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Te Papa Atawhai

Cover Photo: The new Waihohonu hut, the third hut to occupy this part of Tongariro National Park. *Photo: Karen Williams*

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Foreword

Harry Keys

Welcome to the e-Tongariro Annual 2011. In here you will find stories about some of the projects, activities and areas of our work in and around Tongariro National Park and Taupo Nui A Tia, often in association with a growing number of community partners.

These are examples of the wide variety of work done in the area helping New Zealanders and visitors gain environmental, social and economic benefits from healthy functioning ecosystems, from recreational opportunities and from living our history. You will read about the breakthrough made with whio conservation in association with Genesis Energy, some major track developments and improvements, and an exciting new historic cultural heritage project in which we are engaging with Ngati Hine. Sadly you will also read about how the population of short tailed bats in the southern Ruapehu forests has probably halved in size in the last 10 years, and how the survival of adult kiwis in Tongariro Forest has decreased dramatically in the last two years. We still have a lot to learn about how to effectively counter the devastating effects of introduced predators, including stoats, cats, ferrets and rats.

Despite the period of major restructuring and change that DOC is currently undergoing, including adjustments to the directions or work and changes in roles or loss of some key staff, we felt it was important to continue the tradition of publishing a Tongariro annual. This forms an important record of work in this highly-visited part of public conservation land in New Zealand including the World Heritage area. The audience for Tongariro includes staff, iwi colleagues, members of community groups, businesses and agencies we engage with, and a wide range of people interested in public conservation land in the central North Island.

This e-Tongariro is the most recent in a long history of periodic Tongariro media. The first Tongariro appeared in November 1979 as a photocopied foolscap newsletter of the Tongariro National Park Board. In 1980 it became a printed A5 bulletin and in November 1992 evolved into an annual A4 magazine with an increasing colour photo component from 1998.

Our community partner Project Tongariro has recently completed an index which will help people access the contents of all these various publications and help maintain the "corporate knowledge" therein. We acknowledge the work of Margaret Stothart, a life member of Project Tongariro, who completed this meticulous task. To access the archive go to www.tongariro.org.nz/tongarirojournalslibrary

Happy New Year.

Conservator's Comment

Paul Green

Change is inevitable in any organisation or in society generally. Aspirations, expectations, knowledge and technology all evolve and conservaton and park management is no exception. The challenge for managers and staff is to maximise the opportunities within the existing operating climate whilst predicting where the opportunities will be in the next five to ten years.

Current changes within the Department are driven by a number of factors. Some of these are:

- There is increasing public understanding that conservation and the economy are clearly linked. The contribution of ecosystem services like clean water and its value to the community is a clear example of this.
- A broad expectation the community wants to contribute to conservation. This includes iwi, community groups and business. Community groups have had a long involvement of working in conservation but this involvement has expanded and broadened greatly in the last 10 years. Iwi involvement is growing rapidly in conservation; particularly as treaty settlement occurs and iwi economic authorities become powerful economic players. For example, in the East Coast Bay of Plenty, iwi economic authorities have an estimated $7 billion economic base and iwi support of resources is long-term and conservation is a priority for iwi along with an increased desire to be involved in tourism.

- Recognising the potential for commercial businesses to be involved in conservation is more recent and growing. Comalco (kakapo) and Genesis Energy (whio) are two excellent examples.
- It is clear that the Department cannot achieve protection of New Zealand biodiversity on its own. The task is enormous and the impact of introduced animals and plants on our ecosystems and places continue to threaten. The world recession impacts on New Zealand's economy and there is less money for conservation and other government services. We must do our work more efficiently and prioritise.
- Within the Department, there has been an increased awareness that we must be more consistent and act as 'one' organisation. This does not mean that the same decision will be made all the time but we do need to ensure that the same factors have been considered.
- The Department's organisational structure needs to reflect the new environment in which we are working and in particular, recognise that the Department is only one

player in conservation. The new conservancy structure clearly identifies this with the addition of three management positions focused on Business Development, Iwi Business and Community Support. Dedicated positions targeted at community outreach and technical advice to community groups are other examples.

We are now moving towards a review of the way in which we deliver conservation at the Area level. There will be budgeting factors to consider but we also need to ensure that the Area structure is designed to provide conservation taking into account the factors highlighted above. In particular the role of the community (iwi, business, and community groups). An aspirational goal of the Department is the so-called 60:40. To paraphrase Al Morrison's words, we need to carry on doing the work we do now, and that by working in partnership with others and encouraging more partners in conservation we can achieve more than twice as much as we can working on our own.

The challenges for the future are exciting and there will be lots of opportunities. Some will take time to take shape. The biggest opportunity I see within the Conservancy is develop relationships and partnerships with iwi.

Above: Paul Green addresses iwi, staff and volunteers during the opening of the new Waihohonu hut. *Photo: Jimmy Johnson*

Right: DOC staff from around the central North Island and beyond were called in as part of the initial response to the grounding of the Rena on the Astrolabe Reef off Motiti Island in the Bay of Plenty. *Photo: Harry Keys*

Until now, efforts have been constrained because of a focus on treaty claim resolution and because there have not been shared values and goals between the Crown and Iwi. I personally believe shared values and goals at Tongariro are very possible.

Cultural values have been gained increasing prominence (beyond iwi) since the evolution of the Department in 1987 and the requirement of management to recognise the principles of the Treaty of Waitangi. The inscription of Tongariro National Park on the World Heritage list for its cultural values provides an appropriate platform for these shared values to be developed.

Biodiversity values have been shared for a long time. Working through the implications of recreation and tourism values will be the challenge and will hopefully be seen as an opportunity over the next 10 years.

At a Department level the big challenge for the future is balancing the need to achieve highest priority work, eg, protect the most nationally vulnerable species and ecosystems with its desire to work with communities to achieve the community's priorities for conservation. The two prioritisation systems will not always match and there will be tension. This tension needs open discussion with the community and clarity about what the Department can fund.

If the Department is to have a successful innovative and encouraging relationship with the community, there must be this open discussion. In its administration work, the Department must always remind itself that conservation is not that complicated. There are only so many ways to control animal or weed pests or to build and maintain visitor assets! Sure, innovation will always occur and needs to be encouraged. And yes, we do need to ensure that work is carried out in a safe manner but we mustn't include unnecessary administrative conditions that frustrate staff and particularly the community.

Change will continue to occur. I challenge everyone to pause now and again and to look back and consider what has been achieved. What do we want to keep achieving, what do we want to change? What have we lost? Can we bring it back? Think long term but act now.

After a career of 30 plus years I now move from the Department to the community. And yes, I am interested. I will continue to watch and learn. I do want to be involved.

Paul receiving a carved walking stick or 'tokotoko' from Tuwharetoa kaumatua Jim Maniapoto and Te Kanawa Pitiroi in recognition of his service to the area.
Photo: Jimmy Johnson

Volcano Watch 2011

Harry Keys

It has been yet another quiet year for the volcanoes of Tongariro. The most significant volcanic event that affected New Zealand was the ash cloud from the eruption of Puyehue-Cordon Caulle in Chile.

Ruapehu

The volcano has had three interesting periods in the last 12 months, including a warm lake water temperature peak in February-March, a relatively long cool period and recently what has been described as a "failed eruption".

The temperature maximum of 41° C on 1 March was the warmest since 42.5° C was recorded in March 2003. The warming started in October 2010 and at its peak was accompanied by minor but significant changes in lake chemistry, increases in carbon dioxide gas emissions and minor increases in seismic activity beneath the volcano with many epicentres close to Crater Lake. This dataset marked an elevated level of volcanic unrest and GNS Science raised the Aviation Colour Code to yellow. This is a new system for advising on volcano status principally for international aviation. The main Volcanic Alert Level remained at Level 1 as that already reflected the state of unrest. The yellow code was reduced back to green on 2 May as the heating and seismicity had declined.

In July Crater Lake began a period with temperatures below 20°C perhaps assisted by a severe storm period in the first half of the month. Temperatures then remained in the 17-21°C range until late October, which is the longest period of cool temperatures since the winter of 2004. Significantly perhaps the amount of hydrogen sulphide gas from the lake increased from at least mid August, and numerous people at the ski areas commented on the smell. The increase in this gas is believed to be due to chemical reactions involving outgassing magmatic carbon dioxide and sulphur, with gas and heat flow being partially restricted in the vent (Bruce Christenson, GNS Science, personal communication). The scenario is consistent with minor changes in the chemistry of the lake and cooler lake temperatures. There was no indication from seismic or other gas measurements of an impending event but the cool temperatures were perhaps an indication of an increased potential for something!

As usual, temperatures eventually started to rise again reaching 36° C in early December. In early November GNS reported a period of noticeable upwelling in the lake without any accompanying seismicity. The lake temperature increased relatively rapidly during mid November with seismic tremor. On 19 November a volcanic earthquake occurred with a long period (slow) component suggestive of some volcanic-magmatic event perhaps at about 2 km depth. Some of the geophysical phenomena involved were similar to a small eruption, perhaps with increased upwelling and overflow, but there was no blast and parameters were not of sufficient magnitude to trigger the Eruption Detection System. At the meeting of the Central Plateau Volcanic Advisory Group Brad Scott (GNS) described the 19 November event as a "failed eruption".

Warning systems

The upgrade of the Eruption Detection System (EDS) is proceeding well. Work has been completed on Whakapapa ski area apart from a backup tone alarm for RAL staff radios. All the bugs directly affecting the ski area have been ironed out.

Construction of the bunker on Glacier Knob (Figure 1) that is to replace the Dome facility has begun and the concrete floor poured on 30 November. It is scheduled to be completed by the 2012 winter, thanks to RAL picking up the construction contract and to additional funding from the Earthquake Commission. Equipment for EDS, GeoNet and volcanic research is all planned to be installed by next winter. The facility will be called Matarangi (Guardian of the Heights). Further to discussions documented in last year's Tongariro Journal, the new facility will not incorporate a climate mast due to concerns about visual impact and the ability of climate sensors to operate at the site. GNS have advised that gas from the volcano can be measured sufficiently accurately without a mast.

Figure 1: The completed earthworks for Matarangi as at March 2011 showing the casing exposed above the borehole. This 50m deep hole will be fitted with a downhole seismometer to detect subtle seismic data, and a tiltmeter which may allow detection of the minute inflation of the volcano that is thought to precede many eruptions. *Photo: Harry Keys*

On 29 September the annual test of the Eruption Detection System (EDS) was conducted by DOC, GNS Science and Ruapehu Alpine Lifts (RAL). The upgraded system was found to be functioning well, with RAL staff responding quickly and effectively. As with previous tests the vast majority of members of the public responded appropriately and quickly got to higher ground above the bottom of the valleys, safe from possible lahars. A new speaker installed at the top of Knoll Ridge has improved audibility of the sirens and messages in The Gut.

Figure 2 : DOC staff helping the NZ Alpine Club during major maintenance of Whangaehu Hut. *Photo: Jimmy Johnson*

Meanwhile the Eastern Ruapehu Lahar Detection System (ERLAWS) has also been upgraded in conjunction with our partner Genesis Energy. Massey University and Horizons Regional Council have added a camera and other equipment at Tukino which increases the ability to detect hazards. In recognition of the importance of Whangaehu Hut to EDS and ERLAWS, DOC and GNS Science provided significant assistance to the NZ Alpine Club in their maintenance of this hut late in the summer (Figure 2).

We have also been working on integrating the response to ERLAWS and EDS, including working within the coordinating auspices of the Central Plateau Volcanic Advisory Group that is managed by the regional councils. NZ Army, Kiwi Rail and Ernslaw1 are active partners in this, as well as the Police, GNS and Genesis. We hope Transpower and Ruapehu District Council will soon be too.

Tongariro and Ngauruhoe

Seismic signals referred to as "tornillos" have again been detected under Tongariro near Te Maari craters. The upper crater is the site of the most recent eruption on Tongariro which occurred in 1897. Tornillos were first recorded there in 2001 and are thought to be related to the geothermal system under the volcano.

Soil and gas temperatures at Tongariro and Ngauruhoe have not changed significantly over recent years. Water temperatures at Emerald Lakes appear to depend mostly on climate and weather. No further significant seismicity has been detected at Ngauruhoe.

Puyehue-Cordon Caulle - Chile

A new vent on the Cordon Caulle portion of a five km-long rift on the 2236 m volcanic massif erupted on 4 June. This was after almost 7 weeks of precursory seismic activity and steadily raised alert levels. Ashfall was widespread especially across Argentina (Figure 3) and, together with wind and lahars, caused huge disruption to pastoral and fish farming, water and electricity supplies, air transport, local and international roads and tourism (Figure 4). Up to 4200 people living near the volcano were evacuated from their homes and farms from the morning before the eruption until 19 June. Some self-evacuees in Argentina took even longer to return home even though in most places roads were reopened and essential services restored within days. Fortuitously, Karen and I had planned to travel in this area and visited it 3-5 weeks after the initial eruption. We were able to get a good glimpse

Figure 3 (above): Ashfall deposition map from Argentinian magazine *Noticias* 25 June showing the most affected zone with tephra (mainly ash) thicknesses greater than about 2 mm in red.

Figure 4 (right): Cleanup of sand- and gravel-sized tephra in progress on 30 June at Villa La Angostura, 50 km east of the volcano where there was about 10 mm of deposition. *Photo: Harry Keys*

of the effects of the eruption, its cleanup and the response of officials and the public. The eruption showed how scientists, central and local government authorities in Chile have learnt how to respond effectively and proactively to a large eruption. It took several days for them to get on top of such a difficult situation, and clearly much longer for things to return to normal.

The spectacular plumes of ash from Cordon-Caulle reached altitudes of 12 km and circled the southern hemisphere between about 40 and 70 °S latitude at least twice. The ash cloud, which reached New Zealand on 11 June (Figure 5), caused cancellations and delays of up to several days in domestic, trans-Tasman and south Pacific, Atlantic and Indian Ocean flights for almost two weeks. Wiki, quoting various sources, estimated costs to Australian airlines, airports and tourism industry as over A$50 million. Air New Zealand was less disrupted than Qantas and Virgin Australia and the costs in New Zealand were much less because of work done here after the 1995-96 eruption by the aviation industry, Civil Aviation Authority, GNS Science, Meteorological Service and the Earthquake Commission.

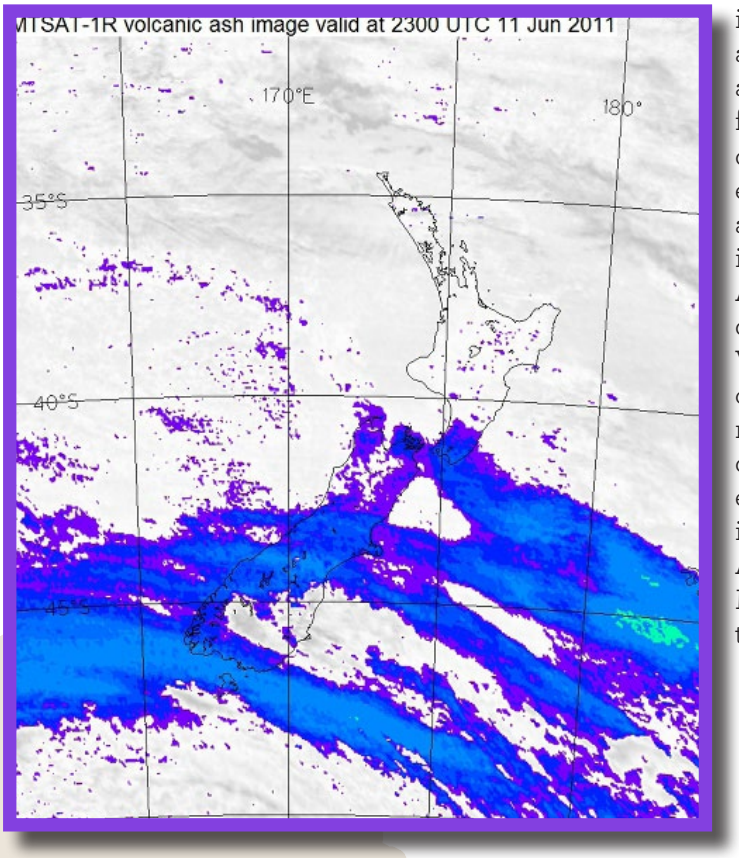


Figure 5: Enhanced satellite image from the Japan Meteorological Agency showing layers of ash plume over New Zealand on 11 June 2011.

It was very different in parts of Argentina. According to a news article, the first commercial plane landed at the airport in Bariloche, about 100 km SE of the volcano, on 17 September, 15 weeks after the airport had closed on 4 June. Private planes had been occasionally using the airport since mid-July. The Alert Level was still at red on 6 December with incandescence at night and plumes carrying a minor ash load rising up to about 3 km and drifting for 100 km. Some flights in Uruguay and Argentina were cancelled on days in late November.

Additional information from GNS Science Volcanic Alert Bulletins Rua 11/02, 03 & 05, weekly volcano reports of the Smithsonian/US Geological Survey, and Wiki. Acknowledgements also to Gill and Art Jolly, Bruce Christenson, Craig Miller, Steve Sherburn, Brad Scott, Mark Chadwick, Tony Hurst, Karen Britten, Jeremy Cole-Baker and others at GNS Science, Hugh Cowan and the Earthquake Commission, Fernando Gil of the Volcano Observatory of Southern Chile (OVDAS-SERNAGEOMIN) and Gloria Hidalgo and Alan Granson, Pucon municipal authority. Thanks also to Ambassador Rosie Patterson and staff of the NZ Embassy in Santiago.

Kiwi and Whio in Tongariro Forest Conservation Area

Nicole Sutton, Rob Hood and Alison Beath

Introduction

Tongariro Forest Conservation Area is a 20,000 ha area of regenerating podocarp forest located between the Whakapapa and Whanganui rivers. This area includes the Tongariro Forest Kiwi Sanctuary (TFKS), one of five nationally designated kiwi sanctuaries, which is the focus of intensive kiwi protection and monitoring work. The three rivers bordering Tongariro Forest make up the Tongariro Forest Security Site a nationally recognised security site for the endangered whio (blue duck).

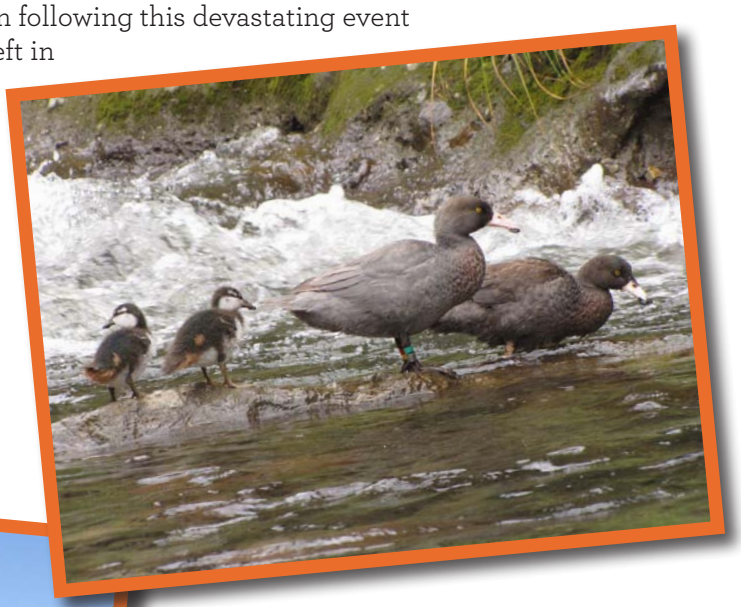
The Animal Health Board undertakes large-scale possum control across the region to maintain low incidence of bovine tuberculosis in deer and cattle by keeping possums (the main transmitter of the disease) at very low numbers. There was an aerial 1080 operation in Tongariro Forest in September 2006, when 14,000 ha were treated. Monitoring of kiwi, whio, and fantails, was undertaken to determine if a reduction in predation pressure from stoats (which are killed after eating poisoned rat and possum carcasses) and rats would result in an increase in kiwi chick survival, fantail nest success, and whio duckling hatch success. This "BACI" ("Before After Control Impact") styled experiment showed that kiwi chick survival, along with the ability of fantails to fledge young, increased dramatically in the two breeding seasons after 1080. However by the third season, both kiwi chick survival and the number of fantail fledglings had dropped back down to pre-1080 levels as stoat and rat populations recovered (see Figure 1). Following the 1080 operation, the number of whio pairs that successfully hatched ducklings in Tongariro Forest increased, and then increased further as trapping began on the rivers, but then declined. In September 2011 Tongariro Forest was again treated with 1080 cereal baits applied aerially using a helicopter. See separate article on the 1080 operation.

Kiwi update

Following the aerial 1080 operation in 2006, kiwi chick survival more than doubled for two breeding seasons (going from 27% to 69% and 59% respectively). Then the 2008/2009 season saw a return to low kiwi chick survival (21%) as predator levels increased. In 2009/2010, with another 1080 operation not scheduled to happen until 2011, the TFKS went back to using Operation Nest Egg (ONE). Eggs are hatched in captivity and chicks are grown to a weight where they have a good chance of fighting off a stoat (>1 kg). This approach was modified slightly for TFKS in that chicks were removed from several nests, instead of eggs, and taken straight to Warrenheip, a 16 ha predator-proof enclosure in the Waikato.

But disaster struck in March 2010, when 11 of the 13 chicks in Warrenheip were confirmed dead. The majority of the dead kiwi showed evidence of stoat predation. This was later confirmed by the capture of two stoats within the 16 ha area. The two surviving kiwi were caught and transferred to The National Kiwi Trust at Kiwi Encounter prior to release back into TFKS. In the season following this devastating event (2010/2011) kiwi chicks were again left in TFKS and monitored for survival.

Since 2009 there have been a high number of adult kiwi deaths in TFKS, mainly due to ferret predations. With their strong legs and big claws, adult kiwi can fight off most mammalian predators, with the exception of ferrets and dogs. Traditionally ferrets live in pasture and on forest margins, but some have clearly moved well into TFKS. Adult survival has decreased from 98% to 91% in the last three years. This may not seem like a huge decrease but when one considers that it lowers the average life expectancy from 46 years down to 12 years, the dire effect on the population is more apparent. However, the 1080 applied aerially in September 2011 provides hope that, like stoats, ferrets will also be susceptible to secondary poisoning.



Previous page: Kiwi rangers Jerome Guillotel and Alison Beath with Taika's chicks prior to release. *Photo: DOC*

Above top: Whio pair with ducklings on the Mangatepopo River in January 2011. *Photo: Bubs Smith*

Above: Looking across to Ruapehu and Ngauruhoe from Tongariro Forest. *Photo: Gina Heron TNHS*

Whio update

Tongariro Forest Whio Security Site is one of eight priority sites nationally designated for whio (blue duck) protection that have the goal of securing 50 pairs within a predator controlled area within 10 years (2019). Predation is the key threat to whio survival, so each of the three rivers (Whakapapa, Mangatepopo and Whanganui) within the site has three trap lines along them. Stoats are the main target of this trapping regime.

Areas around the rivers have also been treated with aerial 1080 in both 2006 and 2007 (the Tongariro Forest 1080 operation followed by an aerial 1080 operation in Pukepoto Forest in the following year).

Water from all three rivers is abstracted as part of the Tongariro Power Scheme. New resource consents granted for the Tongariro Power Scheme came into effect in December 2004. These consents required the establishment of new minimum flows on the Mangatepopo and the Whanganui River. This minimum flow establishment has resulted in an improvement in habitat quality of whio.

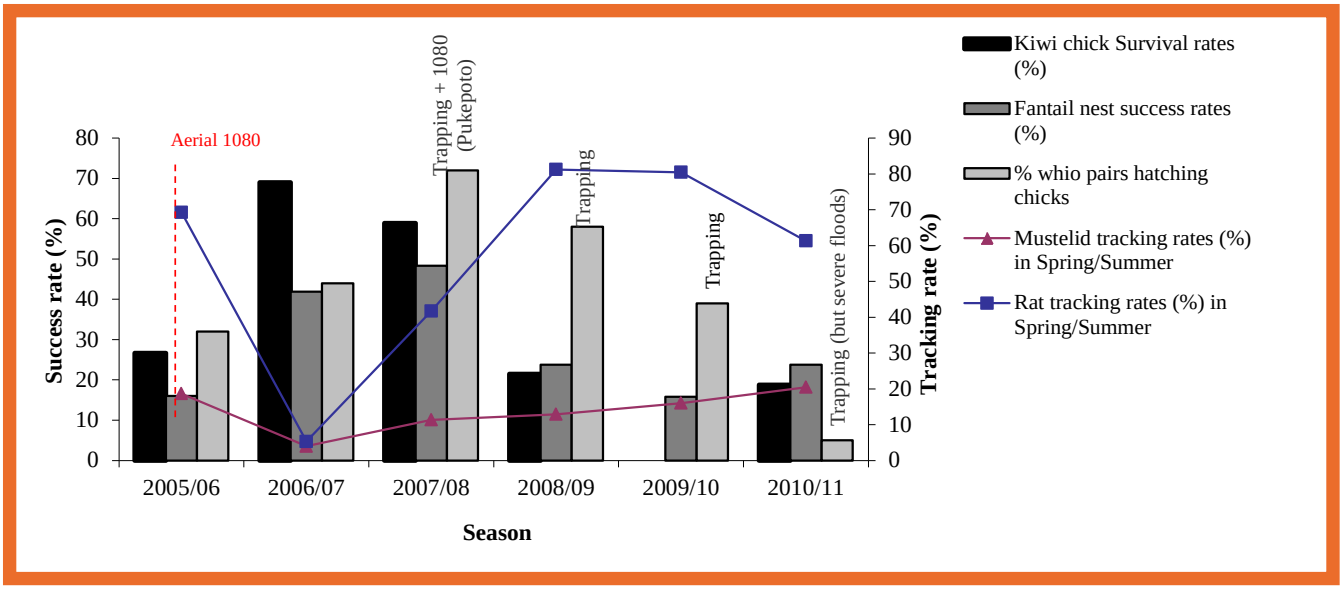


Figure 1: Survival and breeding success rates for two years to kiwi and other native species, including whio and fantails, following the Tongariro Forest aerial 1080 operation in 2006.

A combined approach to predator control using trapping and aerial 1080 has resulted in an increase in whio pairs (see Figure 2). This predator control has also benefited productivity, with big increases in the number of ducklings successfully fledged. Fledgling production per pair was highest when there was both 1080 and trapping (86 chicks hatched and 67 fledged), which is four times the productivity prior to predator control.

From 2004 to 2009, whio produced 255 ducklings on the three rivers, with 72% fledging. A total of 121 juvenile whio were banded from 2004 to 2009. Of these, 45% have been re-sighted in the study area. The longest known dispersal distance was 30 km to the Tongariro River near Turangi.

In the last breeding season (2010/2011), 46 pairs of whio were resident on the Tongariro Forest Whio Security Site rivers, with 40 of these protected under the trapping regime. However, nest success and duckling survival was severely impacted by extensive flooding in September and December 2010 and only five fledged. (Figure 1)

The latest aerial 1080 operation, carried out in Tongariro Forest in September 2011, covered a similar area to the 2006 aerial 1080 operation. At the time of writing, the aerial 1080 operation, in combination with the predator trapping and a lack of floods, has resulted in over 100 ducklings hatching so far this season in the security site and at least 70 more outside it.

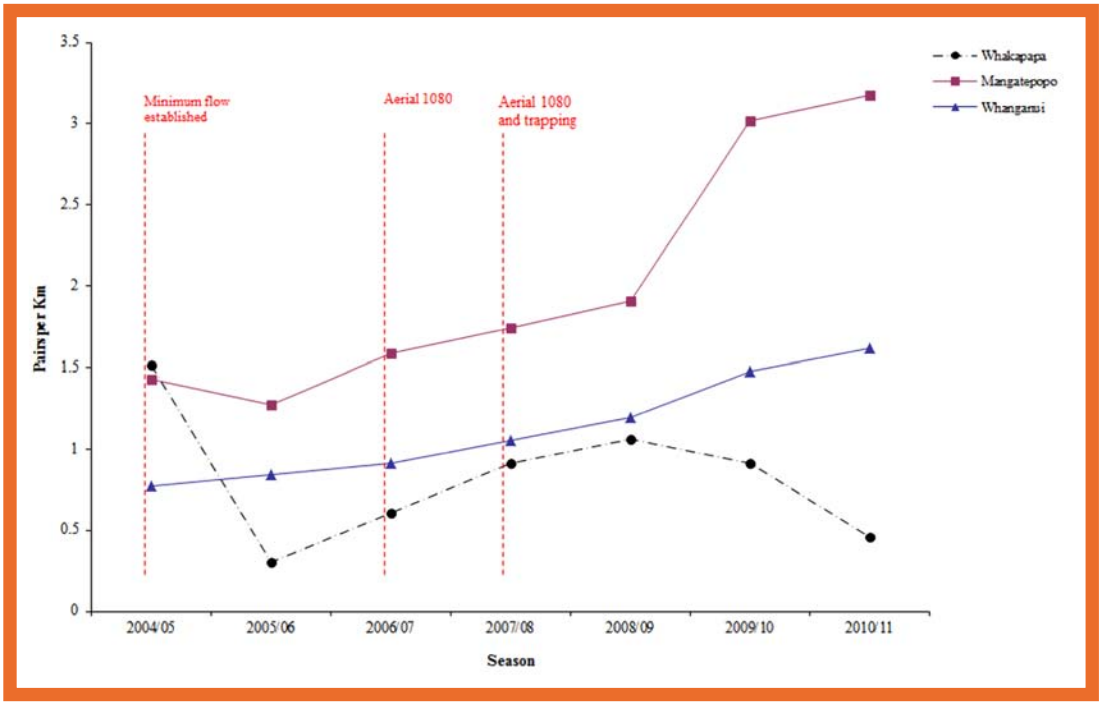


Figure 2: The number of pairs of whio per kilometre on the Whakapapa, Mangatepopo and Whanganui Rivers, 2004 to 2011.

Secrets of the Waimarino Pa: A Final Refuge

Angela Scott

High on the cliffs of the Waimarino River lies an ancient fortress whose past secrets have long since remained forgotten and undisturbed. Fortuitously shrouded by the natural landscape and the passage of time, the remnants of this ancient fortification have remained as much a mystery as its inhabitants, who are thought to have settled and lived in the Taupo region several hundred years ago. Who were these people who lived and fortified the Waimarino? Recent efforts by the Department of Conservation and local hapu Ngati Hine to investigate this refuge site have led to a number of important archaeological finds, and raised more questions about the history of Lake Taupo and interaction between its elusive, early inhabitants.

It was a late autumnal day in May this year when a team of historic specialists, Department of Conservation staff, and students from the Ngati Tuwharetoa Te Reo Wananga made a hikoi into the heartland of the Waimarino to the site of an ancient refuge, commonly referred to as the Waimarino Pa. The team braved freezing river water and dense scrub, followed by a steep ascent to the pa site located in the secluded interior, to reach the top of the pa located on the cliff top above the Waimarino River.

The aim of the investigation was to learn more about the pa's unique defensive features which included a double ditch defence and a number of palisade posts still lying in situ. An archaeological investigation of the sub-surface features of the pa was carried out using non-invasive geophysical surveying equipment to identify the main features of the pa including house floors, storage pits, and hearths. The identification of these 'living spaces' provides a clearer picture of the defensive strategies and layout of the site, and allows us to build a better picture of the lives of the inhabitants. The more information that is gathered about the site will allow greater protection of its cultural and historical values.

Members of the local hapu were able to assist in the survey (see picture) and received basic training on the principles of archaeological survey. A transect (grid) was set up across the main terrace of the site and the data was recorded at 0.2 intervals. The results were then analysed and displayed on a map using standard Teslaview 1.0 GIS software. The map (see Figure 1) revealed that the main occupation areas of the Waimarino Pa were bounded to the north by a deep trench and to the south by a step river bank. This provided an ideal natural defence and meant only the southern boundary required ditches and palisade features. The two main terraces also revealed multiple house platforms both visible and non-visible on the surface of the pa and a number of fireplaces and hangi showing multiple cooking events i.e. cooking areas.

The results of the archaeological survey revealed the Waimarino to have been occupied for one or several short periods by a relatively small number of people and its original interpretation as a refugee pa are consistent with the archaeological features. Little is known about the original occupants of the site but according to local hapu the site

is thought to have belonged to Ngati Hotu, a Polynesian tribe that first occupied Taupo and Rotoaira region in the 15th century. The arrival of Ngati Tuwharetoa led to a number of conflicts between the two tribes for land and resources.

According to oral histories, after a number of skirmishes and battles over a few decades, Ngati Hotu was extinguished by Ngati Tuwharetoa. Evidence for this conflict is further supported by the impressive earthworks and distribution of archaeological features found within the Waimarino Pa.

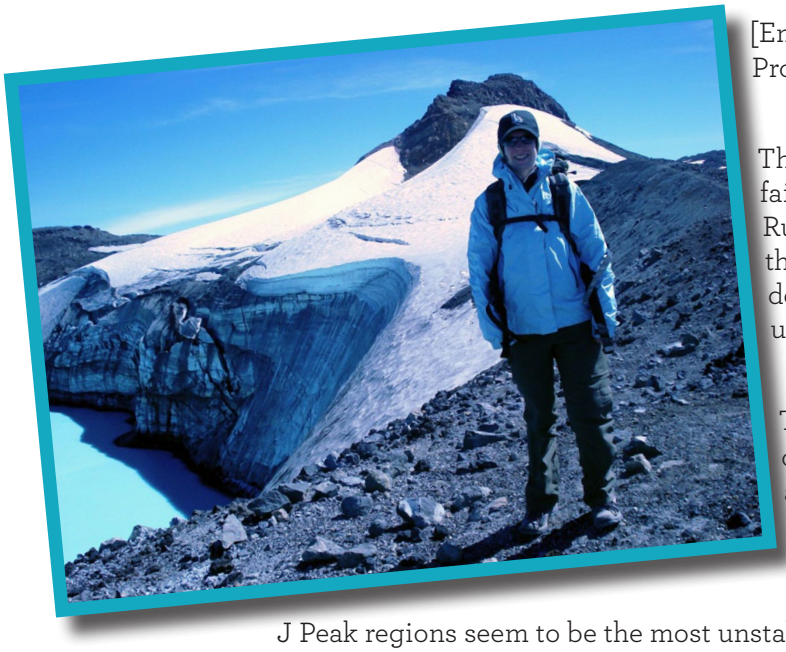
Future investigations at the site will concentrate on the denser habitation areas of the pa, with a particular focus on the house floors and hearths. The charcoal remains from the hearths and fire places may be used to obtain carbon 14 dates. This would be a key to understanding the real age of the site. A DEM (digital elevation model) of the site is also planned which would include a 3D model of the pa and its surrounding landscape. The use of this technology to interpret the pa will provide a greater context and better understanding of the pa and its relationship to the natural environment. It will also allow people to view the pa without having to visit the site.

The use of non-invasive surveying methods to interpret the Waimarino Pa has provided a tantalizing glimpse of early life and warfare in the Taupo region. The geophysical evidence has revealed some interesting results relating to the frequency and occupation of the site and raised further questions about the chronology and dating. Future investigations will be focused on interpreting the wider context of the site and landscape, and importantly, exploring the oral histories of the tangata whenua of the region. A holistic approach to the interpretation of the site will be used so that Department of Conservation staff and the local community can continue to engage on their Waimarino journey.

Previous page: Local hapu, wananga with Eru Biddle and DOC staff in discussion with Hans Dieter-Bader about investigating and interpreting the site. *Photo: Harry Keys*
Above: Ray Bond (DOC) explores the impressive defensive ditch. *Photo: Harry Keys*
Figure 1: Map showing geophysical results of pa with features overlaid.

Modelling the Eastern Rim Failure, Mt Ruapehu

Emma Phillips



Emma during field work at Crater Lake. *Photo: Emma Phillips*

[Emma was one of two university who received Project Tongariro Memorial Awards in 2010.]

The study forecasted the consequences of the failure of the eastern rim of Crater Lake, Mt Ruapehu. This involved mapping the geology of the eastern rim and modelling various volcanic debris avalanches from the upper eastern flanks using a granular flow model, Titan2D.

This study agreed with past stability studies of the eastern crater that the Pyramid Peak area has been relatively stable since historic observations started and this area is likely to remain stable in current conditions due to its broad nature. The Stump Saddle and J Peak regions seem to be the most unstable as they have been altered the most over time (including the last few years and decades) and contain a number of rim faults/ fractures. The structural integrity of the entire eastern rim, however, could be altered by an increase in low magnitude volcano-seismic activity or phreatic eruptions, or the occurrence of a greater magnitude event (extensive magmatic intrusion or an explosive eruption). More simply a change in the hydrothermal system around the vent system could increase the weathering and weaken the eastern crater rim putting increased pressure on the crater wall from the Crater Lake or pore water.

The collapse scenarios in this study were used to depict what could happen if the eastern rim failed. A range of collapse volumes were simulated by Titan2D to model the different sized events that were possible based in observed and inferred geology. Modelling of the simulated flows suggested that as expected the Bund would be completely inundated by any substantial collapse event from the eastern rim of Mt Ruapehu involving more than about 2.5% of the eastern crater rim (Figure 1). The resulting mass flows would also destroy the Alpine Club hut, affect sections of the Round -the -Mountain Track and Tukino Road and avulse (cross-over) into northern catchments upstream of the Bund. Modelling more substantial collapses suggest they would also affect Tukino ski area, part of Tukino Village, the Army Training Area, the transmission lines and a small part of State Highway 1.

Over the evolutionary history of the ring plain, flows have migrated from the north to the south and back again. This is due to changes in topography and elevation from erosion and deposition of volcanic material and other influences such as climate, faulting, and moraines. From the inundation area of the simulated debris avalanches in this study, and mapped inundations of past volcanic mass flows, it can be seen that debris flows, lahars and avalanches on the eastern ring plain are currently migrating northward, a concern for the Tongariro River catchment.

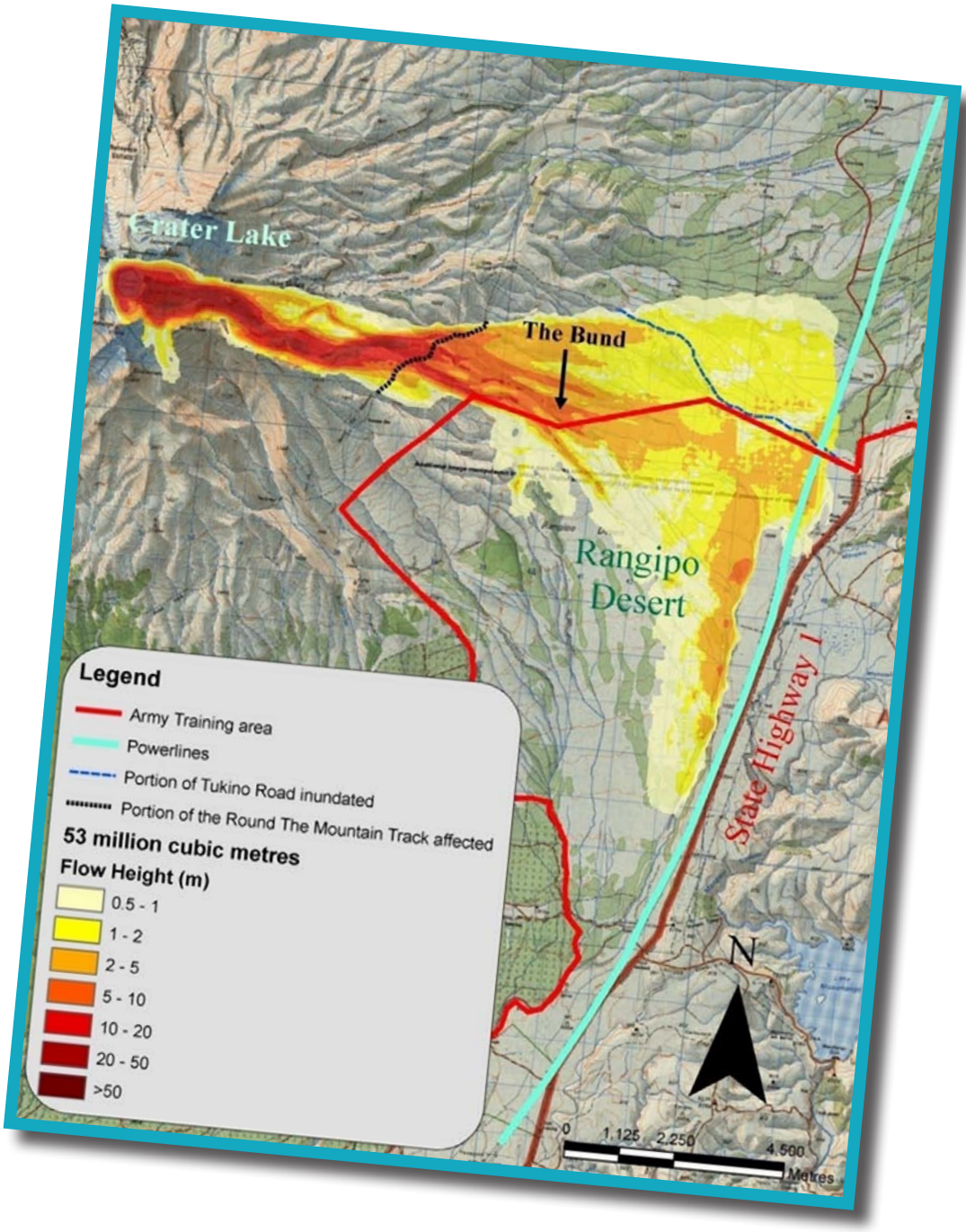


Figure 1: Inundation area and maximum flow heights of the largest collapse scenario, 53 million cubic metres (100% of the entire eastern rim). This scenario includes the release of Crater Lake water, as well as the rim material.

The Mangatoetoenui, Upper Waikato, Tongariro and Whangaehu River catchments could be greatly affected by a sudden collapse of the eastern rim and any subsequent lahar events.

A more detailed study of the eastern rim needs to be completed to define the structure and stability of lower units that were unable to be studied here. Continual monitoring of the stability of the eastern rim of Mt Ruapehu is recommended and the potential impact of a possible collapse event needs to be included into current hazard maps and mitigation plans.

Project Tongariro – the Tongariro Natural History Society in 2011

Karen Williams, President

The Society continued strongly during the 2010-2011 year, adapting to changing staff, economic conditions and other challenges.

This was the first year of operating using the Project Tongariro brand. This is intended to assist people to better understand who we are and what we do and to raise our profile in the communities where we work.

It was the end of an era in another way too. After more than seven years with the Society, Sarah Gibb, our director since July 2002 moved on to a new job in Hamilton. Sarah's achievements are too numerous to list here. Suffice to say she enjoyed the confidence and support of the executive and members, brought many conservation projects to life, won hundreds of thousands of dollars in funding and fostered a fabulous group of volunteers who completed an ambitious programme of activities each year.

The retirement of Conservator Paul Green QSM in April also marked a watershed, especially for our Department of Conservation partners in the Tongariro/Taupo Conservancy (now Tongariro-Whanganui-Taranaki Conservancy). Paul was Chief Ranger of Tongariro National Park from the early 1980s up to 1987 and with the creation of the Department he then led the Tongariro/Taupo Conservancy from 1987 until 2011. Paul has been connected with the Tongariro Natural History Society from the start and has served as the department's honorary member on our executive since 1987. His outstanding contribution to the Society was acknowledged at the 2010 AGM when he was made a life member.

Above: Bill Fleury at the Moawhango Dam telling society members about the fascinating ecology and history of the Army land. *Photo: Harry Keys*

Mark Davies who was the Area Manager at Whakapapa from 1995-2005 is Paul's replacement. Already a member of our executive, Mark is now the official department representative.

Nina Manning was appointed as the Society's coordinator in January 2011, to work 20 hours week, taking over some, but not all aspects of Sarah's role. Her focus is to facilitate our annual business and work plan including seeking ongoing funding assistance, organising conservation work alongside DOC at our key restoration sites Rotopounamu and Te Mataapuna (South Lake Taupo wetlands), coordinating volunteer input, organising members' field trips and running the day to day business of the Society. Nina is now on maternity leave for a year and Kiri TeWano has taken on the role. (Stop press: Nina and Aaron had a baby boy, 4.8 kg, in December. Congratulations!)

Over the 2010/2011 summer, Nina and DOC ranger Jo Nash worked together with our four conservation interns. Waikato University students Stacey Bryan, Gina Heron, Kaitlin Morrison and Kris Taipeti all helped DOC with pest control, blue duck monitoring, kiwi in

Tongariro Forest, short-tailed bats at southern Ruapehu, Hapuawhenua viaduct painting, and weed control especially willows at Te Mataapuna. This work was generously supported by funds from Craters of the Moon and Waikato University.

Other funders who assisted us in our work for the year ending June 2011 were the Pacific Conservation and Development Trust, The Pharazyn Trust, Huckleberry's, DOC, Waikato Catchment Ecological Enhancement Trust (WCEET) and The Park Travellers Lodge. In October 2010 Project Tongariro signed a memo of understanding with Ruapehu Alpine Lifts. We now have a presence on the company's very popular website and earlier this year RAL sold an old chairlift at auction this year donating the proceeds to Project Tongariro.

Above: Iwi and staff from Ruapehu Alpine Lifts and DOC after the blessing of the Stone Drive building at Whakapapa Ski Area. This may be a new restoration project involving Project Tongariro. *Photo: Karen Williams*

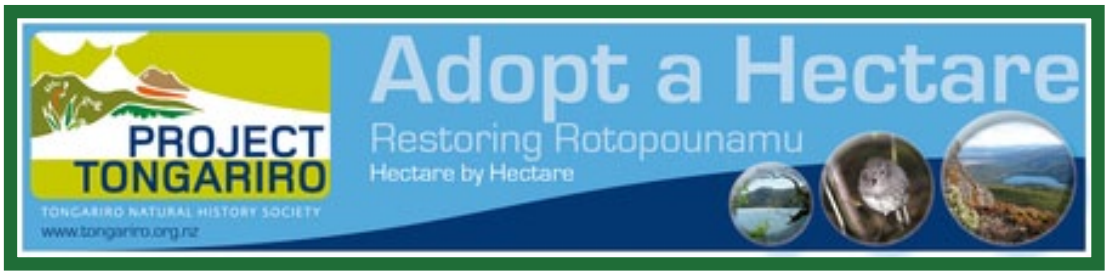
Right: Dead grey willows controlled in the Te Mataapuna project. *Photo: Karen Williams*

In another new development, the executive have contracted Kim Manunui to assist the Society with its marketing. Kim manages the content on our website and sends out newsletters via email every two months. She is also working with us on a number of other exciting projects to help raise our profile.

One such project is a 'pocket ranger' for the Tongariro Alpine Crossing – launched at Labour Weekend. A brainchild of Dave Conley, this is a downloadable phone application providing information, video and stories about the Crossing for free on any Smartphone (both iPhone and Android). This app project ticked all the boxes for Project Tongariro. It is hoped it will be a useful planning and interpretation tool for visitors and help people to be better prepared on the Crossing. It also provides some amazing profile-building opportunities for us and it is taking Project Tongariro and conservation alike on a new path into the wide world of technology. The Pocket Ranger has also allowed Project Tongariro to set up some neat partnerships with businesses in the local area which will help in the conservation efforts that Project Tongariro undertakes each year.

Go to www.tongariro.org.nz/pocketranger to download the Pocket Ranger

Kim is also marketing our new 'adopt a hectare' campaign. Since 2005, Project Tongariro has 'invested' close to a quarter of a million dollars at Lake Rotopounamu to reduce pests, increase native birdlife and promote general forest health. It takes about $100 per hectare per year to do this. To assist the long term sustainability of this restoration campaign we now offer individuals and businesses the chance to participate by 'adopting' a hectare for $100 per year. This is a tried and true formula in action at Mt Bruce, Zealandia and Arc in the Park. 30 hectares have already been 'adopted' since we launched this initiative. That's $3000 towards our ongoing pest-control work with DOC during the bird nesting season to keep a safe haven for the increasing numbers of species (kaka, NZ falcon, kereru and North Island robin) since work began. The website www.tongariro.org.nz/adoptahectare has more details.



Rotopounamu requires ongoing funds to keep conservation work going there. *"Adopt a Hectare"* is a new way to seek funding from individuals. By adopting a hectare a donation is being made to assist the Restoring Rotopounamu Project. This is not a purchase of ownership, entitlement or other rights to the land but is a step towards making a visible and audible difference to this jewel of a place.

Finally, a warm acknowledgement of the work of all our wonderful volunteers – you know who you are and we need and value your ongoing support! For example a team led by Margi Keys tackled the weeds in the Alpine Garden following the 2011 AGM at Whakapapa. The 2011/12 calendar includes a wide array of ways to get involved including bird counts, species monitoring, kiwi egg transport, habitat restoration, tree planting, animal and weed pest control, historic surveys and restoration, and assistance with event management.

Executive committee member Peter McNaughton led a large contingent of members in the Army Training Ground near Waiouru. This was a very interesting trip as we learnt about and experienced the details of the place with its fantastic landscape, ecology, history and horses. This is an example of the special opportunities Project Tongariro organises for members.

Some of the Kaimanawa wild horses in the tussock of the Army land with green farmland in the background.
Photo: Harry Keys

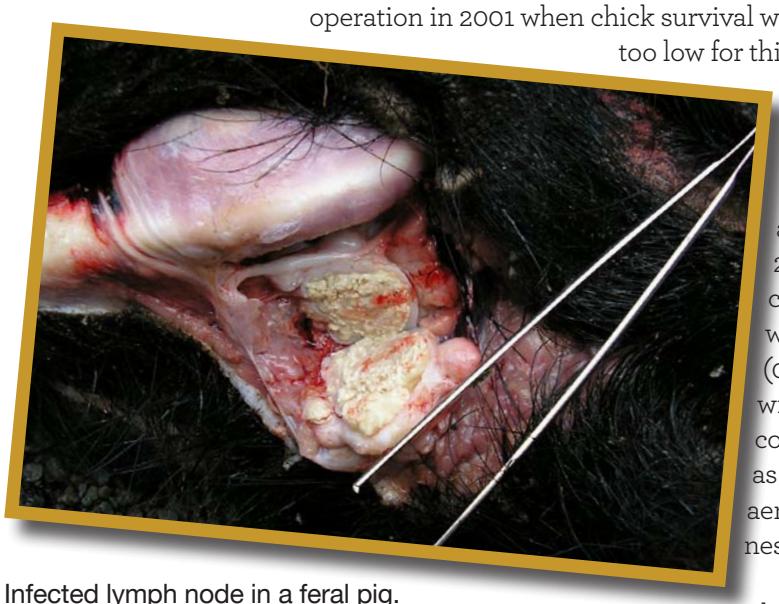
Tongariro Forest Aerial 1080 Operation 2011

Nick Poutu

Stoats are a major predator of kiwi chicks in our forests, and the main agent of decline for many kiwi populations. Methods of managing the threat of stoats to kiwi chicks have included removing chicks and 'creching' them in predator-free areas until they are less susceptible or, in-situ by controlling stoats using fairly labour intensive trapping methods. By 1996 it was also suspected that aerial 1080 operations (targeting possums and rats) might be an effective method for controlling stoats by secondary poisoning (the stoats eat poisoned rats and die). As Tongariro Forest has a significant population of western North Island Brown Kiwi and had an existing need for aerial 1080 operations for Tb vector control it was selected in 2000 as one of five kiwi sanctuaries around the country set up to investigate various methods to improve the protection of kiwi: the key objective for this sanctuary is to investigate the following management questions:

- Do aerial 1080 operations benefit kiwi chick survival?
- Can aerial 1080 operations benefit other forest birds preyed upon by rats?

Answering these questions requires a lot of work and cannot be done robustly without a good method that is repeated more than twice. Measuring the survival of kiwi chicks has been found to be a key part of such a method. The method was first tested after a 1080 operation in 2001 when chick survival was 40-45% but the number of chicks monitored was too low for this result to be robust. So the method was improved and following an aerial 1080 operation over the sanctuary in 2006 the survival rate of kiwi chicks in the subsequent 2006/07 and 2007/08 breeding seasons was measured to be 69% and 59%. This was a substantial improvement in chick survival over the 2005/06 season prior to the 1080 operation when chick survival was only 27%. Survival of kiwi chicks was also monitored in two more recent seasons (08/09, 10/11) without any large scale pest control with survival of only 21%, and 19%. Fantails are a common forest bird that is preyed upon by rats, and as a result of nine years monitoring it is clear that the aerial 1080 operations appear to also help improve their nesting success (see kiwi and whio article, page 12).



Infected lymph node in a feral pig.
Photo: Courtesy of Animal Health Board

The results of this research-by-management are very important because they are applicable to kiwi management and predator control nationally. For example, it has been found that intensive trapping of predators was insufficient in the early years at Okarito Kiwi Sanctuary, so management has recently switched to the aerial application of 1080. It has been decided to repeat the measure of kiwi chick survival following another aerial 1080 operation in September 2011. This will improve our confidence and understanding of how aerial 1080 can be best applied to help manage kiwi populations in different years and with varying predator dynamics.

The 2011 operation was again done in conjunction with the Animal Health Board (AHB). Their aim is to control possums to low numbers over large Tb vector management areas to minimise the risk of possums transmitting bovine tuberculosis to domestic cattle and deer

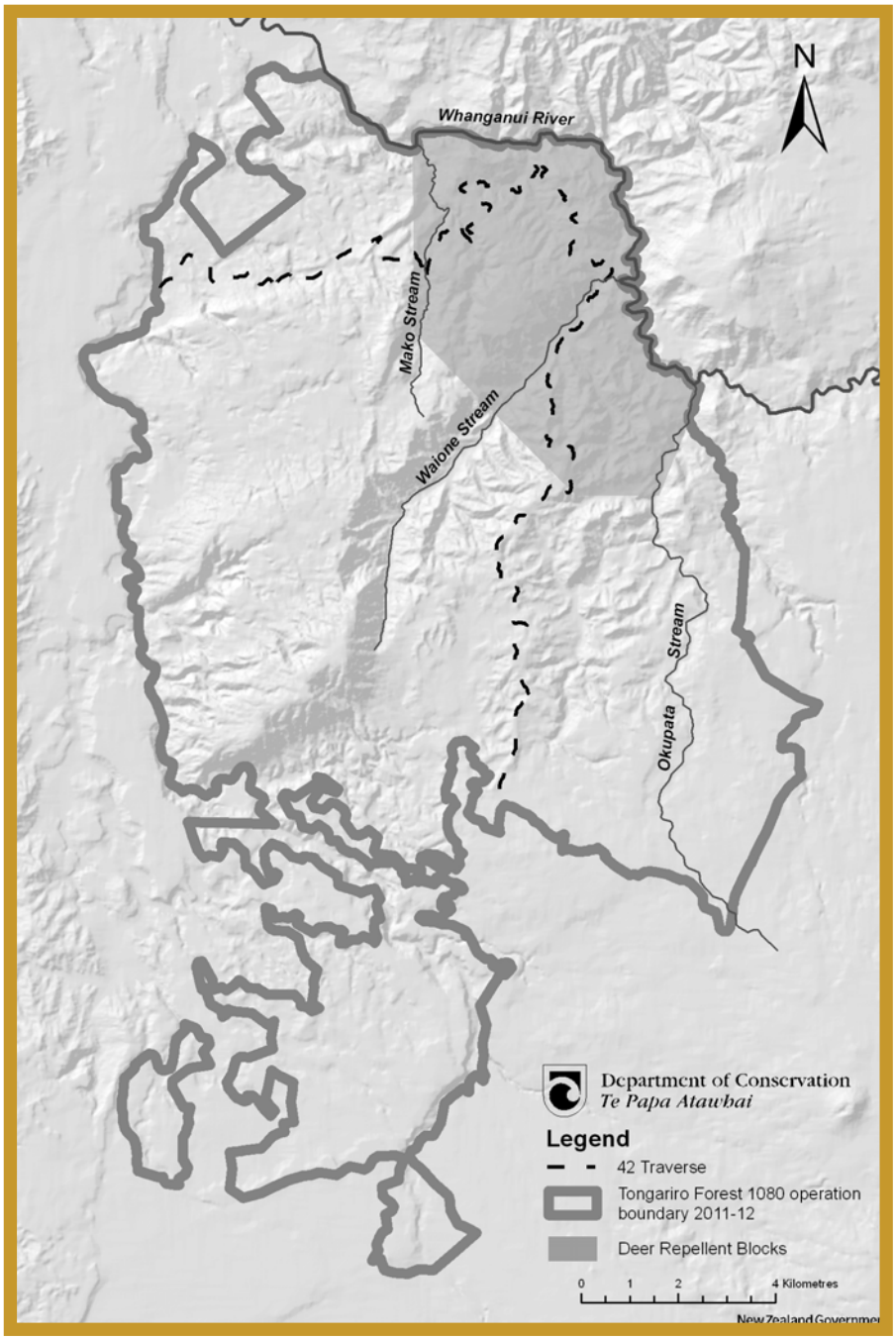


Figure 1: Map of operational area, showing area in the northeast where deer repellent was used.

herds. Beginning in mid-2010 staff from the Ruapehu Area Office and the AHB approached iwi and the wider community in the area, to outline the objectives of each agency and the rationale for the methods they were proposing to use. Community engagement efforts from previous operations in the area had established good channels of communication with iwi, interest groups, and local residents. Most were supportive of the biodiversity objectives led by the Department of Conservation and the farming and wider economic benefits of the AHB Tb free programme.

As anticipated some concerns were raised around the proposed use of aerial 1080. Despite previous operations, some members of the Owhango community remain concerned about potential effects because their water supply is from a catchment within Tongariro Forest. However, all aerial 1080 operations require permission from the district health board who put in place conditions to ensure any human health risks are managed. Studies and measures from operations over the past decades (including use of 1080 in the Owhango catchment) have shown that 1080 is rarely detected in waterways following operations (less that 4% of more than 2000 samples). Any traces in streams are short lived (<24 hrs) and below New Zealand Drinking Water Standards (maximum allowable value of 3.5 parts per billion).

Consequently, methods of treatment for the 900 ha Owhango water catchment area were developed in response to the consultation with the Owhango community and the Waikato District Health Board. A 470 ha part of the catchment was aerially treated at a rate of 1 kg of bait per ha (half the rate of the larger operation). There were also areas immediately around and up to 800 m upstream of the water extraction point where baiting was excluded (55 ha) or targeted to ridges to ensure streams were avoided (74 ha). A 350 ha area was treated with bait applied in bait stations.

Representatives from Hunters and Habitats highlighted the value of Tongariro Forest from a recreational and sustenance hunting perspective due to the network of former logging roads that provide access and the quality of the red deer population. Aerial 1080 operations

can impact negatively on hunting opportunities due to the pesticide caution period (when animals from the area should not be eaten - usually 6 months) and the potential population reduction due to the by-kill of deer.

To address the concerns of hunters the Animal Health Board funded the addition of deer repellent to baits for a 3000 ha area of the forest. Deer repellent bait greatly reduces deer by-kill while still being effective in controlling possums and rats. The area treated with deer repellent bait was in the northern part of the forest centred on the Waione Stream (Figure 1). This area was chosen because it is prime winter deer habitat that is accessible and popular with hunters.

Aside from the variations noted above the majority of the 18,000 ha area was treated with aerially applied 'Wanganui No. 7' pellets, with a 0.15% 1080 concentration, at a rate of 2 kg/ha. Twenty days prior to this toxic bait application, the area was 'pre-fed' with non toxic pellets at 1.5 kg/ha. Pre-feeding improves kill rates of our target predators by ensuring they are conditioned to accept the bait at the time of the application of the toxic bait. Both the pre-feed and toxic applications of bait took place with good weather conditions, which is important for optimised kills.

We think that the operation took place at the appropriate time to protect the new cohort of kiwi chicks, coinciding closely with the earliest hatch dates of the season's monitored eggs. Nineteen adult male kiwi are currently fitted with transmitters and it is hoped from these birds a sample of at least 18 kiwi chicks can be fitted with radio transmitters, and then monitored to determine their survival in the forest.

We use tracking tunnels to monitor rat and stoat abundance in the forest. Tracking tunnels are made to house ink pads and paper surrounding them. Anything entering the tunnels leave their prints behind on the paper. Prior to the operation stoat foot print tracking rates were at 13% in August and rats at 77%, (following a stoat peak of 27% in the previous January when the seasonal high in stoat abundance is usually recorded). Rat and stoat abundance was measured again in November 2011 to determine the level of kill achieved. No stoat tracking was found and rat tracking had reduced to 3%. Further measures will be made in 2012 to quantify the rate of population recovery of these pests.

It is hoped that this operation has provided a good basis for a robust measure of what kiwi chick survival can be achieved following a well-timed large scale 1080 operation.

Results of the Taupo Fishery Harvest Survey

Mark Venman

This intensive year-long survey has been completed every five years since 1990/91. Aerial counts of anglers were used to estimate the daily angling effort and anglers were interviewed at the boat ramps to determine their fishing success on the survey day. Catch rates are an estimate of success rate and are normally expressed as the number of legal sized fish caught per hour of angling effort. Harvest rates refer to the number of legal sized fish caught and killed per hour of angling effort. The catch rate is normally higher than the harvest rate as not all legal sized fish caught are actually killed.

This article introduces preliminary results from the Lake Taupo and rivers fishery. A full article will appear in Target Taupo magazine.

History of the survey

During the early years of the Taupo fishery, the size of the trout population was thought to be so huge that the overall catch by anglers would be relatively insignificant. Estimates of the annual harvest varied considerably from 440 to 1200 tonnes.

In the late 1980s, the fishery went through a well publicised decline. Estimates of the annual production of trout at the time ranged from 340 to 540 tonnes but were clearly incompatible with the incredibly high estimates of harvest across the fishery.

The importance of being able to accurately estimate the harvest then became a priority for the fishery. So harvest surveys were developed. They commence in July and run through until the following June. Given the logistics and the cost of such surveys, they are only undertaken once every five years.

Boats moored in the snug boat harbour on the western bays of Lake Taupo. *Photo: DOC*

The results from the initial survey in 1990/91 estimated the annual harvest to be 113,000 trout or approximately 175 tonnes. This was much more consistent with the previous estimates of annual trout production and showed that a very large proportion of the trout being produced were actually being caught and killed. Because the harvest was having a major effect on the quality of the fishery the bag limit was reduced from eight fish per day to three trout in December 1990.

Lake Taupo Results

The combined harvest (fish caught and kept) for anglers on Lake Taupo (guided & non-guided) during season 2010/11 was estimated at 40,415 trout, with non-guided anglers accounting for 86% (34,738 trout) of the total. Many trout are caught and released and overall, anglers caught a total of 53,876 legal sized fish. An estimated total of 196,812

hours were spent fishing on the lake with non-guided anglers accounting for 90.1% of the total effort.

Anglers anchored up and fishing at the Tongariro River delta were kept separate from other lake anglers for the purposes of this survey. Delta anglers accounted for a further catch of 2,446 legal sized trout of which 1,392 were harvested. Overall, anglers spent a total of 7,280 hours fishing at the Delta and accounted for 3,309 angler visits during the year-long survey.

The totals for the lake fishery do not include any estimates for the lake edge fishery which hasn't been measured over the last two harvest surveys. If we assume that the lake shore fishery accounts for 12% of the total lake effort (using data from 2000/01 survey) then this equates to an effort of 27,835 hours or a total lake effort of 231,927 hours (guided boats, non-guided boats, Delta anglers and shore-based anglers). If we also assume that the lake edge fishery represents 7.4% of the total lake catch (2000/2001 data) then this produces a lake edge catch of 4,501 trout or a total lake catch of 60,823 trout. Assuming that the lake edge harvest equates to 5.5% of the total lake harvest then this produces a lake edge harvest of 2,434 trout or a total lake harvest of 44,241 trout.

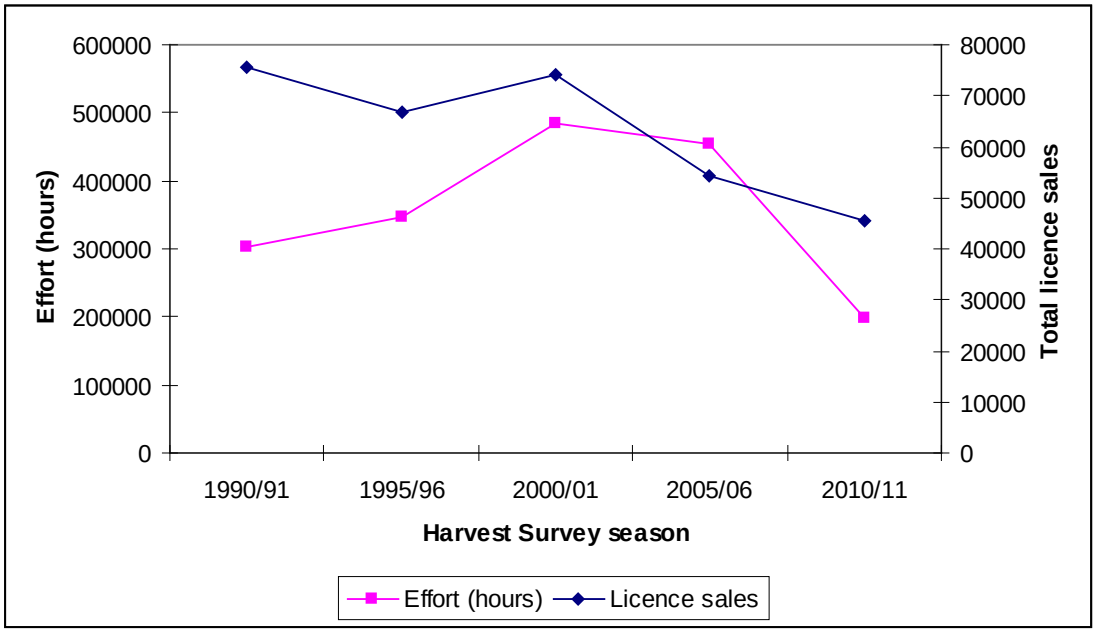


Figure 1: Estimates of effort on Lake Taupo over the last 20 years and the total number of fishing licences sold during these harvest survey years.

The total boat fishing effort on Lake Taupo (trolling and jigging & guided/non-guided combined) was estimated at 196,812 hours which was the lowest recorded effort out of the five harvest surveys completed (Figure 1). However, when the total number of licences is also plotted for these five survey years then it is no surprise that the effort has decreased similarly over the years.

The catch of legal sized trout on Lake Taupo this season was estimated at 53,876 fish and was the lowest recorded catch out of the five surveys completed. A similar trend was observed with the harvest (Figure 2) which was estimated at 40,415 trout. This was down on the harvest estimated for previous surveys but in line with the actual effort spent fishing this season and the lower overall catch.

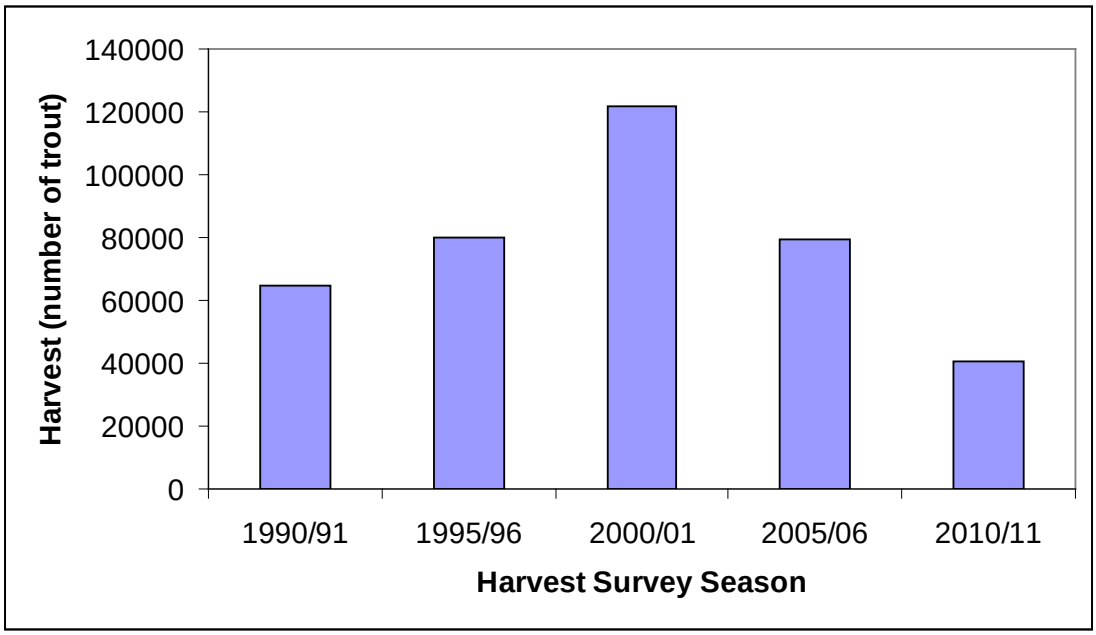


Figure 2: Estimates of harvest (trout killed) on Lake Taupo during the last five harvest survey seasons.

The first harvest survey in 1990/91 coincided with a low point in the productivity of the Taupo fishery while the 2000/01 season was acknowledged as a peak year. As the fishery rebounded over this 10 year period, the catch and harvest rates increased as expected. Increased catch and harvest rates are not a problem when there are more fish available to be caught as occurred in season 2000/01. However, increased catch and harvest rates during a period of low productivity could result in an overharvest of the trout population as the catches exceed what is sustainable. Since season 2000/01, the catch and harvest has decreased but so too has the effort expended by anglers on the lake. With fewer licences being sold during more recent years, fewer anglers are coming here to fish and so the effort has been reduced.

It has been well documented that the waters of Lake Taupo didn't fully mix during the winter of 2005 which basically resulted in a shortage of nutrients that ultimately caused smelt numbers to decline through a lack of available food. When combined with a large influx of juvenile fish into the system in 2005 after a very productive season, fish that were already in the lake soon began to struggle due to the shortage of smelt. The size and condition of the trout in the lake decreased in the seasons after this to another low point around 2007/08. Maiden fish were small and lean and not in great condition. Since then, the fish are still on the small side but the condition has improved considerably and there certainly appears to be a lot more smelt around at present. It is likely that this decline in the fishery hasn't helped with the sales of fishing licences and when combined with a struggling economy it isn't surprising to see a reduction in the amount of fishing done on the lake during season 2010/11 when compared with earlier years.

River Harvest Results

Preliminary estimates suggest a total effort on the Tongariro River of 56,095 hours, a catch of 15,695 (Figure 3) and a harvest of 5,692.

Consistent with the lower effort measured across the lake fishery, there was also a reduction in the amount of effort measured across the Tongariro River fishery. The effort during 2010/11 was the lowest recorded and considerably lower than the peak of 102,784 hours recorded in season 2005/06, and the five season average. Similarly, the catch was also lower than recent surveys and well below the season average but was on par with the low catch made during 1990/91. The harvest for the Tongariro River during season 2010/11 was the lowest by far at just 5,692. The percentage of fish harvested by anglers on the Tongariro River has decreased from a peak of 75.5% in 1990/91 to a low of 36.3% in 2010/11. Anglers are clearly releasing more of their catch than 20 years ago.

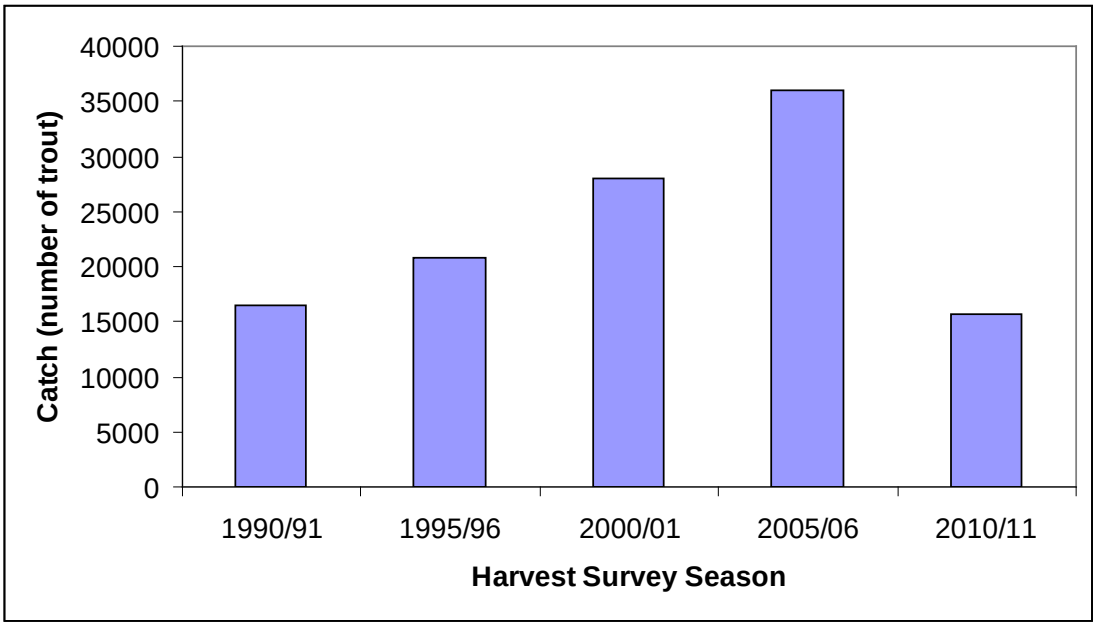


Figure 3: Estimated catch (number of trout) on the Tongariro River during seasons 1990/91, 1995/96, 2000/01, 2005/06 & 2010/11.

Calculation of the total tonnage of fish harvested

Average weights were calculated for the rainbow trout caught and killed by anglers during the 2010/11 season. Lake-caught rainbows averaged 1.08 kg while river-caught rainbows averaged 1.3 kg. The estimated total Lake Taupo harvest was 44,241 trout or 47.8 tonnes (Table 1). Similarly, the total harvest from the rivers equates to 10,110 trout or 13.1 tonnes.

	Number of trout	Average weight (kg)	Harvest (tonnes)
Lake Taupo	44,241	1.08	47.8
Rivers	10,110	1.3	13.1
Total	54,351		60.9

Table 1: Calculation of the total tonnage of trout harvested from Lake Taupo and the surrounding rivers during season 2010/11.

Given the low effort and catch during the 2010/11 season compared with previous surveys, a low harvest of just under 61 tonnes is to be expected and at this stage the low level of harvest is not of concern for the fishery itself (Figure 4). In the 2005/06 survey, 88,330 trout were killed on Lake Taupo resulting in an estimated harvest of 132.5 tonnes (at the then average weight of 1.5 kg). The latest harvest is half what was recorded during 2005/06 but the hours spent fishing during 2005/06 was more than double what was recorded in 2010/11. So essentially half the effort produced half the catch. Similarly on the rivers, half the numbers of trout were caught during season 2010/11 than 2005/06 but again the effort was essentially half of what it was five years ago.

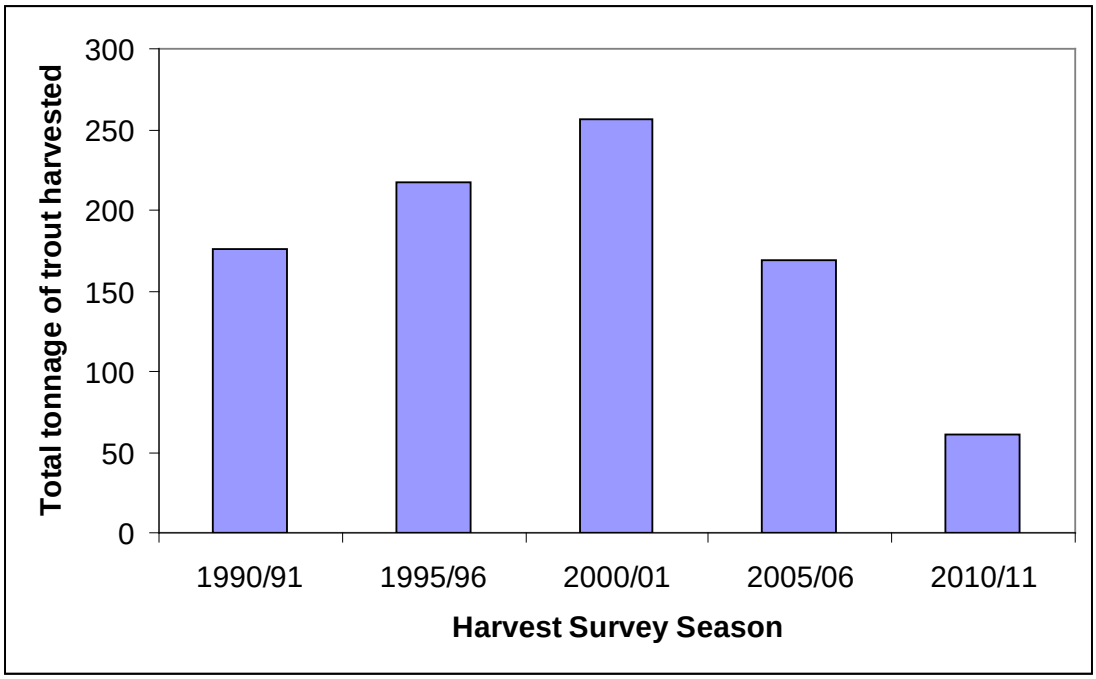


Figure 4: Total tonnage of trout harvested from Lake Taupo and the surrounding rivers during the previous 5 harvest surveys.

Some of the harvest survey team ready to carry out an aerial survey. *Photo: DOC*

The percentage of fish harvested on the Tongariro River since season 1990/91 has steadily declined from 75.5% 20 years ago to 36.3% during season 2010/11. This could be due to a number of factors including the reduction in the size and quality of fish during more recent years and the timing of the spawning runs becoming much later. A similar pattern was observed on Lake Taupo with the percentage of fish harvested declining from 86.6% to 67.3% between seasons 1990/91 and 2005/06. A small increase to 75% was observed during season 2010/11 and is perhaps attributed to the reduction in the size limit from 45 to 40 cm during this period while the daily bag limit of three fish per day remained unchanged. However, with a combination of lower estimates of effort and a decrease in licence sales then this slight increase in harvest is unlikely to be a cause for concern at this stage.

Overall, these results will further increase our knowledge and understanding of the effort, catch and harvest of trout across the entire fishery and subsequently our ability to manage it. The Taupo fishery has clearly changed over the last 20 years with average sizes decreasing over time and the spawning runs getting much later, in particular. With the Taupo Fishery Management Plan currently under review it is timely to look at the fishery and how we need to manage it to get the most out of it.

Thanks to everyone who participated in the survey and especially to those anglers that took the time to pass on their angling data to the rangers and of course the charter boat operators who meticulously recorded their catch throughout the season.

Editor's note.

Some extrapolations based on data from previous harvest surveys had to be made to ensure a complete set of results for this season's survey. The results have been presented with a high level of precision to define their central values. The final report will clarify the actual level of uncertainty in the results.

Heather Beetle: the little bug that could

Paul Peterson

Heather (*Calluna vulgaris*) is invading the majority of tussock grassland within Tongariro National Park (TNP) and reducing native biodiversity. In the absence of viable or cost-effective control methods, heather cover is increasing at a rate of 5% per annum at one monitored site (Peterson, unpublished data). In 1991 a biological control programme for heather was initiated by the Department of Conservation to release heather beetle (*Lochmaea suturalis*) into TNP. In 1996, after an importation impact assessment (Keys and Syrett 1995) and five years of host-range testing carried out by CAB International in the UK and Landcare Research in New Zealand (Syrett et al. 2000), the heather beetle was approved for release (Smith et al. 1998).

After a slow start, four beetle populations are now attacking large areas of heather in and around TNP, including one site in the Waiouru Military Training Area (WMTA) where 99% of heather in an 80 ha area has been killed so far (Figure 1).

Figure 1: The majority of heather has been killed in the largest area of heather biocontrol to date (site 40, near State Highway 1 in the WMTA). The area of vegetation outlined in the photo has been protected from beetle feeding for research purposes by application of an insecticide. This provides a further scientific illustration of the efficacy of the beetle. *Photo: Landcare Research*

More recently, established beetle populations are building at five other sites in and around TNP (Figure 2) and large areas of dead or dying heather could also start to appear at these locations over the next few years.

Figure 2: Sites where large areas of heather are currently being damaged by beetle feeding are shown in red, new beetle outbreaks are in orange, and a population that initially damaged heather then collapsed is shown in yellow. The extent of serious heather infestation is shown in purple.

Long winters, unpredictable spring cold-snaps, and very low foliar nitrogen levels in heather on the Central Plateau, combined with genetically bottlenecked beetle populations, have likely contributed to the slow start of this biological control agent (Peterson et al. 2011). However, persistent re-releasing and modifying release sites to

improve beetle establishment is starting to pay off.

Of the currently established populations on the Central Plateau, beetles at site 42 (a frost flat near National Park) have arguably had the largest beneficial impact on biodiversity because the area is of high conservation value (Figure 3). We predict that beetles will spread throughout the entire 60 ha heather infestation at this particular site within two to three years.

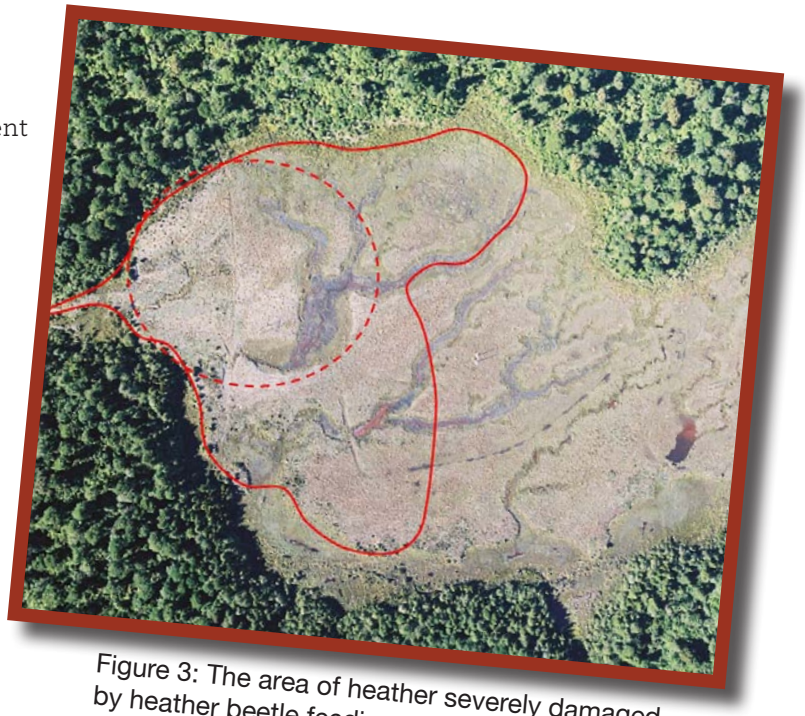


Figure 3: The area of heather severely damaged by heather beetle feeding at site 42 has more than doubled from 4 ha in 2010 (- - - - - -) to 10 ha in 2011 (——) (aerial photo taken by Lawrie Cairns on 9/3/11).

Data from an experiment to compare the performance of heather beetle with herbicide application at a WMTA site show that beetle feeding can kill 99% of heather compared with 90% after two herbicide applications. Outcomes for indigenous vegetation in and around TNP after successful biological control include reduced competition from heather and increased native plant cover/diversity. Herbicide application can also reduce heather cover but severe non-target damage kills native plants. Biological control clearly out-performs herbicide application because there is no non-target damage, leaving natives to recover (Peterson et al 2011).

Solutions to a poor climate match, low beetle genetic diversity and poor foliar nitrogen levels in Central Plateau heather are being sought to further improve beetle population performance in future. An experiment designed to boost foliar nitrogen levels and 'kick-start' beetle populations in TNP has shown some promise, with three new outbreak populations occurring only two years after release at sites where foliar nitrogen levels are elevated. A trip to re-collect more genetically diverse beetles from areas in the UK or Spain with a closer climate match to TNP is also being planned to maximize beetle performance at the altitudinal extremes of the heather invasion. Any new collections will be screened for microsporidial infection, a disease found in overseas populations, using a sensitive new genetic tool developed as part of this project.

References

Peterson P, Fowler S, Harman H, Barrett P, Merrett M 2011. Biological control of heather. Unpublished Landcare Research contract report LCR0910/186 to the New Zealand Army and the Department of Conservation. 70 p.

Smith L, Harris R, Peterson P, Syrett P 1998. Introduction of heather beetle *Lochmaea suturalis* (Thomson) (*Coleoptera: Chrysomelidae*) into Tongariro National Park as a biological control agent for heather *Calluna vulgaris* (Ericaceae). Unpublished Landcare Research Contract Report LC9798/133 to Department of Conservation. 7 p.

Keys H, Syrett P 1995. Introduction of the heather beetle *Lochmaea suturalis* into New Zealand for biological control of heather *Calluna vulgaris:* an importation impact assessment. Unpublished Landcare Research report, Lincoln, New Zealand. 62 p.

Syrett P, Smith L, Bourner T, Fowler S, Wilcox A 2000. A European pest to control a New Zealand weed: Investigating the safety of heather beetle, *Lochmaea suturalis* (Coleoptera: Chrysomelidae) for biological control of heather, *Calluna vulgaris*. Bulletin of Entomological Research 90(02): 169–178.

Tracks and other work by the Taupo Nui A Tia Visitor Assets team

Harry Keys and Terry Slee

Tracks are a huge contribution to people's enjoyment of Public Conservation Land. They are part of the reason why people visit the central North Island. The numbers of people trekking in Tongariro National Park continues to grow and more people want to go on walks near towns and roads as well. But loose volcanic soils in and around TNP and heavy rainfall mean that there is often a large amount of wear and tear on the ground. So we need to design and maintain tracks well to avoid erosion, and build new ones in places where it is important to do so. In this way we can encourage more people to participate in recreation.

This article shows some of the tracks completed and other projects undertaken this year and some of the tools used. We have had good feedback already from public users on these tracks.

Above left: New track below Ketetahi Hut and climbing out of valley. *Photo: Jimmy Johnson*. **Right:** The large rimu tree at Ōpepe that could be up to 1000 years old. *Photo: Karen Williams*

A new section of the Tongariro Alpine Crossing track was constructed early in 2011 bypassing the private land around Ketetahi Springs on the northern side of Mt Tongariro. The track starts at Ketetahi Hut, runs down the ridge then into a valley before climbing up past a young mountain toatoa forest to rejoin the existing track below the Springs. It was constructed after years of discussion between the Department, the Ketetahi land owners and guiding concessionaires during a period of major growth in use of the Crossing. The new section of track means people do not have to cross the private land and allows guided parties to complete the Tongariro Alpine Crossing rather than back-tracking. Previously some people and groups were taking other routes to loop back to the Mangatepopo car park. This was accelerating and extending the impacts of trampling in places where building further tracks is not desirable or where restoration is impractical. The Ketetahi bypass minimises these trampling impacts elsewhere on Tongariro.

Major capital repairs were made to the Tama Lakes track which has increased in popularity over the last two decades. Contractors installed boardwalks and culverts to cross damp or vulnerable areas and drainages. Hard wearing plastic geocells material is increasingly being used in high-use tracks to hold in place the rock material that forms the wearing surface of the track and distributes the weight of users to avoid the creation of boggy areas.

Major capital work was also done on the northern loop track at Opepe Reserve. The track has been rerouted in places to flow easily through the landscape and surfaced to provide easy walking. This introduces people to some large podocarp trees and podocarp-hardwood forest beside State Highway 5 close to Taupo town. The large and oldest rimu trees here grew after the great Taupo eruption and could be as old as 700-1000 years. The original Opepe Bush was much more extensive but logging in the late 1960s reduced it to the present small reserve.

Above left: Plastic geocells in foreground. Workers install a small drainage crossing on the Tama Lakes track. *Photo: John Wilton.* Above right: Gareth Chapman operating a track compactor with Ellen Abrahams and Roy Baker working with a mechanical wheel barrow on the new track at Opepe Reserve. *Photo: Murray Cleaver*

A lot of work is also being done beside the Tongariro River. After exotic forest logging around the Tongariro River lookout, above the highway bridge at Turangi, the track has been reinstated and is now able to be used by pushchairs and bikes. Preliminary planting and weed control have been done and there are now panoramic views of Turangi and the southern end of Lake Taupo. We have also been working with the local community through the Tongariro River Advocates. The aim is to make a track on the true left of the river linking Red Hut bridge with Turangi via the trout centre. This will create an easy half day looped walk from Turangi via the trout centre and its new aquarium.

Above: Ex Ranger John Newton, who has a close connection with the first two Waihohonu huts, was first to sign the visitors book at the opening of the Waihohonu Hut, October, 2010. *Photo: Jimmy Johnson*

Finishing touches and fitting out have been completed at the new Waihohonu hut since the opening late last year (see also article in Tongariro 2010). A range of interpretation has been built into the tables so people can read about the area and its natural heritage while they eat.

A new resource consent for the Tokaanu bathhouse complex will result in work behind the scenes on drainage, further monitoring of water use and energy conservation initiatives. Research has shown that the geothermal activity at Tokaanu has been declining over at least the last 100 years, and that there may have been pulses of new activity resulting in deposition of fresh silica sinter terraces over the last 1500 years at least.

A large new project involves working with Bike Taupo to develop the Great Lake Trail. This is part of Nga Haeranga, the New Zealand bicycle trail network.

Chasing Bats: not just a walk in the Park

Jess Scrimgeour

It's not easy catching bats. Especially those of the short-tailed variety. They are quick to anger, and not afraid to fight back. And when they're armed with razor sharp teeth, DOC rangers soon found out the price of a moment's distraction – a bat clamped firmly on a finger, stubbornly refusing to let go. Blowing gently on its face to encourage it to release only appears to infuriate it more. This was a key learning taken from the most recent season of bat monitoring done in Rangataua Forest on the southern slopes of Mount Ruapehu.

Rangataua was home to one of the largest populations of the endangered short-tailed bat in New Zealand, with close to 7000 bats counted emerging from tree roosts in the 1990s. Ten years later DOC has returned to determine the status of the population within the forest.

Above left: Kerry Borkin removing long-tailed bat from mist net. *Photo: Kerry Borkin Collection*
Above right: Short tailed bat and radio tracking antenna. *Photo: Kerry Borkin Collection*

Opposite page: Bat held in soft bag prior to having a transmitter attached.
Photo: Jess Scrimgeour

To do this, nets are hoisted up to 15 m high at night to catch bats as they fly by in search of bugs for dinner. Rangers have to be alert to ensure that as soon as the bat hits the net, it can be pulled down and the bat removed as soon as possible to avoid injury. It is at this point that angry bat meets determined ranger, and it isn't always clear who emerges victorious from each encounter.

The bat has to suffer the further indignity of having a small patch of hair on its back shaved, and a transmitter glued in place. A transmitter is only attached when a bat weighs over 12 g, so that it always weighs less than 5% of the bat's body weight. Once done, the bat is released without further ado to continue on its way, no doubt wondering what on earth just happened.

The following day the bat is followed to its roost, where rangers establish infrared cameras around the entrance to record how many bats emerge at night. There are usually two or three roosts occupied at one time throughout the forest, so it's a busy day trying to get all roosts set-up at once. This generally involves lugging a few heavy batteries about, whilst dodging swarming wasps intent on inflicting maximum pain on as many people in the group as they can.

As night falls, there's a stirring in the roosts as bats start to wake, hungry and ready to hunt. DOC cameras capture the torrent of bats emerging from the trees, with more than 3000 bats recorded from one tree alone. It's an astonishing sight, with slow motion technology employed to its fullest to be able to count the stream of bats racing in to the night.

The best estimate achieved this last season amounted to 3664 bats. This is comparable to the 3017 bats counted the previous season. Both counts would have included young bats produced during the breeding season, so DOC's estimate of the adult population is around 3000-3200 bats. This suggests that the population has declined in the last 10 years.

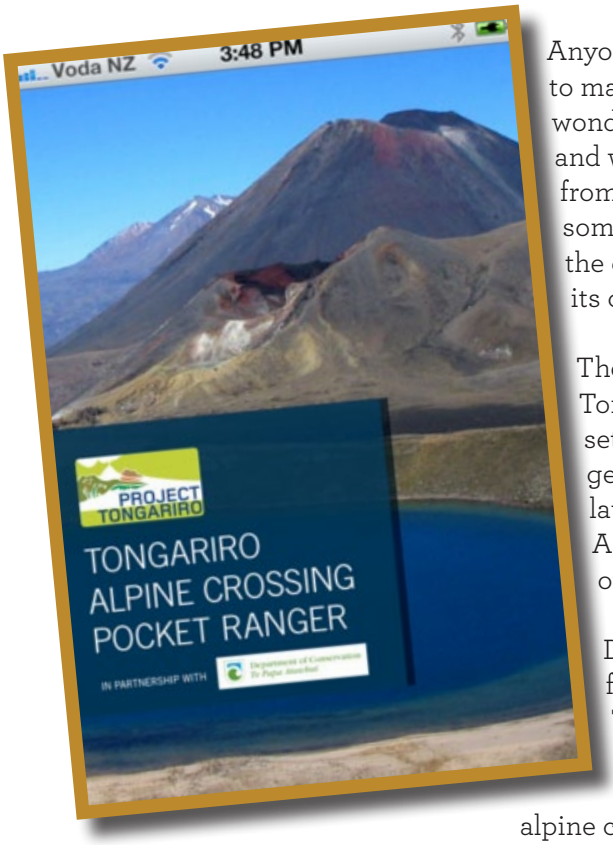
Bats are vulnerable to introduced mammals such as rats, stoats and cats. Last season over 100 bats were killed in a week by one cat alone, which shows how destructive one animal can be.

This coming summer DOC rangers will be out once more, chasing the feisty bat to try and confirm the status of the population present within the forest.

Tongariro Alpine Crossing Pocket Ranger App

Dave Conley

The Story Behind the Project



Anyone who has done the Tongariro Alpine Crossing can relate to marvelling at the sheer beauty and scale of the landscape, and wondering why the Red Crater is red, the Emerald Lakes are just so, and whether or not the hot ground under your feet is likely to erupt from under you. The Department has long juggled with how to tell some of these stories, due largely to the numbers of people who use the crossing, as well as needing to be sensitive to the landscape and its cultural value.

The Department of Conservation has partnered with Project Tongariro, a Turangi-based community group, in a new venture set to transform the way visitors to the Tongariro National Park get their information. Together we've recently developed and launched a Smart Phone application ("an App") for the Tongariro Alpine Crossing, called the Pocket Ranger, which you can check out at *www.tongariro.org.nz/pocketranger*

Dave Conley, Community Relations Officer - Public Awareness for Department of Conservation, Tongariro-Whanganui - Taranaki Conservancy, put forward the idea of developing an App for the busy Tongariro Alpine Crossing over a year ago as a way to add value to the experience of people walking the alpine crossing by interpreting the landscape and its stories, but in a manner which wouldn't leave any visual impact. "We've worked with Project Tongariro in the past on other interpretative jobs, everything from signs to books and displays, but this is a breakthrough in the way visitors get the information and the stories, on the spot, out in the Park."

DOC and Project Tongariro have made a significant investment in developing the Pocket Ranger because it's a win-win for all parties – "the Department gets out its important safety and conservation messages, it adds value to the experience for visitors and Project Tongariro gains profile and generates funds that flow back into local conservation projects."

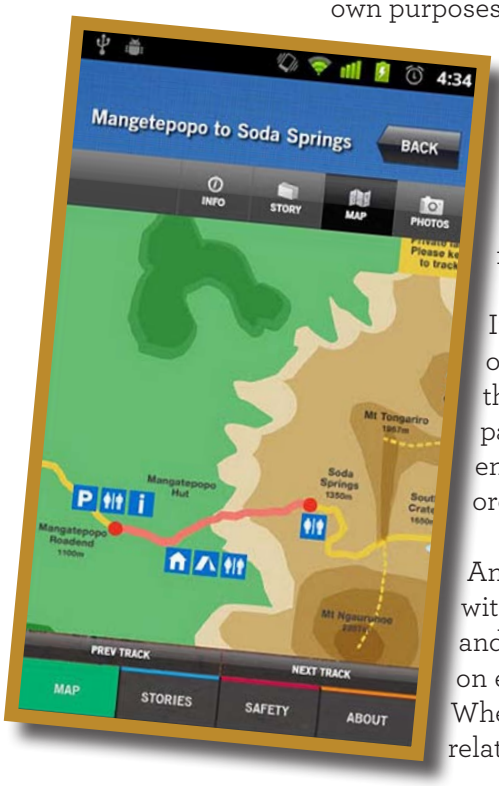
The concept was first developed late 2010 and over summer 2010-11, DOC and Project Tongariro investigated the opportunity, researching smart phone usage and surveying users of the Tongariro Alpine Crossing. A business model was developed and both organisations saw the positive benefits and gave the go ahead for the project. Several App developers, both locally and overseas were contacted and out of the interview process Born Digital in Auckland was successful in getting the contract. They have been awesome in terms of providing the technical component of the App as well as working through all the intricacies of Tongariro National Park. The App was launched in late October 2011.

The App is free to download, which is important to ensure as high a level of downloads as possible. Project Tongariro will then generate income to sustain its ongoing projects by partnering with local businesses that benefit by having a listing on the App to spread the message about their services. These businesses also benefit by being able to demonstrate that they are making a positive contribution to conservation in the Park, and can market themselves accordingly. "Fundamentally, it's a win-win-win situation - enhanced visitor experiences, greater community input into conservation, and increased exposure for local businesses. From the Department's perspective, being involved but not owning the project ensures that Project Tongariro have access to a means of revenue which can help secure their long term future. This is the vision in action as we see it, the Department providing support to the community to provide so much more."

The App provides mapping, interpretation, and safety messages for the Tongariro Alpine Crossing as well as provides information about the local area including accommodation, activities, transport, guiding, dining etc.

The App's function to users is twofold. First a research tool for visitors investigating visiting the Tongariro Alpine Crossing and the local area, and secondly as a 'ranger in your pocket' when actually walking the Crossing – with essential info with weather and backcountry links and stories about the points of interest along the track.

The Pocket Ranger has been developed so that it can be used as a 'template' that can be easily adapted for use in other great walks, national parks, cycle ways and mountain biking tracks. This means other organisations can purchase the template for their own purposes for a fraction of the cost. They won't have to build an App from scratch and can take advantage of the research and financial investment that DOC and Project Tongariro have undertaken including licensing the technology. Part of the design parameters was to ensure that Project Tongariro would maintain the ability to change the content themselves, and very easily keep the material up to date. Having control over their own content management system will allow Project Tongariro to offer this facility with the App licence.



In addition, the ability of the App to generate income is something other organisations can utilise. The local area map can be tailored to their particular region and showcase local businesses that support their particular visitor experience. Project Tongariro has already had a number of enquiries and plans to make the Pocket Ranger technology available to other organisations very soon.

An updated version of the App which should be available in mid December with video clips with audio for each section of the Tongariro Alpine Crossing and includes a Quick Response (QR) code reader. QR Codes will be placed on existing track markers at points of interest along the way ie the Red Crater. When scanned the QR Code will lead users directly to the information or story relating to that point of interest.

Further development is being investigated including GPS capabilities, more detailed mapping and the ability to perform a 'check in' at the start of the track for safety.

Taupo Sports Fishery Management Plan Update

John Webb

(John was previously Ranger, Community Relations)

As reported in Target Taupo 61, the Taupo Sports Fishery Management Plan (TSFMP) is currently under review, a task required to be completed by the Department of Conservation every 10 years.

In early June 2011 a discussion document asking eight key questions about the Taupo fishery was released into the public arena. The purpose of this document was to encourage discussion and invite feedback from anglers, key stakeholders and the public about the Taupo fishery and highlight some potential changes in future management directions for the plan. Indeed some of the questions posed a significant shift or change of direction in management from the current TSFMP and it is important to canvass the opinions of Taupo fishery stakeholders before incorporating these changes into the reviewed draft.

The consultation utilised the "Consultations" section of the DOC website and local community websites as a consultation platform. In addition to this around 3000 anglers registered on the Target Taupo database were sent an electronic copy of the discussion document and asked to respond. The discussion document was also developed in conjunction with and disseminated through the Taupo Fishery Advisory Committee (TFAC) and Tuwharetoa Maori Trust Board (TMTB). This allowed distribution of the document locally through Iwi, interested clubs, groups and community organisations.

Questions posed were as follows:

PART A: INCREASED PARTICIPATION

Question 1

Do anglers consider declining participation good or bad for the Taupo fishery? Why?

Question 2

Should the TSFMP provide more impetus for the recruitment of anglers, particularly children, to the Taupo fishery or the sport of angling in general? Are there any suggestions about how this might be achieved?

Question 3

Should the TSFMP change direction and allow for much more active promotion and marketing of the Taupo fishery?

PART B: TAUPO, WILD FISHERY OR NOT

Question 1

In circumstances that benefit the Taupo fishery, should the TSFMP give some scope to fishery managers to allow stocking or selective manipulation of the trout populations?

Question 2

Would you be prepared to consider some more stringent regulations in the short to medium term to assist a return to earlier runs?

PART C: ECOSYSTEM MANAGEMENT

Question 1

Should the TSFMP allow for licence revenue to be used for research outside of the trout populations alone to better understand the ecosystems that impact on Taupo fishery?

PART D: MANAGEMENT OF LAKE OTAMANGAKAU

Question 1

Should the Lake Otamangakau fishery continue to be managed as a trophy fishery?

Question 2

If a trophy fishery at Lake Otamangakau is desirable, should the TSFMP allow for the selective manipulation of the trout populations to achieve this?

Results

It was disappointing that there were only 90 responses that directly addressed any or all of the discussion document questions. There were a further 15 general responses that provided general comments or opinions about the Taupo fishery.

Conclusions

The discussion document exercise has produced some interesting results although the pool of respondents was not as big as expected. We now have to consider the opinions of only 90 respondents, or 0.9% of season licence holders. This has not provided a very clear direction for refining the draft of the Taupo Sports Fishery Management Plan. Possibly this was due to the nature of the questions posed, but in general the level of response was poor. Some observations from the process have come to light and these are as follows.

Many people did identify that recruitment of children was important for the future of the Taupo fishery and the sport of angling. Some respondents felt that declining participation in the fishery was simply due to the recent downturn in its quality and that participation would go back up when things improved. This feedback from respondents often seemed to be framed more as a threat. Some actually said they would not buy another licence, or threatened not to until the fishery improved. Some questioned the need for a specific Taupo license and that this might be contributing to declining participation in hard economic times. This does make some sense as Taupo is a visitor-based fishery.

Ultimately, although it is good to know about these kinds of feelings they said little about the core issue of recruiting new users like children and the necessity of this to preserve the longevity of the fishery.

It appeared that advocacy and education programmes about the fishery are making an impact in the community. It was satisfying to see that many respondents understood the concept that the fishery is revenue-driven and further, that reduced revenue equates to reduced ability to manage the fishery. Another area where there was good understanding was how important the overall ecosystems and, particularly, food chains are to the Taupo fishery. Many respondents recognised that the recent downturn in the fishery was essentially due to starvation in the system and that work was urgently needed to better understand the ecosystem and, particularly, the food resources for the fishery and how they could be improved.

Reading the responses there was a strong feeling that many respondents just wanted something done. Perhaps that is why there was such a shift in opinion from the historical viewpoints on wild fishery ideals. Taupo as a wild fishery used to be held in very high regard but now there seems to be a changing view that this is less important than having plenty of good quality fish to catch (perhaps another outcome of the downturn).

There was an overwhelming feeling amongst respondents that Lake Otamangakau should continue to be managed as a trophy fishery. Many who commented on this issue were long term users of that fishery and as such understood it and what it offered in the past. Some were keen that anglers be offered the first opportunity to return Lake Otamangakau to its trophy status through a relaxation of the season and bag limit regulations.

Where to next?

Once endorsement of the Department's analysis of the discussion document has been received by the Taupo Fishery Advisory Committee and the Tuwharetoa Maori Trust Board the document recommendations will then be incorporated into the final draft of the management plan and it will go to full formal public submission in 2012.

With over 10,000 adult season licence holders we hope for a better response to the final draft of the management plan.