

# tongariro

## May 2014

Journal #20

The journal for  
Tongariro National  
Park is produced by  
Project Tongariro and  
the Department  
of Conservation

### 50

years ago the summer  
programme began and  
it has continued ever  
since...

### 100

years since the  
Ruapehu Ski Club  
was formed. A lot has  
changed over  
the years ...

### 2012

Te Maari erupts.  
Read more about  
the impacts of this  
eruption...

### 4623

volunteer hours worked  
in the park and area  
during the year...

TONGARIRO  
NATURAL  
HISTORY  
SOCIETY





**Cover Photo:** Upper craters in the chain of small craters west of upper Te Maari, with the “chasm” behind. This is the source area for the debris avalanche.  
*Photo: Harry Keys*

**Photo above:** Auckland Green Gecko, Pukawa settlement  
*Photo: Heather Hassell*

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# Contents

|  |    |
|--|----|
| Contents   | 3  |
| President's corner                                   | 4  |
| Adaptation to the environment                        | 6  |
| Greening Taupō                                       | 8  |
| Take only Photographs Leave only Footprints          | 10 |
| Volcanoes of the South Wind                          | 12 |
| The 2012 Te Maari eruption episode Tongariro Maunga  | 13 |
| Te Matapuna – South Taupō Wetlands                   | 25 |
| International mountains update                       | 28 |
| Will New Zealand have any more world heritage sites? | 32 |
| Katherine's camping safari                           | 34 |
| A century of skiing on Mt Ruapehu                    | 36 |
| Tongariro - the first summer programmes              | 37 |
| Tongariro Summer Programme 50 Years On...Mahi Aroha  | 43 |
| Lessons from the Rangipo Desert                      | 46 |
| Volcano watch 2012-2014                              | 48 |
| Pukawa wildlife management trust                     | 56 |
| Out of the dark with bats and kiwi                   | 59 |
| Tea and Scones on the Desert Road                    | 63 |
| Tongariro National Trout Centre                      | 66 |
| Central North Island Services team summary           | 68 |
| Call of the Whio                                     | 70 |
| Conservation in the Central North Island             | 74 |
| A year of change for the Taupō Fishery               | 77 |
| Lake Rotopounamu – Mt Pihinga Restoration Project    | 83 |
| The Great Lake Trail                                 | 86 |

# President's corner

Paul Green

During the last three years DOC has been engaged in extensive restructuring which has resulted in a very different organisation with different goals and many new faces. It has been a difficult three years for all staff and has meant that organisations like our own are also having to understand and work with the new organisation. Project Tongariro was disappointed to learn in April 2013 that the Conservancy would no longer produce the annual Tongariro journal. We immediately resolved to fill the void, deciding it was far too a valuable record of work in Tongariro National Park and the Central North Island generally to go into recess. We have been pleased to do this and are grateful to all the DOC staff who have continued to support the journal by contributing stories to ensure the record is not lost.

The work of Project Tongariro continues to evolve and grow with the biggest challenge as President in encouraging innovation and new ideas for expanding our role but ensuring we do not over reach the capability and capacity of our small team of enthusiastic staff and our volunteers. It is a fine line. Our geographic location away from major population centres limits both our volunteer support base and ability to engage with a broad business base for support of projects.

I believe the move towards facilitating a broad volunteer

and supporter network rather than focusing on growing membership has been particularly successful. Our members are a special group but there is a significant number of people in the community that will identify with some activity we are undertaking but do not wish to feel obligated to being a member of an organisation. This has helped us successfully undertake new projects and our involvement in a number of events.

It has especially been pleasing for me to see progress towards achieving the goals of the Rotopounamu –Pihanga restoration project. It has taken ten years but we now have a stoat trapping line over 1000ha. Implementation of this was a reflection of the quality of the partnership with DOC. A real milestone towards the goals with both parties working with similar enthusiasm and commitment.

Similarly work at Te Matapuna wetlands has expanded with three hapu committing to a partnership with DOC and ourselves. This greatly increases the land to be restored and commits to important cultural values in addition to the ecological ones.

Great progress has been made in Taupō with the development of the “Greening Taupō” project aimed at improving the value of the town for its wildlife attributes as well as giving it an identity and making it a better place to live or visit. This has been a great opportunity to develop partnerships or relationships with a good number of landowners, Regional and District Council, Wairakei International Golf Course, Federated Farmers as

**Below:** Trap checkers on Long Beach, Rotopounamu with high lake levels.

*Photo: Project Tongariro*





**Above:** Project Taupo and community volunteers in full swing during a Greening Taupo planting day.  
*Photo: Project Tongariro*

well as traditional partners like DOC and Forest and Bird. This project has greatly increased our profile in the broader community which is critical for support including sponsorship.

It was pleasing to be able to support DOC with rebranding the summer programme as Mahi Aroha. We have had a long history of assisting DOC with running the programme and our support and enthusiasm helped ensure DOC undertook the review and branding in a positive way. One of the good opportunities is being able to partner with a number of other community groups in delivering the programme.

A project ready to ‘take off’ is restoration of the Stone Sanctuary on Whakapapa ski field. The building is a valuable one in terms of early European architecture on the ski field and will be an ideal place for quiet reflection for those that have passed on. With the benefit of a bequest, sundry donation grants from DOC and labour and resource commitments from R.A.L I am optimistic that restoration and interpretation can be completed over the next couple of years.

Events like the “Tussock Traverse”, the “Goat” and kite flying are also ideal for raising our profile and fund raising. I do need express a special thanks to all the

DOC staff we work with. It has been a difficult 2-3 years for them but they have continued to work professionally with us, often going beyond expectations to help us achieve our goals and good conservation outcomes. Without this contribution we would be much less successful.

I am personally thankful to the Executive of Project Tongariro. They are committed and supportive. Our small staffing team of Kiri and Nina continue to be enthusiastic and innovative and work well with Kim [marketing] and Nick Singers [ecology] who are contracted for some jobs but provide lots of ideas and volunteer time. Keeping up with this group and occasionally getting ahead of them can be challenging but is always rewarding. And of course finally a huge thanks to all the volunteers and supporters who make things happen on the ground. Without their efforts we would achieve nothing.

# Adaptation to the environment

Lou Sanson

Director General, Department of Conservation (DOC)

*I have been in the job for about six months now and I have inherited a restructured Department that is far better equipped to handle the responsibility of making conservation part of everyone's value set and part of New Zealand's economic viability. The real change for DOC's revised role is a strategic long-term view of where New Zealand wants to be environmentally and economically in 50 years and beyond. The new way of working focuses on partnerships; making others successful and working together to expand conservation.*

*DOC had to change. Doing business previously, DOC was never going to give New Zealand the outcomes needed to ensure the enduring viability of our natural heritage. We were not winning the battle against the decline of ecosystems.*

Discussions about economic prosperity and conservation and environmental stewardship must occur in the same forums. We may have different drivers that motivate us but we all have the same longer term objectives of a prosperous lifestyle. All New Zealanders have to be partners in economic and environmental responsibility because impacts of human activities do not recognise park boundaries and the health and well being of the natural environment is critical to all of us.

In the coming years, I expect that the role of DOC partnerships will assume a greater level of importance in making conservation part of everybody's responsibility. As part of that commitment to the wider community I feel that because taxpayers' dollars fund the Department we must create more of a sense of ownership of natural and historic heritage for everyone. Public Conservation Land is the jewel in the crown of heartland New Zealand and there must be a real connection with 'Brand New Zealand' beyond the park boundaries.



Partnerships are nothing new in DOC. We have numerous examples from one end of the country to the other and I know there are great examples in the Taupō region. I'll come back to that soon but overall, DOC needs to make a quantum leap in the level of involvement of others in conservation if we are to be effective.

A significant partnership that had people pricking up their ears was the deal that DOC struck with Fonterra in March 2013 to work with local communities to protect some of New Zealand's waterways. Although it is a strategic partnership, it will benefit local communities. Operating under the 'Living Water' partnership brand this is a ten year commitment to improve water quality in some of the natural habitats of five waterways located in significant dairying regions. Twenty million dollars will be invested into the community projects for Kaipara Harbour, Firth of Thames, Waikato Peat Lakes, Te Waihora-Lake Ellesmere and Awarua-Waituna catchments to improve water quality and protect and enhance wetland species. For conservation of wetlands to become part of people's lives, it is crucial to build understanding and support amongst farmers and community. This partnership between DOC and Fonterra gives the dairy giant an opportunity to build real connections with conservation by developing catchment plans with communities.

At a local level, there is a great partnership that is really putting Taupō on the map worldwide. This is an example of where DOC partnerships need to be heading. 'Bike Taupō' has nearly finished building the Great Lake Trail on the western shores of Lake Taupō. This world class mountain bike track is 95% on Public Conservation Land and on completion the Great Lake Trail will be 72 km long, made up of a series of links that could be ridden or walked individually or as a whole. Even before it is fully completed, the track has about 40,000 people per year - just under half are pedestrians.



Like any community network partnership, the groundwork to establish and maintain good relations with all involved was important and getting the blessing of local iwi put Bike Taupō in good stead before the project even started. They have worked with a range of people throughout the planning and development phases and used local contractors and suppliers for almost all of the work and materials. As well as building the trail, Bike Taupō has built the car parks, shelters, toilets, signs and camping areas that go with it. A number of transportation and guiding businesses have started as a result of the trail and a new water taxi service has also started to ferry people from Kotukutuku landing to Kinloch.

It's not just recreation either. The native birdsong is being enhanced with pest control. There is currently a trap line along the Whakaipo link to

Kinloch and this is planned to be extended to the full trail. Wilding pines are being eradicated and there are plans to undertake a number of wetland restoration projects.

DOC has supported Bike Taupō's efforts throughout. Here is an example of a dynamic partnership that continues to grow. The relevance of conservation values to economic outcomes is in stark relief. The success of the relationship is based around making a contribution to both conservation and tourism – delivering positive outcomes both environmentally and economically to NZ.

I want the DOC ranger to be part of the iconic brand that exemplifies the qualities inherent in conservation and its contribution to the community. I see the work that many rangers do and I am proud of the way in which they have conducted their

**Above:** On the W2K track looking across Whakaipo Bay to Tahunatara.

*Photo: Bike Taupō*

business. Now, when the future is in partnerships, the need to be even more a part of the community is imperative and I have trust that we are all heading in the right direction together.

# Greening Taupō

Kim Manunui and Nina Manning

Project Tongariro Marketing Coordinator, Greening Taupo coordinator



*Greening Taupō, managed by Project Tongariro, has a mission to build healthy neighbourhoods in Taupō, increasing the greenery in the community by promoting green urban development.*

*The concept for Greening Taupō arose as a result of vision and discussions between Project Tongariro, the Department of Conservation and Wairakei Golf & Sanctuary who believed that a collaborative organisation could take conservation to the next level in the Taupō community.*

## Building members

To help build profile and funds, a partnership and membership model has been introduced where families, individuals and business are encouraged to join the Greening Taupō mission.

A number of benefits from Taupō Native Plant Nursery, who have come on board as a major partner, are offered upon joining.

The goal is to replicate the intensive conservation work occurring within the Wairakei Golf & Sanctuary into the surrounding community. The objective of Greening Taupō is to improve the Taupō environment for people and native wildlife and will involve undertaking restoration planting and pest control to create ecological corridors to allow the number of native birds to flourish.

After completing a comprehensive feasibility study and engaging an advisory group with various stakeholders, Greening Taupō was launched in July 2013. A successful community planting day held in conjunction with Contact Energy saw over 300 people turn out to plant 3000 trees. This kick-started the project and a number of other community planting days were held across Taupō aimed at engaging families, clubs, community groups, local business and iwi. Over the past season (between April – late September) under the Greening Taupō umbrella, over 20,000 trees were planted, well on the way to planting the target of 250,000 trees in five years.



**GREENING  
TAUPO**

*Kia tangi ai te tini parirau to hear the sound of many wings*



Another exciting profiling event for Greening Taupō this year was being selected as a recipient charity for the King of the Ring Charity Boxing Event. This gave the project a lot of exposure in local newspapers, radio and web within the local community. There were a number of different donation options available from text to donate, Trademe charity auction and website donation.

**Greening Taupō raised over \$5000 from the event.**

The website [www.greeningtaupo.org.nz](http://www.greeningtaupo.org.nz) and Facebook page are kept up to date and supporters receive regular newsletter communication. The Taupō community is invited to become a member or partner or to participate in one of the community planting days.

Photos from a very successful Greening Taupō day.

*Photos: Robin Orchard*



# Take only Photographs Leave only Footprints

Karen Williams

ex President Project Tongariro, life member



Graffiti - initials or names, slogans or drawings scribbled, scratched or sprayed on everything from pavements to public toilets is a universal phenomenon. These days our thinking has evolved to the point where many view some kinds of graffiti as 'public art'. However, most of us are offended when our homes or public buildings are targeted by random acts of graffiti. Even iconic world heritage sites such as the Great Wall of China and Peru's Machu Picchu are under attack as people leave behind mindless graffiti on ancient Ming Dynasty and Incan stones, without a care.

It is easy to recognise these spray-painted or scratch marks on ancient historic sites as graffiti but what do you make of visitors who build rock cairns by the dozens and 'write' their names on the landscape in rock. These are perhaps more subtle kinds of graffiti that are a problem consuming time, money and energy at many national parks and world heritage sites around the world.

Traditionally, cairns (manmade conical stacks of rocks) were placed at regular intervals, a bit like a breadcrumb trail, to indicate a path across terrain. But in many of the planet's wild and beautiful places these useful way-finding devices have morphed into a proliferation of cairns added to by copycat behaviour.

*Photos: Harry Keys and  
Karen Williams*

On a recent trip to several world heritage volcanic islands off the coast of Sicily it was impossible to miss the rock graffiti in the crater of Vulcano. We were so cross we descended into the crater and dealt to El Padre and broke up the rest of the words 'written' there. Wasted energy no doubt as the natural patterns of rock distribution had already been disturbed. Sadly, the view into the crater is no longer a work of nature. A future eruption may sort this out some day!



As the number of visitors grows in Tongariro National Park, park managers are noticing an increase in both kinds of rock dislocation. Manmade rock cairns can be found in numerous places - from Restful Ridge, to the Taranaki Falls track to Blue Lake on Mt Tongariro. Rock graffiti is also often 'written' on the floor of Southeast Crater under Mt Ngauruhoe.

Please think again if you are tempted to build a cairn or to write rock messages as a memento of your visit. Messing with the rocks in places like national parks is not appropriate as it causes soil erosion, plant loss and impacts on the natural landscape. Please leave the mountain and the rocks as you find them. Take only photos, leave nothing but footprints.



# Volcanoes of the South Wind

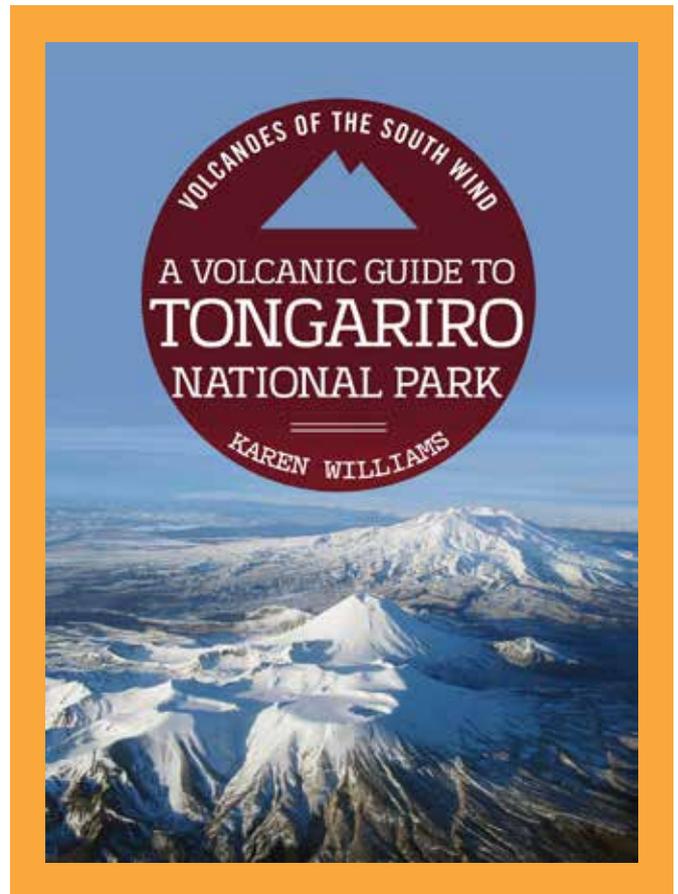
After being out of print for several years – **Volcanoes of the South Wind - A Volcanic Guide to Tongariro National Park** – is available once again. This popular guide to the volcanic landscape of the park written by Karen Williams was first published in 1985 by the Tongariro Natural History Society (Project Tongariro). Two further editions were published in 1989 and 2001 as well as several reprints.

With the old printing plates now obsolete a decision was made to go to Random House. Working with Karen who has rewritten and updated the book from start to finish, they have reformatted, added great new diagrams and photos. The book was published by Random in December 2013 and can be purchased on line from [www.tongariro.org.nz](http://www.tongariro.org.nz)

Volcanoes of the South Wind is an easy-to-read guide that is perfect for students, tourists and anyone with an interest in the area's geology as a ready reference. The book outlines the turbulent history of the volcanoes, explains the inherent processes at work with beautiful photography and detailed diagrams and clearly identifies the volcanic features found in the park – vents, peaks and lava flows.

A useful chapter found at the end of the book shows you where to find some of these features in the park. It also details the different walks available in the area, with information on duration, distance and difficulty.

The post-eruption events of Ruapehu in 1995-1996, the long-predicted outburst of the Crater Lake and safe passage of the lahar in 2007, as well as the Te Maari



eruptions from Mt Tongariro in August and November last year are all included. The book also updates the research work of New Zealand scientists, including the study of ash layers using improved techniques to refine the age of the volcanoes in the area.



**Karen Williams** is also the author of *Skiing on the Volcano* and *Ruapehu Erupts* along with several other titles. Karen is a full-time writer, specialising in local and natural history. Karen is married to DOC volcanologist Dr Harry Keys. Karen and Harry were made life members of Project Tongariro in 2013.

Photo: Sibyll Guler

# The 2012 Te Maari eruption episode

## Tongariro Maunga

Harry Keys, Technical Advisor - Volcanology, Department of Conservation

### Introduction

Tongariro erupted on 6 August 2012 and again on 21 November from the Upper Te Maari area on the north-eastern flank of the volcano. This was the first eruption episode from the Tongariro-Ngauruhoe volcanic complex since the 1974-1977 eruption episode of Ngauruhoe. Since then we have only seen Ruapehu erupt from Crater Lake in the summit area. The eruption of Tongariro was the first confirmed non-summit, multiple-vent eruption we have seen in living memory. It had the most significant effect on forest and other vegetation in Tongariro National Park (TNP) since the last eruption of Te Maari in 1896-97.

### Initial period of unrest and management

Three weeks of volcanic unrest preceded the first, main eruption. GeoNet seismic equipment detected swarm activity that started between 11 and 13 July. It was located under the Te Maari area at depths initially calculated at 2-7 km deep. These earthquakes were too small to be felt by people. Geological and Nuclear Sciences (GNS) raised the Volcanic Alert Level to 1 on 20 July and then installed four portable seismometers to improve the data collected, including two in Te Tatau Pounamu Wilderness Area with DOC and Tūwharetoa concurrence. Within a week there were reports from people who had smelt gas around the volcanoes. GNS with a representative of Ngāti Hikairo, the local hapu, sampled fumaroles and soil gas at Te Maari, plus fumaroles and spring water at Ketetahi and as far away as Central Crater. By 23 July it was confirmed that there was a significant

**Fig 1** Upper craters in new western crater chain and chasm 8 November 2012.  
*Photo: Harry Keys*



increase in the proportion of volcanic (magmatic) gas being emitted at Te Maari but only a subtle increase in discharge pressures in the fumaroles area and no change in fumarole temperature. Soil carbon dioxide gas emission was highest around the eastern rim of Upper Te Maari crater. It turned out that this correlated with the main fumaroles which subsequently formed during the eruption.

An eruption and its primary and secondary hazards might have threatened people in Rotoaira basin, State Highway 46 and potentially in aircraft nearby. The pre-eruption period of unrest enabled DOC, Ngāti Hikairo, GNS, Genesis and other agencies to prepare for an eruption. On 31 July Hikairo with support from DOC and GNS convened a meeting at Papakai Marae to discuss the situation with 30 members of Hikairo and other hapu, Police, Taupō and Ruapehu District and Waikato Regional Councils, NZ Forest Managers, Genesis Energy and Massey University. DOC and Hikairo then finalised phone tree details for rapid response. The next evening a similar small meeting was held with the executive of the Tongariro Alpine Crossing Transport Operators and Guides (TACTAG). They expressed strong concern about the potential impact on tourism businesses. Supported by DOC, they proposed a similar meeting in Taupō with broader tourism industry groups. No such meeting had occurred in the few days before the eruption.

By the end of July a continuing reduction in the number of seismic events per day was clear and there was no indication of increasing magnitude or decreasing depth of seismic events. The conclusion reached within GNS was that the most likely scenario was a continuing decrease in seismicity back to background levels, but they stressed an eruption similar to 1892 or 1896-97 or larger could not be ruled out. Therefore DOC and the other agencies focussed on refining the Tongariro-Ngauruhoe eruption response plan including coordination with GNS, Police, other core partners and community leaders, potential management actions and consistent messaging mechanisms with GNS and the Tourism Industry Association. The decision was made not to close any facilities on Tongariro.

## **The 6 August eruption**

The eruption occurred at 11:52 pm on a Monday night and lasted less than ten minutes. Reconstruction of events afterwards revealed no immediate useful precursors and suggested that the eruption was initiated by volcanic gas released from a small dyke of old but still hot crystallising andesitic magma. This gas pressurised and fluidised the overlying, hydrothermally weathered and weakened low permeability surface material until it failed. The resulting debris avalanche (landslide) “uncorked” the volcano leading to a series of phreatic explosions recorded on the GeoNet seismic-acoustic network in Tongariro National Park. A series of up to four small craters were created just west of Upper Te Maari crater. That crater was reamed out and a series of fissures including a prominent new “chasm” about 600 m long and 30m deep was formed to the east and south (Figure 1).

The eruption produced very serious volcanic hazards that affected more than four kilometres of the Tongariro Alpine Crossing (TAC) track. Flying rocks and burning ash clouds were the main primary hazards while a



**Figure 2:** Bomb hole  
Ketetahi Hut.  
*Photo: Karen Williams*

serious secondary lahar occurred almost 10 weeks later as a result of the eruption. Anyone in the way would have been seriously injured or killed.

### **Flying rocks**

Canterbury University scientists and students estimated that 13,000 “flying rocks” were ejected on ballistic trajectories at initial speeds of up to 600 - 700 km/hr. These were blocks of old lava up to 2-3 tonnes but with a median mass of 30 kg and a mean mass of 50 kg. They landed up to 2.3 km away and 2.6 km of the TAC track as well as Ketetahi Hut were in the fallout zone, suffering significant damage (Figure 2). Numerous impact craters, holes, spray and rock “shrapnel” deposits were created. None of these rocks were hot enough to char or burn wood in the hut or trees but a very few examples of charred wood have been found in the northern sector, suggesting hotter temperatures there.

### **Burning ash clouds**

Ground-hugging burning ash clouds of hot (<100-400°C) material, gas and steam from multiple vents travelled east, west, north-west and then north. The blasts (known as surges or pyroclastic density currents or PDCs) travelling to the north-west and east were the largest. In the north-western sector they caused quite extensive searing and blast damage to mountain toatoa forest and other trees and shrubs within 1.4 to 2.7 km of the central vent (Figure 3). Later laboratory experiments, by Waikato University, of foliar searing in seven plant species revealed burning cloud temperatures were probably about 50-60°C at their furthest range on the TAC but more than 64°C at the closest points on the track. Mountain toatoa was the most sensitive species and was used as an indicator of where the clouds reached. The TAC track was crossed in nine places and inundated over 3.5 km of its length.



**Figure 3:** Seared Mountain Toatoa at Tongariro Alpine Crossing 7 October 2012.  
*Photo: Karen Williams*

Examination of the deposits by Massey University showed there were three components of the surge. There was an initial fast-moving (up to 500 km/hour), high-energy, hot, high-concentration blast which deposited mainly gravel- and marble-sized sediment. It was followed by a series of slower-moving, lower-concentration, cooler and wetter surge pulses depositing mainly sand-sized material. Finally, an even lower-energy, very dilute, cool and wet cloud deposited even finer material. That upper layer was quickly eroded away over the next few months.

In the western sector, the topography was overrun by the PDCs out as far as 1.4 km west of the vent and 1.7 km to the north-west. People would have been burned or killed in this zone. Beyond these distances the topography started exerting a strong influence on surge direction in places. Contact with the ground was increasingly less severe as cool air was drawn into the cloud, diluting and cooling it. By two kilometres topography was dominating flow direction. Information assembled to date suggests the PDCs may not have affected people seriously at that distance. Overall the PDCs continuously affected about 4.8 km<sup>2</sup> and partially affected a further 1.6 km<sup>2</sup> travelling at an average speed of 40-100 km/hour. People on the TAC might have been exposed for up to 1-5 minutes.

## **Ash**

Finally an ash and steam plume that was detected by the NZ Met Service rain radar rose to seven kilometres, lit up by a dramatic show of lightning with some incandescent rocks and depositing ash up to several centimetres thick around the vents. Most of these phenomena were observed by residents along State Highway 46. They and surrounding pine forests and farmland also experienced thin but significant ashfall from the plume as it drifted east-north-east as far as the East Coast (200 km). Some fluorine and other toxins were present in leachate from this ash. This was presumably the cause of death of the one farmed deer that is known to have died. Blood-stained deer urine was found in snow above the hut in mid August.



**Figure 4:** The breach looking through with Harry Keys for scale (circled).  
*Photo: Bubs Smith*

## Landslide, dams and lahars

The debris avalanche at the start of the eruption flowed in at least three pulses and together formed a million cubic metre deposit of rocks and mud extending two kilometres distant down a valley to the north-west. It over-ran native forest and shrubs and dammed three tributaries of the Mangātipua Stream. The upper part of the deposit choked a gorge area and created a significant lake whose potential breakout threatened up to 1.8km of the Tongariro Alpine Crossing downstream.

This lake and two ponds were discovered on 8 August and monitored until after the dam broke just before midnight on 13 October, following heavy rain. While the ponds formed stable outflows, the lake never did but springs that emerged on the downstream side of the dam steadily increased in discharge due to subsurface flow. The volume of the lake varied between a minimum of about 10,000m<sup>3</sup> in late August to a peak of about 30,000m<sup>3</sup>, just before it burst. This was related to rainfall and snow melt and complicated by percolation into the debris and the old lava surface beneath. We worked with hydrologists from Genesis Energy and on 11 October they installed a lake level measuring system with data telemetered to Tokaanu. This revealed that the lake rose rapidly on 13 October and burst at a level 25 cm lower than the prior height of the dam crest. It drew down slowly for 40 minutes, then drained rapidly between midnight and 1 am on 14 October. Next day a major breach in the dam was found, measuring about 100m long, 29m wide and 12m deep (Figure 4). It marked the establishment of a stable surface outflow from the much-reduced lake and elimination of the main threat to people below.

**Figure 5:** 21 November 2012 eruption from the Tongariro Alpine Crossing.  
*Photo: Neil Fausset*



The dam break caused a hyper-concentrated lahar which damaged parts of the TAC four to five kilometres downstream in what we refer to as the Lahar Hazard Zone (LHZ). Remobilised debris filled in the lower pond and inundated a further 300m of riparian forest below the toe of the debris avalanche. Erosion by the lahar and dislodged boulders obliterated about 200m of the track. Water scour and mud affected more track as far as the Ketetahi car park but no bridges were damaged. Mud and sand overflowed a culvert at State Highway 46 and sediment and woody debris were deposited over the road. Since then at least two smaller lahars created by rain, remobilising debris from unstable areas on the debris flow, have caused more minor damage in the LHZ. Small secondary lahars had also travelled down Te Karo stream and crossed State Highway 46.

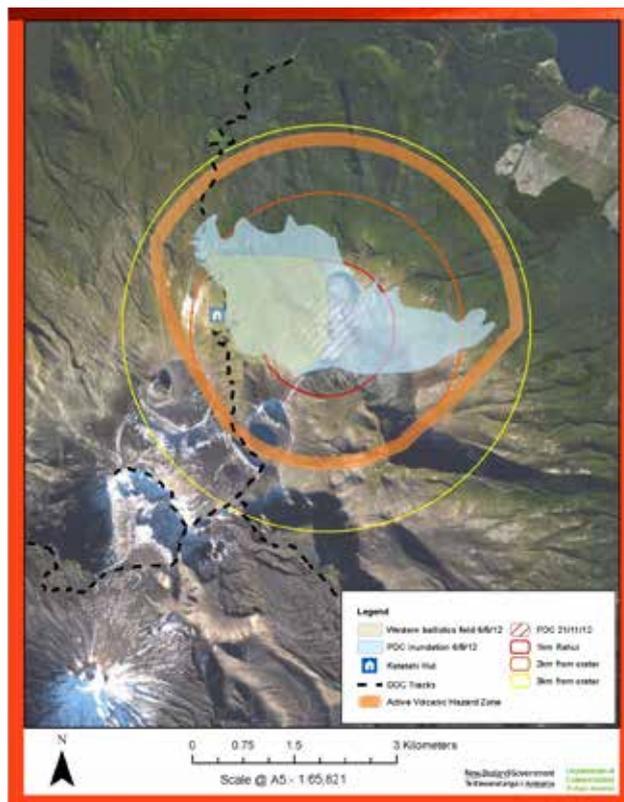
### The 21 November eruption

This eruption occurred from the upper Te Maari crater at 1:25pm on a Wednesday afternoon in fine clear weather (Figure 5). There were no immediate useful precursors. It is believed that between 30 and 70 people were in the two kilometre summit hazard zone, as close as 1.3km from the vent, with clear views of the eruption. It was also well recorded by the GeoNet webcam at Karewarewa north-east of Ketetahi Springs. Tephra jets emerged first through the existing steam clouds, followed by a vertically ascending plume column and a series of pyroclastic density currents fed partially by column collapse. These were observed travelling to the north-west, north then north-north-west at average velocities of 50km/hour. The visible component of the currents lifted off the ground and dissipated after 500m, although a Massey University sensor 900m distant detected air warmer than ambient afterwards. No ballistics were observed and no impact craters have since been reported beyond about 200m at most but the plume rose 3-5 km, depositing 15mm of fine tephra 600m from the vent and dustings were reported up to 25km to the north.

The eruption did not affect the TAC. All significant hazards were contained within the one kilometre rahui established in mid-October for eruption risk management purposes by DOC and Ngāti Hikairo (Figure 6). However images of the eruption and some young people's panicked reactions were dramatically presented on TV and other media, including the internet. This created a distorted view of the danger to people on the TAC. Such a view was promulgated widely.

### Management

Management of the impact of the eruption episode quickly became focussed almost entirely on the Tongariro Alpine Crossing. Risk management issues there far outweighed anywhere else, especially after the dam break in mid-October 2012 removed risk to SH46 and local residents.



**Figure 6.** Active Volcanic Hazard Zone with PDC shown. April version

**Table 1.** Status of the Tongariro Alpine Crossing and summary of management following the 6 August 2012 eruption of Te Maari

| Dates                                  | Track status  | Track and other management details   |
|--|---|--|
| <b>2012</b>                            |   |  |
| 20 July - 6 August                     | Open  | Volcanic Alert Level raised to and kept at 1. Eruption response planning within DOC, hapu  |
| 1:52 pm 6 August                       | First eruption  | Affected hut and 3.5km of track. VAL 2.  |
| 7 August - 30 August                   | Completely closed                                     | Including both car parks & access roads. Rāhui about five kilometres. First qualitative risk assessment for management on 13th. VAL decreased to 1 on 16th.  |
| 31 August                              | Partly opened - to Red Crater                         | From Mangatepopo car park to Red Crater. Ketetahi road & car park still closed. Rāhui reduced to three kilometres. Te Whakapainga (opening ceremony) led by Hikairo at Mangatepopo car park and new signage. |
| 4 September                            |   | GNS started first quantitative risk assessment with DOC's input.   |
| 18 September                           | Partly opened –to Emerald Lakes junction              | From Mangatepopo car park to Emerald Lakes junction. Ketetahi road & carpark still closed. Rāhui reduced to 2.5km.   |
| 8 October                              |   | Stabilisation and repairs started on TAC and Ketetahi Hut.   |
| Midnight 13/14 October                 | Dam break and lahar                                   | Severely damaged 200m of track.  |
| 1:30 pm 19 October to 21 November      | Fully open  | Rāhui reduced to one kilometre.  |
| 1:30 pm 21 November                    | Second eruption                                       | No affects on track but proved PDCs occurred on 6 August which influenced subsequent risk assessment & management.   |
| 22 -28 November                        | Completely closed                                     | Including both car parks & access roads  |
| 29 November                            | Partly opened –to Emerald Lakes junction              | From Mangatepopo car park to Emerald Lakes junction. Ketetahi road & car park still closed.  |
| <b>2013</b>                            |   |  |
| 6 March                                | Partly opened –to saddle between North & Blue craters | From Mangatepopo car park to saddle. Ketetahi road & car park still closed.  |
| 19 April                               |   | Hawaiian-led peer review of DOC's application of risk assessment completed.  |
| 8 May                                  | Fully open  | Rāhui kept at one kilometre.   |
| July minor increase in volcanic unrest | Fully open  | Slight increase in gas and seismicity and slight increase in elicited probability of eruption.   |
| 8 October                              | Decision made to keep TAC open for summer             | Plan to install volcanic risk lights, other signage and other risk reduction tools introduced including 24 Sept workshop.  |

The value of DOC's close relationship with GNS Science was clearly demonstrated. The ongoing partnership between volcanologists and managers of TNP, including iwi, clearly demonstrates the importance and value of open communication between scientists and stakeholders during a response to, and subsequent recovery from, a volcanic eruption.

The differences in risk management between Tongariro and Ruapehu were also very apparent. On Ruapehu, risk management has been well developed due to the number and various kinds of eruptive activity in recent years: the Eruption Detection System and a more experienced concessionaire are able to share some of the responsibility as well. New managers at DOC also drew on quantitative risk management to a greater degree than previous managers who had experienced several eruptions and seismically active periods.

Management effort can be divided into the **4 R** phases of emergency management.

- **Reduction and Readiness** prior to the eruption. This included response planning; research including monitoring by GNS Science; preparation of a new hazard (phenomena) map and improved communication between DOC, GNS Science and others including Ngāti Hikairo, TAC concessionaire group, business and political leaders, and the Central Plateau Volcanic Advisory Group; and specific decisions and tools to reduce risk (e.g. Table 1). In hindsight, Ketetahi Hut and the TAC within at least three kilometres of Te Maari craters should have been closed or at least restricted for a period.
- **Response** to the eruption on 6 August. There was rapid prioritised communication with agencies involved and callout of DOC managers and staff. GNS Science provided scientific advice. A conference call which occurred within 45 minutes was between DOC, Police, GNS Science, Ngāti Hikairo and local eye-witnesses. This allowed rapid situational assessment for all key responding agencies.

Police then assumed control: firstly from the Whanganui end with management teams and also at Whakapapa and Taupō, then from 6 am from Taupō. They made the emergency management decisions for highways but for TNP in conjunction with DOC. The highways, TAC and access roads were closed and barriers manned. Teams led by Police with local LandSAR personnel or by DOC checked the four huts on Tongariro-Ngauruhoe and the TAC in the eruption zone, finding people only in Mangatepopo Hut. Two backpackers had self-evacuated from Oturere hut after hearing the eruption. Some locals evacuated to Hirangi Marae in Turangi, based on the Ngāti Hikairo response plan.

Taupō District Council and the New Zealand Transport Agency including their agents Opus Consultants responded to assist Police and locals in Rotoaira basin and manage the highways, following the ash fall and the secondary lahars. Genesis Energy, New Zealand Forest managers and other agencies affected also responded to manage impacts on their own operations and in support of DOC and Massey University. DOC maintained its Incident Management System including manning TNP access road barriers for a week, and issued media releases in consultation and coordination with others. Research agencies responded for their own purposes and in conjunction with DOC and others.

- **Recovery.** This has involved reprioritised repairs and later capital work, and staged reopening on a schedule based on assessments of risk by GNS Science and DOC, eruption risk management zoning, ongoing monitoring and research by GNS Science and others, and other management of volcanic risk (Table 1). The designation of a new Active Volcanic Hazard Zone (AVHZ, Figure 6) around Te Maari followed an approach to hazard management commonly used internationally through restricted access. This was coupled with establishment of a rāhui around the vent area by Ngāti Hikairo with representation of it made with consultation in conjunction with eruption risk zoning.



**Figure 7:** Electronic light sign (right) and AVHZ sign in saddle between North and Blue craters Tongariro Alpine Crossing.  
*Photo: Karen Williams*

Discussions and consultation among DOC, iwi, the Ministers of Conservation and other community and business leaders in regard to short- and long-term options for the recovery phase began soon after the first eruption and are still continuing 16 months after the last eruption on 21 November. Media releases have continued as needed. In December 2013, the most recent work commenced on TAC track repairs with reconstruction and moveable “lahar bridges” installed in the Lahar Hazard Zone in January 2014.

Considerable investment has been necessary to further mitigate risks to people, in particular day visitors through the summer season, given the level of risk. Various risk management tools have been discussed for the TAC, especially those to inform visitors of the level of risk and methods of improving decision-making by both management and the public. The most important new tools have been:

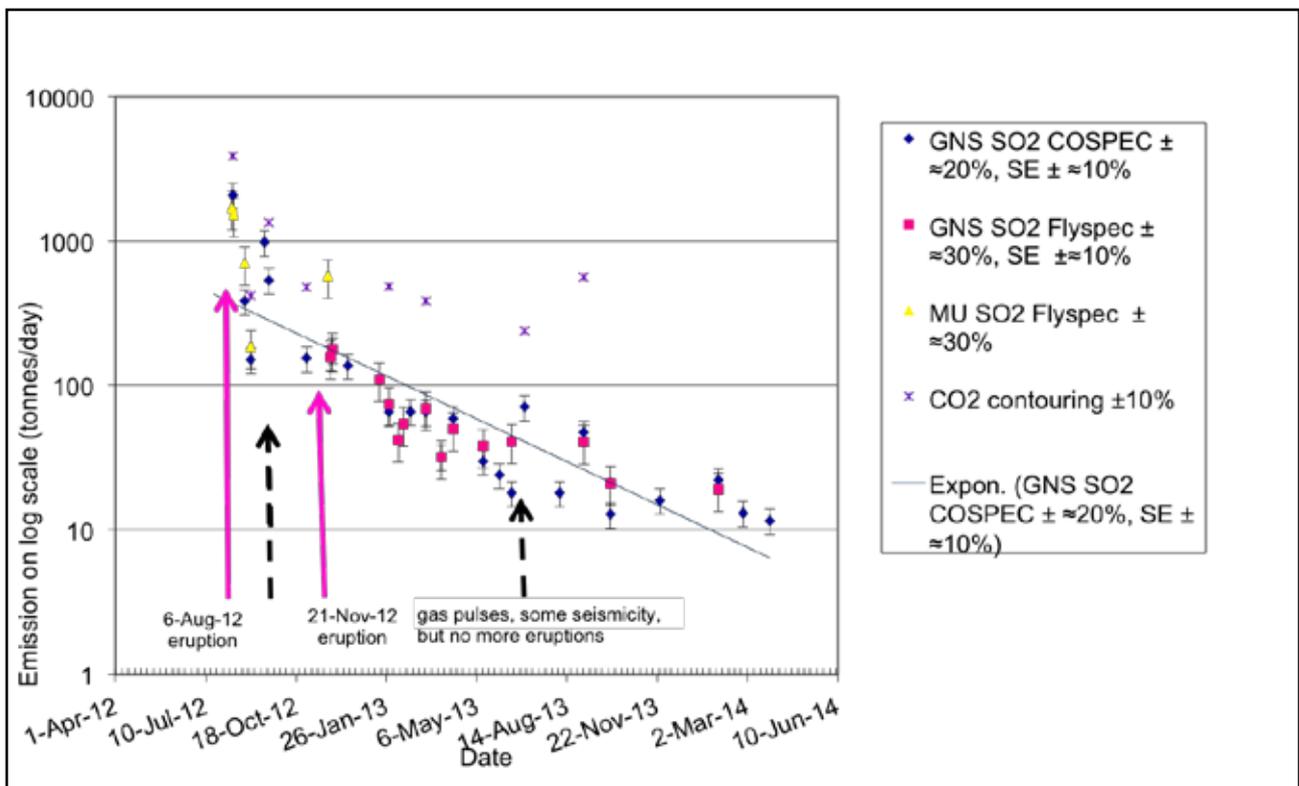
- facilitation of and funding for additional GeoNet sites near Te Maari to improve seismic and gas monitoring and data analysis, including automation of detection of small seismic events;
- a system of electronic light-based signs that are changeable remotely by cell phone in response to levels of volcanic risk (Figure 7);
- a Tongariro Eruption Detection System (TEDS) for automatic detection of eruptions to assist rapid response to an eruption; and
- targeting at-risk or risk-averse groups (like schools) to ensure and assist the transfer of information to such groups, as well as explicit signage, a DOC web page dedicated to volcanic risk, and hand-out information.

It was recognised there were concerns over erecting light-based signs on the TAC, a relatively remote area that people visit for its wild volcanic nature. But it was considered essential to have the lights installed if the TAC was to

be fully re-opened. The lights provided for improved risk management and without them there would be unacceptable residual risks from a sudden resumption of hazardous volcanic activity. Work is underway to determine how people on the TAC respond to them.

## The present situation

As of March 2014, the eruptive episode is probably over. The dam break in mid-October 2012 may have marked the end of the main period of life-threatening volcanic hazards and risks to users of the Tongariro Alpine Crossing. In March 2014, GNS volcanologists judged the chance of another eruption in this episode to be 2-3% in the next month which is getting close to the long-term average probability. These judgements have been made since August 2012 and extrapolations of them into the future have helped DOC decision making. However the risks are not yet back to where they were perceived to be before August 2012, due to the nature of the volcanic hazards that could still occur and the chance of more secondary lahars in the LHZ.



**Figure 8:** Emission of gas from Te Maari as measured using aerial and highway-based spectrometers by GNS Science (GeoNet) and Massey University. High values are apparent immediately after the two eruptions. Some of the other variation is due to pulses of gas detected (e.g. September 2012, June 2013) while other scatter is due to plume behaviour in different wind conditions which makes the discharge difficult to measure. Error bars are based on nominal percentages relating to uncertainties reported elsewhere using similar instruments (Clive Oppenheimer, pers comm.)

The crater area is still active. Vents around the eastern rim and inside the enlarged Upper Te Maari crater are still very hot (>400°C). Cracks and a large partly failed slump on the western rim indicate the potential for more collapses and potentially hazardous debris flows, probably in the medium to longer terms when the hydrothermal system reseals and fluids build up again. Rock fall from fresh cliffs is ongoing. An area in the head of Te Karo stream south-east of Lower Te Maari crater appears to have heated up since before



**Figure 9:** *Olearia nummularifolia* trunk resprouting one kilometre from the vent 10 November 2013.  
Photo: Karen Williams

the eruption and is emitting more steam. The one kilometre rāhui is still in place. Steam plumes from the 2012 vents are still prominent most days, depending mainly on atmospheric humidity, but GNS monitoring shows that gas emission is continuing to decline consistent with a reduction in the probability of another eruption (Figure 8).

Impact craters and damage to vegetation are still very apparent. Some toatoa forest will likely end up dead and tree skeletons will result. However *Celmisia* and other alpine species have recovered rapidly and some of the other tree

and shrub species are also sprouting at various distances from the vents (Figure 9). The extent and species of probable vegetation recovery is not yet clear. Craters are slowly filling with sediment. The remnant lake has almost silted up but the area can still be seen from the 1.3km zigzag above Ketetahi Hut.

Although small by world standards, this eruption episode generated a huge amount of interest and scientific and management effort, due to its prominence, ready access for field work, the risks associated with the large numbers of people (75% international visitors) using the TAC close by, and importance for the local and national tourism economies. The new 2013 edition of *Volcanoes of the South Wind - a Volcanic Guide to Tongariro National Park* by Karen Williams has several photos and detailed information on the event. A special issue of the international scientific Journal of Volcanological and Geothermal Research is being prepared. It focusses on the eruption episode. Edited by Art Jolly (GNS) and Shane Cronin (Massey University), it will contain up to 17 articles with detailed data and information, including DOC management, and will hopefully be published later in 2014.

## Acknowledgements

Many people from GNS Science, Massey, Waikato and other universities have contributed to the information presented here and the ongoing assessment of risk. I particularly acknowledge input from Gill Jolly, Steve Sherburn, Bruce Christenson, Nico Fournier, Craig Miller, Art Jolly, Karen Britten, Agnes Mazot and Brad Scott from GNS Science, Shane Cronin, Jon Procter, Gert Lube, Eric Breard and Kate Arentsen from Massey University and Bruce Clarkson, Vicki Moon and Jackson Efford from Waikato University.

Keith McKenzie (helicopter pilot), John Wilton, Anna Eilers, Jono Maxwell, Damian Coutts, Bhrent Guy, Dave Lumley and Mark Davies (DOC), Te Ngāehe Wanikau, Bubs Smith (Ngāti Hikairo) and Karen Williams (Project Tongariro) have also provided essential support.

DOC, GNS/GeoNet, Massey & Waikato universities and NZ Forest Managers, NZ Transport Agency, Taupō District Council and Waikato Regional Council have provided funding to support this information gathering.



# Te Matapuna – South Taupō Wetlands

Kiri Te Wano

Project Tongariro Coordinator



**Above:** An artist's impression of the Te Matapuna wetland once willows have been removed.

**Below:** The wetlands restoration planting team.

*Photo: Kiri Te Wano*

**Left:** The Hapauwhenua Viaduct, once an integral part of the Main Trunk Railway line but bypassed in the 1980s. The viaduct was restored to be part of the Old Coach Road walk several years ago by Project Tongariro and DOC.

*Photo: Project Tongariro*

The whole of Te Matapuna wetland is the largest wetland within the Taupō basin and it covers approximately 1500 hectares, of which 1/3 is public conservation land. The wetland was formed after the Taupō eruption as pumice sediment was washed into the lake forming a large area of low lying land. The wetland is heavily influenced by the water height of Lake Taupō as well as flood flows from three major rivers, several streams and upwelling of ground water. Te Matapuna is nationally significantly important because of its large size and variety of ecosystem types.

This wetland is in relatively good health despite the best efforts of the invasive grey willow and human impacts. Grey willow is currently the biggest threat to the wetland, as it quickly colonises all other wetland vegetation types and turns the area into a mono forest choking water ways in the process.

The area known as the Waimarino wetland near the settlement of Motuoapa is where we and our partners are currently focusing our work. Since 2005 we have been working in conjunction with DOC to figure out the best way to manage the spread of grey willow and the best way to kill it – and this has proved extremely difficult and expensive. To date there has not been an established 'best practice' for killing grey willow, resulting in our having to do a great deal of trial and error over the years.



Grey willow grows to a moderately sized multi-stemmed tree which is highly resilient to herbicide damage. We have tested many ways of control including spraying herbicides on willows from a boat and from a helicopter, but we have found that the most successful and environmentally sensitive method which usually achieves around 95% control is drilling and poisoning mature trees. Smaller sized or young bushy willows can be sprayed. The work is physically difficult and access is through boggy wetland or working from a boat or small platform. The work can be in close scrubby, unforgiving and difficult environments and is not something most volunteers enjoy! Therefore contractors



are employed, and they need to be effective and efficient. For the past two to three years Asher Inc. has been employed, has done an excellent job and tracks their work with GPS which makes monitoring and planning a breeze.

**Above:** Karen Ardin kayaks through Waimarino wetland.  
*Photo: Fraser Crighton*

Our major funding for this considerable work comes from the Waikato Ecological Enhancement Trust (WCEET). In 2007-2009 we obtained one-off funding from the Trust, but then in 2010 we managed, in partnership with DOC, to secure a further five years funding. This was a significant step in the fight to control the spread of willow. In 2011 we also secured one year's funding from Waikato Regional Council where we undertook willow control work on neighbouring Māori-owned land.

**Below left:** Waimarino wetlands after willow spraying. Dying willows showing brown.  
*Photo: Nicholas Singer*

This work, including restoration planting, achieved over the last 10 years on both public conservation land and a small part of neighbouring Māori-owned land has led us to strengthening partnerships, not only with DOC and the Waikato Regional Council who provides river and stream work but also with local hapu with mana whenua status in the Te Matapuna wetlands. Extensive consultation with Ngāti Te Rangīta, Ngāti Hine and Ngāti Rongomai has resulted in a draft Memorandum of Understanding (MOU) which includes ourselves and DOC. Both Paul Green, our current president and I personally believe that this is an excitingly significant and important outcome of the work achieved to date.

The MOU states conservation work will commence on hapu land with the focus of kaitiakitanga over their land, specifically the removal of willows. Previous consultation attempts with individual Māori land owners to secure consent to carry out willow control and restoration planting proved difficult and finding individual owners of the land unsuccessful. With the MOU in place the hapu involved will now



take over that consultation process. Other responsibilities include funding applications, traditional cultural knowledge and skill, the desire to run wananga on site to up-skill rangitahi, and participate in volunteer restoration planting activities. DOC has undertaken to provide help with funding applications, technical support and management of contracts including health and safety.



**Above:** Nick and Zoe Singers kayaking through the wetland.  
*Photo: Fraser Crighton*

Another exciting development recently has led to a further MOU between ourselves, DOC and the Department of Corrections. This MOU sets out the agreement whereby the local Tongariro Prison will develop a nursery which will grow 10,000 locally eco-sourced trees per annum. Total eradication of willow entirely is not a feasible option at this stage, therefore restoring riparian areas with the correct native vegetation will slow if not stop the willow invasion. This does pose another problem for us in finding enough land to plant these 10,000 per year. We believe with the advent of the hapu MOU we in partnership with DOC will procure enough land for restorative planting.

The success of this entire project is reliant on many factors, including relationships, funding, technical advice and trial and error. For myself, helping to coordinate this project, working alongside the team from DOC and Project Tongariro has provided me with many learning situations culminating in valuable experiences. Having Nick Singers close at hand with his expert technical advice, practical know-how and his 'just get it done' attitude is invaluable. Paul Green with his happy, relaxed yet quietly focused brand of leadership, wealth of conservation knowledge and world-class negotiating and relationship building skills is also inspiring. The team from DOC consisting of Ian McNickle and his boss Leith Rhynd continue to provide Project Tongariro the best possible support wanted in a partner with a project like this at hand.

To conserve and protect Te Mātāpuna o Taupō Moana' for the generations to come so that the mokopuna can see, listen and watch what we enjoyed about the wetland in our youth from Oruatua to Waihi.  
*Manaaki tiaki Te Mātāpuna o Taupō Moana mo nga tamariki mokopuna.  
 Kia rongo, kia kite nga mea o te repo mai Oruatua Ki Waihi.*

*(Jim Maniapoto 2009)*

It is easy to become disheartened with the extent of work needed to succeed in the fight against willow invasion as I feel every year after Ian has invited me on the annual helicopter fly-about to view our progress, but with relationships like this in place we have a good chance of success. I will also take this opportunity to thank WCEET approving a further five years of funding, up until the 2018-2019 season. Our fight will continue with vigour!

To finish, I thought it appropriate to include the beautiful vision for our wetland project, written by kaumatua Jim Maniapoto.

# International mountains update

Paul Green

President Project Tongariro, ex Conservator, Tongariro Taupō Conservancy

## World Park Congress

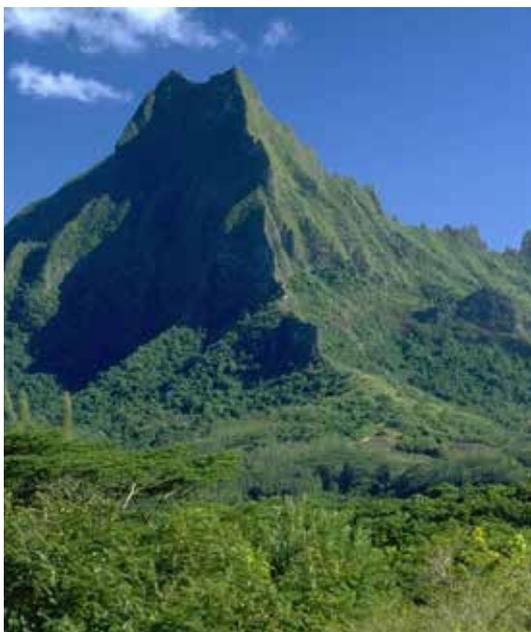
The International Union for the conservation of Nature (IUCN) organises this event every 10 years and gathers the world's most influential people involved in protected area management. The last meeting was held in Durban, South Africa, in 2004 and registration is now open for this year's meeting in Sydney from November 12-19. The theme is "Parks, People, Planet: Inspiring Solutions".

## A succinct case for high biodiversity in mountains

It is often considered that mountains are over represented in Protected Areas and do not contribute significantly to protection of high biodiversity.

Larry Hamilton has argued extensively that this is not true and was delighted to locate a statement in the Editorial on Mountain Biodiversity of the special issue on Mountain Biodiversity [Vol 4, No4,2011] written by Eva Spehn, Katrina Rudman-Maurer and Christine Koerner:

*"Although covering a relatively small fraction of the terrestrial land surface [13-25 %] mountain regions host an overproportional fraction of global biodiversity, supporting an estimated one third of terrestrial biodiversity. On a global and regional scale, mountains that lie in areas of high biological richness are biodiversity hotspots because the rapid altitudinal change of climatic conditions over a very short distance gives rise to a range of bioclimatically defined vegetation types in close proximity. For example, in the tropics, mountain vegetation ranges from submontane forests to tropical alpine ecosystems, thereby concentrating high biodiversity on an area basis. High topographic diversity, a characteristic feature of mountains, results in high habitat diversity and contributes to enhancing richness in biodiversity. Mountain biota, representing islands of high elevation habitats and separated by the surrounding lowlands, have often formed in biogeographic isolation, resulting in high numbers of endemic species that further add to the uniqueness of mountain biodiversity."*



**Left:** Mountain regions host an overproportional fraction of global biodiversity, supporting an estimated one third of terrestrial biodiversity. Dapha Bum is a 3,932m mountain peak near Tezu in Arunāchal Pradesh and is the 91st highest mountain in India. Photo: Arunāchal Pradesh Tourism

The **Mountains Protected Areas network** are members of the **World Conservation Protected Areas for I.U.C.N.**

I share membership with other Project Tongariro members or supporters like Bruce Jefferies, Harry Keys, Dave Bamford and Les Molloy. Information amongst members is shared in a newsletter published four times a year by Dr Lawrence [Larry] Hamilton known with affection as "the silver fox" from Vermont in the United States of America. Larry has published over 80 newsletters which help share information, highlight issues and promote protection of mountains. His work is admired and appreciated by members.

The following notes have been taken from published newsletters over the last 18 months.

## United states national park service science review

The U.S.A has been reviewing its science based policy to take into account change caused by humans.

A group of 11 eminent scientists prepared a report titled *“Revisiting Leopold: Resource Stewardship in the National Parks”* in which they recommended how to manage the resources that parks are charged with protecting ,at a time when environmental shifts are ‘widespread, complex, accelerating and volatile’.

The group recommended that the over-arching goals are to ensure that ecosystems are self-sustaining, cultural and historic resources maintain their authenticity, visitors are educated and inspired, and parks form an anchor in a broad conservation network. The primary recommendation was not to strive to preserve landscapes ‘unimpaired’ as they were when Europeans arrived in the country but to manage parks for ‘continuous change that is not yet fully understood’ in a highly humanised environment.

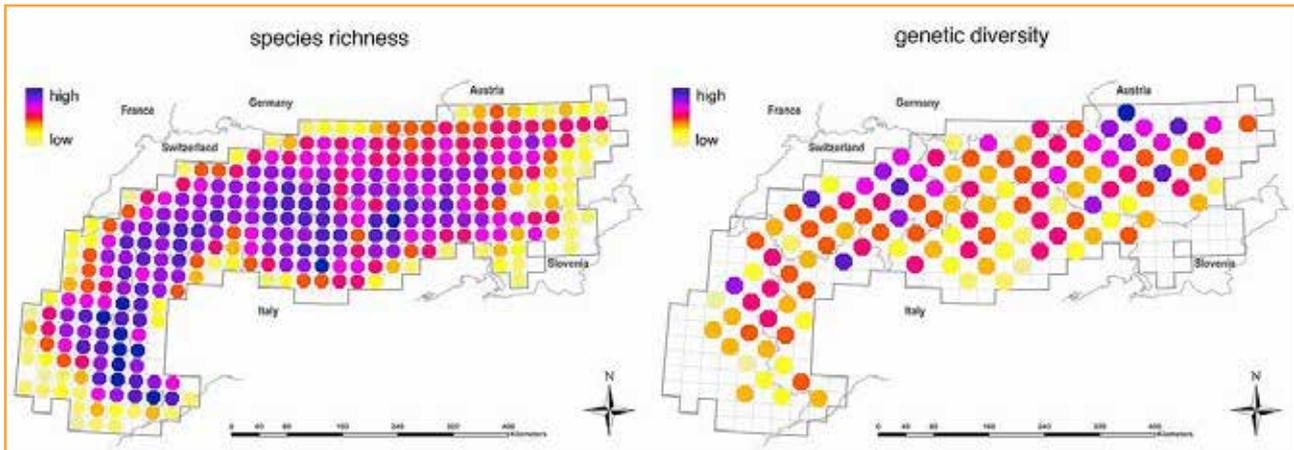


**Right:** Mormon Row is a line of homestead complexes along the Jackson-Moran Road near the southeast corner of Grand Teton National Park, in the valley called Jackson Hole.  
*Photo: US Park Service*

Understandably, there has been a great deal of public debate and submission with some concern that it would lead to a new level of acceptance as to what should be acceptable. At the time of writing decisions have not been made.

### **Do our mountain protected areas adequately protect genetic diversity of alpine plants?**

Biodiversity can be described at three levels: ecosystem diversity, species diversity and genetic diversity. Previous theory assumed that the three levels were congruent , amongst other reasons because they are subjected to the same processes. According to this claim, regions with a high level of ecosystem diversity should also be rich in species and these species should display a high level of genetic diversity. Genetic diversity is very important as it determines a species ‘adaptability’ to a changing environment eg climate change.



An international team led by the University of Grenoble and the Swiss Federal Institute for Forest, Snow and Landscape Research has now discovered that a high level of species diversity does not necessarily go hand in hand with a high level of genetic diversity.

The researchers studied the distribution pattern of 893 alpine plants throughout the Alps. After taking the genetic fingerprint of 27 of these species they found that species rich areas are distinct from areas harbouring high genetic diversity. They pinpointed that species diversity is influenced by local environmental conditions, whereas genetic diversity is determined by processes that led to ice-free areas after the last Ice Age.

This finding was verified in a parallel study in the Carpathian Mountains proving it was not a 'one off' result.

Today's designated Protected Areas are often locations where rare species occur and where ecosystem diversity and thus the number of species is particularly high. In future, then. It can be argued that existing Protected Areas should be complemented by adding areas characterised by a high level of genetic diversity. In addition, new and existing conservation areas should be more efficiently connected, as this would guarantee the exchange of individual plants and their genes between different populations of alpine plants and thus also maintain genetic diversity in the long term.

**Above:** Comparison of species richness and genetic diversity in alpine plants in the Alps.

*Credit: Swiss Federal Institute for Forest, Snow and Landscape Research WSL*

### Call for extractive industries to respect 'no-go' areas

Larry has reported in March 2014 that it seems there is an 'invasion' by mining industries of Mountain Protected Areas, even World Heritage Sites.

Increased demand for both metals and fossil fuels together with pipelines is resulting in more aggressive ventures by large corporations. Financially strapped governments find these difficult to reject.

It is an issue of great concern discussed at the World Wilderness Congress in December 2013 and a broad spectrum of indigenous people, local communities, Non Government Organisations (NGO's) and institutions drafted a joint statement outlining concerns.

I.U.C.N has developed guidelines with some of the mining companies regarding 'No Go' areas but many governments continue to give concessions for mining and extractive industries.



**Right:** The World Heritage status of Virunga National Park, Democratic Republic of Congo, has been under threat from oil exploration.

*Photo: Earth First!*

In March 2014 a positive outcome can be reported. The large oil and gas company Total has joined Dutch Shell in a commitment to refrain from exploration and exploitation in World Heritage Sites. This has taken the imminent threat off Virunga National Park [Democratic Republic of Congo] which has been a World Heritage Site in danger for decades. I.U.C.N has called on all extractive companies and governments responsible for World Heritage Sites to declare them as 'No Go' areas.



In the last 20 years, over 150 rangers have been killed protecting Virunga National Park. Eleven died in just the first seven months of 2011. The Fallen Rangers project was launched to provide regular monthly support for widows and children of Virunga rangers killed in the line of duty. Until the creation of Fallen Rangers Fund, widows received little or no financial support and their families invariably became severely impoverished and destitute.

# Will New Zealand have any more world heritage sites?

**Les Molloy - Conservationist, consultant and author**

Most of us who know and cherish Tongariro National Park are aware of its dual World Heritage status, listed by UNESCO as both a natural (in 1990) and cultural (in 1993) site. But unlike most countries in the world, since the inception of the UN's World Heritage Convention in 1972 New Zealand has shown very little interest in achieving World Heritage status for its natural and cultural heritage which could be of "outstanding universal value". In addition to Tongariro we have only two other listed sites – Te Wahipounamu (South-West New Zealand) listed in 1990 and the New Zealand Subantarctic Islands listed in 1998.

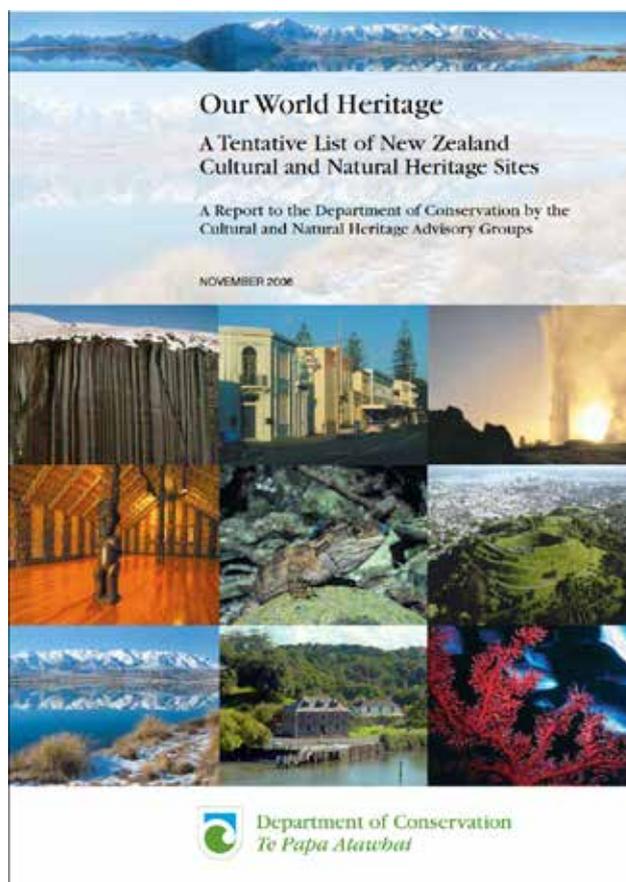
So, it is 16 years since one of New Zealand's iconic places was listed because of its global significance. Furthermore, no in depth work had been done by DOC and cultural heritage agencies on potential sites. Under pressure from UNESCO, the New Zealand Government decided it had to attempt to draw up a 'tentative list' of such potential sites and DOC initiated a public process in 2004 to identify both natural and cultural candidates. The outcome was a report to DOC "Our World Heritage: A Tentative List of New Zealand Cultural and Natural Heritage Sites" (November 2006), in time for the first meeting of the World Heritage Committee of UNESCO in New Zealand in Christchurch in June 2007.

In that report the two expert advisory groups – one natural, one cultural – outlined the outstanding universal values of 11 sites which they considered were worthy of being forwarded to UNESCO as New Zealand's tentative list. Of these, seven were natural sites:

- Kahurangi National Park, Farewell Spit, and the Canaan karst system
- Kermadec Islands and Marine Reserve (and volcanic landforms along the Kermadec Ridge)
- 'Whakarua Motuere', or the 'North-East Islands' (Te Pahi and North Cape Reserves and eight sanctuary island groups, from the Three Kings in the north to the Alderman Islands in the south)
- Canterbury High Country Braided Rivers and Lakes
- Stewart Island/Rakiura Archipelago,
- Rotorua Geyser Fields and Geothermal Sites



*Dr Les Molloy has been involved in natural World Heritage identification and evaluation over the past 25 years – both in New Zealand, East Asia/Central Asia, and the Pacific. He is a past member of the Taupō-Tongariro Conservation Board and chaired the scientific group which produced the natural candidates for New Zealand's tentative list of World Heritage sites.*



**Above:** Cover of the 2006 *Our World Heritage: A Tentative List of New Zealand Cultural and Natural Heritage Sites*

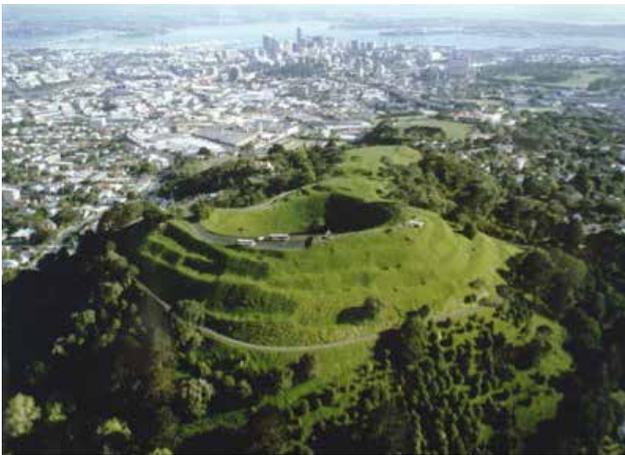
- The Waters and Seabed of the Fiords of Fiordland (Te Moana o Atawhenua) (an addition to the existing Fiordland National Park component of Te Wahipounamu (S-W NZ) WHA).

Three were cultural:

- Kerikeri Basin Historic Precinct
- Napier Art Deco Historic Precinct
- Waitangi Treaty Grounds Historic Precinct

The eleventh site was considered to have both natural and cultural values:

- Auckland Volcanic Field



### What has happened since 2007?

Government decided to advance eight of these proposals to UNESCO as New Zealand's tentative list, holding back the Canterbury high country, Stewart Island, and Rotorua geyser field sites for further consideration. Two other potential natural sites recommended for further study – Lake Taupō (the lake-filled caldera of one of the world's limited number of 'super-volcanoes') and the 'Kaikoura off-shore canyon' – were also held back off the tentative list. At that time, Prime Minister Helen Clark (then also Minister of Culture and Heritage) was keen to advance the Auckland Volcanic Field as a mixed heritage nomination. However, this proposal stalled because of the need to finalise Treaty of Waitangi settlements with Tamaki Makaurau iwi and hapu, a settlement which involved the issue of future restoration of the volcanic maunga to their ownership, thereby allowing them to exercise traditional kaitiakitanga and manaakitanga.

In the meantime, DOC commissioned an initial feasibility study of Kahurangi National Park, Farewell Spit and the Canaan Karst System, but a change of government in 2008 and repeated DOC re-structuring and budget cutbacks resulted in another loss of momentum.

However, in 2011 the 13 Auckland iwi/hapu who had begun negotiating their Treaty of Waitangi claims as a new Tamaki Collective, Nga Mana Whenua o Tamaki Makaurau, gave new impetus to the idea of World Heritage status for their cultural heritage associated with the network of fortifications and cultivated soils on the basaltic cones of the Tamaki isthmus by requesting that central government re-commit to the idea. With the imminent restoration of 14 maunga of the Auckland Volcanic Field to the Collective, the Tamaki Makaurau Collective have joined with the Ministry of Culture and Heritage and the Auckland Council to work as a 'troika' to bring about a World Heritage listing.

Although DOC is still the lead central government agency representing the state party of New Zealand in World Heritage Convention matters, this is the first nomination where the department is not taking the lead role. It is very likely that the case for the "outstanding universal value" of the Tamaki Isthmus volcanoes will relate to the convention's criteria for 'cultural landscapes' – in particular, Aotearoa as the farthest extent of the millennia of Polynesian migration and adaptation of their landuse to a very different environment.



**Above:** The reconstruction of Napier in Art Deco and Spanish style after the devastating 1931 earthquake has created a unique central precinct.

**Above left:** Mount Eden, one of many volcanoes throughout Auckland considered for its natural and cultural features.

# Katherine's camping safari

Bob Stodhart

ex Project Tongariro president and life member

Katherine Mansfield gained international recognition as a writer of evocative short stories and she is rightly regarded as one of our greatest literary figures. The enduring image of Katherine is one of a sophisticated, somewhat feisty young woman enjoying the social whirl of literary figures such as D.H.Lawrence and other luminaries. What is less well known is the trip Katherine did in 1907 through the middle of the North Island and into the Ureweras, with family friends.

Throughout this journey Katherine kept a diary and with perceptive observations, noted her impressions of people they met and of the New Zealand bush. The notebook became an invaluable resource for later stories.

Katherine spent about sixteen years of her short life in Wellington as the daughter of wealthy parents who sent her to England for some of her schooling. While back in New Zealand in 1907 she joined the Ebbett family on a trip through rugged, challenging Urewera countryside, not often travelled by Europeans at that time, encountering remote communities, experiencing the wonders of thermal Rotorua and trekking through some of the most rugged territory in New Zealand. Indeed the roads were rudimentary, often delineated by an occasional rut. It was not all clear air and sunshine as Katherine notes:

*In the morning rain first is the chuffing sound of the horses – we get up very early indeed – and at six o'clock ready to start – the sun breaks through the grey clouds. There is a little dainty wind – and a wide fissure of blue sky – Wet boots- -wet motor veil – wet coat – the dew shining in the scrub – No breakfast – We start – the road grows worse and worse – we seem to pass through nothing but scrub covered valleys – and then suddenly comes round the corner a piece of road – Great joy but the horses sink right into it- the traces are broken – it grows more and more hopeless – (1)*

The safari began in mid November 1907 and ended in mid-December. Katherine travelled to Hastings by train and thereafter with the Ebbett family on horse drawn covered vehicles. Mr Ebbett was a keen camper, a lawyer in Hastings, who spoke Māori and had extensive knowledge of Māori history, a source of great interest to Katherine. The luggage was transported on another horse drawn vehicle. On steep parts of the journey the intrepid passengers alighted to spare the horses. They covered about twenty miles a day, sleeping in a large white tent, divided down the middle by a large curtain, men on one side and women on the other. Katherine observes:



*After brief snatches of unrefreshing sleep I woke – and found the grey dawn slipping into the tent – I was hot and tired and full of discomfort – the frightful buzzing of the mosquitos – the slow breathing of the others seemed to weigh upon my brain for a moment and then I found that the air was alive with bird's song – From far and near they called and cried to each other - (2)*

The party crossed the pumice bowl of the Galatea basin and traversed the Kaiangaroa Plains decades before that vast area was planted for forestry. They stopped a few days at Rotorua where Katherine found the pervading aroma quite distasteful and a few days in Taupō. They observed Aratiatia Rapids and Huka Falls. They camped between Huka Falls and Aratiatia Rapids and Katherine records her thoughts from the day:

*Then there came rapids – a great foaming rushing torrents – tore down among the mountains – thundering and roaring – we drew*

**Photo above:** Katherine Mansfield. Murry, M Middleton (Mrs): Photographs of Katherine Mansfield. Ref: 1/2-002590-F. Alexander Turnbull Library, Wellington, New Zealand. <http://natlib.govt.nz/records/23007077>

rein – and there was a wide space of blue forget-me-nots – The quiet bush – and mist is on the golden moss – the silent river – the ducks- the mist – the quiet and there through the leaves and trees the water – Then the climb – the rocks – the uncertain foot walk – higher and higher- climbing to trees – the shrubs till at last on the grey rock we fling ourselves – blue as the tropical sea where the rapids commence and then a tumultuous – foaming torrent of water leaping crashing snow white like lions fighting – thundering against the green land and the land stretches out ineffectual arms to hold it back – It seems there is nothing in the world but the shattering sound of water – it casts into the air a shower of silver spray – it is one gigantic battle. (3)



**Above:** Katherine Mansfield at Te Whaiti on her Urewera camping trip 1907.

Alexander Turnbull Library, Wellington, NZ, F-25484-1/2

the full glory of the morning – the dew on the grass and warata – a lark thrilling madly – drinking a great pannikin of tea and a whole round of bread and jam – December 14th – the last night. Oh what a storm last night – And the coming of dawn- with willows lashing together. (5)

At times, in the more remote areas, the direction of travel was determined by compass bearings. Katherine describes reaching Taupō:

We came over the hills to Taupō – Before us the lake – in the foreground blue, then purple – then silver – on this side the pines – the gum trees – the clustering houses – and a fringed yellow meadow – In the lake the little Motutaiko – and beyond that clear water mountains until at last Ruapehu snow covered majestic – lord of all – towers against the steel sky clearly – behind us Tohara is under a cloud- all the clouds are so vivid white- grey blue – (4)

Katherine records meetings with Māori children, with anxious, isolated women in post offices or in remote general stores, her keen observant eye noting things in her notebook for future use.

On the last night of this epic journey (14 December, 1907) Katherine writes:

Then to Waipunga falls – river – and rain follows – found a cover tarpaulin here a better shelter- you fling out your clothes – bathe face and neck and back in a bucket of water – Then

Six months after returning to Wellington Katherine was back in England embarking on another journey which would lead her to international recognition and acclaim as a great writer of short stories.

This account is based on a scholarly, academic work edited by Professor Ian Gordon, formerly of Victoria University: *The Urewera Notebook Katherine Mansfield*, (1978) Oxford University Press, Oxford.

# A century of skiing on Mt Ruapehu

Alan Graham

Long term RSC member and ski historian



**One hundred years ago in July 1913 two young men, annoyed by their lack of forward movement in thick snow at Ruapehu, imported two pairs of skis from Switzerland and tried them out at Waihohonu.**

Little did they know that 100 years later:

- Ruapehu would have three skifields with 25 lifts and tows and capacity for 12,000 skiers and snowboarders per day.
- The Ruapehu Ski Club they founded would have four accommodation buildings at and around the national park with room for 180 beds, and 1600 members.
- Ruapehu Alpine Lifts Ltd (RAL) would employ 750 people in winter to run its lifts, tows, cafes, car parks and ski patrols at Whakapapa and Turoa. There is also a small club skifield at Tukino.

Those first two skiers were Bernard Drake and Bill Mead, a couple of railway clerks who ventured to Waihohonu because it had Ruapehu's only hut. That building is still there today, a Category 1 Historic Place.

However, it took Drake and Mead only a few days to decide that Whakapapa was a much better bet. After the war when the Tourist Department decided to invest £200 (\$400) at Waihohonu, the men's new ski club was able to persuade the state to instead spend £500 (\$1000) at Whakapapa.

From there things moved quickly. One public accommodation hut at Whakapapa Village was followed by three more, a dance/dining hall, a

cookhouse and in 1929 the imposing Chateau Tongariro.

Skiers now had three options to (a) ski around the Chateau as there was a lot more snow in those days (b) travel to Scoria Flat where Salt Hut was the skiing base (c) venture to 1800 metres where the Ruapehu Ski Club had built two huts.

World War 2 then intervened but after it club huts popped up at Whakapapa skifield like mushrooms.

A Swiss maestro skier named Walter Haensli set up a new ski school and ski hire facilities, and then he joined with Wellington businessman (Sir) Bryan Todd to form RAL and open New Zealand's first chairlift in 1954.

More chairlifts, T-bars, Poma lifts and Platter lifts followed at Whakapapa, and from 1978 they were joined by Turoa skifield which today handles as many visitors as Whakapapa, and in some years slightly more skiers and snowboarders.

Skiing and snow are addictive. The sun, the slopes, the thrill of the downhill run see to that. Skiing is very much a family sport and many small tots can be seen learning the art at Happy Valley or the Alpine Meadow. Long may it continue.

# Tongariro - the first summer programmes

Pat Devlin

Associate Professor Parks, Recreation & Tourism, Lincoln University

The first Summer Programme at Whakapapa was a two week trial in the summer of 1964/65. It was very successful and much enjoyed by staff and visitors. In the following years it was extended to three weeks or more and underwent a number of modifications which reflected the influence of broader social and political changes. Change is rarely exempt from criticism but some things endure. I believe that the pervasive ethos of zeal, enthusiasm and caring for recreation and conservation nurtured in those early years is alive and well as evidenced by the strength and direction of the Park's current programmes and infrastructure.



To answer questions about the beginnings of Tongariro's Summer Programmes it is helpful to look at the 'bigger picture' of what was happening in NZ at the time and to describe how I came to be involved. I had trained as a teacher and then specialised in 'nature study' which was a primary school subject until the early 1960s when it was replaced by a subject with the broader title of 'Science'. After further training we were re-named as 'Science Advisors'. Most of us with this natural history background were also avid outdoor enthusiasts and relatively experienced in teaching in the outdoors. Individuals from our small group would initially become the first specialist 'interpreters' for the emerging summer programmes in Parks. It would be both a steep learning curve and a career highlight.

## The origins

A little bit of 'social/political history' may be helpful to understand what may seem a sudden move in the early 1960s to provide a major public service in national parks. During the 1950s, the years in which nature study struggled to gain ascendancy in schools, there were significant developments in

**Below:** Ranger Dave Bamford leads a children's summer programme activity outside the park headquarters.

*Photo: Whakapapa archives*



New Zealand conservation. Tongariro National Park had been gifted to the nation in 1887, and was probably the fourth such park in the world. Other areas of outstanding natural beauty were initially set aside as reserves – Fiordland, Aoraki/Mt Cook, Arthur’s Pass, Taranaki/Egmont and Te Urewera – and subsequently became national parks. In 1952 the National Parks Act formalised a system for the management and development of these places and provided for the eventual development of a comprehensive Protected Natural Area system.

### **Exuberant times**

The 1950s and early 1960s were exuberant years for post-war New Zealand. A robust economy, rapidly increasing population and openness to innovation were features of a period when interest in conservation was emerging in response to ecological and landscape imperatives. Visiting national parks increased dramatically. This was an outcome of increased mobility, car ownership, and the relative affluence of New Zealand society at the time. Those parks with accommodation and facilities became destinations, either planned or serendipitous, for increasing visitor numbers. The 1952 National Parks Act had been followed by the formation of a National Parks Authority and National Parks Boards. Membership included scientists, recreationists, Tangata Whenua and various interest groups and political appointees.

I think it is fair to say that while the Boards had little history to draw on, they were generally open to the changing expectations of the management and use of the resources they were responsible for. They were often enthusiastic, but their experience was relatively limited. The Lands and Survey Department was responsible for the administration of the Act and it became obvious that their officers would need to look overseas for best advice for the proactive management of what was rapidly becoming a huge public estate. Fulbright and Churchill scholarships enabled a number of Lands and Survey personnel to travel to learn about the administration and management of national parks, particularly in North America. They brought back and implemented the best practices. It was the beginning of the professionalisation of the New Zealand national parks system.

All national parks at this early stage had some walking tracks and routes and a scattering of huts. These were mostly unsophisticated and had developed through the hands-on efforts of volunteer groups like tramping clubs and hunters. This began to change as Lands and Survey administrators and rangers in the field acknowledged a significant increase in visitation and use of the conservation estate. National parks in New Zealand were established for the conservation of nature and for the inspiration and recreation of New Zealanders and overseas visitors. These mandates were not all being met. Few parks had facilities to attract visitors, to provide information or even to be welcoming! U.S. national parks had visitor facilities which provided information and interpretation, walks with naturalists, campfire sessions in the evenings, and a range of brochures and information packages to cater for visitors. The question was how to introduce some of these services in New Zealand’s parks when the system did not have the required human resources. There were plenty of good scientists, but the scientists protested that they were not teachers! This was the point at which nature study specialists were to make a unique contribution. They were to become the pioneers of “interpretation” in our national parks.

## Parks go public

The first summer programme catering specifically for park visitors and which used a nature study specialist was Paul Gay's at Arthurs Pass in 1962. Paul organised programmes and competitions for children and adults, family nature walks and evening slide programmes.

At about the same time rangers in some parks were trialling their own programmes. For example, in Aoraki/Mt Cook there were guided walks to the Hooker Glacier and in Westland National Park to Franz and Fox Glaciers. The obvious success of the various trials was noted and promoted by the National Parks Authority. A national newspaper in December 1964 quoted the Authority:

*"Nature study programmes for members of the public will be held in all nine National Parks during the holiday period. These programmes are designed, not to make park visitors into expert naturalists, but to enable young and old alike to gain the added enjoyment that comes from a greater understanding of the outstanding features in the parks."*

From what happened next, we can safely assume the Authority recommended the use of nature study specialists who were employed at Tongariro, Te Urewera, Abel Tasman and Nelson Lakes, Arthurs Pass, Fiordland and Egmont/Taranaki.

## A successful trial

As already mentioned, Science Advisor Paul Gay, went to Arthur's Pass in the summer of 1961-62 where he worked in association with Chief Ranger Peter Croft. Peter, like Tongariro's Chief Ranger, was pro-active in facilitating innovations. Their programmes were highly rated by participants and staff. Paul was joined in 1963 by two other advisors, Dave Pringle and David Roberts. He went on to initiate programmes in Fiordland, and continued to work in parks for several years. Dave Pringle in a diary entry captures something of the 'flavour' of being involved; he notes the interesting mix of

**Below:** Tongariro National Park where summer programmes began in 1964 - a first for North Island national parks.  
*Photo: Dave Wakelin*



participants, weather, the encouragement of permanent staff and personal satisfaction:

*“1963 at Arthurs Pass -- 22 inches (550mms) rain in 11 days! Plenty of films, quiz challenges, colouring competitions. Very often wet at the village while fine at Klondyke Corner/Bealey Spur/Hawdon. Many who participate are owners of cottages. They come with their children and join in enthusiastically. Also, they add to the programme with their stories of the Pass. Many return year after year. Some visitors from Indonesia saw and touched snow and ice for the first time! Park rangers very helpful. For me there was an abundance of personal rewards: being away from the city - climbing above the bush-line - extending knowledge of plants/animals. Meeting people on the programmes - many of them having vast knowledge, which they shared.”*

## Tongariro

Our fourth child was three weeks old when we began the first of the Tongariro Summer Programmes on Boxing Day 1964. I was a Science Advisor based in Hamilton. The request for my involvement at Tongariro came as something of a surprise. I was aware of what Paul Gay had been doing in Arthurs Pass but at that stage I did not know the concept was being expanded and in fact knew very little about Tongariro. I had plenty of warning, however, and made a couple of prior trips there with enthusiastic amateur and professional botanists and naturalists. Particularly appreciated was DSIR scientist, Dr Ian Atkinson. Ian had made a major contribution to the new Park Handbook and was part of the Park's Scientific Advisory Board. His approach to understanding the natural and cultural environments remains inspirational. The Chief Ranger was John Maze, who later became the senior field person in Land and Survey Head Office and was probably the most influential of all early practitioners in his efforts to professionalise the park service. His staff were all dedicated in various ways to the emerging tasks of being a ranger, though they varied in their outdoor skills and their knowledge of natural history. The same was true of their ability to communicate with visitors. With such good people to work with, it quickly became obvious that in the summer programme I would be a team player, not a solo act.



**Right:** 12 May 1962 and the Tongariro National Park Headquarters is opened. A few years later the summer programmes began in the park.  
*Photo: 20th Century Photography, Taumaranui*



Daytime walks were either full or half-day. Full days involved the major mountains: crossing Tongariro, going to the Crater Lake on Ruapehu, climbing to the Ngauruhoe summit, and several others including the Mangaturuturu Valley, Hauhungatahi, and Tama Lakes.. There would be less talking and more hard walking (and puffing) with these. Some were hugely popular and it was not uncommon to have over a hundred people and several staff on peak days crossing Tongariro and going to Crater Lake. Half-day walks were two- to three-hour nature walks. Once we saw how many people there would be, decisions were made on additional staff and transport arrangements. Unlike some parks, we made a considered decision not to have separate programmes for children and children had to be accompanied by an adult. Most of the walks thus became family activities and we did not become 'baby sitters'. Evenings were given over to illustrated talks on geology, history, vegetation, introduced animals, winter sports, and hiking/tramping. They were all well attended and the first couple of years we were bursting at the seams in the makeshift conditions..

I was a part of the programme for twelve years and watched the park facilities grow and develop to a very high standard. I also watched my children grow, develop a love for the bush and the mountains, and acquire knowledge and skills that in turn have rubbed off on their children. John Mazey had insisted from the beginning that I was not to be the "pet Park naturalist". He knew I had certain outdoor skills and experience and gave me the broader title of "Ranger Naturalist". He made sure that I led a share of the climbs and crossings and worked closely with his full-time rangers. This provided opportunities both for him to foster staff development and to ensure I had a wide experience of what the park had to offer.

We were very lucky in terms of our dealings with park visitors in welfare terms. We always carried a radio on the full day walks but they were heavy and cumbersome. We would 'divvy' them up. Someone would carry the battery, someone the aerial and someone the rest. We would combine our resources for a scheduled call if required. Such an arrangement would have no place in today's safety conscious world. There were no serious

**Above:** At Tongariro National Park Chief Ranger John Mazey (front centre) led a team of rangers who were among the first in the country to lead summer programme trips and give talks in the newly opened park headquarters.

*Photo: Whakapapa archives*



**Above:** Returning down from the summit of Mt. Ruapehu.  
*Photo: Peter Blaxter*

accidents and retrospectively I believe we achieved a good balance in providing a measure of care appropriate to the circumstances without diluting the visitor's sense of adventure and independence.

Some things changed during the first decade of the Summer Programme. Initially transport was provided free of charge. First we used the Mountain Goats which we drove and one year the Park Board budgeted for a bus which we also drove. It was too good to last. The move to 'user pays' was a painful one. We started by soliciting donations and eventually to cost recovery. It was clear that families with several children were disadvantaged and we did not like it.

I became involved in the Park's Scientific Advisory Board, and after moving to Christchurch Teachers College in 1971 our family made an annual migration back to Tongariro. It never failed to be a genuinely superb time for us all, and I reflect with great thank to do what I loved best, which was to teach about the natural environment. Since 1977 I have led training programmes in park management in New Zealand, Nepal, and Sarawak (East Malaysia). Always at the heart of these was the importance of the interaction

between 'people' (the users) and 'place' (the environment) – all enriched by my time at Tongariro and the people there I worked with. Readers will be well aware that the majority of Tongariro rangers during the period described above have been hugely influential nationally and internationally in protected area management both with Lands and Survey and subsequently with DOC. Summer Programmes have had a significant role in all of this. For so many people -- staff and visitors -- Tongariro has provided an unforgettable environmental and culturally nurturing experience.

In 1976 I presented a Master's thesis on the use of the park, and in 1977 moved to Lincoln Agricultural College (subsequently Lincoln University) where I developed a new qualification in Parks and Recreation to supply Lands and Survey with its future rangers. It is obvious that the serendipitous 'happening' of being asked in 1964 to be a summer naturalist in Tongariro National Park proved life-changing for me. I don't believe I ever had long-term plans other than to do what I loved best, which was to teach about the natural environment. Since 1977 I have led training programmes in park management in New Zealand, Nepal, and Sarawak (East Malaysia). Always at the heart of these was the importance of the interaction between 'people' (the users) and 'place' (the environment) – all enriched by my time at Tongariro and the people there I worked with. Readers will be well aware that the majority of Tongariro rangers during the period described above have been hugely influential nationally and internationally in protected area management both with Lands and Survey and subsequently with DOC. Summer Programmes have had a significant role in all of this. For so many people -- staff and visitors -- Tongariro has provided an unforgettable environmental and culturally nurturing experience.

# Tongariro Summer Programme 50 Years On...

## Mahi Aroha

Lisa Laity and Kim Manunui, Project Tongariro Marketing Coordinator



**Above:** Participants take in the views on the Pukeonake sunset hike.

*Photo: Jimmy Johnson*

**Below:** Discovering sulphur & secrets at Rotokawa geothermal area.

*Photos: Project Tongariro*

You would be forgiven if the words exciting, action-packed and adventurous were not the first words that sprung to mind when you thought about conservation. This year the Department of Conservation together with Project Tongariro flipped the notion of conservation on its head and introduced Mahi Aroha breathing new life into what has been known for 49 years as the Summer Nature Programme.

With focus on showcasing, celebrating and acknowledging all things conservation, and bringing together the Central Plateau's stunning natural and historical treasures, the programme served these to the public in a way that ignited the senses of both the young and the young at heart.

Forget a palette of khaki, fanny packs and club sandwiches - exploring the environment has never been more fun or diverse, accessing some of the area's most remote locations, walking, running, biking, jet-boat riding or flying by helicopter to learn more about our place.



and historical sites, creatures and the people working tirelessly to ensure the Central Plateau remains intact for future generations.

With activities targeting individuals and families, the Department of Conservation and Project Tongariro delivered a Summer Programme worthy of applause.



The exciting activity calendar extended on recent years and allowed the public an exclusive opportunity to explore the environment, learning more about the unique flora and fauna, landscapes, cultural

*“We are pleased to be working with the Department of Conservation on this programme which gives everyday New Zealanders the opportunity to enjoy the special places that staff and volunteers get to experience everyday through their ongoing work and commitment to conservation. It is exciting and an honour to have the chance to share what we value with the public,”* says Project Tongariro President Paul Green.

The Department of Conservation and Project Tongariro are certainly excited about the programme and with good reason. It’s a feast for the senses and offers an alternate events avenue to the acclaimed “events capital of New Zealand.”

*“Mahi Aroha offers an awesome range of events that gives people the opportunity to get out into the great outdoors and experience what the Tongariro and Taupō areas have to offer. It is great that we can team up with Project Tongariro and other groups to be able to develop an outstanding selection of events and experiences for people of all ages and abilities,”* says the Department of Conservation’s Partnerships Manager, Whakapapa, Jono Maxwell.



There was a strong emphasis on participation within this year’s programme with the majority of activities costing less than a movie ticket. Many are open to children as young as six years old and there are plenty of opportunities for families or groups of friends to head out and explore something new together.

Grass roots fun like building a kite and flying it beneath the volcanic peaks of Tongariro National Park for the price of a gold coin was a guaranteed family favourite. For those who wanted something to get the heart racing, there were a number of mountain bike rides that have earned their place on the North Island’s list of must-do rides.



**Above:** Kites fly high at the annual New Year’s Day Kite Flying Event on the Chateau Golf Course.

*Photo: Kim Manunui*

**Below left:** A photographer captures nature as part of the Landscape Photography Workshop.

*Photo: Anna McKnight*

For wildlife enthusiasts, an exclusive trip to the heart of Kaimanawa horse country was exciting and the elusive Blue Duck captured many hearts. Glowworms, iconic Rainbow Trout and more native species of birds than you can shake a stick at, all featured in this year’s summer programme.

Conservation work in the Central Plateau is a tireless job. In order to ensure the region stays intact, beautifully preserved and offering a haven for the various species of flora, fauna and wildlife that call it home, it needs many man-hours.

Mahi Aroha rallied in the experts. Tours were led by those in the know, - volcanologists, ecologists, fishery advisors, biodiversity officers to name a few. The programme applauded and recognised the many people working behind the scenes whose job it is to go into bat for the environment and who are the driving force behind the region’s future, but the message remains, there is always room for more help and extra bodies to lend a hand.



This year's summer programme was a milestone as it celebrated its 50<sup>th</sup> year. Launched in the Tongariro region in 1964 and spearheaded by Lincoln University's Associate Professor Parks, Recreation & Tourism, Dr. Patrick Devlin, it has come a long way since its humble beginnings.

Dr. Devlin played a significant part in the programme for 12 years and speaks fondly of those early days when visitor numbers were 'bursting at the seams in makeshift conditions'.

During his time as Programme Leader he witnessed areas of significant growth, not only in the facilities offered to the public, but also that of a future generation developing an interest in the natural environment.

*"I was a part of the programme for twelve years and watched the park facilities grow and develop to a very high standard. I also watched my children grow, develop a love for the bush and the mountains, and acquire knowledge and skills that in turn rubbed off on their children."*

**Above:** The Boyd Oamaru trip takes participants into the heart of the Kaimanawa Forest Park for a walk like no other.

**Below:** Taking in the wonderful view from Pukeonake.

*Photos: Jimmy Johnson*

Mahi Aroha serves to follow on this tradition, educating the younger generation about the importance of protecting the natural environment through the notion of participation.

Mahi Aroha is designed to encompass conservation participation throughout the year with special emphasis on the Summer Programme and delivers equal parts education, enjoyment and encounters with a clear underlying message. Bring the kids, grab a friend and explore the environment like never before. This is our place, let's protect it, nourish it and hold onto it. Mahi Aroha - Doing it for Conservation.



# Lessons from the Rangipo Desert

Karen Williams

ex Project Tongariro president and life member



**Above:** Shun and colleague measure vegetation at site 5  
*Photo: Harry Keys*

Japanese scientists have been taking a detailed look at vegetation in a very blustery spot in Tongariro National Park. Dr Shunichi (Shun) Kikuchi and colleagues from Yamagata University and Hokkaido University have ten vegetation plots, 10 x 10 m to 20 x 20 m in size, all in the Rangipo Desert not far from the Tukino Mountain Road. The research area has been frequently disturbed by volcanic activity including lahars in the past.

The Rangipo Desert study site was a deliberate choice, selected because it is a natural alpine landscape in a volcanic environment. The harsh climate was another factor as well as its accessibility. Shun and Professor Tomomi Murutani first came to New Zealand in 2005 as part of the international interest sparked by the Crater Lake issue.

Accompanied by Japanese research students, Shun has returned most years for the last decade. Their focus is the

natural hummocky 'geosurface' of this area and the revegetation processes which follow frequent volcanic disturbances. Shun's speciality topic is the interactions between micro-topography and vegetation.

Volcanic sediment samples are taken from the mounded terrain and nearby areas for physical and chemical analysis to compare effects on vegetation structure and species composition. Tree-ring sampling and analysis help date the revegetation processes.

Shun is also looking for possible interactions between the mounds and the plants in the other environment conditions. "It can be very subtle, very hard to pick". For instance, one of his Japanese micro-environmental

sites has shown surprising results. *“Long term studies have shown that the growth of the aquatic plant has actually created the hummocky topography of the river bed. It is not a case of the aquatic plant colonising existing mounds as you might think.”*

Shun also has numerous study plots on the islands of Honshu and Hokkaido. These are situated in a range of natural environments from alpine zones to river beds. However, he noted the landscape in Japan is generally more modified and it can be hard to see natural processes at work.

In Japan Shun is involved in a joint project with New Zealand’s Department of Conservation about the best ways to revegetate alpine zones. Shun noted that people often try to use technology to solve problems.

*“Instead, we should learn from nature to help to change and improve environmental conditions to keep the natural system.”*

DOC Technical Advisor Dr Harry Keys believes Shun’s work will help the department locally with its revegetation efforts at challenging environments like the lahar bund in the Whangaehu Valley and for Project Tongariro’s tussock revegetation project in the Rangipo Desert.



**Above:** Shun and colleague at work in Ruapehu’s Rangipo Desert.  
*Photo: Harry Keys*

# Volcano watch 2012-2014

Harry Keys

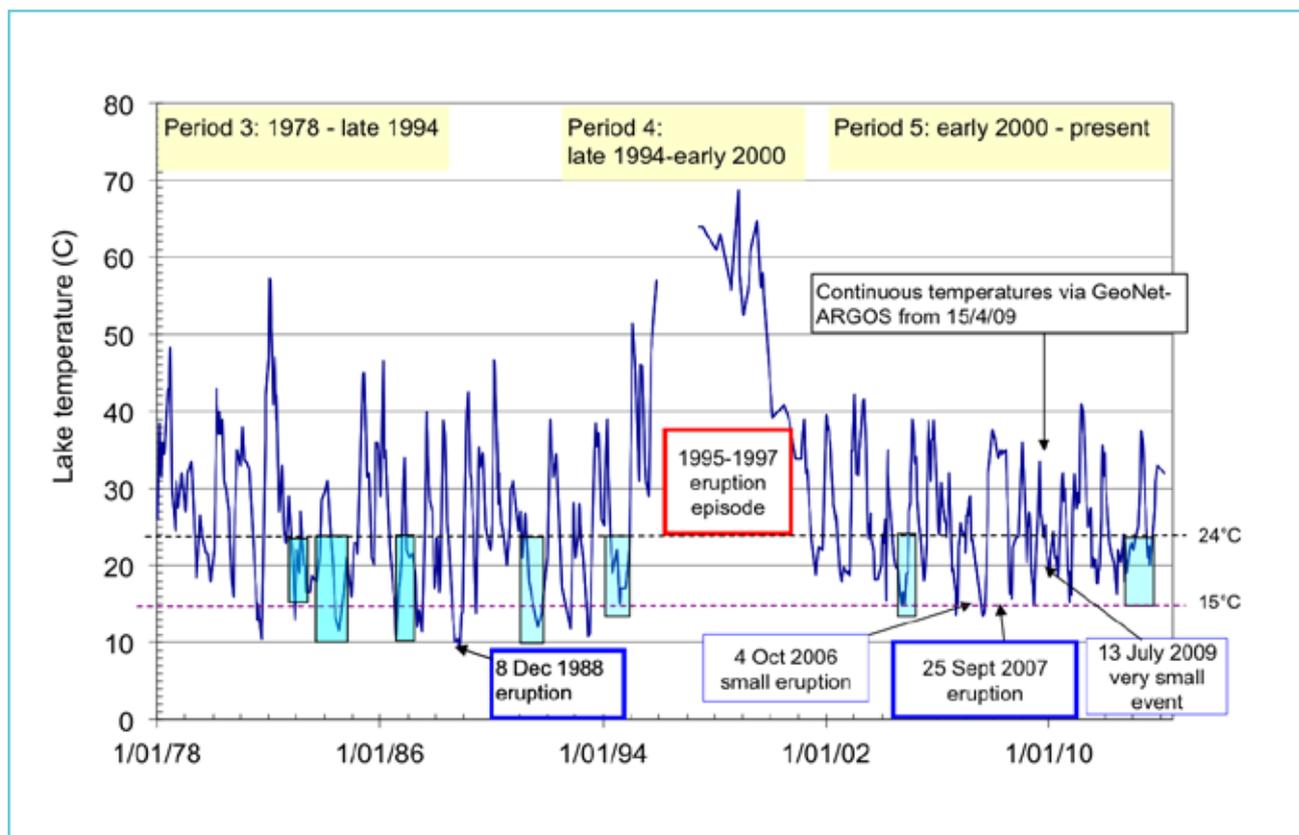
Technical Advisor - Volcanology, Department of Conservation

## Introduction

2012-2013 has been the busiest period of volcanic activity and risk management in New Zealand for a long time, with four volcanoes erupting or showing unrest behaviour. Fortunately two of them - White Island and Havre submarine volcano, 800 km north-east of Tauranga - are outside Tongariro National Park (TNP)! GNS Science (GNS) did have an extremely busy time though, also having to cope with the Cook Strait-Seddon earthquakes. The Tongariro eruption is covered in a separate article.

## Ruapehu

A period of cool temperatures in Crater Lake from mid-2012 to March 2013 (Figure 1) raised a series of concerns. In early June 2012, the GNS monitoring (part of GeoNet) showed that the temperature had cooled to 16°C. From 2006, sudden eruptions and smaller events have all occurred following temperatures cooling below 15°C (Figure 1) without other obvious precursory signs such as seismicity. So the Department provided preliminary advice of this to Ruapehu Alpine Lifts and carried out extra tests to be sure the Eruption Detection System (EDS) was fully operational. The temperature never warmed above 24°C before the end of the ski season. By then, new research by Bruce Christenson (GNS) suggested temperatures in the vent a few hundred metres below the lake floor had heated without a corresponding warming in the lake. Bruce measures volcanic gas ratios



**Figure 1:** Crater Lake temperatures (mainly from GNS) from 1978 to February 2014, showing eruptions and seven periods (rectangular highlights) when temperatures were below 24°C for 6 months or more.

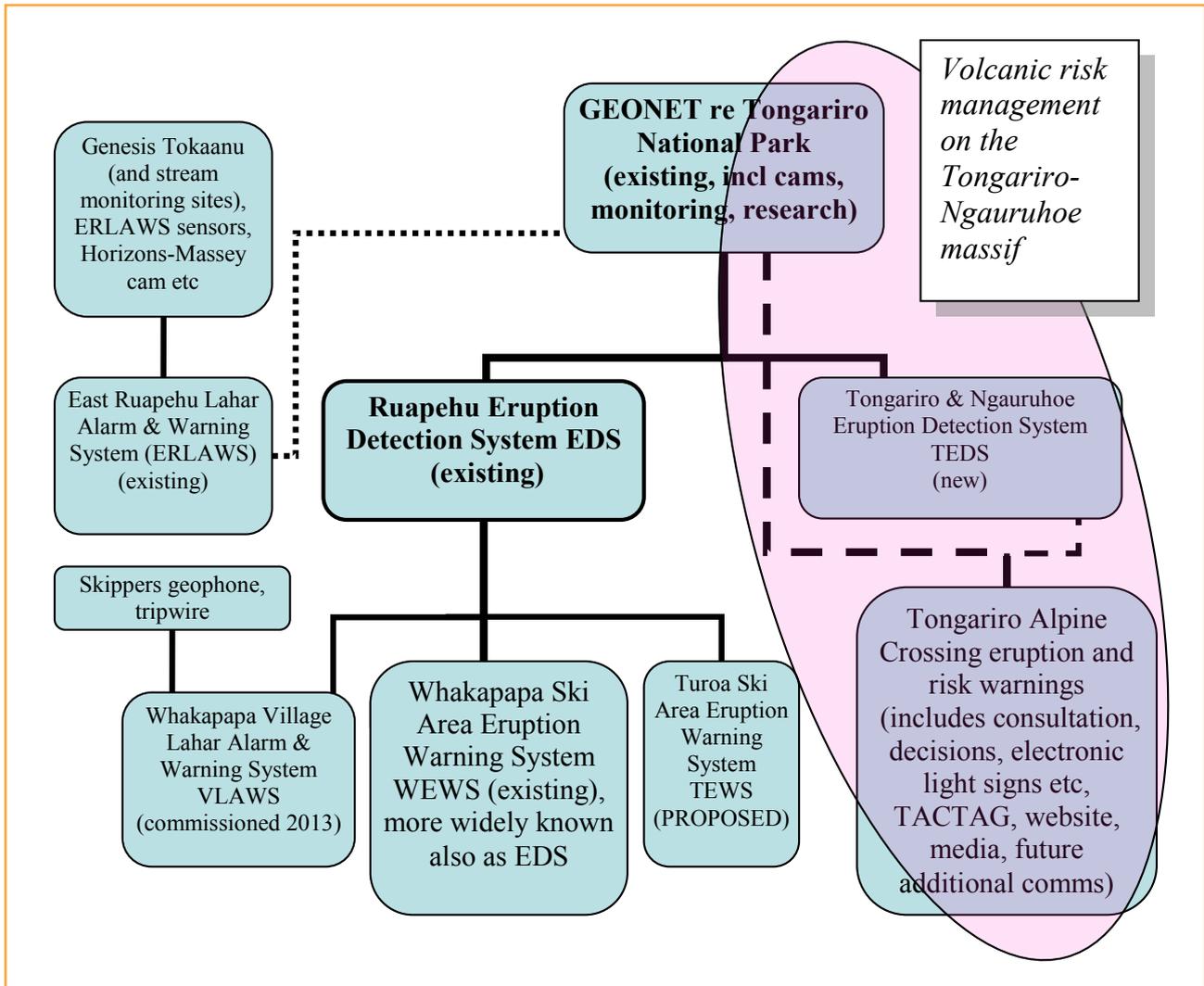
in Crater Lake water: based on current models of volcanic processes and heat flow in the vent under Crater Lake plus temperature cycling in the lake, the data implied a partial blockage had developed in the vent system. From late October, a series of earthquakes occurred about five kilometres beneath the crater but were thought to be too deep to be directly related to the high vent temperatures. However the situation led GNS to advise of an increased possibility of an eruption (GNS Science VOLCANIC ALERT BULLETIN: RUA – 2012/01, 16 November 2012). The Volcanic Alert Level (VAL) was kept at 1 but the Aviation Colour Code was raised to yellow.

DOC issued a media release on 16 November, advising concessionaires and the public not to enter the summit area. Many Ruapehu eruptions have happened without warning. Past experience has shown that although many activities can be run safely at VAL 2 (raised only after a minor eruption has occurred) in the ski areas, risks in the Summit Hazard Zone (SHZ) within two kilometres of the centre of Crater Lake are higher.

In December 2012, the Department prepared a new risk assessment for Ruapehu, based on the current situation. Four simplified scenarios were developed:

1. A passive failure of the assumed partial vent blockage sometime in the next month or so. This would pose no hazard, and a significant lake temperature rise would be seen within a few days. Given five previous anomalously long periods of similar temperatures lasting about 7-12 months that occurred prior to the 1995-97 eruption episode, and one in 2004, this was thought to be the most likely scenario. But the following scenarios could not be ruled out.
2. An eruption - probably something smaller in scale to 25 September 2007- sometime in the next month or so, without precursors, perhaps like the 4 October 2006 event. Impacts would be restricted to within the shore area of Crater Lake and beside the Whangaehu within TNP. A slightly larger event (larger than 2006 but smaller than 2007) would deposit small amounts of mud around the crater basin and could be hazardous there. GNS discussions on 14 January 2013 were consistent with scenario 2 being much less likely than scenario 1 and considerably more likely than scenario 3.
3. The next most likely scenario (in the next month or so) would have been a 2007 scale event which would be hazardous in the Summit Hazard Zone (SHZ) and in additional lahar paths. Like a scenario 2 event, these might not have useful precursors but would most likely last minutes not days.
4. A larger eruption or a longer, larger sequence, starting in the next month or so (perhaps like April 1975, 1895 or even 1995-1997) in which large lahars may occur in three or more catchments and the SHZ threatened for weeks to years. This was seen as the least likely scenario.

The assessment concluded that people within 1.4 km of the centre of Crater Lake would be exposed to a significantly higher level of volcanic risk that was assumed to be too high for the type of visitor trekking up to the area. It also concluded that risks would normally be uncomfortably high within the crater basin (400 m from the lake shore).



**Figure 2:** The current volcanic alarm system in Tongariro National Park. Solid lines show automatic data telemetered from sensors in the field, plus information and communication links. Dashed and dotted lines show links that rely on duty staff and other interagency communications. Subsequent automatic or manual communications from DOC and GNS to other agencies are not shown.

By mid-March 2013 there had been local pilot reports indicating strong convection in Crater Lake and temperatures had risen above 25°C. Based on that, plus an absence of seismicity for several weeks and no unusual amounts of gas, GNS lowered the Aviation Code to green. On 15 March, DOC lifted the advisory. People were advised not to camp anywhere inside crater basin or on the summit plateau, and to stay out of the major lahar paths in the Whangaehu and Whakapapaiti valleys. By April, conditions were clearly back to normal. But the risk remains higher than acceptable according to new provisional interpretations of DOC’s visitor safety guidelines so camping is still discouraged inside crater basin.

### Volcanic warning systems

The volcanic warning system in Tongariro National Park has dramatically increased in scope in the last 21 months (Figure 2). Three subsystems have been reinstated or added, additional seismic and acoustic data inputs added to GeoNet and links with the GNS Duty scientist team have been improved. The performance of the Eruption Detection System (EDS), which has been the key element on Ruapehu for a long time, has remained

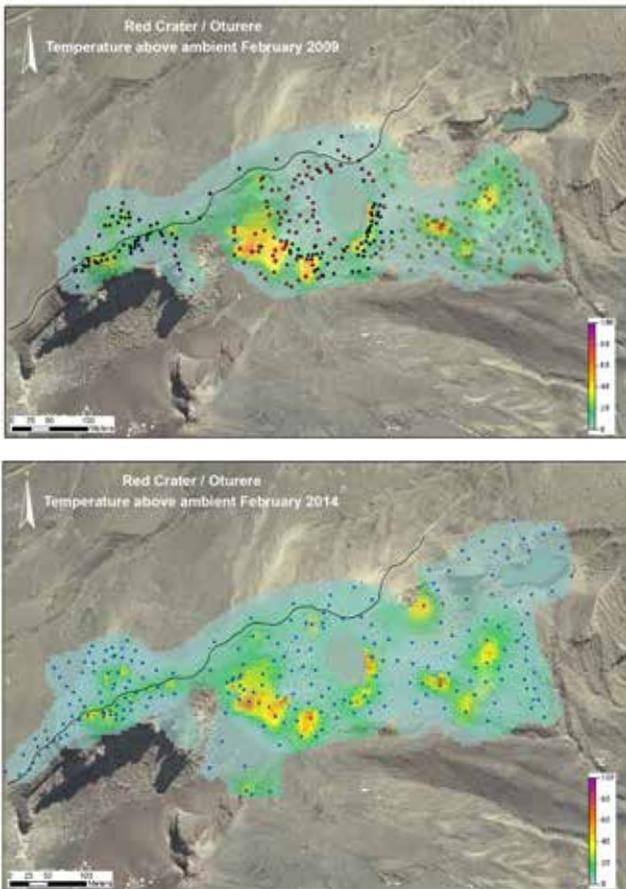


**Figure 3:** Gas warning system for the public on the rim of Nakadake crater, Asosan volcano.  
Photo: Harry Keys

a priority. Research has continued on how to improve ski area patrons' response to it. DOC's response systems, including our phone activation system for responding agencies, have been enhanced.

The Whakapapa Village Lahar Alarm System (VLAWS) was largely rebuilt in 2013, based on similar principles to the previous system but with improved data inputs. Four speaker hubs provide the main public output along similar lines to the EDS. The alarm specification is to warn of a large lahar in the Whakapapanui Stream, generated by a large eruption of Mt Ruapehu. Lahars large enough to create this risk to the western side of Whakapapa village may have occurred twice in the last 1800 years (Manville and Scott, 2008). Smaller events that could threaten people on the road bridge above the village or the footbridge near Whakapapa Holiday Park or beside the stream have occurred at 100-300 year intervals, on average, in the last 1800 years. The last such event was in April 1975.

Major steps have been made to fill the gap on the Tongariro-Ngauruhoe volcanic massif in the last nine months (see also the article on the Te Maari eruption, page 13). To date, the solution put in place has two main technology-based subsystems in addition to normal responses and provision of information. The first subsystem follows our recommendation to the GeoNet review in late 2012 to establish what is now called the Tongariro Eruption Detection System (TEDS). This is currently being commissioned, in conjunction with GNS Science. TEDS uses the same types of GeoNet seismic and acoustic (blast) data as inputs, as does EDS, but automatic outputs are limited at present to DOC and GNS. The specification is for



**Figure 4:** Near-surface soil temperatures in the Red Crater-Emerald Lakes area in February 2009 and 2014, courtesy of GNS Science and GeoNet. The differences between these surveys are regarded as insignificant and do not indicate any effects from the Te Maari eruption episode.

us to be notified of an eruption from any vent on the massif, including phreatic or large hydrothermal events like those of 2012 so we can respond quickly without reports from eyewitnesses being needed. The second subsystem follows a suggestion made by the Minister of Conservation, Dr Nick Smith, in April 2013 to develop a light-based warning system. A few volcanoes elsewhere in the world use light systems (e.g. at Aso in Japan, see Figure 3). But the system of four light signs installed on the Tongariro Alpine Crossing (TAC) and its two car parks in October-November 2013 is probably unique. They are controlled remotely, allowing us to rapidly warn visitors to the TAC about the risk status before other responses have a chance to take place.

## Research

As usual, a significant amount of volcanic research has continued in TNP. Most of it has related to understanding the hazards and mechanism of the Te Maari eruption (see page 13) but other work relating to public safety aspects of the volcanoes continues. There has been too much work to summarise here but

three projects are worth noting.

Natalia Pardo continued Massey University's active research, completing her PhD on the most recent large explosive eruptions from Ruapehu. These occurred 27,000 to 10,000 years ago and represent the largest scale eruptions from the geologically most active andesitic volcano in New Zealand in the last 30,000 years. The largest eruptions in this period were about as large and hazardous as those from St Helens (1980), Pinatubo (1991) and Vesuvius (79 AD). They sent eruption columns into the stratosphere, produced pyroclastic density currents and 20 cm bread crust bombs as far as 10 km from the vent, severe lahars, and tephra thicknesses up to 20 cm at Iwikau and 50 cm on the Desert Road. They were two to three orders of magnitude larger than anything else on Ruapehu within the last 4,500 years. While there would be clear precursors before such eruptions, the implications would be severe - probably for several years - in TNP and, of course, beyond for local highways, power generation and transmission and local residents and villages, possibly including Waiouru.

Graham Hill (GNS Science) has completed a second phase of electrical resistivity work to determine the location and structure of the magmatic system below the Tongariro-Ngauruhoe volcano complex. The first phase was controversial in DOC because of concerns that relatively intense helicopter logistics would have too much impact on visitors on the TAC, although we could time the logistics to minimise this. As it turned out, there were no complaints received from the public. 3-D modelling of the first phase of data (from prior to the eruption) shows a narrow vertical zone below Ngauruhoe, linked to but offset from a larger region about

**Table 1.** Causes of fatalities in Hawai'i Volcanoes National Park 1990-2013 (information from HVNP staff)

| Cause of fatality  | Number    | Incidents and Years                                   |
|--|-----------|---|
| Traffic-related  | 16        | In 12 incidents between 1992 & 2011, including 1 bike |
| Scenic & other aircraft/helicopter crash   | 14        | In 3 incidents between 1999 & 2009                    |
| Natural causes including heart attack, illness or collapse while hiking  | 11        | Between 1991& 2010                                    |
| Suicide/homicide   | 4         | 4 incidents   |
| Fall off cliff or crater rim into crater   | 3         | 3 incidents between 1991 & 2001                       |
| Hypothermia of passenger on tour from cruise ship  | 1         |   |
| <b>Total non-volcanic</b>  | <b>49</b> |   |
| Fall during collapse of bench at lava entry to sea   | 2         | 1993, 1998  |
| Inhalation of steam or gas or respiratory problem or asphyxia caused by sulphur dioxide, including confined space situations | 2         | 1 incident in 2000                                    |
| Fall into steam-filled crack   | 1         | 1992  |
| <b>Total volcanic</b>  | <b>5</b>  |   |
| Under investigation  | 1         |   |



**Figure 5:** Lava flows in 2002 caused major damage to infrastructure and forest at Piano Provenzana (2000 m) on the northern side of Etna. There is a new chairlift and many easily moved new buildings here.  
*Photo: Harry Keys*

four kilometres beneath the surface, under the north-east flank of Tongariro. The recent Te Maari eruption and prior seismicity occurred at the margin of this larger region. Modelling of the second phase of data, acquired after the eruption, was consistent with the presence of a small dyke under Te Maari.

Other scientists in GNS have carried out a wide range of research, including monitoring. In February 2014, Karen Britten, Agnes Mazot and colleagues from GNS carried out a soil gas and temperature survey in the Red Crater-



**Figure 6:** Guided tourist group on west rim of Bocca Nuova crater near the summit of Etna, June 2013.  
*Photo: Harry Keys*



**Figure 7:** Flowers and repaired highway up the south side of Etna showing building engulfed by lava probably in 2001.  
*Photo: Harry Keys*

Emerald Lakes area. There has been concern that the area may be heating up, possibly as a consequence of the Te Maari eruption. Even small hydrothermal eruptions from this area could be hazardous for people on the TAC as the track runs right past it. But no significant changes were detected from a similar survey done in 2009 (Figure 4). Brad Scott and Sally Potter have completed a major review of historical accounts of eruptions on the Tongariro-Ngauruhoe massif. This shows that there were at least two and possibly six eruptions from Red Crater since the 1850s. This information is forcing us to review our management perspective of Red Crater and its potential effect on visitor safety on the TAC.

### **Enhanced activity at overseas volcanoes having high visitor numbers**

Volcano tourism is very popular worldwide, and experience on active volcanoes elsewhere can help inform and improve our management. The long-running eruption in Hawai'i Volcanoes National Park (HVNP) continues to keep park and US Geological Survey staff occupied with the safety of the 1.5 million visitors per year. Joint work with senior HVNP staff during the Te Maari eruption recovery period (see page 13) showed that the three main causes of non-volcanic fatality statistics in HVNP (Table 1) are the same as in TNP. But as yet there have been no direct volcanic-related deaths in TNP (no murders or suicides either here!)

Etna (Sicily) and Aso (Kyushu, Japan) are visited by probably tens of thousands of tourists per year, which, like in Hawaii, is very significant in the local and regional economies. Both are in national parks and both have had eruptions recently.

Etna (3340 m) is the most active volcano in the world with ski areas. Both ski areas are frequently affected by ash fall. Lifts and other facilities were seriously damaged by lava flows in 2001-2002 (Figure 5). Eruptive periods with lava flows and some pyroclastic density currents are also frequent. It seems that the summit area is often closed above 2500-2900 m but guided tourism below that elevation occurs during eruptions. When we visited in June last year, the volcano was having a brief respite (early May to early September), allowing us to investigate part of the crater rim (Figure 6). It was a good time of the year to visit as many alpine flowers were in bloom (Figure 7).

Nakadake crater in Asosan caldera (1592 m) is one of Kyushu's most popular destinations. It is normally accessible by road and gondola to the crater rim. Volcanic unrest, including very small eruptions, resulted in it being closed for two and a half months recently (to 12 March 2014) within one kilometre of the crater (Alert Level 2 eruption warning). A gas warning system is in place (Figure 3).

These three examples point to the important relationship that needs to exist between managers of popular, active volcanic areas and volcanologists monitoring volcanoes. Monitoring is intensive at these three volcanoes, and management responds according to the information passed on. The safety of the ongoing tourism activity depends on it, just as it does in Tongariro National Park.

## Acknowledgements

Gill Jolly, Steve Sherburn, Bruce Christenson, Nico Fournier, Brad Scott, Mark Chadwick and others from GNS Science contributed to the Ruapehu and Tongariro work outlined above. Blake McDavitt, Bruce Harvey, Jono Maxwell, Don Bogie and Peter Devlin from DOC also had input.

**Below:** Mistletoe flowering near the Whakapapa Visitor Centre - New Years Day 2014.  
*Photo: Karen Williams*



# Pukawa wildlife management trust

Frances Gazley and Kevin Loe



**Above:** Don Scurr at work.  
*Photo: F and D Gazley collection*

**Below:** Trappers' boots with rats.  
*Photo: DOC*

## Background

The community led Pukawa Wildlife Management Group was formed in 2002 and became an Incorporated Charitable Trust in 2007. Funding is received from private donations and grants from local trusts and bodies.



It instigated rodent then possum and mustelid control at Pukawa Bay and Omori in a 150 ha managed area 15.2 km west of the Turangi township on SH41. The area runs into the Omori settlement and is bounded by farmland, Lake Taupō and extends to just south of the Oreti Timeshare complex.

The Trust's aim is to restore the native bird-life and natural flora of the Pukawa Bay lakeshore forests through integrated, sustained animal pest control.

The Trust works with guidance from the Department of Conservation on land administered by Taupō District Council, DOC and private land owners. It also monitors papakianga, a parcel of Māori land.

## Start-up impetus

A resident observed at night that a large tree was literally moving with climbing rats. So, whilst waiting for equipment to arrive the group began trapping with a basic Victor snapback trap set under a 20lb apple box with a hole cut at each end.

The first rat was caught, followed by a rat each night for the next fourteen nights. After that a foundation member summed up the group's feeling - "we were hooked on trapping".

## Methodology

Approximately sixteen trap lines have been set out over several kilometres using self-resetting traps, DOC200/250 traps and bait stations.

Single-catch traps are permanently set and checked about once a week. In spring and summer first generation anticoagulant poisons are offered in bait stations. The group also uses Timms and Trapinator traps and live capture cages as needed, and sets the traps with a wide variety of lures.



**Above:** Trapper at work.  
*Photo: F and D Gazley collection*

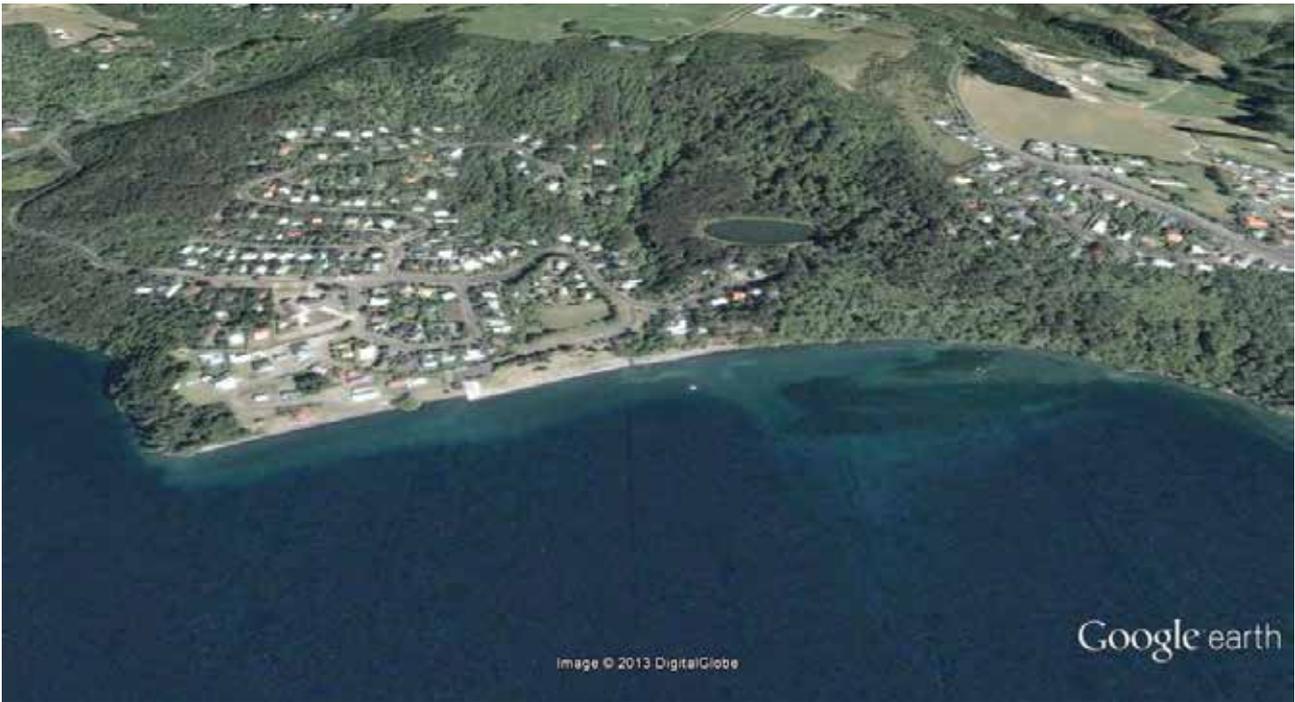
**Below left:** Jean Stanley (founding member of PWMT) and Ian McNickle (DOC) with the then newly erected sign board.  
*Photo: DOC*



## A brief summary at what the team has achieved

Ten years on since its inception the Trust is servicing 420 DOC200 traps, 75 rat and 5 possum self-resetting gas operated traps resulting in a kill tally of over 7,300 predators as at March, 2014.

There has been public recognition of birdsong quality and quantity; especially honey-eaters in the Omori area. The success of the Trust's work can be seen in the spread of *Tupeia antarctica*, (white mistletoe), now commonly seen throughout the Pukawa Bay.



**Above:** Google earth aerial photograph of the managed area around the hamlet of Pukawa

**Below right:** Original Vector Snap Trap as used by the Trust 10 years ago.  
*Photo: F and D Gazley collection*

### Lessons learnt along the way

During the ten years the trust members have learned many lessons:

- Cameras are absolutely essential to monitor and understand predator behaviour
- Continue to update and alter predator control methodology
- Seek field expertise from government agencies, scientists and specialist contractors as needed
- The need for an effective flag system on box traps is to show when a trap has been sprung
- Golf balls are a useful alternative to using fresh eggs as lures
- Tracking tunnel indices and bird counts are essential tools to gauge project's on-going success
- Importance of recording all poison up-take and kills
- Importance of including the community through newsletter updates and public signage.

### Where to now?

In the future the Trust plans to support on-going research by universities and DOC within the management area, continue to further community education and provide knowledge learnt to other restoration groups

It will also promote appropriate plantings on public land to encourage the return of endemic fauna and flora and encourage a BioBlitz <http://en.wikipedia.org/wiki/Bioblitz> of Pukawa forest.



# Out of the dark with bats and kiwi

Alison Beath

Technical advisor- Ecology, DOC

After darkness is when the New Zealand bush really comes alive. When everyone else is tucked up in their beds for the night, some very secretive animals come out to play.



**Above:** Alison Beath (DOC) removes a short-tailed bat from a mistnet, watched by Hannah Rainforth (Ngāti Rangī).  
*Photo: Korty Wilson*

In the Tongariro area we are lucky enough to have two of New Zealand's most unique and endangered night creatures - bats and kiwi.

Our largest population of short-tailed bats resides in Rangataua Forest, on the southern slopes of Mt Ruapehu. It is an ancient 10,000ha forest, dominated by towering beech trees. Funnily enough, no one knew about the Rangataua bats until the mid 1990s when the cat of one of the local residents in Rangataua caught and killed one of the bats in a raspberry patch.

Subsequent to this discovery, monitoring of the Rangataua bat population by bat scientists Brian Lloyd and Shirley McQueen counted close to 7000 bats. Until quite recently, we did not know the status of the Rangataua bat population- were they still hanging in there?

A three-year monitoring programme from 2010 to 2012 by DOC staff found the answer. To achieve this, a small sample of bats are caught in a mistnet, put up to 15m high. Once caught, bats are quickly extracted from the net, though those things have teeth, and they love using them, so it's a real skill to get the bat quickly out of the net whilst trying to avoid being bitten.

The bats have a tiny radio transmitter fitted to their backs, we are then able to track the bats (using a fixed-winged aeroplane) and find their roost trees.



**Above:** Short-tailed bat, Rangataua Forest. The bones in its wing are extended 'finger' bones, with the 'thumb' protruding to allow it to climb trees.

*Photo: DOC*

**Right:** "The Spire", one of 54 known short-tailed bat roosts throughout Rangataua Forest. Thousands of bats roost inside this tree, and emerge just after darkness from a narrow crack in the tree trunk. Camera equipment (seen to the left of the photo) films the bats emerging. *Photo: DOC*

pouring forth out of the tree. The footage shows thousands of bats, and someone gets the mind-numbing job of watching the slow-motion footage to count the individual bats emerging. Forget counting sheep to try to get to sleep, counting bats has the same effect.

In 2012, we tracked the bats to a single gigantic beech tree - which we nick-named "Transylvania" (yes, bat-themed names are essential). The footage of the bats emerging from the tree over many nights showed approximately 6000

bats in that one tree, very close to the estimate of 7000 bats in the 1990s, showing that the population has stayed at a similar level to the 1990s.

There's another night creature that roams in our forests after the sun goes down, a brown shape in the shadows - the kiwi.

There is a substantial population of kiwi in Tongariro Forest, 20,000 hectares of regenerating bush located between the Whakapapa and Whanganui Rivers. Tongariro Forest appeals because it's hard country. Toitoe covered hills mean it's no place for wimps (of the bird or human kind).

There is a thrill in finding a bat roost - tracking into it, the signal is getting louder, so you know that you're near. Then you catch a scent on the wind - the unmistakable scent of bats - it's a mousy smell, but so much more pungent. Then you hear the bats, the noise is coming from an immense red beech tree, its girth wider than two outstretched arms. High up in the tree there is a small crack, and you can hear the bats within the tree - thousands of bats, all huddled tightly together inside the hollow tree. The sound is unmistakable, very much like the high pitched squeaking of a rifleman, combined with the scrabbling sound of thousands of claws on wood.

Once the roost is located we then position a camera and recording device near the roost entrance, so that the footage will record the bats when they emerge to feed after dark. Just after dark the show begins, when all of the bats begin





**Above:** Kiwi/whio detection dog “Fern”, a German short-haired pointer, and her handler Malcolm Swanney (DOC Tongariro).

*Photo: DOC*

**Below:** The first kiwi release into Wairakei Golf + Sanctuary. From left to right: Che Wilson (Ngāti Rangī), Renee Potae (DOC kiwi ranger), “Funky” the kiwi chick, and Gary Lane (Wairakei owner).

*Photo: DOC*

Fourteen years ago, the national Kiwi Recovery Group chose five kiwi sanctuaries throughout the country to develop techniques for kiwi protection. Tongariro Forest was chosen as one of the sanctuaries as it protects a significant population of western brown kiwi, has a long history of kiwi work already in place and has excellent access with a network of old logging tracks.

A raft of kiwi research has occurred in Tongariro Forest over the years, including investigating sub-adult kiwi survival, dispersal, territoriality, and age-of-first-breeding.

However, the key focus of most of the kiwi work in the last decade has been around a research question of national importance - can aerial 1080 be used as a tool to increase kiwi chick survival? The answer, after years of research is that it can. Tongariro Forest Kiwi Sanctuary has successfully shown that kiwi chick survival at least doubled immediately after application of aerial 1080 in both 2006 and 2011.

Further research in Tongariro Forest is now testing the efficacy of lower 1080 sowing rates. To put this into context, the 2011 aerial 1080 operation distributed 2kg of bait per hectare. The new trials will be testing the outcome of distributing half of this, no more than 1kg per hectare of bait. Will a 1080 operation with lower sowing rates still show the same benefit for kiwi chick survival? Time will tell.

When not conducting kiwi chick survival research, another important aspect of kiwi work in the Tongariro area is “BNZ Operation Nest Egg”. Eggs are removed from kiwi nests in the wild both in Tongariro and Rangataua Forests. The eggs are then driven by Project Tongariro volunteers to the incubators at Kiwi Encounter, Rainbow Springs in Rotorua. Once the chicks have hatched, they then go to a rather special location to be crèched.

This special location is somewhere where you wouldn’t normally expect there to be kiwi chicks. It’s a world renowned golf course surrounded by a predator-proof fence, the Wairakei Golf + Sanctuary. The kiwi chicks remain here until they are at a “stoat-safe” weight of 1kg, and are then released back into the wild. So far this season, with support from Ngāti Hikairo and Ngāti Rangī, there have been a record 16 kiwi chicks from Tongariro and Rangataua Forests who have resided at Wairakei - chicks with highly imaginative names such as “Bangle, Korma, Georgie and Royal (to celebrate the royal birth of course), to name just a few.



An important member of the Tongariro kiwi team to introduce to you is a girl of German descent.



**Above:** DOC kiwi rangers Renee Potae and Jerome Guillotel with “Puhina” the kiwi chick, in a golf cart at Wairakei Golf + Sanctuary. Photo: DOC

She drools in her sleep, whines a bit and is rather hairy. Her name is “Fern”, and she’s a German short-haired pointer dog with a nose that knows like no other. She is a highly trained conservation dog, and is fully certified for both kiwi and whio detection work. She proves her worth time and time again, particularly so in helping with kiwi catching.

So that’s a quick summary of what’s been happening in the world of working with our night creatures. It’s a privilege to be able to work with these enigmatic creatures. We are proving techniques to protect kiwi in large tracts of forest, and are now out of the dark in regards to short-tailed bats in Rangataua Forest. Our night creatures will come alive under the night sky once more.

# Tea and Scones on the Desert Road

Kaye Rabarts

Project Tongariro historian

Are you one of those people whose childhood was spiced with stories of endurance trips across the Desert Road, only to find, with disappointment, when you finally got there that it wasn't a real desert with towering sand dunes, camels and Lawrence of Arabia. I was, but the disappointment faded while the fascination remained and our Historic Survey programme in the summer of 2013 gave me a chance to explore a route which is close to many a heart.

As we zoom down State Highway One, admiring those magnificent mountains, most of us don't realise that lurking in the tussock and scrub are the tell tale shadows of a history of endurance and endeavour which could rival that of our friend Lawrence from Arabia. This story is woven around field studies and research undertaken by myself and Clayton Blackwood, joined one weekend by Peter McNaughton, Harry Keys and their boundless enthusiasm for exploring.

The route running north/south on the eastern side of Ruapehu, Ngauruhoe and Tongariro is an ancient one. It is part of a huge network of trails which Māori used to crisscross Aotearoa. In most part the Māori trail, which was also used by early European travellers, ran closer to the mountains than the present highway. The Onetapu desert route from Waiouru to Tokaanu was often undertaken with trepidation as it was in the shadow of the sacred mountains and conditions could change without warning. This was a two day trek in good weather, with an established overnight camp

**Below:** Coach on Waiouru – Tokaanu Road 1910.

*Photo: Whakapapa Visitor Centre archives*



**Kaye Rabarts** lives in a remote area of the Coromandel peninsula and has been a member of Project Tongariro for many years. Kaye has a passion for New Zealand's special places and has dedicated much of the last seven years to researching and recording historic sites at Tongariro and the Chatham Islands. She is very happy to share this knowledge with others and some members will have happy memories of being taken around the Chathams by Kaye to visit many of these sites. The Chatham Island community has welcomed the way Kaye has been able to carefully transfer her knowledge into site signage and information.

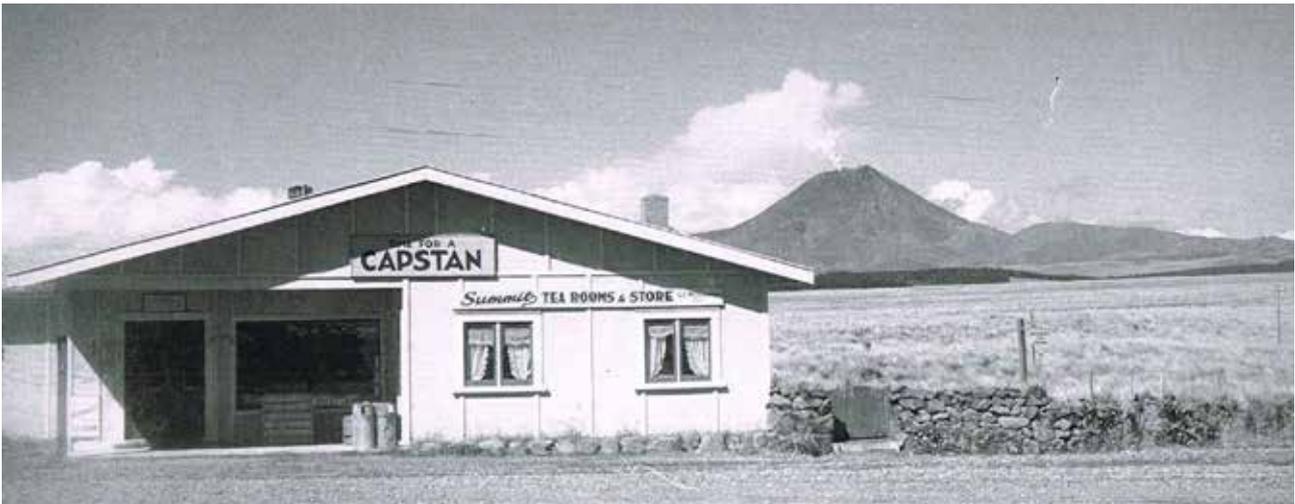
In this article Kaye takes the reader on an historic journey on the eastern side of Tongariro where much of the early European tourist and farming development occurred.

Kaye's researching and recording at Tongariro National Park continues and along with Clayton Blackwood she is currently focusing on historic sites around Ketetahi milling and a range of sites near Whakapapa and National Park. About a dozen members recently had the pleasure of visiting some of these sites with Kaye.

Project Tongariro is pleased to be able to give Kaye some support for this important work.

at Pangarara. The time it took in bad weather was anyone's guess, and sometimes it took their lives.

When a coach road opened in 1894 this quickly became an international tourist route. Travellers on "*The Grand Tour*" went up the Whanganui River to Pipiriki by river boat, then by coach through the bush to Karioi, on to Waiouru and up the Desert Road to Tokaanu, across Lake Taupō by lake steamer then on to Rotorua by coach before continuing on to Auckland.



**Above:** An oft bleak camping spot, but the Summit Tea Rooms offered a welcome break or shelter and a hot cuppa for stranded travellers.

*Photo: Alexander Turnbull Library photo, ref No. G-23454-1/4 G L Adkin Collection*

In 1898 the coach fare for the 43  $\frac{3}{4}$  mile, day long Waiouru – Tokaanu trip, was £1 5s 0d. There were three coaching stops on this route. The first, north of Waiouru, is on Military land and outside our area of investigation.

The road was marked at mile intervals with red painted, numbered pegs. At the 22 mile peg Peters & Sons had an unmanned halfway station. The Waiouru and Tokaanu coaches met here. Passengers ate their packed lunch then changed coaches to continue their journey. This coach service ceased in 1920 when people had switched to travelling on the North Island Main Trunk railway. However this site seemed to retain some sort of shelter or hut until the 1950,s when it morphed into a tearoom/shop, garage and motor camp. Memories were cloudy and information scarce but the Summit Tea Rooms appears to have existed for about ten years until it burnt down around 1963, some say for insurance money by the proprietor who reputedly kept a loaded shotgun under the counter. Sharp eyes can still spot the concrete floor of the building 35 metres back from the west side of the road a little south of the Pangarara Stream.

Just north of Peter & Sons halfway station there was a “stables” marked by a row of five pine trees which could be seen from a great distance when all this area was a “sea of tussock from Waiouru to Taupō”. No evidence of the stables remains but the now felled pines do, along with a well defined walking trail and the overgrown old coach road.

The third coaching stop was associated with an Accommodation House and Stables built by the Tourist Department in 1905 and was situated just north of the three deep gorges known as the Three Sisters. Twenty one and a half kilometres south of Turangi this site is also marked by two large pine trees. Again nothing of the building remains but a flat platform between the pines suggests its location and a nearby spring would have provided a reliable water supply.

Another interesting activity was the early sheep runs which operated around the mountains from 1855 to 1918. Directly opposite the Accommodation House site an old dray track leads uphill to the Mangamate Farm site. A well preserved concrete water tank, sheep dip and drip pad are concealed in the bush. Adjoining the water tank rotting totara piles indicate the position of what presumably was a 10m x 10m shearing shed. Further up the track there are more totara piles, a concrete formation and earthen steps which mark the position of farm accommodation built in 1910, and yes it has two pine trees. From 1908 to 1918 a Mr L W Wall leased and operated the farm. He created a headache for the Tourist Department when his workers occupied the aforementioned accommodation house as well as the Waihohonu hut. A visit from the Commissioner of Crown Lands and the building of the farm accommodation eventually solved this problem.

After the coach service ceased in 1920 the Desert Road fell into virtual disuse. John Wilton recalled his parents’ Desert Road expedition in 1937 - *“they ended up in a big sandy area and realised they had missed the road, so back-tracked until they found another route which looked like the*

road. They continued but on several occasions lost the road and ended up in places where the track they were on petered out or was washed away. Each time they had to back out until they could re-find the “proper” road again”. The introduction of the express bus service helped bring the road back into regular use by the early 1950s.

Waikune Prison near National Park ran prisoner work camps which built and maintained roads around Tongariro district. A temporary Desert Road camp was set up each spring to do maintenance so the road was in good order for Christmas.

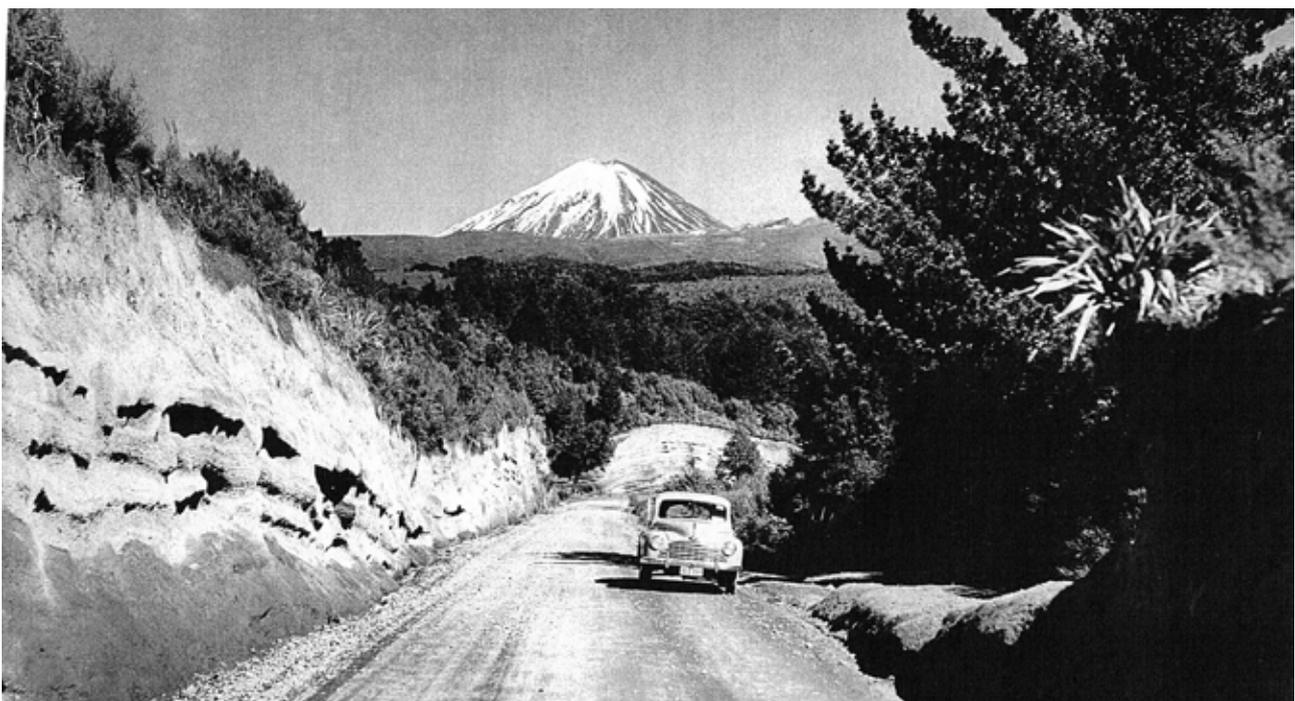
Commercial tourism is recorded before 1894 when Harry Wilcox and a mate ran guided tours on horseback, using the old Māori trail and an overnight camp near the desert. Another early operation, Allen Bros. Summer Camp, which was situated near the coach road and Waihohonu stream, advertised in 1895 “*plain but comfortable accommodation*”, and the cost of the full package “*Guide, horse, meals and bed, 25/- per day*”.

The well known Waihohonu hut, built in 1904, became a key feature on this route. Coaches detoured to drop adventurers at the door and it was from here that exploration and use of Tongariro National Park as a recreation area began ... but that’s another story.



**Above:** The concrete sheep dip and water tank at Mangamate were recorded by Mr John Mazey in a history he wrote on sheep farming in the Tongariro district in 1979. *Photo: Clayton Blackwood*

**Below:** Morris Minor on the Desert Road in the 1950s with Mount Ngauruhoe in the background. *Photo: Whites Aviation Ltd Photographs. Ref: WA-25831-F. Alexander Turnbull Library, Wellington, New Zealand. <http://natlib.govt.nz/records/22441231>*



# Tongariro National Trout Centre

Kevin Farrington

Tongariro National Trout Centre Manager



**Right:** Visitors to the TNTC feed trout from the entry bridge.

**Below:** A great underwater view of trout from the viewing chamber.

*Photos: DOC*

The last year or so has seen a great deal of activity and changes at the Tongariro National Trout Centre (TNTC). Staff, volunteers and supporters have all been working hard to maintain and improve the site's appeal to tourists, families and school groups.

A recent DOC review has added impetus to some of the upgrades at the centre. A new DOC partnership ranger, Dave Connolly, has been appointed and he is now working closely with the onsite team.

A recent addition to the Sargood gallery, in the form of an interpretation display, tells the story of Ngátoro-i-rangi and Te ika o Taupō Moana, the fish of Lake Taupō. Incorporated in the display are artefacts depicting traditional fishing materials and methods recreated by local artists.

Our collection of fresh water fishing memorabilia continues to grow with some great additions to the centre's collection of fishing flies and lures, both historical and modern.

The Genesis Energy sponsored freshwater aquarium is currently undergoing an overhaul of the main display tank by the DOC team. These





upgrades will enable visitors to better view and understand the life and habitats of our native fresh water species.

**Above:** Inside the visitor centre.  
*Photo: DOC*

We have also been very lucky to secure some brook trout and a few beautifully marked tiger trout for display this year. A tiger trout is a hybrid between a brook trout and a brown trout. They are sterile and not found in the Taupō fishery.

The hatchery is rapidly approaching breeding time again and the DOC fisheries team will be busy with this year's new batch. Each year around 5,000 rainbow trout are bred here at the hatchery. The fish remain on site with us until they are almost three years old. They are then distributed around the country to other fisheries but are not released into the Taupō Fishery.

One of our Children's Fishing Day sponsors, Sage, has provided us with a brand new set of #4 weight fishing rods and reels. These lighter weight rods have proved perfect for our junior anglers. Sage have also provided us with a set of #8 weight casting rods and reels for adult practice. The lightweight rods proved a great hit with volunteers and kids alike, providing good sport with some of the larger fish in the pond.

With the support of our excellent army of volunteers, the kids fishing has been very busy this summer with two very successful 'fish out' days in January, when we gave around 400 children the opportunity to catch and take home a trout from our well stocked pond.

Due to public demand we also trialled over the summer holidays a programme that gives children the opportunity to learn the very basics of fly casting. A 'mini lesson' of around 20 minutes ended with the opportunity to catch and take home a trout. More than 260 children took part with some very respectable trout caught, weighing more than 1.5kg. We intend to continue these 'kids fishing lessons' on selected days over all school holidays. Bookings will be essential.

Come and see the changes we are making at the Trout Centre. We look forward to your visit.

# Central North Island Services team summary

Dave Conley

Partnership Ranger, DOC



As for the rest of our counterparts around the country, the past year or so has been a challenging time as we worked our way up to and through the recent structural review of the department. Now six months in the dust is settling, and the Central North Island (CNI) Services team is getting used to the new landscape.

For us the changes have been significant, following the decision taken to incorporate the bulk of Tongariro National Park under the management of Tongariro District office. Whereas previously the northern area of the park was managed from Turangi, from an efficiency point of view it made sense to move the management boundary north to State Highway 46, which means the Tongariro Northern Circuit and the Tongariro Alpine Crossing are now managed out of the one office.

Most importantly in terms of how the team functions, the new management structure has been flattened. Effectively a whole tier of managers have been removed, leaving a single Conservation Services Manager (CSM) in charge of the wider team. Day to day supervision is overseen by a group of senior rangers, but the overall managerial responsibility lies with the

**Above:** Contorta control in the Needles Block.  
*Photo Ian McNickle*

CSM. This, combined with the implementation of the Partnership teams, has had a significant impact on how we work and has taken some time to adjust to. That said, we are now progressing well, and getting on with things as we look forward.

For the CNI team, our primary focus remains recreational access and activity, as well as biodiversity, which for us is predominantly weed management. *Pinus contorta*, broom, heather and *celastrus* remain key species for us to manage in Kaimanawa Forest, our reserves, and the northern-most part of Tongariro National Park. This is where another of our key projects is, in the collaborative approach taken to pest management around Lake Rotopounamu.

Thanks must go to Project Tongariro for all their work, which this year has returned some extremely good rat control results around the lake, and has doubtlessly been important in allowing the bird population to make the most of what has been a stunning year for flower and seed production in the surrounding forest.



**Above:** Horse mustering by Helicopter.  
*Photo: Belinda Thomas*

Just to the north of Turangi is the South Taupō Te Matapuna wetlands project, which again is a Project Tongariro initiative with the support of the department. This continues to develop, with exciting new plans for greater involvement with iwi groups in and around the wetland, as well as a new collaboration with the Department of Corrections. This will involve a new plant nursery on the nearby prison supplying thousands of seedlings each year for planting in Te Matapuna and alongside tributary rivers.

This is a significant project, and is indicative of the way that building conservation through effective partnerships is the way of the future for our department. Collectively we can achieve so much more than working in isolation. We will be working with Corrections to fully maximise the opportunities offered by working together, and are looking forward to some great outcomes in the upcoming months.

Another important milestone event this year was the official opening of the Great Lake Trail, which was again the result of a community group, in this case Bike Taupō, working towards a fantastic outcome which is fast becoming a jewel in Taupō's crown. Bike Taupō, with support

when needed by the department, have worked with multiple landowners and in challenging conditions to build a spectacular mountain bike trail which has opened up the western bays of the lake to a whole new user group.

And as we write this, we are just finalising planning for the 2014 muster of the Kaimanawa horses. This is a good note to end on, as again it exemplifies the positive outcomes that can be achieved by a collaborative approach to issues. Over the years the muster has developed from a highly fractious, controversial and difficult issue, into an event with increasingly positive outcomes. Because of their impacts on some highly sensitive areas of the southern Kaimanawa ranges, horses need to be maintained at low levels or removed altogether from some zones.

Many of the mustered horses are finding new homes thanks to the sterling efforts of the horse preservation community, and we are hopeful this trend will continue this year. Without the support of the community the department wouldn't be able to re-home the horses and they would all be destroyed, so the current outcome is vastly preferable. It's a hugely positive result for all concerned, and just the type of outcome we are seeking from the newly re-modelled department.

# Call of the Whio

Robyn Orchard

Communications Advisor, DOC



We are making great progress in the **Battle for our Birds** (*For Battle of the Birds information see Page 73*) in the Tongariro area with continued success in securing the whio population.

The whio is the unique native duck found only in New Zealand's fast flowing waters. With fewer than 2500 whio left nationwide Genesis Energy and the Department of Conservation have partnered together in a five year programme to secure the future of this threatened native bird.

The recovery plan has eight whio security sites across New Zealand including the Tongariro Forest site and a number of recovery sites throughout the country including the Tongariro River site.

The Tongariro Forest security site has 35 kms of river protected. With a combination of aerial

**Above:** Releasing four of the captive bred whio onto Tongariro River are from left Evan Davies (Taupō-nui-a-tia College), Sian Moffitt (Tauhara College), Jennie Noreen (Tongariro River Rafting), Zoe Singers 7 (Blue Duck Project Trust), Les Pepper (Generation Delivery Manager Renewable Energy – Genesis Energy) and Maxwell Singers 11 (Blue Duck Project Trust)

**Below:** The four whio released made themselves quickly at home on Tongariro River after being released.

*Photos: Catalina Amaya-Perilla*

1080 and trapping along the rivers, the results have been astounding. When the project began in 2004, the density of whio in the Tongariro Forest was 1.1 pairs per kilometre of river. Now, ten years later, the density of pairs has increased to 2.6 pairs per kilometre of river. A total of 92 pairs of whio are now protected in the Tongariro Forest rivers.

The Tongariro River recovery site has increased





**Above:** Concept plan of the new whio hardening facility designed for the Tongariro National Trout Centre.

its numbers of protected whio pairs from five pairs to nine pairs. These pairs are producing more ducklings than ever before with 22 ducklings hatched this season.

The work of community groups such as Ngāti Hikairo ki Tongariro hapu, Owhango Alive, the Whakapapa Village community and Tongariro River Rafting in conjunction with Whio Forever and the Central North Island Blue Duck Conservation Charitable Trust has helped DOC to start securing and recovering this unique native duck.

The Battle for our Birds continued with the release of more than 30 captive bred whio back into the wild across the Central North Island recently.

It was a record season for whio ducklings bred in captivity with 45 ducklings produced at captive institutes throughout the country. Several captive breeding pairs around the country had multiple clutches this season.

The eggs are hatched and the ducklings reared in captivity to three-month-old ducks – fledglings - which are then released at different sites around the Central North Island during March.

Six whio were released in the Tongariro area - four onto Tongariro River and two into the Whakapapanui Stream – both locations chosen because of the ongoing predator trapping by local community groups.

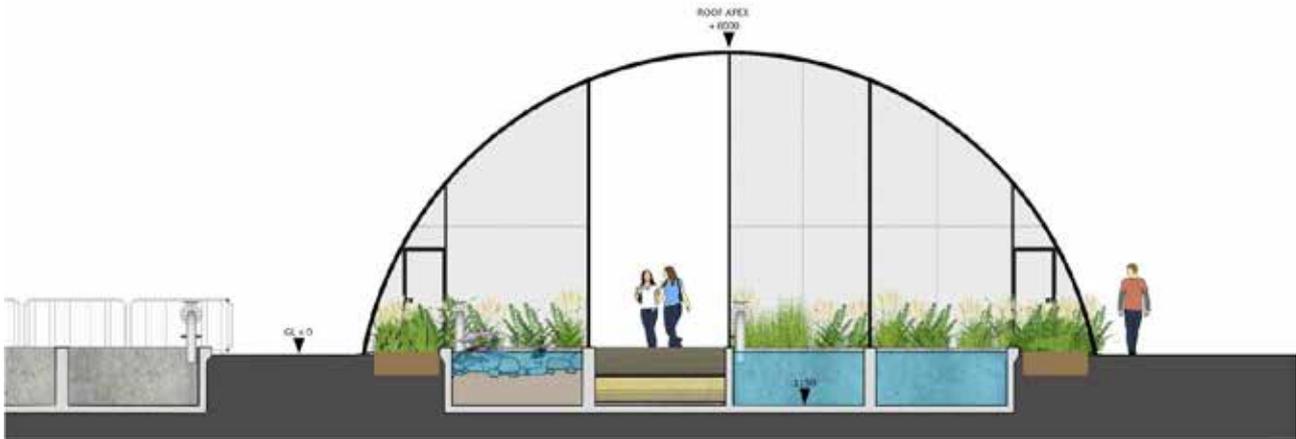
Another 16 fledglings were released into the Waiwhakaiho River in Egmont National Park.

Once extinct in the Egmont National park, the whio/blue duck is now paddling its way to a population soon to top 100. A further 13 captive-bred whio were released into Manganui o te Ao River in the Whanganui National Park recently.

The Whio Forever partnership is now adding another tool to its arsenal of protection this year with funding to build a new whio rearing facility at the Tongariro National Trout Centre near Turangi.

The North Island whio rearing facility will help recover the national whio population by allowing whio ducklings to ‘grow and train’ in a more natural environment, says National Whio Recovery Group leader Andrew Glaser.

*“It’s like a finishing school for whio, where they can learn to swim and feed in fast flowing water, giving them a better chance of survival when they are released back into the wild.”*



**Above:** Cross section concept plan of the new whio hardening facility designed for the Tongariro National Trout Centre.

*A facility like this will mean more ducklings survive the transition from captivity back to the wild, so they can establish their own territories and find mates. This will help us boost the population in the wild,” he says.*

Andrew pointed to the success of restoring the whio population in Egmont National Park which has been achieved through a combination of predator control activities and the release of captive reared birds over the past nine years.

*“We’ve been able to bring whio back from local extinction, and develop the tools and knowledge to enable us to do this in other areas of the country.*

*This is the first successful restoration of a whio population in New Zealand. It is a credit to the Taranaki community and shows what can be done with an effective trapping regime and WHIONE (lifting eggs and hatching and rearing in safe captivity).”*

The whio population in Egmont National Park has grown from almost nothing to 24 pairs of whio since 2005. This breeding season a record 36 ducklings hatched in the park, although it’s not yet known how many of these will survive into adulthood.

The Tongariro National Trout Centre’s rearing facility will give more whio ducklings a fighting chance of making it to fledglings in a safe secure environment.

Using existing infrastructure at the trout centre the facility will be constructed on one of the redundant trout raceways and will give visitors the chance to see whio and learn more about the iconic bird.

Interpretive and educational material will promote whio conservation, including their role as an indicator of a healthy river system.

Existing whio rearing or hardening facilities are located at Te Anau and at Peacock Springs near Christchurch. Using South Island facilities means extended travel for North Island whio ducklings. Constructing a low cost facility in the North Island reduces the risk and expense associated with this.

The facility will cost an estimated \$110,000 with funding from the Whio Forever partnership, DOC and the Central North Island Blue Duck Charitable Trust.

Construction is due to start in the next two months and it is hoped to be completed for the arrival of the first ducklings in September this year.

The support of Genesis Energy is enabling DOC to double the number of fully secure whio breeding sites throughout the country, boost pest control efforts and enhance productivity and survival for these rare native ducks.

# 1080 IN NEW ZEALAND INFORMATION



## 1080

is a biodegradable poison. It breaks down naturally in the environment and does not leave permanent residues in water, soil, plants or animals. The active component of the poison occurs naturally in many plants found in Australia, South America and Africa. These plants evolved the poison as a defence against browsing animals.



**5%**  
The approximate amount of public conservation land currently treated with 1080 (about 440,000 hectares of a total 8.75 million hectares).



**4-6**

The approximate number of bait pellets dropped over an area about the size of a doubles tennis court in an aerial 1080 operation.

The number of kiwi that have been monitored using radio tracking equipment through 1080 operations since 1990. None has ever died as a result of 1080 poisoning.



Rat tracking rates dropped to zero and remained undetectable for



5 months after the 2006 Hawdon Valley 1080 operation.

**ZERO**

The number of times traces of 1080 have been found in reticulated drinking water supplies, in over 500 samples tested over the last 5 years. 1080 is readily soluble and dilutes quickly to low concentrations in contact with water.

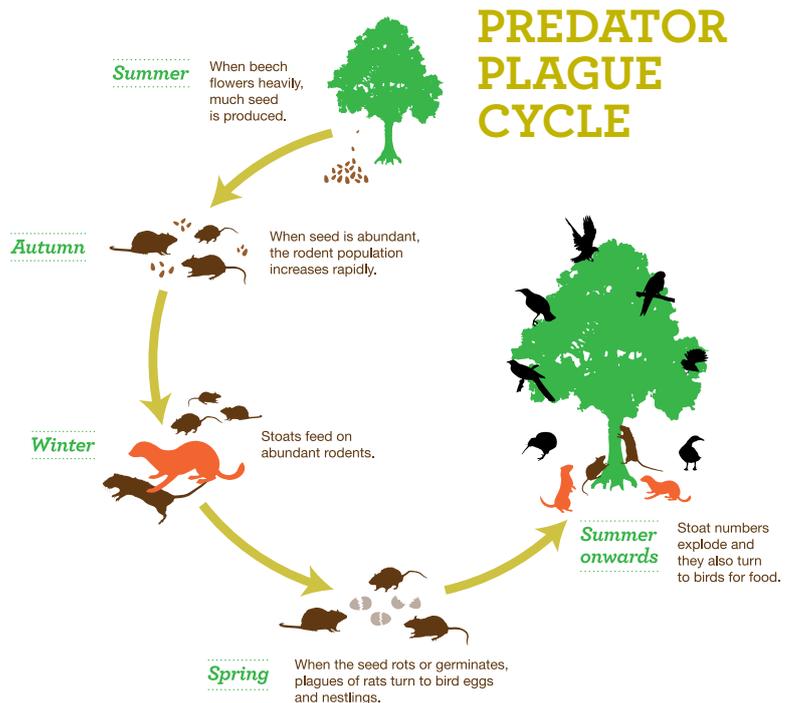


**\$17**

The average cost per hectare of aerially spreading 1080 to control rats, possums and stoats across large areas of often difficult terrain. Costs for ground control, like trapping, vary but can be more than three times as much.



Information taken from the Department of Conservation [Battle for our Birds](#) PDF.   
[Download the full copy](#) and see why the Battle for our Birds is so important.



# Conservation in the Central North Island

**Meirene Hardy-Brich**  
Director of Conservation Services

**David Speirs**  
Director of Conservation partnerships

In September 2013 the Department of Conservation embarked on a new direction for conservation in New Zealand. As Lou discusses in his article, "Adaptation to the environment", a good deal of this change rests on the understanding that our vision "*New Zealand is the greatest living space on Earth*", is bigger than DOC and is about engaging all New Zealanders in some common goals.

To achieve our vision we need to grow the amount of conservation work being done across the whole of New Zealand. DOC can't do this by growing the department – instead, we need to work with others and get more New Zealanders engaged in conservation. We need New Zealanders to understand why conservation is so important to our prosperity, and why they should get involved.

So, the Department's new model seeks to increase our capacity to focus on engaging others to do conservation work while also maintaining the essential services the Department has always provided.



**David Speirs** has a freshwater ecology and catchment management background and has come to DOC from a management role at the Waikato Regional Council. He has been in the new role for five months so you may not have come across him yet but rest assured, if you have a passion for conservation and desire to work with the Department to put your conservation projects in place he'd love to hear from you.



**Meirene Hardy- Brich** has a long history with the Department. Mei started her career in the Department in Northland working in a number of roles for a period nearing 20 years. Her most recent role was as an Area Manager based in Kauri Coast, Northland before moving to Taupō to take up her current role in September 2013. Meirene has vast knowledge of conservation, what works, what doesn't and what is required to work with communities to make them successful.

Essentially the Department has:

**National teams** to take the lead in developing national strategy and direction, and provide specialist support to regional teams on the ground.

**Regional teams** that are focused on maintaining the conservation estate and the services DOC has always provided such as tracks, huts and pest management as well as scoping, planning and securing new value exchanges with partners and co-managing resulting project initiatives in each region.

**The Conservation Partnership Group (Kāhui Manutataki) is responsible for driving growth in conservation through partnerships.**

This group focuses on securing new value exchanges with partners to benefit conservation, project managing new, large scale value exchanges to ensure they are delivered successfully on the ground (locally, regionally and nationally) as well as maintaining and enhancing strong working relationships with external partners.

It works to be a strong advocate for conservation locally, regionally and nationally.

There are six partnership regions:

- Northern North Island
- Auckland Super City
- Central North Island
- Lower North Island
- North and Western South Island
- South and Eastern South Island

**Opposite page:** Tongariro National Park's Mt. Ruapehu with Rangataua Forest in the foreground.  
*Photo: DOC*

**Below:** Mahi Aroha participants make their way up the Waipakahi River in Kaimanawa Forest Park.  
*Photo: Jimmy Johnson*



**The Conservation Services Group (Kāhui Matarautaki) is responsible for delivering great conservation work on the ground.**

This group focuses on delivering on conservation work plans, building great relationships and ensuring value exchanges are implemented successfully, locally, regionally and nationally.

It works to continuously improve the effectiveness and efficiency of conservation work methods and positions itself to be the primary point of contact for conservation work and conservation work planning in the local and regional landscape.

There are six Conservation Services regions:

- Northern North Island
- Central North Island
- Lower North Island
- North and Western South Island
- Eastern South Island
- Southern South Island



**The Central North Island**

Within the Central North Island Region (CNI) there are two directors; Meirene Hardy- Brich, (Director of Conservation Services), and David Speirs, (Director of Conservation Partnerships). We are both based in the Taupō office and work very closely, together with our district managers to plan and manage the delivery of all Conservation activity in the CNI.

Between the two of us, we hope that we can work with our community to capitalise on the great work and partnerships already underway in the Central North Island. We want to lead the country in demonstrating that “New Zealand is the greatest living space on Earth” and that the Central North Island truly is at its centre.

# A year of change for the Taupō Fishery

Dave Conley

Partnership Ranger, DOC



**Above:** Fishery Manager Kim Turia with a nice fish from Lake Otamangakau.  
*Photo Dave Conley*

There certainly have been many changes for the fishery in the past year, which like the rest of DOC was swept up in the largest structural review the department has seen since its inception in 1987.

On the 2 September 2013, the Taupō Fishery, which was previously part of the Taupō-nui-a-Tia Area Office under Dave Lumley's guidance, was separated back into its own Service group. Kim Alexander-Turia was appointed as the new Fishery Services manager and Dave Lumley is now running the Turangi Services team.

Our team has certainly gone through some changes as well with seven service rangers being appointed – Michel Dedual as our Fishery Science Advisor, Mark Venman Senior Ranger and Randal Hart, Dave Plowman, Mike Hill, Harry Hamilton as Fishery Rangers. We recently appointed Thomas Simmonds to the Fishery Team as a fishery ranger position and he starts on 14 April.

We receive support from the newly established Partnership group with Peter Shepherd and other partnership rangers. This group supports Service with communications through media releases and using social media such as facebook, helping to identify new future angler opportunities.

Together we are working on *The Taupō Fishery review – exploring future opportunities* report which was released 20 May 2013. This means working closely with our key partners, the Tuwharetoa Maori Trust Board, and the Taupō Fishery Advisory Committee to provide an effective angler voice in the management of the Taupō Fishery.

The review is now complete and may be viewed on the Department's website - [The Taupō Fishery review](#). The report provides a very good summary of the challenges facing the fishery, and highlights a range of opportunities to focus on:

The range includes;

- **Establishing an overarching goal for the fishery:** This really boils down to coming up with a clear and defined vision statement for the fishery, which will form the basis of everything we set out to achieve.
- **Improved governance and management structures and processes;** This refers primarily to the opportunity to maximize the role the Taupō Fishery Advisory Committee can play in aiding the management of the fishery by providing for detailed angler input into its management. We may need to look at re-structuring the committee and its membership base if we want to get the most out of it.
- **Ensuring there is clear direction focused on maximizing the full value of the Fishery:** Fish and Game apply a “user pays, user says” model in their management, and the Taupō Fishery may benefit from a similar approach. By working more closely with anglers and businesses that rely on the fishery we may be able to provide better recreational, economic and cultural outcomes for stakeholders in the fishery.
- **Management of the resource** (the trout). This is something we have always done well, and the review re-confirmed this. What we perhaps need to do better is utilize our deep understanding of the fishery to better inform pro active management around increasing angler opportunity.
- **Adopt angler notices** as a means of making quick regulation changes when managers see a need. This will allow us to achieve some of the desired outcomes described in the previous point.
- **Better engagement with anglers and licence-holders** (particularly with a view to increasing participation); This forms an important part of the reasoning behind the move to online licensing. Anglers have told us during the review process that they wanted licences available online. This would also help us talk to anglers more directly via email, and also give us a better understanding about our anglers as customers.
- **Improving relationships more generally** (adopting a ‘philosophy of a partnership’).

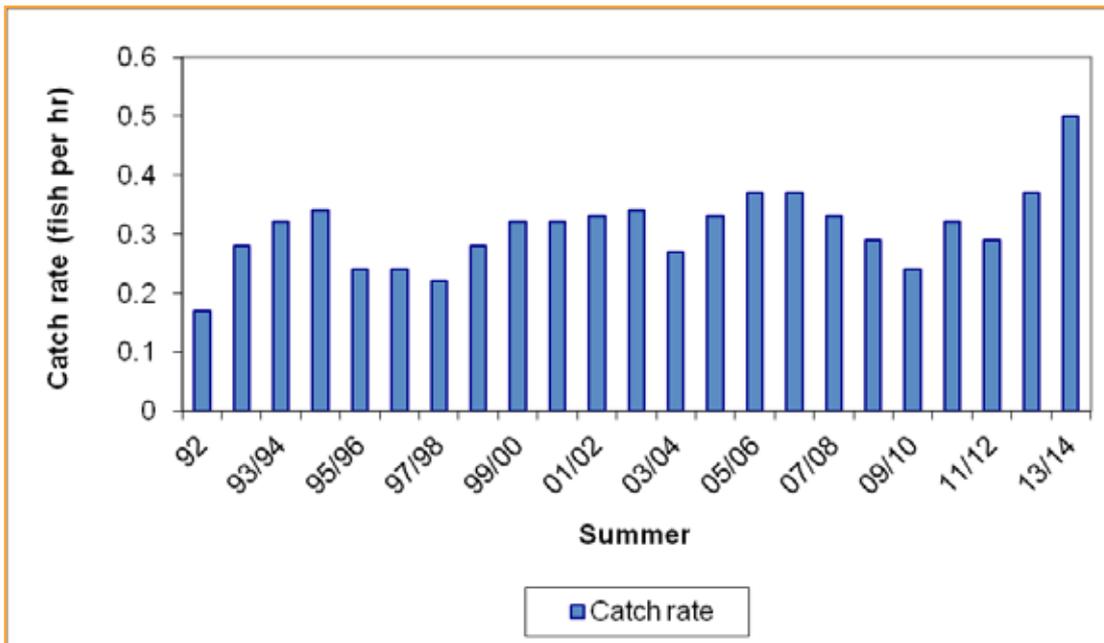
To date we are making progress on a number of fronts.

The Taupō Fishery has already achieved a number of recommendations in the report, with stronger links with Ngāti Tuwharetoa, re-aligned staff structure and budget allocations, reviewing the Tongariro National Trout Centre, and making better use of social media. Our Fishery Facebook page has been very popular and of course we have re-evaluated our Target Taupō magazine, to name a few.

We are currently working at getting the Taupō licences online, and this will be in place in time for the new licensing season. We are really excited by this for a number of reasons. In achieving this we will be delivering what anglers told us during the review process they wanted to see in place. We will also make a number of significant financial savings which we will be able to re-invest back into other outcomes anglers indicated were important to them, such as improved access and fishing opportunity, as well as more visible compliance activity. And finally we will be in a position to really start to fine tune our licensing options over time, including the chance to explore offering annualized licenses, or a different range of short stay licences. While none of this will happen without a full engagement process with our stakeholder groups, licensing online offers convenience and flexibility to us as managers in responding to customer demand.

**Below:** Whio are an increasingly common but always welcome sight out on the Tongariro River.  
*Photo Nick Singers*





**Figure 1.** Summer catch rates for guided & non-guided anglers fishing on Lake Taupō since 1992

So the key thing for our staff and anglers to realize is that the report is an important document for us to re-evaluate and re-prioritise where we put our collective energies. At the end of it all, it appears to me we all want the same thing, a healthy, vibrant and challenging fishery which continues to live up to its reputation as one of the great trout fisheries in the world.

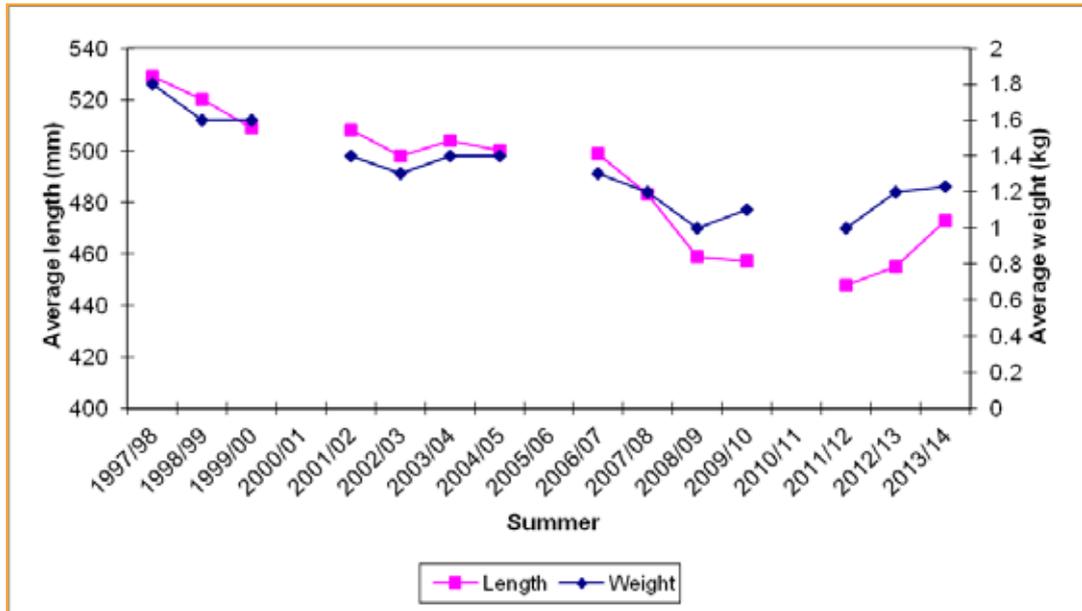
Enough about structure changes – let’s get on to more important stuff as far as anglers are concerned. How has the fishing been?

The 2013/14 summer started off warm in November and then temperatures dropped again during December and early January before the heat finally arrived from late January and throughout February. Overall, 767 anglers were surveyed on Lake Taupō over the last five months and had their fishing licences checked, and the catch rate for lake anglers this summer was calculated at 0.50 fish per hour (one legal sized fish every two hours). This continues the increasing trend observed over the past two summers and is the highest summer catch rate out of the last 23 years (Fig.1) and well above the summer average of 0.31 fish per hour (one legal fish every 3.25 hours).

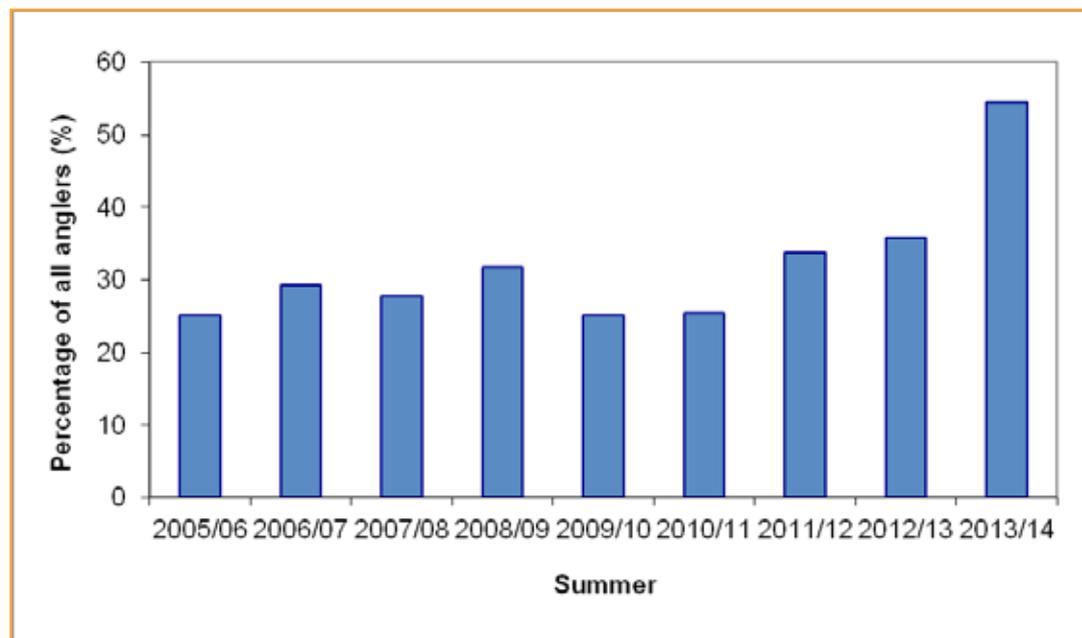
## Angling methods

Jigging produced the highest catch rate out of all the methods this summer with an estimated catch rate of 0.65 fish per hour (one legal fish every 1.5 hours). Unsurprisingly, it was the preferred method of fishing the lake this summer and was used by 55% of all anglers interviewed (Fig.2).

Jigging remained relatively constant between summers 2005/06 and 2010/11 at approximately 25-30% before steadily increasing to a peak this summer of more than 50%.



**Figure 2** Trend in the popularity of jigging over the last nine summers on Lake Taupō



**Figure 3.** Average lengths and weights of rainbow trout caught by anglers on Lake Taupō since the summer of 1997/98 where data exists

## Fish caught

A total of 338 trout were measured and weighed during angler surveys on Lake Taupō this summer including three brown trout. These three browns averaged 612mm and 2.6kg (5.7lbs) with an average condition factor of 41.7. The 335 rainbows kept by anglers averaged 469mm and 1.21kg (2.7lbs) with an average condition factor of 41.5 (Fig.3). In comparison to last summer, these rainbows are on average 14mm longer but of a similar weight and as a result the average condition factor is down slightly. The heaviest rainbow weighed on the lake by rangers this summer was a hen measuring 550mm and weighing 2.5kg (5.5lbs) with a condition factor of 54.3.

## Angler satisfaction

Given anglers' positive feedback this summer regarding the general state of the Taupō Fishery, it was encouraging to see this reflected in the angler satisfaction scores given by anglers this summer. Overall, anglers rated the trout that they were catching at 7/10 which is on par with last summer's 7.2/10 and again higher than previous years.

Anglers were also asked to rate how satisfied they were with their catch rate and rated it at 6.9/10 this summer. This is the highest average score out of the last eight summers and reflects the very high overall catch rate this summer. Anglers were also asked to rate their angling enjoyment and rated it at 9.5/10 which is up on last summer and the highest out of the last eight summers.

As always, the key thing is to get out there and enjoy it – it's your fishery. We had a rough time for a year or two, so get into it now when the going is good. It looks like we could be in for a great winter! With plenty of smelt around currently, the next four months will be important for those fish preparing to spawn this winter. It will be interesting to see what the runs are like this winter in terms of size and quality given the large number of trout currently present in the lake.



**Left:** Avid kayak fishers Andy and Suzy Broadley out enjoying the fantastic late summer weather.  
*Photo Mike Hill*

# Lake Rotopounamu – Mt Pihinga Restoration Project

Kiri Te Wano, Project Tongariro Coordinator

**Right:** The new Rotopounamu signs are in! Pictured from the left; Anna McKnight, Peter Shepherd, Dave Lumley, Ian Reid & Paul Green.

*Photo: Anna McKnight*

**Below:** Al Hardy setting up a bundle of traps to carry into the trapping line.

*Photo: Kiei Te Wano*



The Lake Rotopounamu Restoration project is one of Project Tongariro's "flagship" restoration projects and is currently in its 11<sup>th</sup> year of operation. Predator control still occupies most of our energies, however this year saw us install the long-awaited interpretation signs at the start of the track, at the junction at the top of the hill and on Long beach.



Up until 2012 we had 50 DOC200 traps around the lake which protected a core 500ha of forest. Late 2011 after a review of our progress, we decided that it was time to increase the amount of area protected and to increase our pest targets to specifically include stoats. So in September 2012, after the 2011/2012 season we organised and executed the 'great traps out day'. This required coordination of many factors and I believe was a great example of our working relationship with DOC.

Bundles of 10 traps were choppered into 'canopy gaps' along our newly cut trapping lines. We managed to attract around 30 people, (locals and from afar), and we assigned four teams with experienced team leaders who carried and placed 150 traps that day. There were a few standout volunteers that day and Al Hardy springs immediately to mind with his pack carrying frame that could hold six traps to everyone else's two traps. He happily strode through bush the whole day seemingly not noticing the load he'd strapped on.

By increasing the area of predator control we should protect any nesting kaka and kakariki in approximately 1200 hectares of mature forest in our special part of Tongariro National Park.

Each year we host two students from Waikato University on a 'hands-on conservation internship'. They arrive in late November and stay until mid February. This programme is run with the help from DOC staff who provide supervision and conservation management experiences. It is funded generously by the Craters of the Moon Trust.

This season we happily added Carly Hill and Laura Frances to our team – two hard working, friendly and intelligent girls who spent a large proportion of their time up at Rotopounamu, checking the new trap lines and maintaining and clearing vegetation to make the trap lines 'user friendly'. Heather Morrison, (DOC's wonderful Rotopounamu Ranger), also found them very useful for the annual tracking tunnels used to monitor pests, bait station maintenance used for rat control, and the annual five minute bird counts used to monitor outcomes from control methods used. Mention must also be made to a 'hard core' group of wonderful volunteers that I'm lucky to associate with who check these traps once to twice a month. A trapping line 'loop' generally takes between three to five hours and we check traps between late August through to the end of April. This is a really great way to 'schedule' yourself in for some quality time in a quality piece of beach forest. However there is a bit of territorial feeling around who checks which lines - there are definitely favourites!



**Above:** Waikato University Biodiversity Interns Laura Francis and Carly Hill with Kiri Te Wano (centre).

*Photo: Project Tongariro*

**Below:** A trap boxes placement team ready for a day's work.

*Photo: Project Tongariro*





In late June 2013 we were fortunate that the Animal Health Board undertook an aerial 1080 poison operation of the whole of Mt Pihanga, Tongariro National Park. In addition to reducing the possum population this operation controlled rats and stoats to very low levels, though rats have invaded quickly from the neighbouring untreated land, motivating us to undertake rat poisoning in what was at the time our core 600 hectare area. Then in early December we realised that we were possibly in for a busy summer period with a podocarp mast season predicted. Red Beech and rimu were flowering and seeding prolifically which causes an explosion in both nesting birds and rodent numbers.

As I write in early April, we are still unsure if this mast event will mean an explosion in rodent numbers around Lake Rotopounamu - Mt Pihanga and we are intently watching the tracking tunnel results and the trapping tallies to garner some idea of what is in store for us. It is well documented nation-wide that we are expecting this difficult period, with the Government wading in with their own programme - 'Battle for the Birds'. Should there be a sharp rise in rodent numbers, it will be difficult, expensive and possibly unsuccessful to maintain status quo.

Our programme aimed at raising funds directly for pest control - called 'Adopt a Hectare' is continuing into its third season this year, and continues to be popular and well supported. We are averaging 150 'virtual' hectares adopted a year and we are very encouraged that this programme will continue to 'self support' our efforts at Lake Rotopounamu. Please check out our website at [www.tongariro.org.nz](http://www.tongariro.org.nz) to secure yourself a 'virtual prime' piece of Lake Rotopounamu/ Mt Pihanga and contribute directly to conservation within Tongariro National Park.

DOC is once again our major partner in this project and from our objectives and the vision, the main reasons we are doing this are:

- To be part of a long-term project that sees the re-introduction and restoration of species to the area
- To see people enjoying the area, appreciating their surrounds and the flora and fauna living in it
- To provide an "outdoor classroom", somewhere for groups to base themselves for environmental learning on the edge of Rotopounamu
- To encourage access for all on the track and around Rotopounamu
- To improve and provide interpretation in the area.

# The Great Lake Trail

Rowan Sapsford  
Chair, Bike Taupo



**Above:** The Great Lake Trail is open! Prime Minister John Key cuts the ribbon (actually bike tubes!) ably assisted by (left to right) Green MP Julie Anne Genter, National MP Louise Upston, Bike Taupō Chair Rowan Sapsford, the Prime Minister John Key, Taupō Mayor David Trevawas, National MP Todd McLay, Reverend Sonny Garmonsway.  
*Photo: Martyn Davies*

On April 3 2014 The Prime Minister, John Key, officially opened the Great Lake Trail. The Great Lake Trail (GLT) is the latest of the Nga Haerenga, the New Zealand Cycle Trails (NZCT) to open. The GLT has been built and is maintained by Bike Taupō who, in 2009, were successful in applying for 2.4 million dollars from the New Zealand Government. The GLT is one of the only NZCT trails nationwide to be built by a community group as most of the others were built by either local or central government.

The GLT is 70 km long and runs around the Western shores of Lake Taupō. At its southern point it starts at the Waihaha River Bridge on SH37 before following the Waihaha River down towards the lake for 13km. Once it reaches the end of Waihaha Road it then follows the cliff tops above Lake Taupō before descending down to Kotukutuku landing on the lake shore. The descent to the lake is a spectacular piece of trail that drops down a waterfall using a series of boardwalks and bridges. From here it is either an honest ride back or a boat shuttle to Kinloch. The other, and more established sections of trail extend from Whangamata road down to Kawakawa Bay and then over the headland to Kinloch, and of course there is the iconic K2K and headland sections between Kinloch and Whakaipo Bay.

[Bike Taupō](#) is a community based cycling advocacy group who have been operating since 2003. As well as being a voice for cyclists the group also builds and manage nearly 200kms of mountain bike tracks in the Taupō District. The Group is funded via a combination of grants, memberships and donations. Bike Taupō started on what is now the GLT back in 2005.



The first section, the W2K was developed through local funding with the GLT, funded under the NZCT scheme starting in 2009. There have been more than 40000 riders and walkers use the Great Lake Trail in the past year.

The project has been a collaborative effort with almost all those working on the project being local. This has included the builders, transport companies, helicopter operators, boat builders, designers and more. As a result of this support it is estimated that the actual value of the trail is closer to four million dollars. The huge value in partnering with the community has meant that Bike Taupō have been able to almost double the government's investment.

The project also had support from the Department of Conservation, Taupō District Council and Ngāti Tuwharetoa. The GLT predominantly runs through native vegetation which meant that the construction of the trail was done in a manner that reflected the high ecological and cultural values of the area. Prior to building, an ecological assessment was undertaken, and the trail crews received training on how to identify and avoid important

**Above:** Riders take a break on 'Codger's Rock' overlooking Kawakawa Bay.

*Photo: Bike Taupo*

**Below:** Riding back out Waihaha Road with the mountains of Tongariro National Park in the background.

*Photo: Rowan Sapsford*





**Above:** One of the amazing lookouts over Lake Taupō on the Waihora link of the Great Lake Trail.

*Photo: Bike Taupo*

**Below:** Looking down towards Tieke Falls on the Waihaha River.

*Photo: Bike Taupo*

native species in the area. In addition a cultural researcher preceded the track-building crew to ensure that any waahi tapu sites or sites of cultural interest were avoided. Prior to the development of each new section of the trail, local iwi blessed the crew and the machinery. This process resulted in a track that flows with the landscape and the values of the land. Instead of straight lines the trail is in sync with the environment, which makes for a great riding and walking experience. On his last inspection Jonathan Kennett from NZ Cycle Trails, stated that the GLT was the finest piece of Grade three single track in the Country.

For a virtual ride down the Waihaha section of the Great Lake ride check out this [Youtube video](#)

While the GLT is now officially opened there is still more work to do. There are carparks to be sealed, signs and interpretation to be put up and the track crew is currently building a campground above Kotukutuku Landing. There are plenty of options for expanding the trail, but currently the focus is on finishing off the trail and maintaining it. Bike Taupō are also seeking funding to put a trap line along the length of the trail as well as eradicate wilding pines and undertake some wetland restoration on Orakau Stream.



## Trail Facts

Information can be found on the official [Great Lake Trail](#) website.

| <b>Great Lake Trail West</b>  |  |  |                                   |
|---|--|--|-----------------------------------|
| Access points are at Waihaha bridge and Waihaha Rd, (by road off Western Bays Rd) and by boat at the stunning Kotukutuku inlet. |  |  |                                   |
| Section   | Details  | Description:   | Access points                     |
| <b>Waihaha</b>  | <b>Grade:</b> 3<br><b>Distance:</b> 13km<br><b>Estimated time:</b><br>Cycling 1.5 hours<br>Walking 3.5 hours | From the Waihaha River Carpark, the trail follows the river for a few hundred metres before it crosses the river on a swing bridge. The trail then gently climbs up the river onto the cliffs above, following the course of the river to the end of Waihaha Road. The trail has great views of the Waihaha River canyon and waterfall. It is surrounded by Tanekaha dominated native bush and large outcrops of weathered volcanic rocks. <a href="#">You Tube</a> link.  | Western Bay Road,<br>Waihaha Road |
| <b>Waihora</b>  | <b>Grade:</b> 3<br><b>Distance:</b> 17km<br><b>Estimated time:</b><br>cycling 2 hours<br>walking 4 hours     | This extraordinary & scenically beautiful link offers expansive views of Lake Taupō, the majestic volcanoes of Tongariro National Park and big blue skies. Ride amongst vast stands of Kamahi, through volcanic rock formations, past the intriguing echo rock and descend down the Kotukutuku stream via the unique engineering feat of bridges, platforms and boardwalks, culminating at the lake edge of a tranquil bay where you await your boat transfer. <a href="#">Boat transfer bookings</a> are essential. | Waihaha link,<br>Waihaha Road     |
| <b>Great Lake Trail North</b>   |  |  |                                   |
| Access points at Whakaipo Doc reserve (Mapara Rd), Kinloch, and Whangamata Rd.<br>Boat access at Kawakawa Bay.                  |  |  |                                   |
| <b>Orakau</b>   | <b>Grade:</b> 3<br><b>Distance:</b> 9.8Km<br><b>Estimated time:</b><br>cycling 1 hour  <br>walking 3 hours   | From the Whangamata Road carpark, the trail follows the Orakau Stream and Harakeke (flax) wetland through regenerating native bush down to Kawakawa Bay on the edge of Lake Taupō. The trail is generally downhill and offers views across the lake to the volcanoes of Tongariro National Park.   | Whangamata Road                   |
| <b>K2K (Kawakawa to Kinloch)</b>  | <b>Grade:</b> 3<br><b>Distance:</b> 9.2Km<br><b>Estimated time:</b><br>cycling 1.5 hours<br>walking 3 hours  | From Kawakawa Bay the trail climbs up through native bush to the Te Kauwae headland providing a reward of spectacular views across the lake and Western Bays. The trail then descends to the lake edge with the final section on the lake front before finishing at the village of Kinloch.  | Kinloch                           |
| <b>W2K (Whakaipo to Kinloch)</b>  | <b>Grade:</b> 3<br><b>Distance:</b> 13km<br><b>Estimated time:</b><br>cycling 2 hours<br>walking 3 hours     | Starting at the Kinloch Domain, follow the markers around the marina and along the waterfront and then up a gully to Boojum Dell. The trail climbs steadily up through native bush and up onto the headland providing great views across the lake and back down into Kinloch. Once on top of the headland the trail then starts a long flowing descent through native bush into Whakaipo Bay. Once again the trail is typified by stunning scenery and views across the lake and along the lakes edge.               | Kinloch or<br>Whakaipo Bay        |
| <b>Headland trail</b>   | <b>Grade:</b> 3<br><b>Distance:</b> 9.5Km<br><b>Estimated time:</b><br>cycling 1.5 hours<br>walking 3 hours  | A loop trail option off W2K that follow the top of the Whangamata Bluffs out to the end of the headland. More great native bush and awesome views across the lake to the Kaimanawas, Karangahape Cliffs and Tongariro National Park. There is also a short lookout trail that offers views of Kinloch and Whangamata Bay.  | W2K                               |