous. Only 1% of respondents had been denied access by the landowner or occupier.

*'90% of respondents thought public access to such rivers and lakes was "about right".'*

The survey found walking, swimming and relaxing to be the most popular activities at beaches and rivers. Scenic appreciation and picnicking are also popular. At rivers, fishing and whitebaiting are also popular activities, but more people in the region go to lakes to boat and water ski rather than fish, jog or kayak. Figures supplied by Fish and Game Taranaki show that in the 2007/2008 fishing season Taranaki licence holders fished for an estimated 11,690 angler days, spending approximately 3,470 angler days (22%) fishing outside of the region. A local survey conducted in 2012/2013 estimated that 15% of Taranaki fish licence holders fished in other regions, but not Taranaki.

There are very few situations where public access to and along streams, rivers and lakes is restricted because of existing structures or operations that present a potential risk to public safety. In these cases, alternative access can be provided.

## National comparisons

New Zealanders have traditionally enjoyed good access to and along rivers and lakes throughout the country. The concept of the Queen's Chain (introduced to New Zealand in 1841) was designed to protect in perpetuity, a 100-foot-wide strip of public land alongside waterways. However, the Queen's Chain does not exist beside all water bodies because since the 1840s an increasing amount of land has become privately owned. While it is often assumed that there is a right of public access to such areas for recreation and for cultural and spiritual purposes, this is not always the case.

## Find out more

*NPDC community survey tinyurl.com/TRC7g*

*Recreational Use of Coast, Rivers and Lakes in Taranaki 2007–2008 (TRC) tinyurl.com/TRC7u*

*The Te Hēnui bridge at East End connects the Coastal and Te Hēnui walkways.*

# Our responses

## Regional plans

The Regional Council has limited power to provide public access to and along streams, rivers and lakebeds where the adjoining land and riverbed are privately owned. However, the *Regional Policy Statement for Taranaki* and the *Regional Fresh Water Plan for Taranaki* (under review) contain policies encouraging district councils to provide for public access in district plans, including the creation of esplanade reserves and strips.

The plans contain objectives, policies and methods to maintain and enhance public access to streams, rivers and lakes. *The Regional Fresh Water Plan* also contains a list of rivers and streams (Appendix IA) for which access arrangements are desirable and appropriate because of their natural, ecological and amenity values.

The *Regional Coastal Plan for Taranaki* recognises that the maintenance and enhancement of public access within the coastal marine area is an important issue. The Plan therefore contains objectives, policies and methods to ensure that public access to the coastal environment is maintained. Methods include rules which give effect to the policies for each of the four coastal management areas (as outlined earlier in this chapter), and general rules that apply to all coastal management areas. Such methods may include:

- restrictions to be applied on coastal permits to maintain existing access
- conditions on coastal permits to provide for alternative access where appropriate
- advocacy to improve public access to the coast (including advocacy to district councils for the continued implementation of esplanade strips and reserves)
- provision of information on the location of public access points.

## Regional Walkways and Cycleways Strategy

The Council's Regional *Walkways and Cycleways Strategy for Taranaki* was developed to promote walking and cycling activities in the region, including access to fresh water and the coast. This strategy lists current and potential routes that together would make up a network offering pedestrian and cycle access to the region's natural attractions, as well as population centres. The strategy aims to recognise and promote the leisure, recreational, commuter and tourism opportunities provided by walking and cycling. Some of the new routes foreseen in the strategy include:

- extensions to the New Plymouth Coastal Walkway
- Oākura/Wairau River to Mount Taranaki
- Waiwhakaiho River to Lake Mangamāhoe
- Stratford to Egmont National Park
- a coastal pathway and cycling route in South Taranaki
- an 'Around the mountain' route
- links to Te Araroa, the walkway being developed spanning the length of the country.

*An 'Around the mountain' cycleway is one of a number of potential routes proposed for the future.*

## District plans

All district plans in Taranaki provide for the creation of esplanade reserves and strips to ensure that public access to and along the region's most important streams, rivers and lakes can be maintained and enhanced. Councils do have the discretion to waiver a requirement. Esplanade strips may be required by a rule in a district plan when land is subdivided or developed. Under the RMA, all subdivisions of allotments under four hectares are required to have esplanade reserves of 20 metres width created along the edge of any river and lake, or the coast. This requirement may be waived or modified by either a rule in district plan, or by resource consent. There is no default requirement for an esplanade reserve when allotments over four hectares are subdivided. However, requirements may result from a rule in a plan.

- The *New Plymouth District Plan* identifies 'preferred esplanade reserves and strips' and 'priority waterbodies'. These are areas of land that would link existing public access and where enhanced public access is desirable. These areas require an esplanade reserve or strip to be set aside at the time of subdivision and development.
- The *Stratford District Plan* provides for esplanade reserves (upon subdivision) and esplanade strips (as a condition of any land use consent) on land adjoining priority ringplain river catchments. These are in areas of more intensive land use.
- The *South Taranaki District Plan* has a schedule of priority rivers for protection via esplanade reserves and strips at the time of subdivision and development.

Both the *New Plymouth District Plan* and the *South Taranaki District Plan* contain objectives, policies and methods to safeguard public access to the coast. Policies relate to esplanade reserves or strips set aside at the time of subdivision, or by other means.

*The Carrington Walkway in Stratford provides public access along the Pātea River.*

*A number of tramps and walks provide access to the region's natural environment.*

In addition, the district councils maintain roads, tracks, paths, reserves and walkways that provide public access to and along waterways—for example, the Carrington Walkway in Stratford, and the Huatoki and Te Hēnui walkways in New Plymouth—and to and along the coast. Most conduct ongoing upgrade and maintenance of walkways and other facilities.

The *New Plymouth District Council Coastal Strategy 2006* has a strong focus on coastal access issues—also reinforced in the recently released draft *Open Space, Sport and Recreation Strategy*. The South Taranaki District Council has accepted in principle a proposal to explore options for enhancing public access and walking opportunities around the South Taranaki coastline.

## Navigation safety bylaws

The Taranaki Regional Council has prepared navigation bylaws for Port Taranaki and its approaches. These bylaws apply to Port Taranaki only and are for the purpose of regulating navigation and safety in this area. It is important that both recreational and commercial users receive clear guidelines on appropriate speed and access at the port.

## Walking Access Commission

Central Government established the New Zealand Walking Access Commission in 2009 to provide leadership on walking access issues and administer a national strategy on walking access, including walkways. It also undertakes mapping of walking access, provides information to the public, oversees a code of responsible conduct, assists with dispute resolution, and negotiates new walking access information, education and advice.

Regional and district councils provide information and technical advice relating to the provision of public access when requested.

### Find out more

*NPDC Coastal Strategy tinyurl.com/TRC7x*

*NPDC District Plan tinyurl.com/TRC7a*

*Regional Policy Statement for Taranaki tinyurl.com/TRC7k*

*Regional Fresh Water Plan for Taranaki tinyurl.com/TRC7v*

*Regional Walking and Cycling Strategy for Taranaki tinyurl.com/TRC7w*

*SDC District Plan tinyurl.com/TRC7b*

*STDC District Plan tinyurl.com/TRC7c*


# WASTE

8

THIS CHAPTER COVERS:

## Waste minimisation

- Regional waste management
- Waste minimisation initiatives

## Residual waste

- Waste to landfill
- Kerbside collection
- Hazardous and special waste
- Cleanfills
- Illegal dumping

*Waste tinyurl.com/TRC8vid*

*In today's world, the focus of waste management has shifted to minimisation—reducing the amount of waste created and therefore needing disposal. It's also about looking at ways to treat waste as a resource with potential to be recovered, reused or recycled.*


'The focus of waste management has shifted to minimisation ...'
COMPACT SOFT HANDS
CHLORIDE of LIME

# Waste

The *Waste Minimisation Act 2008* defines waste as any thing disposed of or discarded and includes any type of waste that is defined by its composition or source—for example, organic waste, electronic waste, or construction and demolition waste. To avoid doubt, it includes any component or element of diverted material, if the component or element is disposed of or discarded. The Act establishes a hierarchy of priorities and preferences in waste minimisation and management. These are reduction of waste generated, reuse of items and materials, recovery and recycling for alternative uses, and finally, treatment and disposal of residual wastes.

In past years, waste management has been about the environmental effects of solid waste disposal in dumps—things such as managing odour, seagulls, and pollution leaching to groundwater. However, over the past two decades, most environmental issues associated with solid waste disposal have been addressed. Most small municipal landfills or 'dumps' have been closed, and there has been marked improvement in landfill engineering and management practices at new or remaining sites.

*'Over the past two decades, most environmental issues associated with solid waste disposal have been addressed'*

The focus of waste management has shifted to minimisation—reducing the amount of waste we create and therefore need to dispose of. Recovery and recycling or reuse have become about recognising the opportunity to use waste as a resource—exactly as other activities use resources such as water, land, hydrocarbons, wind and air. The difference is that the resource is generated by human activities rather than being inherent in nature. Effective waste management also recognises that it is far more efficient to reduce the amount of waste we generate than to manage waste disposal.

Councils in the region follow current best practice in waste management by adopting the principles of minimisation, recovery, and recycling. On a practical level, this means minimising waste going to landfill, encouraging composting of organic material and reusing or recycling materials where possible. All of these actions help to minimise the environmental impacts associated with solid waste disposal and avoid the depletion of critical resources.

Unlike much of New Zealand, Taranaki has secured long-term access to a future landfill site. However, as a region, it is still important to reduce the amount of waste generated and to divert waste that does not need to go to landfill and could instead be recycled, composted or used in another process.

Effective and innovative waste management requires involvement of the whole community. It is no longer a case of leaving it to the local council rubbish truck crew. Education is a crucial part of ensuring that as a region, we manage waste in a responsible and sustainable way.

# Waste minimisation

A key part of waste minimisation is reducing and reusing waste, finding ways to reduce the waste created, or reusing materials that might otherwise be discarded. In an increasingly throwaway society, it is important to focus on recycling, reusing and recovery as key principles of minimising the amount of waste that ends up in landfill.

## Regional waste management

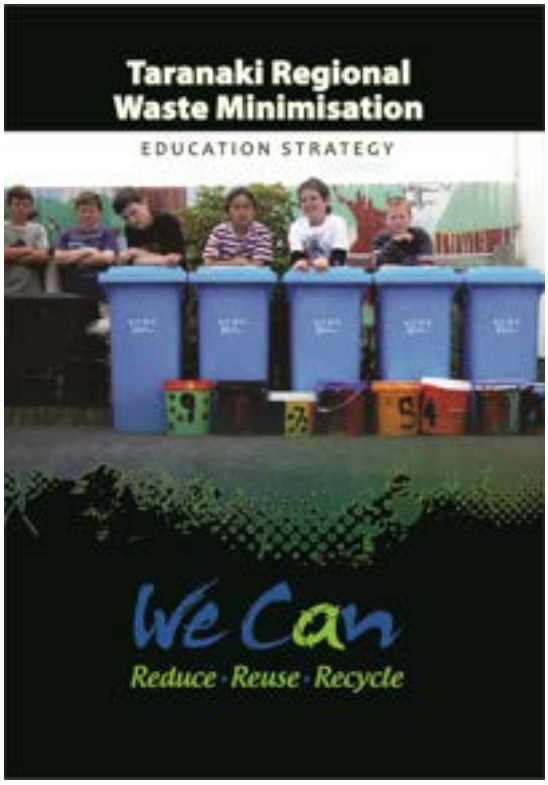
In September 2008, the *Waste Minimisation Act 2008* was passed into law and became the basis for managing waste in New Zealand. The purpose of this Act is to encourage waste minimisation and a decrease in waste disposal in order to:

- protect the environment from harm; and
- provide environmental, social, economic, and cultural benefits.

In 2009/2010 the Taranaki Solid Waste Management Committee was established. Administered by the Regional Council, this is a joint inter-council committee with decision-making roles. The committee provides a forum for New Plymouth District Council (NPDC), Stratford District Council (SDC), South Taranaki District Council (STDC) and Taranaki Regional Council to jointly consider and implement waste management issues of significance to the Taranaki region. In particular, the committee collaborates on the delivery of functions arising from the *Waste Minimisation Act 2008* (where it is efficient and effective to do so).

In 2011, the Taranaki Solid Waste Management Committee adopted the *Waste Management and Minimisation Strategy for Taranaki.* This strategy outlines how the region will manage waste. The goals of the strategy are to:

- reduce the harmful effects of waste; and
- improve the efficiency of resource use.




*Taranaki Regional Waste Minimisation Education Strategy.*

The strategy feeds into the district level waste minimisation and management plans produced by STDC, SDC and NPDC as required under the *Waste Minimisation Act*.

In 2013, the *Taranaki Regional Waste Minimisation Education Strategy* was adopted. This strategy focuses on education and is built on the strategy developed in 2011. Its purpose is to allow the Taranaki Solid Waste Management Committee "to effectively and efficiently communicate with and educate the community so that the entire regional community fully understands and appreciates the need to minimise waste and is empowered to take action". Under the Taranaki Solid Waste Management Committee, the four councils in Taranaki also fund a Regional Waste Minimisation Officer, who works to promote sustainability and waste minimisation across the region.

## Regional waste brand: 'We Can'

In 2012, the waste officers and communications staff at each of the four councils in the region developed a regional waste brand 'We Can'. The brand was approved by the Taranaki Solid Waste Management Committee in November 2012 and has subsequently been used for all communications involving waste or recycling. In the long term it is hoped that the brand will become recognisable to the public as representing waste-related activities in the region.


*'We can' branding has been used in signage on waste collection trucks, in brochures and in other communications materials about recycling and in annual community awareness campaigns, such as TV Takeback.*

### Find out more

*Taranaki Regional Waste Minimisation and Education Strategy 2013 tinyurl.com/TRC8a*
*Waste Management and Minimisation Strategy for Taranaki 2011 tinyurl.com/TRC8b*
*'We can' (TRC website) wecan.org.nz*

# Waste minimisation initiatives

Commercial service providers contracted by councils to collect kerbside recycling and other waste play a major role in recycling in the region. Recovery and processing of recycled goods is also undertaken by other companies. The councils in the region also actively support community and business efforts to minimise waste in the region.

## Kerbside services

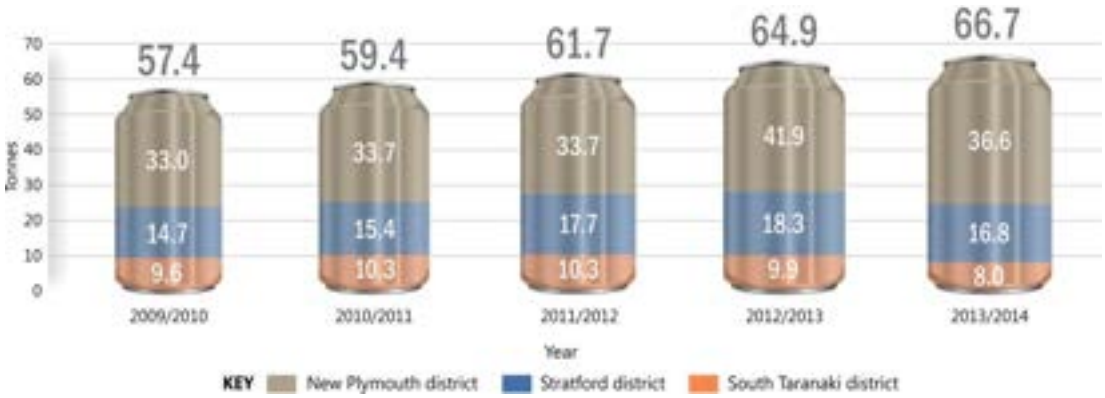
Each of the three district councils in Taranaki provides a kerbside recycling service. In the New Plymouth district, residents can recycle weekly and put unlimited recycling out for collection in plastic bags. The South Taranaki district also has a weekly recycling collection where residents are provided with a 120-litre wheelie bin. In the Stratford district recycling is collected monthly and residents are provided with a 240-litre wheelie bin.

## What's the story?

The amount of material recycled through council kerbside collections, at transfer stations and through council-provided school recycling services has increased in the region over each of the last five years.

In the 2013/2014 year, the overall increase in sorted recyclables for the region was smaller than for the previous two years, with reductions recorded in both the South Taranaki and Stratford districts. This is likely related to a period between October 2013 and February 2014, when a significant amount of material collected for recycling went straight to landfill while the contractor was setting up a new sorting facility.

*Kerbside recycling is business as usual for students at St Joseph's School, Hāwera.*




*Kerbside recycling in the region has steadily increased over the past five years.*

# Composting

The South Taranaki District Council offers an optional fortnightly kerbside green waste collection using 240-litre wheelie bins. Residents in other districts can recycle their green waste through private contractors or at transfer stations. There is also an unquantified amount of green waste and food waste composted by residents at home.

## 2011 Rugby World Cup

The Rugby World Cup games at Stadium Taranaki (Yarrow Stadium) were a great success in terms of waste minimisation, with almost five tonnes of waste being recycled—an average of 46% of the waste over the three games.

The Regional Waste Minimisation Officer worked closely with New Plymouth District Council (NPDC) staff to implement waste reduction initiatives at the stadium during the Rugby World Cup. Recycling stations were set up for the public, including bin lids and flags provided by the 'Love NZ' Public Space Recycling Project. This was complemented by promotions on the big screen and PA announcements about using the recycling bins.

This recycling system will continue to be used for all events at the stadium in the future.

# Electronic waste

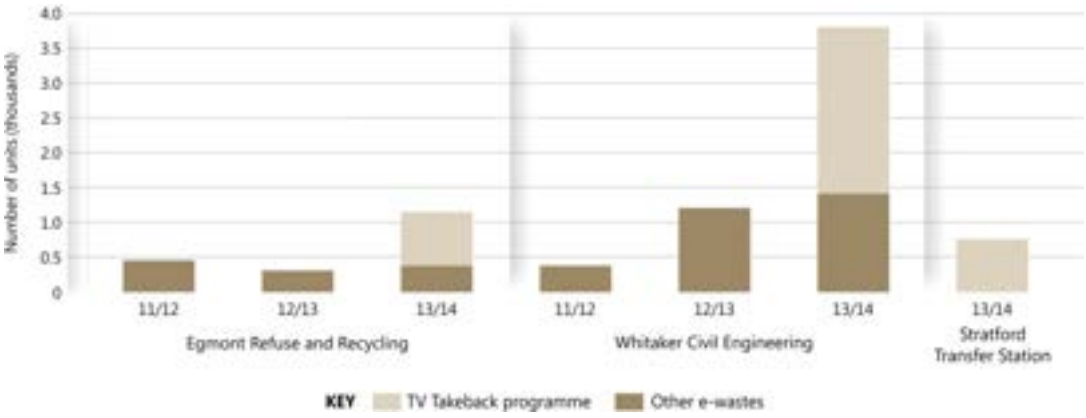
In 2011, three council-supported electronic waste recycling sites commenced operation in the Taranaki region. These sites accept computers, televisions, stereos, printers and other e-waste. Following on from previous one-off e-day collections, establishing these sites allows residents to recycle their e-waste throughout the year rather than on one particular day.

*Recycling electronic waste has been well supported.*

## What's the story?

Current collection sites are located at Whitaker Civil Engineering on Corbett Road in Bell Block, the Stratford Transfer Station on Cordelia Street, and Egmont Refuse and Recycling on Scott Street, Hāwera. Until 2013, Egmont Refuse and Recycling also collected electronic waste from the Stratford district. The Stratford Transfer Station now accepts e-waste. Unfortunately no collection records were kept at the Stratford Transfer Station during the 2013/2014 year, except for the number of televisions collected as part of the TV Takeback programme.

Three sites collect electronic waste items for recycling (see graph *below* for results). Figures show that even when the televisions collected as part of the TV Takeback programme are excluded, the number of electronic items collected each year is increasing at a steady rate.




*Electronic waste units collected 30 June 2011 to 30 June 2014.*


*Extensive advertising of the TV Takeback programme resulted in thousands of televisions being collected.*

## TV Takeback programme

During 2013, in association with the switchover to digital TV, the Government funded a TV Takeback programme. This programme allowed residents to recycle obsolete TVs at three electronic recycling sites and at selected national chain retailers for no more than $5.

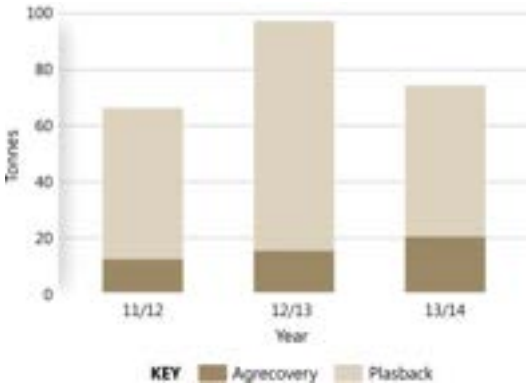
Various activities were undertaken to promote TV TakeBack. These included advertising on the *Taranaki Daily News* website, radio advertising, development of a webpage as part of the 'We Can' website, print advertising in local newspapers and information cards and bookmarks for the district council service centres. A total of 3,936 TVs were recycled through the council-supported electronic waste recycling sites.

# Agricultural waste

The Council continues to support the farm plastics recycling programmes available in Taranaki. There are two main companies involved with this collection, Plasback and Agrecovery.

Plasback, established in New Zealand in 2006, currently recycles balewrap, silage sheet, polypropylene bags, HDPE drums, vineyard nets and twine. It also recovers HDPE drums.

The Agrecovery rural recycling programme enables farmers to recycle agrichemical plastic containers and drums. Reusable drums are also recovered. Silage wrap collection was discontinued from this programme during the 2013/2014 year.




*The amount of farm plastics collected between June 2011 and 2014.*

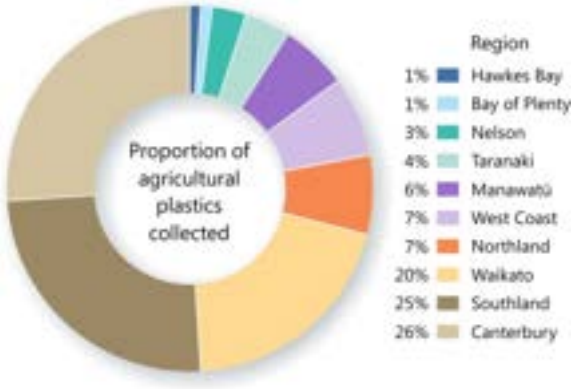
## What's the story?

Data from farm plastics recycling programmes in the region appears to show that the quantity of waste collected by Agrecovery is increasing, with the quantity that Plasback collects remaining fairly constant over the long term. Further data is needed to confirm this as a trend.

## National comparisons

Regional data collected by Plasback was used to compare Taranaki's agricultural plastics collection and recycling with other regions.

*Plasback employees collect farm silage wrap for recycling.*




*The proportion of agricultural plastics collected in Taranaki during the 2013/2014 year was lower than many other dairying areas in New Zealand.*

## Project LiteClub

Project LiteClub works to promote sustainability in sports clubs. Clubs are provided with a number of resources to encourage sustainability, including sorting-at-source bins for recycling, and water and energy saving devices such as low flow shower heads and energy efficient light bulbs.

In the two visits to Taranaki to date, LiteClub staff have assisted 24 clubs, working with the clubs and with local waste businesses to help set up a detailed waste minimisation plan (and other support as needed). Four large New Plymouth clubs are now part of a waste minimisation acceleration programme, which includes an initial year of free recycling, provided with assistance from NPDC's Waste Levy Fund. The intention is to gather data over the year and use this for case studies to demonstrate the value of recycling to other clubs.

The Regional Waste Minimisation Officer provides local information and Project LiteClub has further visits to Taranaki planned to work with additional clubs.

## Para Kore

Para Kore is a zero waste programme for marae. The programme is funded by the Ministry for the Environment and by the district councils in the region. The Taranaki Regional Council provides advice and support. Facilitators for the Taranaki area started working with marae in April 2013, with a plan to work with at least one marae in each iwi area. Para Kore facilitators are currently working with 12 marae: Meremere Marae, Oākura Pā, Otaraua Marae, Ōwae Marae, Puniho Pā, Te Pōtaka Pā, Waipapa Marae, Waiokura Marae, Wai-o-Turi Marae and three marae at Parihaka, Takitūtū, Te Niho o Te Atiawa, and Toroānui.

*A waste audit at Tarawainuku Marae, Puniho Pā.*

## Business engagement

Between 2012 and 2014, Environmental Health Officers from the district councils surveyed 113 cafes and restaurants in the region on their recycling habits. The Regional Waste Minimisation Officer also offered assistance with recycling systems. During this process, businesses became more aware of recycling options for their waste and many made improvements to their existing systems.

## School programmes

The Taranaki Regional Council offers an extensive waste minimisation programme for schools, where schools can take part in a series of three waste minimisation workshops. Initially a school learns about waste and why they should reduce, reuse and recycle. With the help of the Taranaki Regional Council Education Officer and the Regional Waste Minimisation Officer, the school then conducts a waste audit. The school uses the data gathered to produce a plan to start reducing, reusing and recycling their waste. The Council Education Officer completes a follow-up visit six to twelve months later, to look at the progress and measure the success of the school's waste reduction activities.

*The Council's Education Officer helps students from Rāwhitiroa School with their waste audit.*

Within these the five years the Council Education Officer has taken more than 50 lessons and nine waste audits have been completed.

Both the New Plymouth and South Taranaki district councils provide free recycling bins to schools to encourage recycling. The Regional Waste Minimisation Officer can also provide additional assistance to schools to help schools set up or improve their recycling systems.

The three district councils in the region also provide tours of their transfer stations, recycling facilities and landfills.

## Puketapu Kindergarten teaches valuable lesson

You're never too old to learn, the old saying goes, and nor are you ever too young to learn about waste minimisation.

Take Puketapu Kindergarten in Bell Block, for example. It is attended by 60 children and has a staff of five—four teachers and an administrator. Not too long ago, the kindergarten generated two 240-litre bins of waste to landfill each week. There was no recycling, and no organic waste was composted.

However, an Environmental Education Awareness programme was developed, which quickly generated action to reduce, reuse and recycle. Waste minimisation is now part of the everyday programme and as well as a focus on recycling, there are five compost bins and five worm farms, the products of which are used in flower and vegetable gardens.

The kindergarten has halved its waste to landfill, from two to one 240-litre bin a week. It is also filling one 240-litre bin of recyclables each week, when previously there was no recycling.

Some seven litres of organic material is also used in compost or worm farms, instead of being sent to landfill, and is being turned into income, with wormcasts and worm juice sold from a stall at the gate.

Other initiatives have included leaf collections, pest management activities and can collections. The children are also encouraged to consider how healthy their lunches are, and to cut down on packaging.

*Children learn about composting as part of gardening activities at Puketapu Kindergarten.*

## Find out more

*Agrecovery recycling programme tinyurl.com/TRC8f*

*E-waste initiatives tinyurl.com/TRC8d*

*Para Kore programme—zero waste for marae tinyurl.com/TRC8h*

*Plasback recycling programme tinyurl.com/TRC8e*

*Project Litefoot—energy and waste efficiency for sports club tinyurl.com/TRC8g*

*Waste minimisation study unit for schools (TRC) tinyurl.com/TRC8i*

*New Plymouth District Council tinyurl.com/TRC8n*

*Powerco Ltd tinyurl.com/TRC8m*

*Puketapu Kindergarten tinyurl.com/TRC8j*

*House Maintenance Manager, Yvonne Kettle and Head Chef, Krishna Bogulla from New Plymouth's Devon Hotel.*

CASE STUDY

# Hotel embraces recycling

A New Plymouth hotel has massively increased its recycling and dramatically reduced its waste to landfill—and communication is the key to its success.

Within a year of starting a waste minimisation campaign, the Devon Hotel had achieved a 60% reduction in the rubbish it sends to landfill, from 1.2 tonnes a week to less than half a tonne, and a whopping 780% increase in the amount of material it recycles, from 110 kilograms a week to more than 850 kilograms. Food waste is sent to pig farms and at least two 240-litre bins of garden waste are also collected weekly for composting.

Laying on extra recycling bins was relatively easy and simple. The most complicated part was ensuring the recycling message got to all staff in what is a round-the-clock operation involving different shifts and many part-time and casual workers.

## *'A 60% reduction in the rubbish it sends to landfill ...'*

"It was a case of getting the day shift all sorted, then starting again with the night shift," says the Devon's House and Maintenance Manager, Yvonne Kettle.

"It really was a matter of changing habits and changing mind-sets. It was sometimes difficult at first, and I had to take on the role of 'rubbish witch' for a while. But after a few weeks everyone started getting into the swing of things. Now everyone enjoys seeing what a difference it makes."

An eye-opener for her has been seeing how much cardboard is generated by the kitchen operation. "It all used to get dumped. Now it gets recycled, unless it has food on it or in it."

How did it all start? As part of a coordinated approach to waste minimisation by the region's four councils, the issue of recycling is raised when food premises are inspected. Thus the Devon's Head Chef, Krishna Bogulla, found himself completing a questionnaire on the subject—and saw potential for the hotel to improve.

Advice was sought from the Taranaki Regional Council's Waste Minimisation Officer, who works with industry sectors and individual firms to help them reduce the burden on Taranaki's sole landfill, and Waste Management NZ also worked closely with the hotel to set up its new system.

The rest is history, although Yvonne notes that continued commitment and communication are required.

*A few of the hotel's many and well-used recycling bins.*

## Sustainability at Taranaki Regional Council

As an organisation, the Taranaki Regional Council operates internal waste minimisation initiatives. The Council's in-house sustainability group continues to promote sustainability within council and to identify improvements that can be made. In 2012, the waste collection services contract was reviewed and as a result a more comprehensive system was implemented. Council staff can recycle glass bottles, aluminium and steel cans, plastics (1 and 2), paper and cardboard.  Food scraps are also composted. Each staff member has a brightly coloured paper recycling bin and general recyclables and food scraps bins are located in each work area.

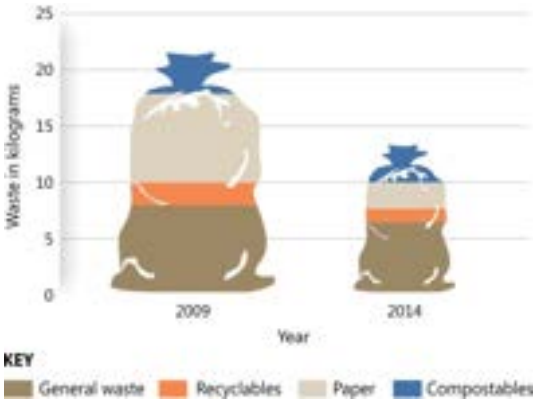
In 2012, a section on 'Sustainability in the Workplace' was included in the staff guidelines document *Working for the Taranaki Regional Council.* This formalised what is expected from staff in relation to reducing waste and recycling. All new staff are introduced to the Council's recycling system as part of induction.


*The Council's recycling checklist.*

## Waste audit

The Council has undertaken regular waste audits of the amount and type of waste disposed of from the main office building on Cloten Road. The most recent audit of February 2014 showed:

- The amount of waste going to landfill had reduced by 38% when compared with the first audit undertaken in December 2009, based on the number of full-time equivalent (FTE) staff. This is a total of 13.2 kilograms per person per annum—down from 21.5 kilograms.
- The compostables category (food waste and compostable paper) was the largest category with potential to be diverted from landfill, at 3.4 kilograms per FTE per year. This was followed by recyclable paper at 2.3 kilograms per FTE per year.
- The weight of other recyclables was 1.1 kilograms per FTE per year.




*Significantly less waste was collected during the Council's 2014 waste audit compared with 2009, indicating a reduction in waste generated.*

*Council staff carry out a waste audit.*

*Recycling bin and worm farm at Hollard Gardens.*

# **Into the ground** go the grounds

Gardener Mitch Graham's fervent hope is that the world never grows tired of coffee. Every week the coffee grounds from two local cafes are fed into the compost at Tūpare, the New Plymouth heritage property where Mitch is the manager. And he's enthusiastic about the results. "It's been part of a renewed focus on composting and it's really paying off for us in a lot of ways."

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Composting and broader waste minimisation have become important considerations at Tūpare, Pukeiti and Hollard Gardens, the three heritage properties owned and managed by the Taranaki Regional Council on behalf of the people of the region. And gardeners being gardeners, the approaches can be quirky and creative.

## *'Staff happily find new uses for any discarded material that might previously have been sent to landfill ...'*

At Hollard Gardens, for example, there are worm farms in old baths and in boxes that double as park benches. And staff happily find new uses for any discarded material that might previously have been sent to landfill. With a bit of imagination, it is turned into sculptures, or furniture, or habitats to encourage insects and wildlife. Potatoes are grown in old tyres, and old fencing has been used to give the recycling bins that rustic look. The barbecue area at Hollards has been set up with recycling and composting bins to make it easy for users to do the right thing. These and other initiatives have resulted in a reduction of waste to landfill from four to five rubbish bags a week to one a week in winter and two to three a week in summer.

A major development at Pukeiti has been construction of three large compost pads, while track upgrades mean a mulcher can now be taken to most areas of the garden. The nursery has opted for reusable hard pots rather than plant bags, and while the café does sell coffee in takeaway compostable cups, it encourages patrons to remain in the café and enjoy their hot drinks in crockery cups. Those compostable coffee cups, meanwhile, are collected and washed from February to October and reused as seedling containers in the Rainforest School's 'pot-a-plant' sessions. Being at the mountain end of Carrington Road, Pukeiti takes responsibility for its own recycling, with visitors encouraged to use the marked bins and recyclables stored on site until there is enough to fill a ute and take to the transfer station at Ōkato.

The Council's Regional Gardens Manager, Greg Rine, says it's been interesting to watch waste minimisation ideas being bounced around by staff at the gardens, and heartening to see staff adopt and adapt practices followed by their colleagues at the different locations. "Minimising waste to landfill is not only important in terms of protecting the environment and conserving resources, but also important because these days, garden visitors expect us to be doing it," he says. "The garden setting is an opportunity for us to be creative and have some fun with it. And there's a financial upside in being able to use our own compost."

*Worm farm, complete with instructions, at Hollard Gardens.*

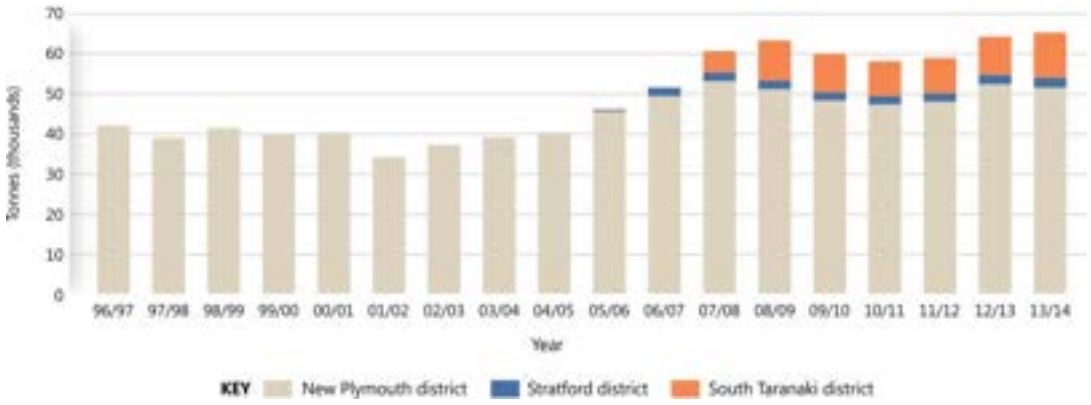
# Residual waste

Although recovery and recycling are effective waste minimisation principles, there is still waste in the region that requires disposal, and it is important to continue to minimise the amount of waste that does end up in landfill. It is also important to encourage people to use the appropriate services to dispose of residual waste, rather than perform illegal or unsafe practices.

## Waste to landfill

Research shows that waste generation is linked to economic activity—when the economy is flourishing, more waste tends to be generated. Tracking the quantity of waste going to landfill helps to give an indication of the impact of waste minimisation initiatives, such as kerbside recycling.

Waste from all three districts in the region is currently disposed of at the Colson Road landfill in New Plymouth. The amount of waste disposed of has been recorded since 1996. However, prior to 2008, only waste from New Plymouth was disposed of at Colson Road. Data has been provided by all three district councils—New Plymouth, Stratford and South Taranaki.




*Waste from all districts in the region has been disposed of at New Plymouth's Colson Road landfill since 2008, although records of waste disposal have been kept since 1996.*

### What's the story?

In the first year that all municipal waste from the region went to Colson Road landfill (2008/2009), the total amount of waste going to landfill was 63,309 tonnes.

In the following three years the amount of waste to landfill decreased, before increasing again in the 2012/2013 year. In the 2013/2014 year the amount of waste that went to landfill was 65,257 tonnes—an increase of 3.1% compared with 2008/09.

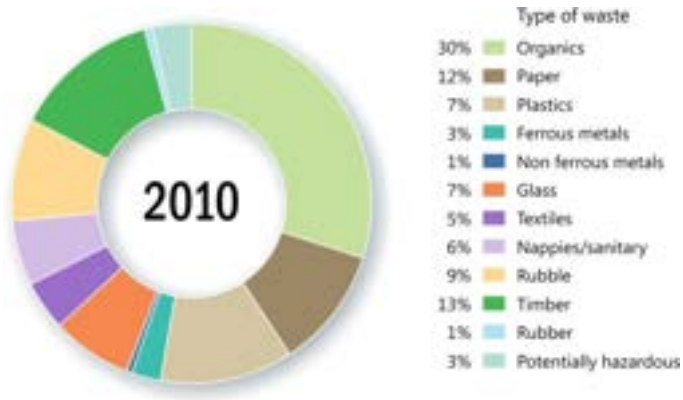
The total amount of all waste to landfill (calculated per person) decreased every year between 2009 and 2011 and before increasing in 2012. In 2014, the amount of all waste to landfill calculated per person was about the same as in 2008/2009 (lineal population change is assumed between each census).


*The total amount of all waste to landfill in the region (calculated per person) is about the same as in 2008/2009.*

Landfill weighbridge data shows that the amount of residential waste going to landfill has remained fairly constant in the past six years, with commercial waste accounting for the variation shown in gross tonnages to landfill.

In 2010 a New Plymouth District Council survey of waste entering the Colson Road landfill showed waste from organic materials (primarily food and garden waste) made up nearly 30% of the total waste generated.

The survey determined that 55% of the waste could have either been recycled or composted rather than being sent to landfill.



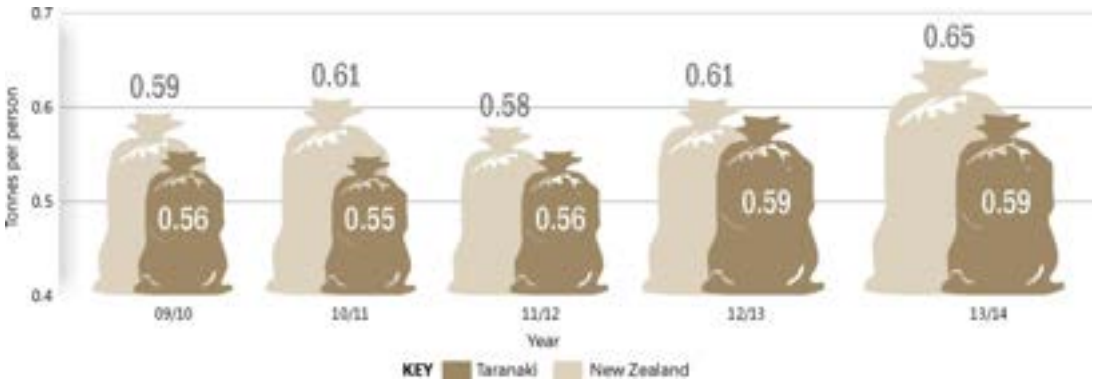

*Analysis of the composition of waste going to landfill in 2010 showed that over half of all waste ending up in the landfill in the region could have been recycled or composted.*

The Colson Road landfill is expected to close in June 2019, and therefore has a remaining life of less than five years. Once it is closed, waste from the Taranaki region will either go to a new pre-approved landfill under consideration in South Taranaki or it will be transported out of the region.

## National comparison

Waste disposal in Taranaki is not increasing as rapidly as it is nationally, despite Taranaki leading New Zealand in economic growth. In terms of waste to landfill per person, the quantity of waste disposed to landfill in Taranaki has remained below the national average (assuming lineal population change between each census). In the 2010/2011 year, there was an increase in national quantities of waste as a result of the Christchurch earthquakes.

*'Waste disposal in Taranaki is not increasing as rapidly as it is nationally, despite Taranaki leading New Zealand in economic growth.'*




*The amount of waste per person going to landfill is lower than the national average (national data has only been collected for the past five years).*

# Kerbside collection

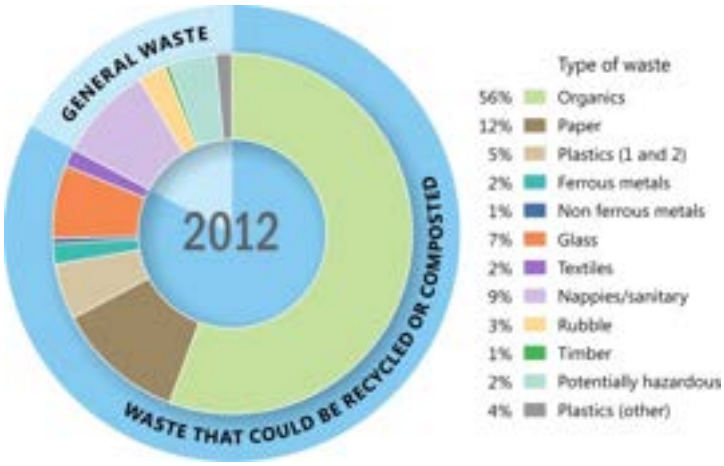
All three districts in the Taranaki region provide a kerbside municipal waste collection. Residents in New Plymouth can put out one 60-litre rubbish bag per week. For any additional bags an excess refuse sticker must be purchased. Alternatively, New Plymouth residents can choose to pay for a commercial refuse collection where wheelie bins are generally used. Stratford and South Taranaki district residents are supplied with 120-litre refuse wheelie bins, which are emptied weekly.

## What's the story?

In 2012, the New Plymouth District Council (NPDC) conducted a survey of waste collected from the kerbside.

Analysis showed that waste from organic materials accounted for 56% of waste generated.

Analysis also showed that more than half of NPDC's kerbside refuse collection could be diverted from landfill by either recycling or composting.




*A 2012 survey showed that over half of the kerbside waste collected in the New Plymouth district could be recycled or composted.*

# Hazardous and special waste

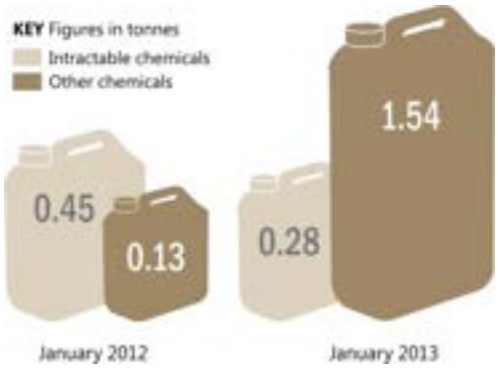
Agrecovery undertook agricultural chemicals collections in the Taranaki region in July 2012 and November 2013. The Taranaki Regional Council and the three district councils contributed to the cost of these collections along with brand owners and the Ministry for the Environment.

These collections follow on from Taranaki Regional Council collections held in 1991, 1995 to 1997, 2001, and 2004, where approximately 40 tonnes of chemicals were collected.

## What's the story?

In 2012, the total amount of chemicals collected by Agrecovery was 0.589 tonnes. The amount tripled in 2013 to a total of 1.832 tonnes. The largest proportion |of chemicals collected were herbicides and insecticides, with 284 kilograms requiring treatment offsite and 36.4 kilograms classified as persistent organic pollutants.

Residents are able to dispose of their household chemicals at the New Plymouth and Hāwera transfer stations.




*The amount of agricultural chemicals collected by Agrecovery tripled between 2012 and 2013.*

*Ray McGregor from the Haz-Tech agrichemical hazardous waste collection service (right) with Allan Nolly (left).*

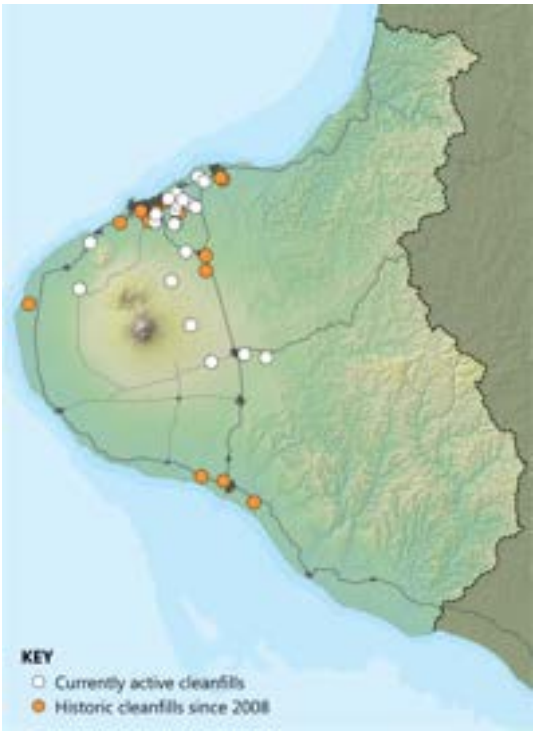
# Cleanfills

Cleanfills are managed disposal sites that can accept inert non-biodegradable materials that would otherwise be disposed of to landfill. The sites are managed via resource consent and compliance monitoring. This monitoring ensures that the sites only accept materials that will not produce leachate, which may contaminate groundwater or waterways.

*'No cleanfills were found to have an 'Improvement required' or 'Poor' environmental performance.'*

## What's the story?

Forty-one resource consents to discharge cleanfill were active at some time during the past five-year monitoring period, with an average of 23 being active at any one time. Currently, there are 21 active cleanfills in Taranaki.




*The location of both current and historic cleanfills in the Taranaki region.*

In the 2013/2014 year, the Council noted nine cleanfills as demonstrating a 'high' level of environmental performance, and three cleanfills as 'good'. No cleanfills were found to have an 'Improvement required' or 'Poor' environmental performance.

# Illegal dumping

In October 2012, a regional report was prepared to document the current levels of illegal dumping. Staff from the Department of Conservation, New Zealand Transport Agency, New Plymouth District Council, Stratford District Council and South Taranaki District Council provided information. The report indicated that in some areas scarce information made it difficult to get an overall indication of the extent of illegal dumping in the region. To get a clearer picture, additional information was collected over the 2013 calendar year. Regional promotion, including press releases and print advertising, was undertaken at this time to increase public awareness and encourage reporting of illegal dumping as soon as it is seen.

## What's the story?

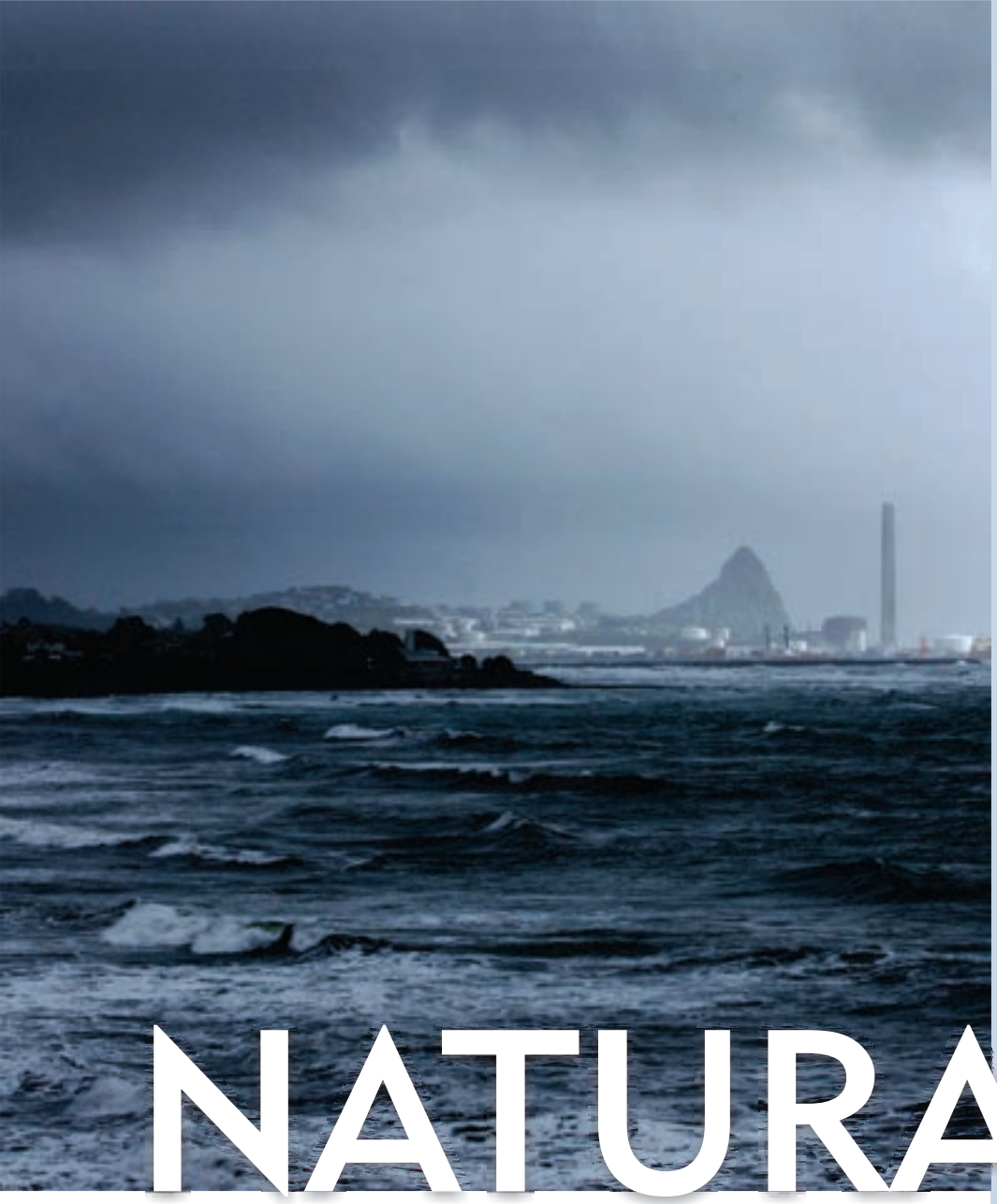
In 2013, the total number of illegal dumping events recorded for Taranaki was 249, or an average of 21 events per month. The total volume of illegally dumped waste collected by all five agencies was 967 $m^3$, or 81 $m^3$ per month.

In September 2014, the agencies involved launched a regional campaign of education and enforcement to reduce illegal dumping to coincide with Keep New Zealand Beautiful week and with the Councils' *Waste Minimisation Education Strategy* annual awareness campaign, which focused on illegal dumping for the 2014 year.

| Agency | Number of events | | Volume |
|---|---|---|---|
| | 2011/2012 | 2012/2013 | |
| NPDC | 133 | 100 | 73 |
| SDC | 6 | 17 | 7 |
| STDC | 16 | 29 | 31 |
| TRC | 5 | 19 | 857 |
| NZTA | ND | 84 | ND |
| DOC | ND | ND | ND |
| Total | 160 | 249 | 967 |

*The number and volume of illegal dumping events between June 2011 and June 2013 recorded by each agency (ND= No data).*

*District and regional council staff collect illegally dumped rubbish during 'Keep New Zealand Beautiful' week.*



9

THIS CHAPTER COVERS:

## Geological hazards

- Volcanic eruption
- Earthquakes
- Liquefaction
- Tsunami

## Weather-related hazards

- Coastal erosion
- Flooding
- Riverbank erosion and landslides
- High winds and tornadoes
- Droughts
- Climate change

*Natural hazards tinyurl.com/TRC9vid*

# NATURAL HAZARDS

*New Zealand's location on the active Pacific-Australian plate boundary means much of the country is susceptible to geological hazards such as volcanic eruptions, earthquakes, liquefaction and tsunami. The country can also be subject to weather-related hazards such as flooding, landslides, high winds, tornadoes and droughts.*

*A major event can have dramatic social and economic effects. Preparing for and responding to natural hazards in terms of reduction, readiness, response and recovery is a key component of the Council's work.*

*'A severe tornado occurs about once in every four years.'*

# Natural hazards

New Zealanders live on the edge of the active Pacific-Australian plate boundary and earthquakes and volcanoes have shaped the country's landscape. New Zealand is also subject to a large number of meteorological or weather-related hazards. Historical evidence and scientific research show the potential impact on New Zealand's population and economy as a consequence of natural events to be significantly greater in more recent years, as witnessed in Christchurch in 2010 and 2011.

In Taranaki, significant potential hazards include volcanic activity, earthquakes, flooding, high winds, drought and erosion and landslips, although to some extent, vulnerability to natural hazards depends on where in the region residents live.

Experts generally agree that climate change is affecting New Zealand's weather patterns. In Taranaki, rainfall is predicted to decrease in summer and increase in winter. An increase in extreme rainfall is likely as the temperature increases through the 21st century, potentially increasing both the severity and frequency of flooding. South Taranaki is predicted to become drier on average, with more frequent droughts. Gale and storm force winds from the west are also predicted to increase.

*'In Taranaki, significant potential hazards include volcanic activity, earthquakes, flooding, high winds, drought and erosion and landslips …'*

Regional and district plans, and emergency management plans identify potential natural hazards for Taranaki, and contain controls to reduce hazard risks. The regional and district councils undertake flood prevention work and have flood event procedures in place to minimise risk. Building controls, refurbished infrastructure (such as water and power supplies) and improvements to road networks all enhance the region's resilience. However, an increasing reliance on technology can lead to greater vulnerability.

The Taranaki Civil Defence Emergency Management (CDEM) Group identifies significant hazards and risks for management in the *Taranaki Civil Defence Management Group Emergency Plan.* In addition, the CDEM Group promotes community awareness and education on natural hazards, including measures and responses to reduce risk.

Together, all agencies involved in civil defence in the region work to minimise the risk of natural hazards to the people, places and economy of the region.

*Mount Taranaki is closely monitored for signs of eruption.*

# Geological hazards

Agricultural and pastoral producers can thank Mount Taranaki's historical eruptions for the region's fertile soils. However, a volcanic eruption today has the potential to affect the region for a long period of time.

Volcanic eruption is the region's key geological hazard and the mountain is monitored closely to ensure timely and appropriate action can be taken if there is any threat of an event. Taranaki is less likely to experience earthquakes and liquefaction than other regions because of the geographical distance from New Zealand's major fault lines and the types of soil in the region. However, being on the coast means the region could be affected by storm surges or earthquake-created tsunami. The Taranaki coastline has high rates of erosion.

*'Volcanic eruption is the region's key geological hazard.'*

A number of national and regional agencies and organisations are responsible for monitoring and preparing for potential geological hazards in the region.

## Volcanic eruption

At 2,518 metres high, Mount Taranaki is the second highest peak in the North Island and one of the most symmetrical volcanic cones in the world. The mountain is the youngest and only remaining active volcano in a chain that includes the Kaitake and Pouakai ranges, Paritūtū, and the Sugar Loaf Islands.

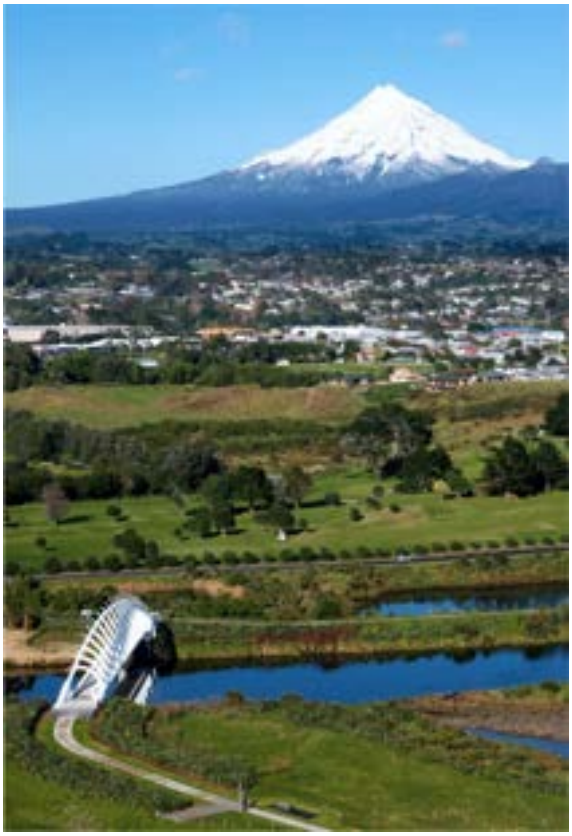
The Institute of Geological and Nuclear Sciences Limited (GNS) undertakes volcanic monitoring through the nationwide GeoNet network. GNS has nine regional seismometers that detect any local earthquakes or magma movement that would indicate the beginning of an eruption. Because volcanic tremors have a signature different from common earthquakes, scientists can analyse the information recorded by the GeoNet seismic network and determine whether or not the earthquake is of a volcanic nature.

## What's the story?

Since the GeoNet network was commissioned in 1994, no volcanic activity or earthquake of volcanic significance has been recorded in Taranaki.

However, an eruption of Mount Taranaki is potentially the most significant geological hazard the region faces. In 2008, GNS forecast the probability of an explosive eruption over the next 50 years to be 49% (a 1.5% chance in any one year).

In 2013, following further research, GNS estimated the probability that Mount Taranaki will have at least one eruption in the next 50 years to be about 81% or 3% in any one year, which equates to about a 50:50 chance within 23 years. This is double the former annual probability estimates and significantly increases the risk of potential eruption. The estimated risk is also cumulative and will increase each year.



*No volcanic activity has been recorded since monitoring began in 1994.*

The *Taranaki CDEM Volcanic Unrest Response Plan* is intended for the use of agencies and operational staff. It identifies roles and responsibilities across New Zealand's Volcanic Alert Level system, and the effects of the many hazards that may arise during an eruption of Mount Taranaki. The 2013 forecast of volcanic eruption has resulted in a CDEM Group review of procedures in 2015.

## National comparison

GNS monitors 12 volcanoes or volcanic fields in New Zealand. This includes the Auckland volcanic field (which includes no fewer than 50 small volcanoes) and the Northland volcanic field. It also includes cone volcanoes like Mount Taranaki, Mount Ruapehu and Mount Ngauruhoe, calderas such as Taupō and Tarawera (within the Okataina Volcanic centre) and the Kermadec Islands, Mayor Island, Rotorua, Tongariro and White Island. At the time of publishing, three volcanoes (Ruapehu, White Island and Tongariro) had an alert at level one indicating minor volcanic unrest. The others, including Taranaki, had zero alert levels indicating no volcanic unrest.

## Find out more

*Developing an eruption forecast for dormant volcanoes: Mt Taranaki case study (Bulletin of Volcanology, 2008) tinyurl.com/TRC9d*

*Shhh! Mt Taranaki is sleeping: Quantifying the Hazard from Re-awakening Volcanoes (GNS website) tinyurl.com/TRC9c*

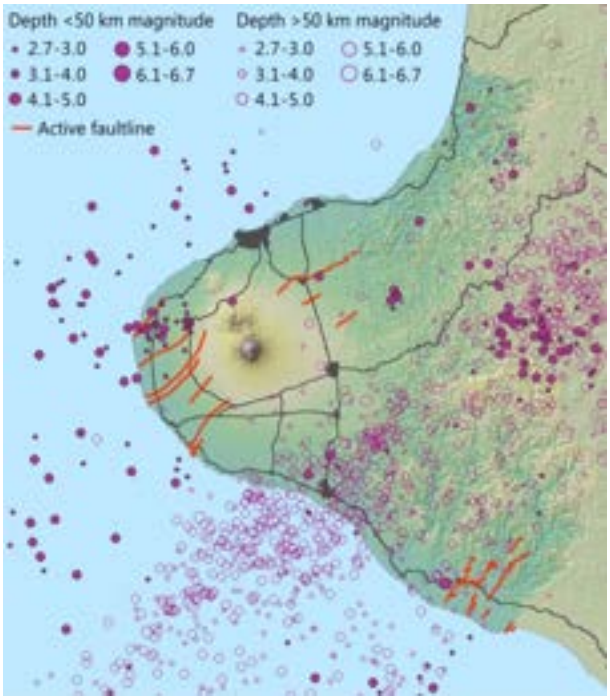
*Studying past eruptions and monitoring active volcanoes (GNS website) tinyurl.com/TRC9a*

*Green R M, Bebbington M S, Cronin S J and Jopnes G (2013) Geochemical precursors for eruption repose length; Geophysical Journal International, 193(2), 855-973*

*Turner M B, Bebington M S, Cronin SW and Stewart R B (2009); Merging eruption datasets: building an integrated Holocene eruption record for Mt Taranaki, New Zealand; Bulletin of Volcanology, 71(8) 903-91.*

# Earthquakes

Since the Christchurch earthquakes of 2010 and 2011, people know a lot more about earthquakes than they did before. Although a number of active fault lines run underneath Taranaki, the region is not as earthquake-prone as other areas of the country. Less than 2% of New Zealand's earthquakes recorded annually are located in Taranaki. Only a handful of that number are felt by people in the region and reported.




*Between 2008 and 2013, a number of magnitude 2.7 earthquakes and above occurred across the Taranaki region.*

Nine GeoNet seismometers are installed at carefully chosen sites in the region to detect the arrival time and strength of pressure waves generated by an earthquake as they travel through the ground. The information is transmitted by radio and telephone line to a computer system which calculates (by triangulation) the location and size of the earthquake within a few minutes. The Ministry of Civil Defence and Emergency Management 'Get ready, Get Thru' website and the Taranaki Civil Defence website both provide information on how to prepare for and respond to an earthquake.

## What's the story?

Taranaki typically experiences 250 to 300 measurable earthquakes every year. Up to ten of those might be large enough to be felt by residents. The depth and distribution of earthquakes has remained stable since measurements began in 1994.

Most of the shallow earthquakes in Taranaki are centred west of Mount Taranaki, with only a few events beneath or close to the mountain. Deep earthquakes are mainly located in the Hāwera area, in the south-east and east of Taranaki. GNS calculates the annual likelihood of a magnitude 6.0 earthquake (large enough to damage buildings and move furniture) to be 5% in South Taranaki and 3% in the north.

GNS studies of over 3000 records of seismic activity in Taranaki between 2000 and 2011 have found no correlation between hydraulic fracturing (fracking) activities at hydrocarbon sites and earthquakes—both within five kilometres and three months of fracking activity and in deep-well injection sites.

## National comparison

Taranaki is not considered a high risk area for earthquakes. Nationally, earthquakes occur within a 100 kilometre-wide zone running along the plate boundary from offshore East Cape to Fiordland, including Gisborne, Hawke's Bay, Wairarapa, Wellington, Marlborough, North Canterbury, and Buller, Southern Alps, and Fiordland. The earthquake hazard in this zone of New Zealand is comparable with that of California.

## Find out more

*An assessment of the effects of hydraulic fracturing on seismicity in the Taranaki region (GNS website) tinyurl.com/TRC9h*

*Seismicity in Taranaki annual report 2009-2014 (GNS Science) tinyurl.com/TRC9f*

*Understanding and monitoring seismic activity (GNS website) tinyurl.com/TRC9g*

*A G Hull and G D Dellow, Earthquake Hazards in the Taranaki Region, GNS Science Report 1993/03*

*The Taranaki Emergency Management Office is a hive of activity during Exercise Pahū in November 2013.*

PAHŪ EXERCISE

CASE STUDY

# **Pahū** tests eruption response

Mount Taranaki started erupting about 130,000 years ago, and large eruptions have occurred on average every 500 years, with smaller eruptions about 90 years apart.

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While the mountain is considered today to be dormant or 'sleeping', the best expert advice is that another eruption is a matter of 'when', not 'if'—and it is likely the younger generation in Taranaki today will see it happen. In November 2013, an eruption scenario was the basis of Taranaki CDEM Group's Exercise Pahū (the name translates as 'to explode' or 'to pop'), the largest civil defence emergency management exercise ever run in the region. Exercise Pahū was a Tier 3 (inter-group) exercise in the National Exercise Programme and its purpose was to test the emergency response arrangements and readiness, both within the Taranaki CDEM Group and between nearby CDEM Groups, in the context of a Taranaki volcanic event.

The exercise involved emergency services, the Taranaki District Health Board, councils, utility companies and other critical industries, the Department of Conservation, GNS Science, Civil Defence groups from Waikato, Hawke's Bay and Manawatū/Wanganui, the Ministry of Civil Defence and Emergency Management, and other government agencies. More than 200 people were involved.

The exercise scenario envisaged a developing major volcanic eruption following a period of seismic unrest. Three weeks of lead-in information, based on fictitious but realistic seismic activity, preceded the main exercise and helped to prepare those involved in the exercise for what they might face in a real event.

A significant amount of planning went into the development of the exercise, starting in early 2013 and continuing right up to and beyond exercise day.

"A lot of work went into making the scenario as realistic as possible," says Senior Emergency Management Officer Shane Briggs. "So it was a good 'pressure-test' for Civil Defence people and systems in Taranaki and elsewhere, as well as being a chance for teams to practice working together in a response scenario."

After the exercise, a formal report was presented to the Taranaki CDEM Group and its Coordinating Executive Group. From this, an action plan has been developed with recommendations for particular changes in resourcing, operating procedures, and training and exercising. These actions have been prioritised and are being implemented.

Findings from the exercise have also fed into development of a *Taranaki Volcanic Unrest Response Plan*, an update of the *2004 Volcanic Strategy* and the *2010 Volcanic Contingency Plan*. The Plan will set out the high-level roles and responsibilities of various groups during a volcanic event for each of the five volcanic alert levels.

*Exercise Pahū included a staged 'media briefing' with journalism students from WITT playing the role of reporters. Here they are being addressed by the Controller, Mike Langford (in red jacket) and GNS Science volcanologist Brad Scott.*

# Liquefaction

As witnessed in Christchurch, liquefaction is the process whereby certain types of soil suddenly lose strength. If the shaking is strong enough, as in a large earthquake, the pressure of the water against the soil causes the sand and grains to 'float' in the water, and the soil becomes liquefied.

Not all soil types will liquefy following a large earthquake. Soils at risk are geologically young, fine-grained and sandy and saturated, which means they are below the water table. If one of these preconditions is not met then soils are not liquefiable. The areas in Canterbury that experienced liquefaction during the 2010 and 2011 quakes had all of the necessary soil preconditions. Fortunately, this is not the case for most of Taranaki. If liquefaction did occur in the region, it is expected to be of low impact, nothing like that experienced in Christchurch.

## What's the story?

Historically, there have either been no earthquakes of sufficient intensity in Taranaki to cause liquefaction, or where earthquakes of sufficient intensity have occurred, there has been no liquefaction.

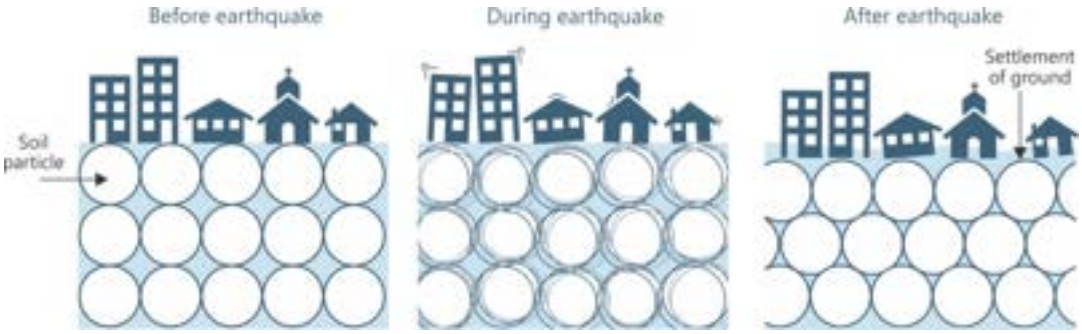
In 2013, a GNS investigation found that, due in part to the region's geology and low earthquake risk, and the fact that only a few coastal areas have the types of soil that might liquefy, the probability of liquefaction in Taranaki is low and restricted to a few areas.

*'The probability of liquefaction in Taranaki is low.'*

Those areas identified as having potential to liquefy include Port Taranaki; the lower reaches and tributaries of the Mōhakatino, Rapanui, Tongaporutu, Mimitangiatua (Mimi), Urenui, Onaero and Waitara rivers (in New Plymouth district); and the lower reaches and tributaries of the Waitōtara, Whenuakura and Pātea rivers (in South Taranaki).

Liquefaction at Port Taranaki would damage freight handling areas and thus impact on imports and exports in the region with significant economic effects. However, on average, earthquakes strong enough to cause liquefaction would only be expected every 150 years at Port Taranaki and between 980 and 1,070 years at the river areas.

The New Plymouth District Council is currently considering whether a detailed district survey of the potential for liquefaction is necessary, or whether a case-by-case approach is more appropriate.




*Liquefaction of soil as the result of an earthquake is unlikely to occur in Taranaki.*

## Find out more

*Liquefaction Hazard in the Taranaki Region (GNS Science, 2013) tinyurl.com/TRC9k*

*Looking Closer: Liquefaction (Science Learning website) tinyurl.com/TRC9i*

# Tsunami

A tsunami is a series of water surges caused when a large volume of water in the sea, or in a lake, is rapidly moved by earthquakes, seabed slips, or volcanic eruptions. The tsunami that hit the Thailand coast in December 2004 and Japan in 2011 demonstrated vividly the loss of life and property damage they can cause. While a tsunami is not identified as a significant hazard in the Taranaki region, some degree of tsunami risk exists for New Zealand's entire coastline. Tsunami information for New Zealand comes from the Pacific Tsunami Warning Centre and goes directly to the Ministry for Civil Defence and Emergency Management. It also comes from many media sources. The Taranaki Civil Defence issues regional advice and warnings based on this information.

## What's the story?

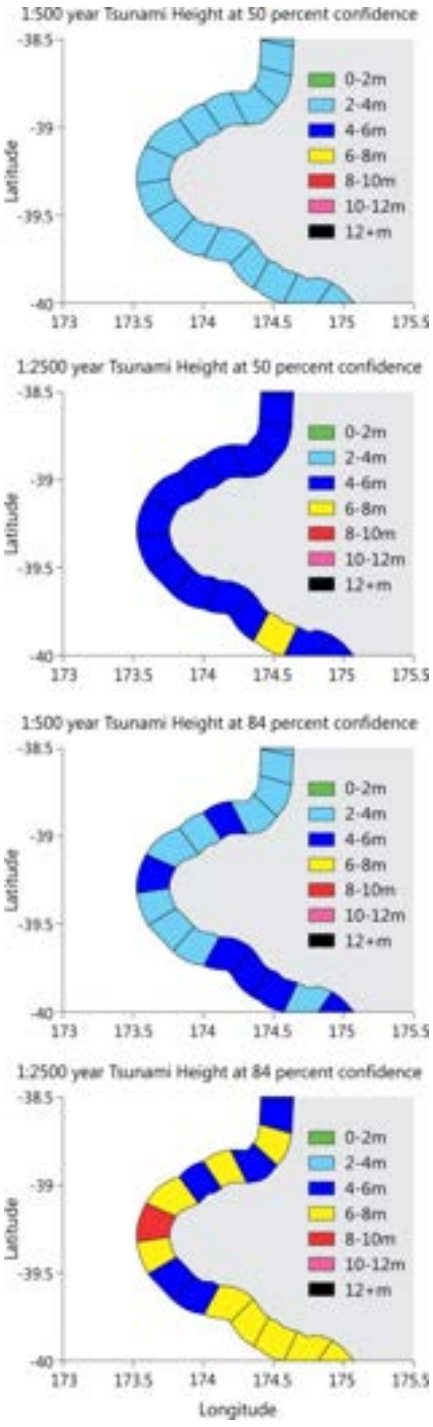
In 2012, the Council and other local authorities contracted a GNS report on Taranaki's tsunami inundation risk. Partially updated in 2013, the report found that most of Taranaki's steep coastline is not susceptible to tsunami. However, some low-lying communities on the coast or in river estuaries do have a higher risk. Those communities include Tongaporutu, Urenui, Onaero, Waitara, Bell Block, New Plymouth, Oākura, Opunake and Pātea.

The time it would take a tsunami to reach Taranaki's shores is dependent on the proximity of the tsunami source—far away or close to home. A locally sourced tsunami may have a travel time of less than 30 minutes. A distant tsunami (for example, sourced in South America) may have a travel time of up to 18 hours. Tsunami activity can continue for 25 hours after the first wave event.

The 2013 GNS report considered the potential for tsunami to be generated by faults around New Zealand and the Pacific for different time frames 1:500 years and 1:2500 years, (or 0.2% chance and a 0.04% chance of such an event in any year). It also estimated the expected maximum tsunami heights at the coast, taking into account the range of uncertainties in any given scenario (such as location of source, storm surges and so on).

Although the 2013 report indicated a slight increase in predicted wave heights for Taranaki over the long term, compared with previous estimates, most results estimate tsunami heights at no more than eight metres—even in worst case scenario conditions such as a locally sourced tsunami, occurring in storm conditions at high tide. A full and updated GNS report due in 2015 and evacuation zones for the region will be updated.

Storm surges experienced around the Taranaki coast can result in wave heights of eight metres or more, which is higher than most tsunami wave predictions for Taranaki. However, the energy and volume of a tsunami may mean a tsunami surge could reach further inland or higher than a storm surge.




*Estimated tsunami heights for different time frames and levels of confidence: 50% confidence results are a best estimate of the tsunami heights, while 84% confidence results assume a pessimistic 'worst-case' scenario.*

*Taranaki's coast is exposed to the west and subject to weather coming in from the Tasman Sea.*

On land, run-up heights can sometimes be higher than expected tsunami heights, in very rare cases up to twice as high (where the tsunami is channelled into steep narrow gullies).

The tsunami risk for Port Taranaki is moderate. A large tsunami damaging the port (as occurred at Lyttleton in the Christchurch earthquake) would have significant local and national impact, preventing imports and exports of oil and gas-related products. A small tsunami might disrupt shipping movements, on a precautionary basis, for a few hours.

## National comparison

In New Zealand, the zone at greatest risk of any tsunami hazard (local or distant-sourced) is the east coast of the North Island and the Chatham Islands.

*'The time it would take a tsunami to reach Taranaki's shores is dependent on the proximity of the tsunami source—far away or close to home.'*

The risk to community infrastructure as a result of tsunami inundation is lower in Taranaki than in other regions because of the many high coastal areas and cliffs. Although predicted potential wave heights have recently been increased for Taranaki, these predictions are still lower than the 10–12 metres predicted for other parts of New Zealand and tsunami are likely to occur with less frequency here. Parts of the region's coastal communities could still be seriously affected by tsunami. A tsunami event combined with bad weather, high tides and coastal surges could increase that risk.

## Find out more

*National Tsunami Hazard Model (GNS Science, 2014) tinyurl.com/TRC9q*

*Review of Tsunami Hazard in New Zealand-2013 update (GNS Science) tinyurl.com/TRC9p*

*Taranaki Tsunami Inundation Analysis (Hawke's Bay Regional Council, 2012) tinyurl.com/TRC9m*

*Taranaki Civil Defence Emergency Management Group: Tsunami Initial Action Plan May 2010*

CASE STUDY

# Grassroots preparedness

The first step in developing what's planned to be a series of community emergency plans in Taranaki started with a public meeting in Oākura in February 2013.

The meeting, organised by Taranaki Civil Defence Emergency Management and New Plymouth District Council, attracted 28 people keen to hear how they could help their community be better prepared for an emergency. From this meeting the Oākura Community Emergency Committee (OCC) was developed and a *Community Emergency Plan* was born.

Of these, 24 put their names down to participate in establishing a plan for Oākura, and they have since held further meetings to define how the local community can best help itself.

Communities throughout Taranaki will be encouraged to develop their own emergency plans, and the process trialled in Oākura will be rolled out to other communities across the region, including Waverley, Pātea and Whangamōmona. Also keen to have an emergency plan are Manaia and Opunake.

## Tsunami alert

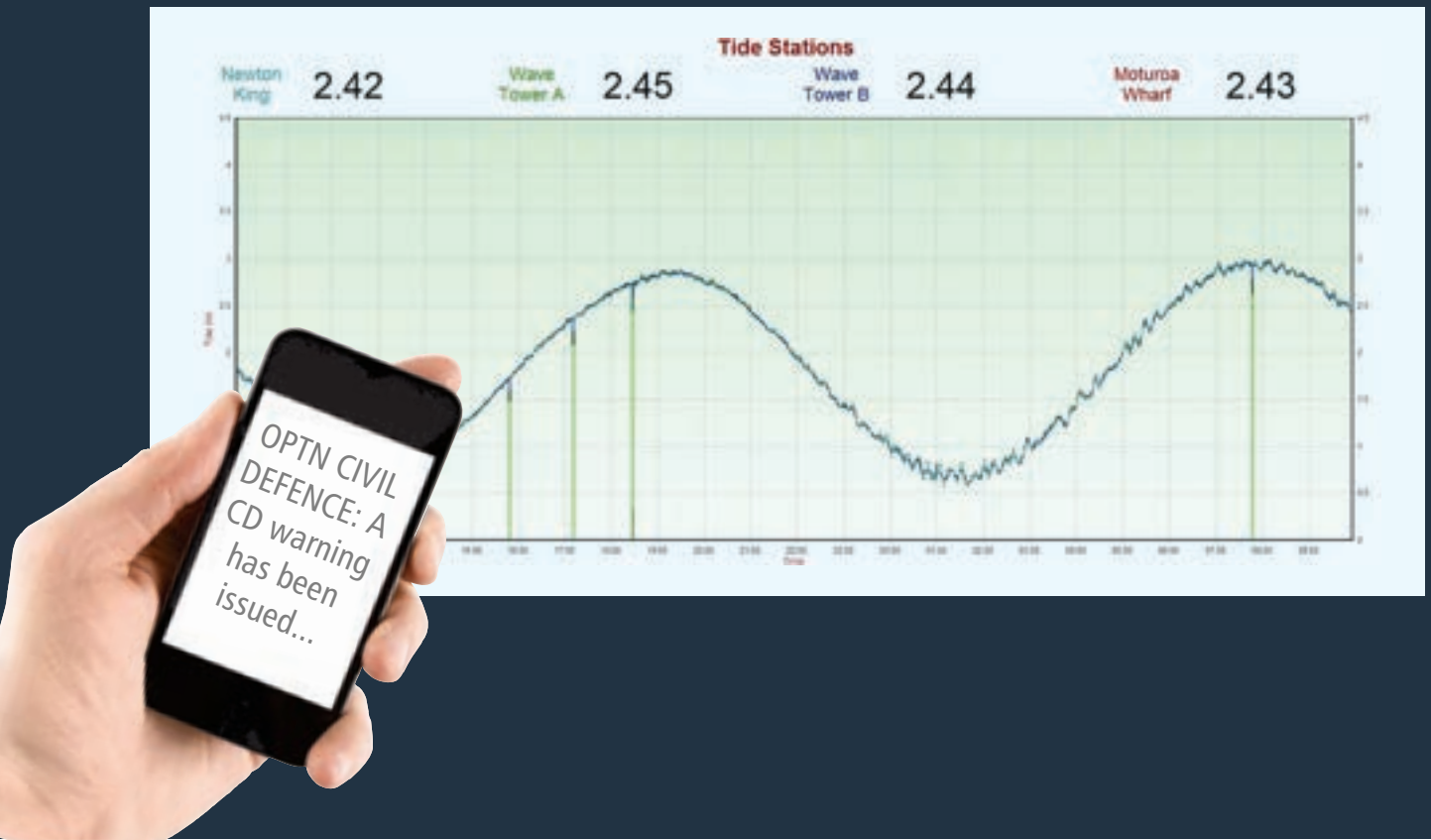
The Taranaki Emergency Operations Centre was partially activated on Wednesday 6 February 2014 in response to advice from the Ministry of Civil Defence and Emergency Management that a scale 8.0 earthquake in the Solomon Islands had triggered a tsunami that might affect New Zealand.

Later information identified that the Taranaki region was in the centre of the coastline of New Zealand that could experience highest amplitude waves of up to 0.9 metres, together with unusual surges and other water movement.

Taranaki CDEM focused on identifying those stretches of coastline that would be at greatest risk, preparing and distributing warnings to key organisations, agencies, and the public, and enlisting the help of surf lifesaving clubs and members, the Fire Service and individual fire brigades, police, and District Council staff to get the message out in vulnerable coastal areas.

A feature was the use of social media. The first warning 'tweet' from Taranaki CDEM was retweeted 30 times and reached a total potential readership of more than 24,000 people, although this would have included double-ups and people out of the region.

While the tsunami brought no large surges or waves, its effects were detected at Port Taranaki, with wave fluctuations of up to 15 cm continuing for more than 12 hours after first arrival.



*Cliffs in the north of the region are buffeted by storms and the sea.*

# Weather-related hazards

Taranaki typically experiences moderate weather, but sitting out on the west coast of New Zealand, the region's exposed position means there can be some extremes.

Taranaki's west coast is exposed to weather systems moving east from the Tasman Sea and to powerful wave and wind conditions that cause erosion that has resulted in a coastline of cliffs. The mainly sunny, windy climate usually provides moderate temperatures and regular rainfall, but when the rainfall is heavy it can cause flooding and landslips. In periods of low rainfall, the region can experience droughts. In some parts of the region, and at certain times of the year, storms and tornadoes are a reasonably frequent occurrence.

## Coastal erosion

Coastal erosion is the retreat of the shoreline caused by water currents, waves, and wind. It is a natural process that can be influenced by human activity. The Taranaki coastline is buffeted by high winds and waves from the west, and parts of the coastline are eroding significantly. However, the location, severity and rate of coastal erosion are influenced by factors such as the local geology and orientation of the location, the supply of sediment to and along the coast, and the influence of artificial structures such as breakwaters and sea walls.

The effects of climate change such as rising sea levels, wave patterns, storminess, and increased sediment from rivers also affect coastal erosion.

### What's the story?

Since 2010, local authorities have been required to give effect to the *New Zealand Coastal Policy Statement* which, among other things, sets out mandatory policies for avoiding and mitigating the effects of natural hazards in the coastal environment.

There has been a shift away from managing beaches to managing human activities. The six policies that specifically relate to coastal hazard management focus on avoiding coastal hazards, avoiding the need for structural protection works, and promoting options such as dune restoration as opposed to structural

protection works for existing development. Set-backs from the coast are now generally accepted as the best way to reduce the risk from coastal inundation and erosion in undeveloped areas.

Under the *Resource Management Act 1991* (RMA), regional councils are required to prepare a regional coastal plan for their coastal marine areas. These plans address coastal issues, control the effects of activities and discharges, and identify conservation values. The *Regional Coastal Plan for Taranaki is* currently under review.

District councils, such as the New Plymouth and South Taranaki district councils, are required to manage land use to prevent coastal erosion within their respective districts and to mitigate adverse effects on people and property. The New Plymouth District Council has a *Coastal Strategy*, a *Coastal Strategy Implementation Plan*, and a *Coastal Erosion Strategy*, which together specify the course of action in respect of eight at-risk areas: Tongaporutu, Urenui, Onaero Beach, Onaero Township, Waitara Foreshore, Bell Block Beach, Fitzroy Beach and Oākura Beach. Attempts to prevent coastal inundation and erosion in these areas have included structural protection, beach stabilisation and re-nourishment, and land-use planning and relocation.

## National comparison

It is estimated that approximately one-quarter of New Zealand's coastline is eroding. Coastal communities all over the country are struggling to manage the increase in erosion that is occurring as a result of normal weather patterns and climate change. At Haumoana on the east coast at Hawke's Bay, the shoreline is retreating by 0.3–0.7 metres each year. Protective structures have not been successful and managed retreat may prove to be the only viable option. This may also prove to be the case for at-risk areas on the northern Taranaki coast, such as the Onaero and Urenui beaches.

*Coastal erosion affects the dunes in South Taranaki. A review of the South Taranaki District Plan currently underway will likely see new provisions for coastal erosion added.*

## Find out more

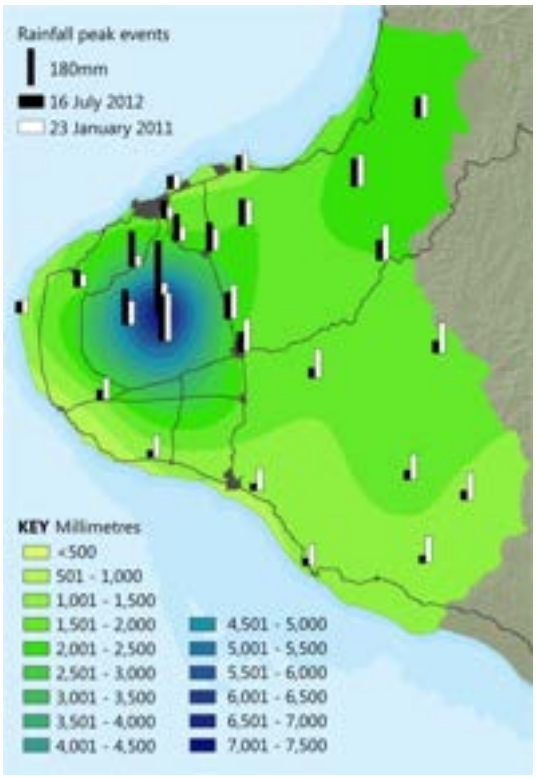
*New Zealand Coastal Policy Statement 2010 tinyurl.com/TRC9s*

*NPDC Coastal Strategy tinyurl.com/TRC9ad*

# Flooding

Floods are New Zealand's most common and costly natural hazard and large floods have sometimes required central government support with response and recovery. Historically, lack of knowledge about the capacity of rivers to flood resulted in many communities being built on flood plains. Floods can be particularly hazardous for agriculture with flooding affecting the welfare of livestock. Economic and social impacts can be long-lasting.

Taranaki's flood plains are small in comparison with other regions. However, the region has numerous rivers and occasional extreme rainfall events. The Regional Council has primary responsibility for flood forecasting and public warnings, using information and data from their own rainfall and river level recorders, and from MetService and NIWA. Because catchments are often short and steep, flood warning times are relatively short. However, unlike earthquakes, floods often occur at the same location on a frequent basis.




*Peak rainfall events for July 2012 and January 2011 compared with the average annual rainfall in Taranaki.*

The Council operates an extensive river level and flood warning and monitoring system, as well as wind and rainfall recorders, to track flood and weather conditions through its telemetered hydrometric network. The Council is required by law to minimise and prevent damage by floods and erosion. Flood protection works have been constructed in Taranaki where there is a significant flood threat to urban areas.

*Flooding causes damage in the Waitōtara Valley.*

## What's the story?

*Stopbanks along the Waiwhakaiho River protect the shopping centre.*

Although there is currently little evidence of long-term change in rainfall patterns in Taranaki, NIWA notes that climate change could lead to more severe and more intense extreme rainfall events in the region with annual rainfall in the north increasing by 5–10% this century. Certain areas of the region are more prone to flooding from heavy rainfall than others, including the Waitara Township and the Waiwhakaiho and Waitōtara valleys.

The Regional Council owns and operates, or provides maintenance on, flood control schemes for the Lower Waitara and Waiwhakaiho rivers, the Waitōtara River, and the Ōkato Scheme on the Stony (Hangatahua) River. Between 2011 and 2014, the Council allocated $1.5 million to doubling flood protection in the lower Waiwhakaiho Valley, including raising the height of river stopbanks and the headwalls of culverts. In 2013, a significant upgrade of the Waitara Scheme began, taking into account the predicted effects of climate change, effectively future-proofing the Waitara township from future risk (see case study on *page* 259).

Under delegation from the Regional Council, the New Plymouth District Council owns and operates flood detention works on the Huatoki and Mangaotuku streams, providing flood protection in central New Plymouth. In South Taranaki, the Regional Council and South Taranaki District Council together manage the Waitōtara River Scheme programme of channel maintenance for flood management. Historically, the Stratford township has not been subject to major flooding events. However, a flood catchment management plan is scheduled for completion around 2016/2017 and there are number of small rural flood control and drainage schemes in the region.

The Taranaki CDEM Group is currently reviewing and merging its flood response plans and the final plan will also cover flooding that may occur as a result of a failure of the Pātea dam and other dams in the region.

Traditionally, flood risk-reduction measures have relied on building structures to keep water away from people. District councils are now moving more towards land-use planning to keep people and property away from flood-prone areas, and adopting building standards to keep people and property above flood levels.

*Flood protection work undertaken in Waitara includes the extension of flood banks.*

# River bank erosion and landslides

High rainfall leading to flooding can also cause erosion and landslides, especially during major storms. Landslides are the natural hazard most frequently responsible for damage to property and infrastructure, including road closures.

*Heavy rain causes erosion and bank collapse in Mākāhu in the Stratford District.*

## What's the story?

Steep slopes with unstable geology that have been cleared of vegetation are more susceptible to landslides. For that reason, in Taranaki the eastern hill country, the slopes of Mount Taranaki, and the Pouakai and Kaitake ranges are more susceptible.

Modification of the urban landscape can also increase the incidence of landslides that cause damage to roads and property, and sometimes to life. Although the region's largest urban area, the New Plymouth district, is assessed as having low landslide risk, an increase in rainfall as a result of climate change may increase the risk in the 21st century.

Sustainable management of soil and land is essential for the region's environmental and economic future, and protection of state highways from landslides is of national importance. The Council and district councils manage land use and control flooding to prevent (as far as practicable) damage and destruction by erosion on river banks and by landslides, as well as on the coast.

*'New Zealand has a relatively high number of landslides compared with other countries.'*

The Council's *Sustainable Land Management Programme* targets the eastern hill country promoting sustainable land management through comprehensive farm plans and other plans, and through advocacy and facilitation (see Chapter 2—Land). District councils also focus on control and development of erosion-prone slopes.

The Council's review of both the *Regional Soil Plan for Taranaki* and the *Regional Fresh Water Plan for Taranaki* will contain policies to manage and prevent soil erosion and minimise landslides throughout the region.

In the event of a large or significant landslide, GeoNet can provide rapid advice on how to manage public safety. GNS also collects information that will contribute to a better understanding of the causes and mechanisms of landslides.

## National comparison

Along with the west coast of the South Island, the Tararua Ranges and the north-eastern North Island, Mount Taranaki has the highest 24-hour rainfalls in New Zealand. A combination of intense rainfall and small catchments with hilly topography means the region's rivers can rise very rapidly.

New Zealand has a relatively high number of landslides compared with other countries. Fortunately, the country's low population density and settlement patterns mean there are few landslide deaths and comparatively limited damage.

### Find out more

- *NPDC District Plan, Management Strategy, Natural Hazards tinyurl.com/TRC9ac*
- *Taranaki Regional Council, Flood Event Standard Operating Procedure; Flood Warning Procedures Manual; Severe Weather Event Procedures*

*McLean Street, Waitara, in the 1965 floods.*

CASE STUDY

# **Keeping the town safe** and the river tamed

The ever-altering boundary between Waitara and its river is changing again, with work well under way on measures to keep the township safe in the face of heightened flooding risk revealed in new hydrological studies and expected to be aggravated by climate change.

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Waitara sits on a floodplain and many townsfolk will remember the devastating floods of 1965 and 1971, and the damage that occurred to the stopbanks in 1990.

The current stopbanks were constructed in the early 1970s and after flood damage to parts of the river bank and stop banks in 1990, the Council undertook a significant amount of work to strengthen the channel banks and improve the channel alignment. The main channel alignment works were constructed downstream of SH3 to direct the river flow away from the stopbanks to the south of the town centre. The last of the strengthening work was completed in 2013.

Latest studies commissioned by the Council suggest that if the 1971 flood was repeated today, the river would spill over the stopbanks and result in significant flooding affecting many homes and businesses

At the moment, a flood this size can be expected every 30 years on average, so existing stopbanks provide a much lower standard of protection than the 'one-in-100-year' standard that is a minimum requirement for urban areas like Waitara. And it can only get worse. Climate change means that by 2065, a flood the size of 1971's would be expected every 15 years on average.

To future-proof the town, the flood defences are being raised by up to 1.8 metres, with a variety of methods being used in different locations.

Don't be fooled by the '100-year' label: The term "100-year flood" does not refer to an event that will occur only once a century. It means that there is a one in 100 (or 1%) chance of such a flood occurring in a given year. Two 100-year floods could occur a year apart or even a month apart, depending on rainfall.

As this *State of the Environment Report* went to press, 90% of the Council's three-year, $3.3 million upgrade was nearing completion, on time and within budget.

This work included:

- raising the earthen stopbanks upstream of the Town Bridge to Browne Street
- raising the stopbanks on the east side of the river between the Town Bridge and High Street East
- raising the height of the stop bank by about a metre on the town side alongside Queen Street from the NPDC pumping station to the northern end of Domett Street
- constructing a flood wall alongside the Anzco site.

The upgrade project includes pedestrian access along or beside all of the flood defences on the town side of the river, from the north end of Dommett Street to the south end of Browne Street. It has also involved relocation of piping infrastructure along the river bank in front of the Anzco site to allow for the removal of 23 trees along a 140 metre section so the riverbank can be recontoured. In conjunction with the New Plymouth District Council, a new walkway and amenity planting are also planned in this area.

The final stage of the upgrade will involve raising the stopbank through Marine Park and from Gold Street to Howard Street on the eastern bank of the river. This work is programmed for summer 2015/2016.

The work in Waitara follows the completion of an earlier three-year project to similarly improve the level of protection at the Council's Lower Waiwhakaiho Flood Protection Scheme. When the Waitara project is completed, all of the Council's major flood schemes will offer the highest practical level of protection—putting this region at the forefront of flood control nationally.

*Earthen stopbanks being raised north of the Town Bridge.*

*An Oākura home is badly damaged during a tornado.*

# High winds and tornadoes

Taranaki is exposed to high winds, tornadoes and cyclones as a result of weather systems coming over the Tasman Sea. The region is also exposed to wind effects related to Mount Taranaki (called orographic effects). The prevailing wind is westerly, but the strongest winds come from the south-east. However, wind speed on the ground varies according to local topography and location within the region.

Tornadoes occur as a result of thunderstorms—when a rotating column of air extends below a cumulonimbus cloud. Tropical cyclones often track close to Taranaki and produce strong to gale force winds from all directions.

*'On average, one damaging tornado will occur somewhere in the region every year.'*

## What's the story?

New Plymouth city is a high wind-speed area in the Taranaki region. Low wind-speed areas are located in the area east and north of the mountain. Mount Taranaki does not influence the development of tornadoes in the region.

On average, one damaging tornado will occur somewhere in the region every year and a severe tornado occurs about once in every four years. Seventy per cent of tornadoes in the region occur in or near New Plymouth city and have caused extensive property damage. In August 2004, a tornado caused two deaths at Motunui. In 2007, north Taranaki was buffeted by a swarm of tornadoes which affected property, and in 2011, strong winds caused widespread damage in the region.

The MetService issues a severe weather warning when widespread gales are expected over a 1000 $km^2$ area with a minimum wind speed of 90 km/h, or frequent gusts exceeding 110 km/h are expected within 24 hours. A severe-weather watch is generated if these conditions are expected to occur in a 24–72 hour period. Around two to five wind warnings are issued for Taranaki each year.

With climate change, NIWA expects strong westerlies to increase in frequency in Taranaki in this century.

## National comparison

Unlike those in the United States, tornadoes in New Zealand are mostly small and short-lived. Around 20–30 tornadoes are observed in New Zealand each year, most lasting less than 15 minutes. Damage paths are usually 10–20 metres wide and less than five kilometres long.

Compared with other regions in New Zealand, Taranaki is a high-risk area for tornadoes, accounting for 12% or more of the national total. Aside from Taranaki, tornadoes are most frequent in the west and north of the country, particularly the Waikato, Bay of Plenty, and Westland areas.

### Find out more

*Climate Hazards and Extremes - Taranaki Region (NIWA,2007) tinyurl.com/TRC9u*
*National Hazardscape Report (DPMC, 2007) tinyurl.com/TRC9t*

# Droughts

Droughts, or water shortage events, are a prolonged period of weather when rainfall is lower than normal. As a result, soil moisture levels are much lower for much longer than an area would normally experience and become insufficient for plant growth (such as pasture). Demand for water increases, particularly for irrigation. However, when demand increases in drought conditions, river levels are usually also lower, reducing the supply of water available for domestic use, for stock water, and for irrigation.

Droughts can have significant psychological and social impacts on our farming communities and create the need for difficult farm management decisions. Droughts are one of New Zealand's most common and costly natural hazards because they can affect large areas, with the effects lingering for several years. As they develop, monitoring of water resources intensifies, and it sometimes becomes necessary for the Regional Council to impose water use restrictions including apportioning, restricting, or suspending water abstraction. District councils can also impose conditions on how domestic water supply is used, in an attempt to reduce demand.

## What's the story?

NIWA produces three-monthly climate outlooks based on rainfall, river flow and soil moisture data, and likely climate patterns. These outlooks help farmers and water users to make decisions and prepare early for possible droughts.

Droughts often occur over a relatively long period of time and, unlike flood events, it is possible to anticipate their onset. However, it is more difficult to predict how long a drought will last and how extensive it will be. Taranaki's most recent drought was declared in March 2013 and lasted until September that year. Fortunately, good weather conditions prior to the drought enabled many farmers to be less affected than they would normally be.

Local authorities monitor water levels, which assists in identifying at-risk water resources

*The Waiwhakaiho River has periods of low flow during summer months.*

and allocation limits for sustainable water management, including management during water shortage events or droughts. This management role increases as a drought intensifies.

The Regional Council's *Water Shortage Event Standard Operating Procedure* outlines the way in which the Council will fairly and equitably fulfil its statutory requirements during droughts to produce the desired outcome. Based on water monitoring, the Council can provide early warning to water users and the general public of possible water restrictions. The Council can liaise with, and advise, other stakeholders of impending water use restrictions and when normal use of water resources can resume.

Restrictions can be imposed through resource consent conditions or, if the Council considers it necessary, by the issue of a water shortage direction under Section 329 of the RMA. The Council also monitors compliance with any restrictions that may be in place.

Federated Farmers, Fonterra and the Rural Support Trust provide assistance to farmers during drought conditions. Taranaki farmers can also follow the NIWA climate outlooks and information provided by district and regional councils.

### National comparison

Drought in New Zealand is related to topography. Although any part of the country can be affected by drought, the most susceptible areas are those in the lee of ranges subject to dry winds—Hawke's Bay, Wairarapa, Marlborough, Canterbury and Central Otago. These areas are also likely to have soils with low moisture-storage potential and little or no available irrigation water.

Some regional councils (the Greater Wellington Regional Council, for example), have developed regional drought-prediction models that can assist in drought management planning.

#### Find out more

*Drought definition, recognition and assistance measures (MPI, formerly MAF, 2009) tinyurl.com/TRC9v*

## Climate change

New Zealand's climate varies from year to year but is strongly influenced by natural climate cycles operating on scales of years to decades. Climate change is a phenomenon by which the global climate system responds to increasing concentrations of greenhouse gases in the atmosphere.

Climate change is already starting to influence the weather and climate in New Zealand and causing rising sea levels. Current research predicts that the sea-level rise around New Zealand may be higher than the global average. However, natural climate variations may offset some of the predicted impacts of climate change for New Zealand in the short term.

### What's the story?

Changes in rainfall patterns are predicted for all regions, and in Taranaki, predictions are that summers will get drier and winters wetter. Current best-evidence projections predict steadily increasing higher annual average rainfall in Taranaki overall. Seasonal changes may mean that by 2080 Taranaki is up to 25% wetter in winter and up to 5–20% drier in summer. This might not mean much change on an annual basis but it does mean more frequent extreme events such as longer droughts and more intense rainfall. These changes will increase adverse weather and erosion hazards, especially along the region's coastline and rivers.

Rising sea levels (predicted at between 0.5 and 0.8 metres by the end of the century) will continue beyond 2100, even if global warming can be limited. Rising sea levels may cause escalated risks to natural and built environments, and to the people who live in coastal and river mouth areas in the region.

*Rising sea levels are anticipated as a result of climate change.*

The Council's flood control works are now constructed to take climate change into account for AEP (annual exceedance probability) levels. Climate change has also been factored into tsunami inundation modelling in the region, and into coastal erosion management strategies, as a result of the *New Zealand Coastal Policy Statement 2010*.

The impacts on, and responses of New Zealand's trading partners to international climate change, may be significant for trade-intensive sectors such as agriculture and tourism. On a positive note, the growing season for Taranaki pasture production could lengthen. However, insurance to cover potential weather extremes and uncertainties may become more expensive, or even unaffordable.

## National comparison

Depending on whether the world can rapidly reduce its greenhouse gas emissions or continues to emit at the same rate, New Zealand's temperature is expected to rise by between 0.8°C to 3.5°C above the average temperatures recorded between 1986 and 2005.

Other long-term climate trends for New Zealand point to a rise in hot extremes with fewer cold extremes, increased westerly flows in spring and winter, and decreased flows in summer and autumn. There is also evidence of rising extreme rainfalls and shifting regional rainfall patterns.

In addition, rising sea levels, together with increased rainfall, will increase flooding and erosion on the coast and at river mouths. The East Cape area is predicted to change in the opposite direction to Taranaki: it will get wetter by 5–20% in summer and drier by up to 25% in winter. Taranaki's climate is expected to experience less change than other regions around New Zealand.

## Find out more

*Climate change effects and impacts assessment: A guidance manual for local government in New Zealand (MfE, 2008) tinyurl.com/TRC9w*

*Climate change urban impacts toolbox (NIWA, 2012) tinyurl.com/TRC9y*

*Climate Trends, Hazards and Extremes—Taranaki Synthesis Report (NIWA, 2008) tinyurl.com/TRC9x*

*'All Councils in the region continuously review current hazard management information ...'*

*Councils must prepare for natural hazards such as extreme weather events.*

# Our responses

## National legislation

Natural hazard management in New Zealand is governed by various Acts of Parliament, regulations, and other central and local government guidance documents. Regional and district councils must undertake hazard management and risk reduction and readiness under these Acts, regulations, plans and guidelines:

- The *Local Government Act 2002* requires territorial authorities to ensure avoidance or mitigation of natural hazards and infrastructure investment to reduce vulnerability and improve resilience.
- The *Resource Management Act 1991* (land use control).
- The *Soil Conservation and Rivers Control Act 1941* (soil conservation and the minimisation of floods and erosion).
- The *Building Act 2004* and the associated Building Code has provisions that ensure wind loading is taken into account during design and construction. Bracing requirements for structures consider wind zones, local topography, site exposure, ground roughness, and wind region. The code also considers earthquake risk.

## Civil Defence and Emergency Management (CDEM)

Representatives of the New Plymouth, Stratford and South Taranaki district councils and the Taranaki Regional Council make up the Civil Defence Emergency Management (CDEM) Group. Under the *Civil Defence and Emergency Management Act 2002*, the Taranaki CDEM Group is responsible for planning and delivering the civil defence role across the region. The Taranaki CDEM Group is administered by the Taranaki Regional Council. Functions include:

- identifying and managing hazards and risks to reduce the region's vulnerability, in conjunction with the regional community
- promoting, educating, and raising awareness of the community's role in implementing CDEM reduction, readiness, response and recovery.

## Policies and plans

The Council's *Regional Policy Statement for Taranaki (RPS)* includes policies on climate change (RPS Chapter 7) and natural hazards (RPS Chapter 11). All regional and district plans, and the *Taranaki Civil Defence Emergency Management Group Plan*, must align with these policies. All councils in the region keep abreast of current hazard management information, undertaking new research into hazards and reviewing their hazard management plans.

- Under the RMA, the district councils are responsible for the use of land to avoid or mitigate natural hazards, except where the control relates to the regional council's functions regarding the coastal marine area and the beds of rivers, lakes, and other waterbodies.
- District councils also control proposed subdivision and/or development in hazardous areas and ensure any approved development will not exacerbate natural hazards. They ensure that known hazard information relating to specific sites is appended to Project Information Memoranda (PIM) and Land Information Memoranda (LIM).

## Monitoring

The Council monitors river and stream levels for both extreme lows and flood risk. Live data and risk information is published on the Taranaki Regional Council website.

GNS undertakes earthquake monitoring through the GeoNet seismographic network. GNS also undertakes volcanic monitoring through the GeoNet network to detect any earthquakes or movement of magma that would indicate the beginning of an eruption.

The Ministry of Civil Defence and Emergency Management and Taranaki Civil Defence websites provide advice to the public on how to prepare for earthquakes in their homes and businesses, and what to do in the event a major earthquake occurs. Other information is provided on the Government's 'Get Ready, Get Thru' website.

Along with MetService, the Council monitors wind speeds to alert agencies and individuals of impending high and dangerous wind. As previously mentioned tsunami information for New Zealand comes from the Pacific Tsunami Warning Centre. The Ministry of Civil Defence and Emergency Management uses the National Warning System (NWS) to issue advice and warnings to the local civil defence duty officer. Taranaki Civil Defence takes action based on this information.

## Contingency and preparation

The Taranaki Civil Defence and Emergency Management Group periodically runs exercises to test the region's ability to respond to a major event like a volcanic eruption. The Group also prepares contingency plans to use during different hazard events. Information and advice on how business and individuals can prepare for, and deal with, an eruption from Mount Taranaki is available in various forms and websites. Exercise Pahū, held in November 2013, was the most recent volcanic event exercise (see case study on *page 249*).

*The Taranaki CDEM Group regularly undertakes exercises to test responses to major events.*

## Education, information and advice

CDEM has a five-year public education plan to increase community awareness, understanding and participation in CDEM in the Taranaki region. In particular, the plan concentrates on:

- increasing preparedness for and understanding of the significant hazards in Taranaki
- outlining what individuals need to do and where they can find guidance before, during and after an emergency
- explaining the role of the CDEM Group and its key partnership agencies
- encouraging the public to participate in rebuilding and restoring communities after the emergency event has passed.

In the 2013/2014 year the CDEM Group carried out a number of activities with children, including promoting the 'What's the Plan, Stan?' teaching resource to schools throughout Taranaki.

In addition, the Council's Education Officer led several marae-based lessons and conducted tours of the Emergency Operation Centre during this period.


*Stan from 'What's the Plan, Stan?' at a Taranaki CDEM public awareness presentation.*

### Find out more

- *National Hazardscape Report (DPMC, 2007) tinyurl.com/TRC9t*
- *Taranaki Civil Defence Emergency Management Group Plan for Taranaki, 2012 to 2017 tinyurl.com/TRC9ab*
- *Taranaki Civil Defence Emergency Management website tinyurl.com/TRC9aa*
- *What's the Plan, Stan? tinyurl.com/TRC9z*

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| Barry Hartley | 210 |
| Conor Lee | 7, 22, 138, 198, 206, 246, 252, 264, 265 |
| Callum Lilley (DOC) | 175, 180, 182 |
| Landcare Research | 169 |
| Philip S Melgren | 151 |
| Puke Ariki | 192 (top) |
| Puketapu Kindergarten | 234 |
| Che Rogers | 34 (Womad) |
| Rob Suisted | 175 |
| Rob Tucker | 21, 24, 29, 31, 32, 34, 37, 38, 51, 59, 60, 65, 75 (bottom), 82, 85, 94, 107, 110, 112, 127, 130, 134, 144, 187, 190, 194, 196, 199, 200, 204, 213, 216, 218 (top), 219, 222, 223, 224, 243, 247 |
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