Tongariro Journal

the Annual

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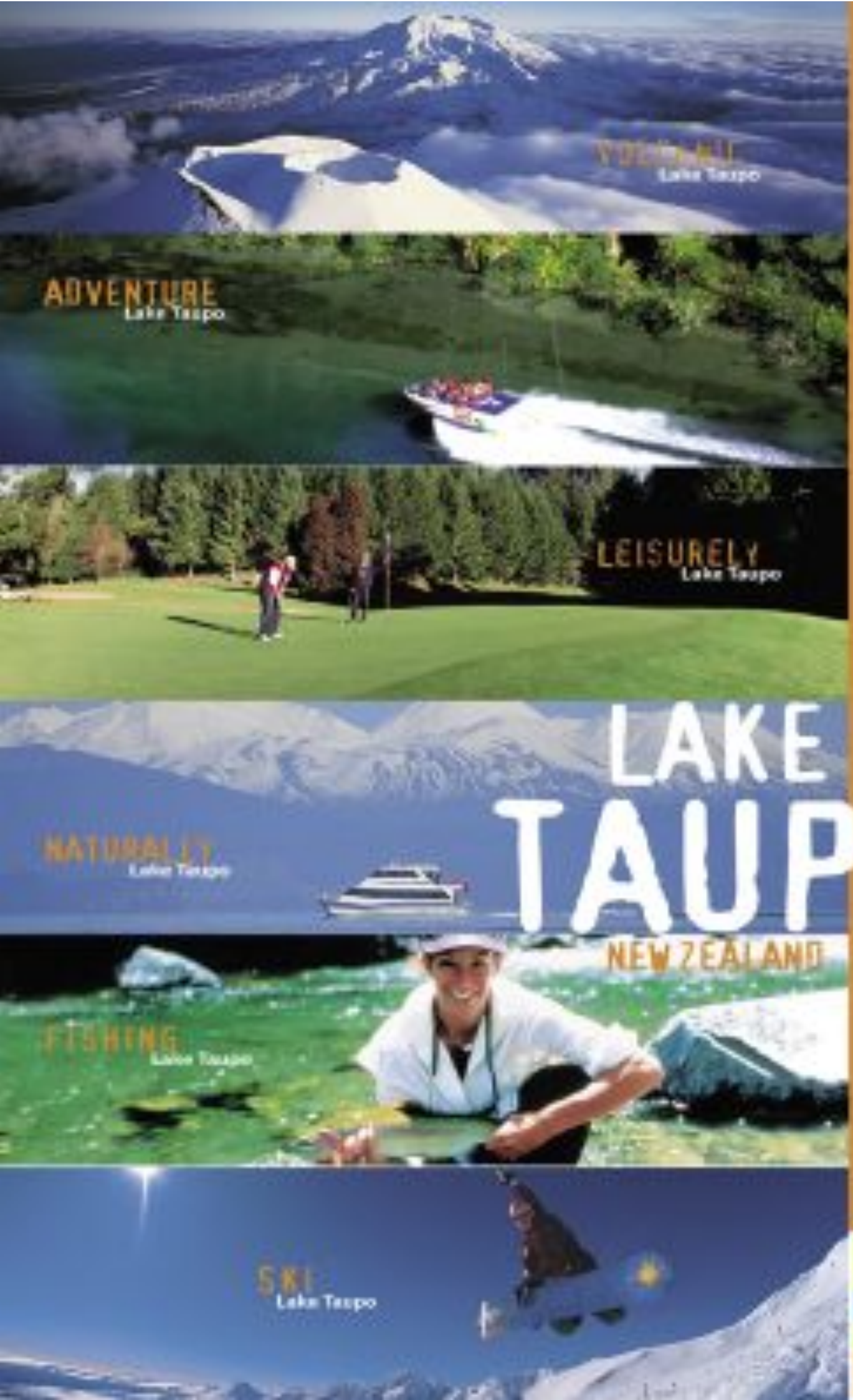
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TONGARIRO

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Cover photo: Trampers stop to enjoy the view over Emerald Lakes on the Tongariro Crossing. (Photo: Iris Broekma)
Above: Trampers cross the Ngaruroro River during the Department of Conservation's summer programme trip into the Boyd/Oamaru in Kaimanawa Forest Park. (Photo: Dave Wakelin/DOC)
Back cover: Sunset over Lakes Rotoaira and Taupo (Photo: Iris Broekma)

Tongariro

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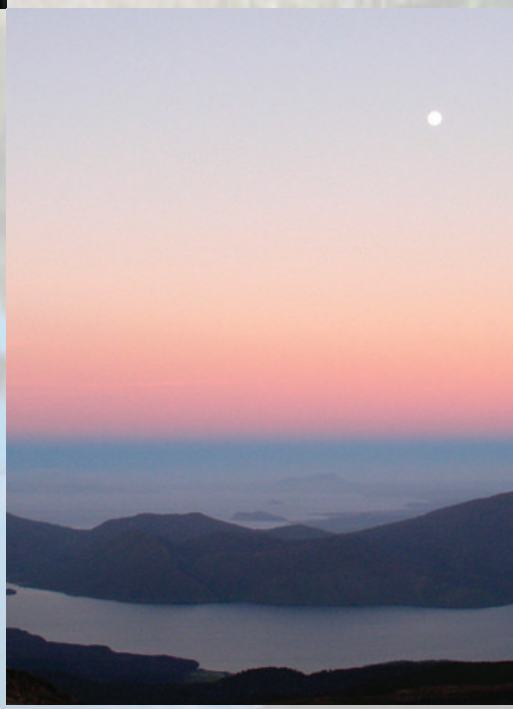
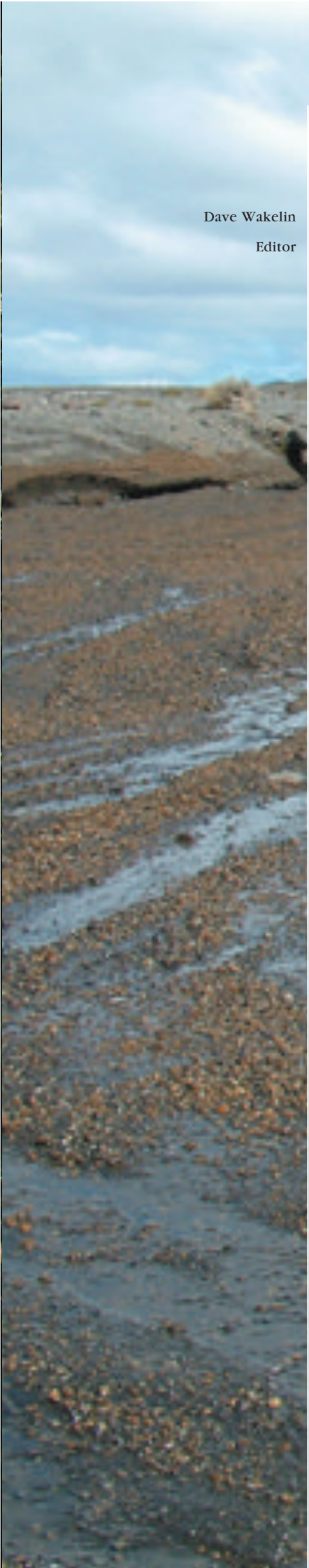
Background: Ohinetonga Lagoon (Photo: Katrina Knill/DOC)

For more information on all matters relating to conservation check out the Department of Conservation's website, www.doc.govt.nz





It Began with a Teardrop

Dave Wakelin

Editor

It began a long, long time ago. Ruapehu, the first mountain of Te Ika o Maui, the North Island of New Zealand, was lonely. Ranginui, the sky father, had placed Ruapehu on the new island to bring calm and peace to the land. Ruapehu grew lonely and single teardrops flowed across the land to form the Whanganui River to the south and the Waikato to the north. His loneliness brought water to the new land. With water came life.

In time, other mountains joined Ruapehu and as the land heaved and tilted, rivers formed to carry away the rains that swept the North Island of New Zealand. Forests grew lush and green and birds twirled and sang through the canopy while others, less flighty, crunched their way through the undergrowth below.

1800 years ago the world changed. After a period of violent ash eruptions that blanketed much of the North Island water found its way into the magma chamber. Superheated water and gas ripped the earth apart in an eruption that hurled pumice, ash and rock up to 50 kilometres into the atmosphere. Gravity took over and a searingly hot pumice laden wave of material buried everything in its path.

Time changes everything. Rains washed into gullies and gullies became rivers, flowing into the vast cavity left in the earth to create Lake Taupo, the heart of the central North Island.

Today the protected North Island mountains are valuable catchment for the rains which falls, feeding rivers that run north, south, east and west to the coast.

We enjoy water in its many forms. Water provides challenge, growth, recreation and sustenance.

Skiers and boarders enjoy their sport on the Whakapapa and Turoa ski areas where careful snow management ensures maximum enjoyment for the visitor and minimum impact of Ruapehu.

Fishing is an international tourism drawcard and little wonder for the waters of Lake Taupo and its tributaries support some of the world's best trout fishing. The value of the legacy begun with a few trout released in a stream more than 100 years ago keeps appreciating.

Wetlands are the hidden gems of the conservancy. Usually overlooked they are immensely biodiverse, acting as filter and host, providing shelter and flood control. Aquatic hitchhikers and runoff threaten the purity of Lake Taupo and other waterways.

Water is essential as it is the basic commodity of life. Iwi recognise the mauri associated with water and this along with the practical benefits of doing something about the sewage problem on Mt Ruapehu culminated in the opening of the Whakapapa Ski Area and Village Sewerage Scheme last year, a ten year odyssey that tested the skill and patience of all concerned.

Ruapehu's tears were pure. The challenge before us is to ensure that we continue to protect Ruapehu's gift.

Tongariro Taupo Conservator, Paul Green. (Photo: Dave Wakelin/DOC)

From the Conservator

Right: Conservator, Paul Green addresses the large crowd who tramped in from the Desert Road to witness the opening of new displays at the historic Waihohonu Hut as part of the hut's centennial. (Photo: Dave Wakelin/DOC)

In recent months managers have discussed the format of the journal with our editor Dave Wakelin. Dave has done a great job in improving the journal over the last ten years and I am keen to ensure it is a way for us to report on our key achievements and issues rather than simply relying on the keenness of specific staff to contribute items of interest. We will always want the journal to be available to provide an informal point of view but it is important for staff to appreciate that writing articles for the journal is an important facet of their work.

The Conservancy remains committed to working with the community. We are unable to do everything the community wishes us to do and we need to make choices regarding projects that we support. I am particularly pleased to acknowledge the evolution of two key volunteer groups with whom we have a close relationship. These are the Tongariro Natural History Society and the National Trout Centre Society. The TNHS has been successful in securing a number of grants including $45,000 from the Pacific Conservation Trust towards the restoration of Pihanga-Rotopounamu. They also do a great job of co-ordinating volunteer work in the Conservancy and this is of great value to the Department and volunteers. The Trout Centre Society continues to thrive and in conjunction with the Conservancy have gained sponsorship form Genesis Energy to enable a teacher to be employed at the Trout Centre. These are two excellent examples of successful partnerships between the Department and the community. At a local level there are many more successful examples and a particularly successful one is the Omori-Pukawa pest control group. I was delighted to see an indication of their success with the re-appearance of white mistletoe.

The recreation opportunities review was a good opportunity to receive feedback from the public on their wishes for recreation. The exercise had reality in that all visitor assets identified by the Department were

fully costed and there was certainty as to the amount of money available. This means that hard choices had to be made on the basis of priority and affordability. The public substantially agreed with the Conservancy suggestions in Tongariro Taupo but in the next ten years we can expect to see a few changes such as maintained tracks to Mt Tihia and the Tauranga Taupo Waterfall. Following this exercise staff have been able to prioritise capital and operating projects for the next five years. It is great to have a well endorsed strategic direction and a planned programme of expenditure. Staff and the public all know what to expect.

It is much more difficult with the challenge of biodiversity improvement. Five years ago we were pleased to have the NZ Biodiversity Strategy approved and to receive additional funding for specific projects. Five years on we are in a strong position to better quantify requirements for biodiversity. Unfortunately the gap between available resources and requirements is much greater than ever imagined. In reality the Department is winning a few battles but losing the war. For example we have five kiwi sanctuaries in New Zealand and all have benefited from intensive management with increased kiwi numbers. Our Tongariro Forest Kiwi Sanctuary is a positive example. Elsewhere throughout the country kiwi numbers continue to dwindle in alarming fashion. It is the same story with many other species including the whio (Blue Duck) which is one of the key species being managed in Tongariro Taupo.

Biodiversity prioritisation will continue to be a major issue in New Zealand and it is only in the last 20 years that the full extent of the threat of introduced plants and animals has become apparent. Also the difficulty and cost of intervention to halt biodiversity decline and provide enhancement is now better understood.

Further difficulty arises in reporting conservation outcomes. The government requires measurable outcomes to be reported annually. Biodiversity improvement is often difficult and costly to measure and can seldom be quantified on an annual basis.

Below: Conservator, Paul Green, points out features of Tongariro National Park on the diorama at the Whakapapa Visitor Centre to Koïchiro Matsuura, UNESCO's Director General. (Photo: Dave Wakelin/DOC)

A highlight during the year was the centenary of the Waihohonu Hut. We thank the Tongariro Natural History Society for their contribution towards restoration and displays. Those attending had a most enjoyable weekend.

The conservancy was honoured early in the year by a visit by the Director General of UNESCO, Koïchiro Matsuura, who showed a keen interest in and knowledge of Tongariro National Park.

The Conservancy was delighted to co-host the Pacific 2009 World Heritage Workshop (along with Tumu Te Heuheu). The objective was to prepare a five year Action Plan for the Pacific. New Zealand has an important role to play in the Pacific as a result of an agreement between the Government and UNESCO and because of its role on the World Heritage Committee. Tumu Te Heuheu is New Zealand's delegate on their committee and we were all delighted to see the New Year honours recognised his contribution to conservation.

Whistling on water - securing the Whio

Above: Whio with chick on the Mangatepopo River. (Photo: John Shorland)

By Nic Etheridge

Technical Support Officer
Biodiversity

Few who hunt, fish or tramp the upper river valleys of the central North Island, the western flank of the Southern Alps or Fiordland can fail to have heard it – Whio! Whio! Whio! A shrill whistle, carrying above the noise of cascading white water. On a rock not far away, its body stretched forward as it utters its most obvious note, a male blue duck signals its presence. His mate, identical in appearance with her steely blue body, chestnut-speckled breast, whitish bill and a piercing yellow eye, will probably add her reply in the form of a couple of low growls.

Blue Duck or whio (here after referred to as whio) are regarded by the IUCN as Endangered and in New Zealand as Nationally Endangered (which are included in the sub-category Acutely Threatened, Hitchmough *et al.* 2002). The latter is the second highest category of threat and places whio in a group of species for which conservation action is imperative.

Whio are our only endemic avian riverine specialist, today confined to headwater catchments of our unspoilt rivers. They prefer turbulent, bouldery rivers and streams which allow for high water quality, low sediment loads, abundant and diverse invertebrate communities. They are an indicator of river and water quality.

Whio live in monogamous pairs on exclusive territories of up to a kilometre long, occupying the same stretch of river year after year aggressively defending territories against other whio. The males tend to live longer at 12 years, while females are generally much shorter lived. Typically, nesting and egg incubation of four to seven eggs is undertaken by the female while the male stands guard. Nesting begins in August and continues through to November, with juveniles ready to fledge in February/March. Typically nests occur as shallow, twig, grass and down lined scrapes in caves, under river-side vegetation or in log-jams. They are therefore very prone to spring flooding. For this and other reasons, their breeding success is extremely variable from one year to the next.

Right: Blue Duck habitat on the Whakapapa River. (Photo: Bubs Smith)

Right: Female on nest on the Mangatepopo River. (Photo: Bubs Smith)

The status of whio declined nationally with the onset of human settlement in New Zealand. They are now limited to the less modified catchments of the Urewera, East Cape and Central North Island and throughout the West Coast of the South Island from Nelson to Fiordland. The remaining populations are increasingly becoming fragmented and isolated as their distribution decreases. It is estimated that about 640 pairs remain in the North Island while just under 700 pairs remain in the South Island giving a total population of between 2,000 and 3,000 individuals.

One of the initial major causes of decline was habitat loss and degradation. Forest clearance for agriculture and poor riparian (river side) management has resulted in reduced water quality through sedimentation and nutrient run-off changing in-stream invertebrate habitat in many catchments. In many other rivers, flows were manipulated for hydro-electric power generation or irrigation, changing the characteristics of the rivers.

Predation by introduced mammalian predators is significant in the ongoing decline of whio, even where high quality river habitat remains. Stoats are perhaps the greatest danger. They attack females on the nest, steal eggs, and perhaps even take young ducklings from the rivers edge. This appears especially significant in the beech forest systems because stoat plagues occur regularly. Feral cats, domestic dogs, possums and ferrets are also known predators of whio, while rats have been recorded at nests and are likely to take eggs. Whio are also predated by natural predators, falcon, harrier, kea, weka and eels on ducklings.

For those of you who spend many a day travelling up and down our backcountry rivers, there is no doubt you would've come across this masterful white water specialist. Sadly however they are becoming less abundant. Males are calling their chilling "Whio" but alas receiving no response from a female.

So why are whio declining? It is this question that the Central North Island Project hopes to answer. One of the major causes is habitat loss and degradation. Flows are now manipulated for hydro-electric power generation or irrigation, changing the characteristics of the rivers. This conservancy has had a long history studying hydro development impacts and is now equipped to manage the threats with power companies using well researched knowledge.

However, even where high quality river habitat remains, predation by introduced mammalian predators is playing a significant role in the regions decline. The lone male is a symptom of what appears to be

Right: Stoat (highlighted) attacking female whio on the nest. Image taken off surveillance video. (Photo: Murray Williams)

Above: Adult whio with chicks on the Whanganui River. (Photo: Bubs Smith)

the root cause of the decline – the high loss of breeding females. It is up to us to determine what the key threat pest is and how to manage it to ensure whio remain on our rivers.

Conservation of whio is guided by the Blue Duck Recovery Group (BDRG), consisting primarily of specialist staff of the Department of Conservation together with a co-ordinator of private holders of captive ducks. The Blue Duck Recovery Plan has been developed with the key aim of maintaining sufficient numbers of whio in the wild to see its IUCN and DoC threat categories reduced from their current high levels.

Since publication of the recovery plan, the focus of recovery planning has shifted from 'how many ducks are there and where are they?' to halting and reversing the ongoing decline. In particular, there is increasing emphasis on the role of predation in population declines. This led the BDRG to develop a research by management strategy which provides a strategic approach to investigating the predation issue on key rivers. This is achieved by monitoring blue duck population responses to predator control as it is started and then stopped for a few seasons, and changes to breeding success or duck numbers are carefully documented.

However, the research by management programme will not protect enough whio over a large enough area to ensure the future of the species. In response, the BDRG has identified eight regions where whio must be conserved to ensure a future for the species. Within these regions a minimum of 30 pairs will be protected. The Central North Island is one of the eight regions identified.

In the Central North Island the Tongariro / Taupo and Wanganui Conservancies have joined forces to conserve a minimum of 40 pairs (we can do better than 30) in the Western Central North Island. Staff, in consultation with the Central North Island Blue Duck Conservation Charitable Trust, have developed a specific strategy for the Central North Island. One of the objectives of the strategy is to secure key populations, monitor the outcomes of management and to work closely with community groups and iwi.

The central North Island remains a national stronghold for whio with a number of rivers holding important populations. The most

Key threats in the Central North Island include:

- Predation. A number of introduced pests are known to predate whio, however which one is the worst offender is yet to be quantified in the CNI.
- Effects of volcanic events such as lahars from Mt Ruapehu. This is especially significant for ducks in the Tongariro and Manganui-a-te-ao catchments which contain major lahar paths.
- Flow manipulation for hydro-electric power generation.
- Recreational river use.
- Competition - trout feed on the same food items as whio.

Above: Bubs Smith and Gavin Thompson with a banded whio. (Photo: Nic Etheridge)

important whio population to secure in the Central North Island was considered to be the Whakapapa, upper Whanganui, Mangatepopo and Manganui-a-te-ao . The Tongariro river previously held a key population but the population has declined as a result of water extraction.

The CNI project started in August 2004. Two new DOC staff were appointed last spring to undertake the field work. General surveys of these rivers had been undertaken for a number of years prior to this intensive study. However, little is known about the mammalian predator impacts and their order of magnitude on the long-term survival of the species.

Bubs Smith started in August last year and spent his first month getting to know the whio territories, establishing access routes to the rivers and working with local landowners to gain permission to use these routes where they cross private land. Gavin Thompson joined Bubs in September to start the next phase of their work. Bubs and Gavin (pictured to left) have been finding whio nests, becoming familiar with the birds and their territories, measuring nesting success and monitoring the survival of adults and chicks. This work will continue from August to February each year for the next five years and will expand to include pest control in 2006/07.

Both of Ngati Hikairo descent, Bubs and Gavin are committed to monitoring and protecting the population. They are making a significant contribution towards meeting the aim of the project to recover and secure the species. As Bubs said, "I saw this as an opportunity to do something physi-

Right: Gavin Thompson, Petra Specht, Nic Etheridge, Jonathan Miles, Bubs taking photo. The whio biodiversity crew! (Photo: Bubs Smith)

Right: Whio nest & eggs. (Photo: Bubs Smith)

cal for kaitiakitanga (guardianship) of our native animals".

At present they are catching birds in order to band and fit females with transmitters so their nests are able to be found and their fate determined next season. This is a time consuming job and requires a lot of people. A team of people are needed when catching birds therefore a range of biodiversity staff support Bubs and Gavin when needed.

Results are preliminary however, of the 33 pairs monitored, 23 nested this season within the study site of 35 km of river. Seven of those nests were successful. From those seven nests 23 chicks were produced and made it to the river as class 1 ducklings. Four of those chicks were lost on the water, causes unknown. Nineteen juveniles have made it through to class five and are soon to fledge. Seventeen of the juveniles have been caught and banded. Currently transmitters are being put on females in order to find more nests for next season as well as banding all birds in the study stretch.

CENTRAL NORTH ISLAND BLUE DUCK CONSERVATION CHARITABLE TRUST

About ten years ago, ECNZ (the predecessor to Genesis Energy) began the process to renew the resource consents to continue to operate the Tongariro Power Development (TPD) scheme.

Representatives from DOC and Forest and Bird were at the core of a working group of many interested parties that investigated and worked through many complex issues surrounding the renewal of these consents. Central to those concerns for DOC and Forest and Bird were blue ducks and trout, two of the more conspicuous inhabitants of these rivers. After much consultation, DOC, Forest and Bird and Genesis Energy established a mitigation package consisting of the release of minimum flows below the Mangatepopo and Whanganui intakes on the Western Diversion of the TPD and the establishment of a blue duck trust. The trust would provide for ongoing initiatives to enhance, protect and promote blue duck populations, habitat and natural character.

The Central North Island Blue Duck Conservation Charitable Trust (CNIBDCT) was launched in Tokaanu on 16 August 2002. The trust is chaired by former Forest and Bird president, Keith Chappell. The new trust will seek to assist the establishment of new blue duck populations, especially locally, the protection of existing ones and the promotion of blue duck river conservation awareness from a chest of $1.5 million to be provided by Genesis Energy over the life of the water right (15 years).

The primary objective of the trust is to create new self-sustaining populations of blue duck in appropriate locations (not limited to the TPD region).

The ancillary objectives are to:

- Enhance existing populations of blue duck within catchments affected by the TPD as a first priority, but not limited to these catchments;
- Enhance priority aquatic indigenous ecosystems within the catchments affected by the TPD.
- Enhance priority threatened species conservation work within catchments affected by TPD.

The trust has approved three projects. The first was to undertake a predator control pilot study on the Manganui-a-te-ao River in the Central North Island;, the second is to establish a new blue duck population on Mount Taranaki in the Egmont National park and the third is to secure whio in the Western Central North Island.

Kaimanawa Forest Park Management Plan Review

By Rowena Cudby

Conservancy Planner

The Department of Conservation initiated a review of the Kaimanawa Forest Park Management Plan in September 2004. A discussion document was released in order to facilitate ideas and suggestions from the public for the review. One hundred and forty three written submissions were received.

The discussion document highlighted some key issues for the review, including public access to and through the park, the possible conflict of air access with wilderness values, the protection of indigenous flora and fauna, the status of the Kaimanawa Recreational Hunting Area, and mountain biking in the park.

Kaimanawa Forest Park is managed as a conservation park under the Conservation Act 1987 (though for reasons of familiarity it will continue to be known as the Kaimanawa Forest Park). The primary aim in management of a conservation park is to protect its natural and historic resources. Public recreation and enjoyment are facilitated where this is not inconsistent with conservation management.

Above: Summer Programme participants cross the Ngaruroro River in Kaimanawa Forest Park as they make their way from the Boyd Airstrip to the Oamaru Valley.
(Photo: Dave Wakelin/DOC)

Kaimanawa Forest Park is a special place with outstanding natural, historic, recreational, wild and scenic values. Its 77348 hectares are situated southeast of Lake Taupo and lie between Tongariro National Park to the west and Kaweka Forest Park to the east. The four ranges which make up the park contain the headwaters of a number of significant rivers, including the Mohaka, Ngaruroro, Rangitikei, Tauranga-Taupo Waipakihi. The park contains a range of habitats which support a diverse array of indigenous flora and fauna. The park offers a variety of recreational opportunities including tramping, hunting, fishing, rafting and kayaking.

The purpose of the Kaimanawa Forest Park Management Plan is to provide for the management of the park in accordance with the Conservation Act 1987, the *General Policy for Conservation*, and the *Tongariro/Taupo Conservation Management Strategy.* The plan will direct the work of the department for the next ten years. The plan was last reviewed in 1990.

The department is currently preparing a draft plan which will be notified later in 2005. The public will have a further opportunity to comment at that stage. Following this the department will re-draft the plan and forward it to the Tongariro/Taupo Conservation Board for approval.

Girls on Top Survey Blue Duck

By Amanda Peake

Girls on Top is a club for women that was formed late in 2002, the aim of the club is to get more women (of any age) into the outdoors and let them experience different outdoor activities in a supportive environment that is non threatening, safe and most of all fun. The original club was started in Auckland, but now there are similar groups in Hamilton, Taupo, Wellington and Queenstown.

www.girlsontop.co.nz

Debbie Chambers, Anne Lowerson and I decided to include a Blue Duck survey in a New Year tramp that we undertook in the Kaimanawa Forest Park.

Blue Duck (Whio) are a nationally endangered species which are rapidly declining in many areas of New Zealand, including Tongariro National Park and Kaimanawa Forest Park. However these areas have always been considered a strong hold for blue duck.

The Department of Conservation in conjunction with the Tongariro Natural History Society (TNHS) are co-ordinating a survey of blue duck this season - 2004/2005.

The aim is to complete a one off full distribution survey of the rivers within Tongariro Taupo Conservancy. The survey will indicate if the population has increased, is stable or has declined. It will be a guide to determine the current population status. The survey will be published as a 2005 population survey for the region. This information will be used to guide management of the species. The dual benefit will be to raise awareness of the endangered blue duck to the general public through promotion and an invitation to participate.

The tramp that we had decided to do was in potential blue duck habitat as it included a significant section of the Kaipo River up an old DOC track that involved many river crossings and stretches of walking up the very cool clear waters of the river itself. We decided that while we were out enjoying our walk we would do what we could for the TNHS and keep an eye out for blue ducks along the way.

To our excitement, about half way up the river we came across a blue duck family, Mum, Dad and three ducklings. Fortunately the ducks had not been fazed by the noise we were making as we gas-bagged our way up the river and despite their initial shyness with the camera, they soon got used to our presence and resumed their normal activities so we could take their picture. We found their behaviour to be quite fascinating and even the young ducklings had river skills that I wished I could replicate in my kayak.

After a period of observing the family group and numerous photos we tore ourselves away and continued on towards our next pit stop – the Kaipo saddle. We got home tired and happy quite a few hours later. We were very pleased to have had a close encounter with one of New Zealand's endangered birds while simultaneously enjoying our tramp in the spectacular scenery of the Kaimanawa Forest Park.

Below: Blue Duck surveying means a lot of time is spent wading streams and rivers. (Photo: Julie Oram)

Above: Red Crater, high point on the Tongariro Crossing (Photo: Iris Broekma)

Red Crater Research

By Harry Keys
Conservancy Advisory Scientist

Red Crater volcanology is now better understood thanks to Waikato University student Candice Bardsley. Red Crater activity began less than 10,000 years ago when magma from 10-15 km depth worked towards the surface as a dike encountering the condensate layer/groundwater and causing a violent eruption. This blasted through the 65,000-115,000 year old Tongariro lavas now exposed in the western wall. Five andesite lava flows were erupted prior to the 186AD Taupo eruption, with the first flowing seven km down Oturere Valley to become the largest preserved flow on Tongariro. The next phase of activity began after the Taupo eruption with an injection of basaltic andesite magma. This led to fire fountaining that constructed the classic red scoria cone, possibly in only a few days. Another six lava flows formed from rapidly accumulating hot bombs and scoria sufficiently molten to flow away into upper Oturere valley, then Central Crater and finally South Crater. The famous dike in the south-east wall formed during this second phase and is the best exposed example of a dike feeder structure on Tongariro. Finally magma withdrawl from the dike system promoted further magma-condensate/groundwater interaction and violent explosions. These blasted out explosion pits (now occupied by Emerald Lakes and on the south side of the cone) and the northern crater wall. Debris from these explosions includes ballistic blocks up to seven metres in diameter round Emerald Lake. There have been only minor eruptions since then.

Why does DOC manage the Taupo trout fishery?

by John Gibbs

John is the Fishery Area Manager and has fished Lake Taupo since the 1950s, with a working involvement with the fishery since 1964.

Why does DOC manage the Taupo fishery when Fish and Game do it everywhere else? This is a question we often hear. Sometimes it comes with a suggestion that managing an introduced species doesn't seem like the Department of Conservation's core role.

Well the answer is quite straightforward. Trout and all other sports fish are public resources. They cannot be privately owned until and unless they have been lawfully caught. And that law? Why, it's the Conservation Act.

The Minister of Conservation is responsible for the Conservation Act and the legislation is administered by DOC, including those bits relating to trout. For the most part, the management of trout (and game birds) is delegated under the Act to Fish and Game Councils, which are Crown entities responsible to the Minister of Conservation.

The Taupo trout fishery is also administered under exactly the same provisions of the Conservation Act. It has its own detailed rules, the Taupo Fishery Regulations, but they are also authorised by the Conservation Act. Fish and Game regions have parts of the Freshwater Fishery Regulations and Anglers' Notices fulfilling the same role.

The big difference goes right back to the early days of the Taupo fishery and the ownership of the beds of the waters where Taupo trout live. Prior to 1926 Ngati Tuwharetoa, the local iwi, owned the bed of Lake Taupo, the beds of the inflowing rivers and most of the surrounding land. This gave them effective control of access to the fishery itself, although the water and the trout were a public resource.

As the quality and reputation of the fishery grew many ardent anglers, particularly from USA and UK, saw opportunities to claim their own piece of paradise. Various overtures were made to Maori landowners either to buy land around the lake or along the rivers, or to purchase exclusive access agreements. New Zealand anglers and the government of the day saw the risk that this could effectively privatise much of the fishery and thus lose a highly valued recreational and tourism resource.

The government began negotiations with Ngati Tuwharetoa in 1924 and these concluded in 1926 with the passing of the Maori Land Amendment

The work done by the fishery team in managing the trout fishery is varied, from checking on the smelt population in Lake Taupo, to monitoring numbers of juvenile trout in the rivers, interviewing anglers, or repairing a bridge for angler access (Photos: Taupo Fishery Area/ DOC)

and Maori Land Claims Adjustment Act. This forestalled the private ownership of Taupo waters by declaring their beds Crown land. Public access to and use of the lake for all purposes was provided by a right of way around its shores. But in a unique move, the agreement also provided access on foot for licensed anglers over most of the banks of the inflowing rivers while retaining their Maori ownership.

There were some small areas of lake shore and river bank already in freehold title and these weren't affected by the new Act. But any Maori land freeholded since 1926 retains its public or anglers' rights of way.

In return for these rights, the Crown pays Ngati Tuwharetoa annual sums based on fishing and boating use. But to quantify this, special fishing licences and boating fees (launching ramp, mooring and berthing permits) were required. All the revenue from this special fishing licence is used to manage the trout fishery, but it provides the figure against which the payment to the Tuwharetoa Maori Trust Board is indexed. To ensure that all angling use is accounted for, fishing licences for other parts of the country cannot be used at Taupo.

Since shortly after the turn of the 20th century the Taupo fishery, along with the other major tourist fisheries of the Southern and Rotorua lakes districts, was managed directly by government agencies. The first was the Department of Tourist and Health Resorts and, since 1913, the Department of Internal Affairs (later its NZ Wildlife Service). This reflected the views of successive governments of the importance of these fisheries to the country's economy and their recreational value to the nation.

In the period after 1926, Ngati Tuwharetoa frequently expressed their view that the Act proclaiming Taupo beds as Crown land did not accurately reflect their agreement with the Crown. By the late 1980s the two parties were close to agreement on the Tuwharetoa view. In 1992 a deed was signed restoring the title to the beds of Taupo waters to Ngati Tuwharetoa while retaining all the existing rights and privileges of public and fishing access.

At this same time the management of sports fish and game birds in New Zealand was undergoing major changes. The old acclimatisation societies were replaced with fish and game councils. Most of the areas formerly directly managed by the government also passed to Fish and Game control.

In the normal course of events the Taupo fishery might well have followed. However, Ngati Tuwharetoa made very clear the value they placed on their unique statutory relationship with the Crown. This required that they dealt directly with the government as the Crown's representative on Lake Taupo issues. It would not truly reflect the pur-

pose and intent of the 1926 Act and the 1992 Deed if the government delegated its management role to a third party.

So recognition of this view was given in the Conservation Act with the responsibility for managing the Taupo fishery being placed with the Director-General of Conservation. DOC had incorporated the former Wildlife Service, which was managing the fishery, as one of its parent organisations so it ensured continuity was maintained.

Perhaps more importantly, the Conservation Act incorporated the government's functions for not only the protection and preservation of historical and indigenous natural resources, but also for recreation and enjoyment of public conservation lands. Crucially, this Act also provided for the management of valued introduced recreational species – sports fish and game birds. The value the community places on these statutorily managed species is reflected in their status in the Conservation Act. And so it was that the political decisions were made and DOC now manages the Taupo trout fishery.

Volcanoes around the world with snow and ice

Information gathered from GVP/USGS Weekly Volcanic Activity reports. See Volcano Watch on page 50 for a report on the volcanoes of Tongariro National Park

By Dr Harry Keys

Conservancy Advisory Scientist

Volcanoes with ski areas continue to erupt. Asama in Japan had significant eruptions from September to November with the larger bombs setting fire to alpine and forest vegetation. Five cm material was ejected five km from the crater and about 40 people were evacuated. It is not clear whether the ski area was affected although presumably skiing had not yet started. Mt Etna resumed erupting in September with lava flowing over snow causing explosions. In March a volcano-tectonic earthquake swarm occurred at the Three Sisters near Mt Batchelor ski area in Oregon, in a zone in which the ground has been uplifted up to 25 cm since 1997 due to a magmatic intrusion seven km below the surface. A lava lake remains active in the crater of Villarrica in Chile above the ski fields there.

Volcanic activity on glacierised volcanoes may also provide lessons for us. During August-September a depression tens of metres deep formed in the summit ice cap of Mt Spurr volcano in Alaska and a 150 m diameter grey lake developed, following increased seismicity and gas emission. Extrusion of a new lava dome at Mt St Helens in Washington is ongoing following its emergence in October after several days of seismicity. Its interaction with glacier ice in the crater caused intense crevassing flowed by steam and ash emission, development of a meltwater pond, small lahars and recently thickening of the crater glacier due to compression. A glacial outburst flood from Grimsvotn caldera lake, Iceland, in late October, led to a drop in water level probably in the order of 10-20 m. This corresponded to a 0.1-0.2 MPa reduction of pressure on the volcano surface which triggered a six day long eruption of Grimsvotn because internal pressure on the shallow magma chamber was high after continuous inflow of magma since 1998.

How much do you value Taupo trout?

Right: Trout fishing at Taupo is a year round experience with summer fishing on the lake and winter fishing on the rivers. (Photo: Petrina Francis/DOC)

By Petrina Francis

Programme Manager
Community Relations
Taupo Fishery Area.

It is strange that human nature often means we take for granted what we enjoy most or what surrounds us. Until one day that 'thing' is gone and then we wish we had stopped to enjoy and value it more!

It is easy to take the Taupo trout fishery for granted. For those of us who have spent years coming to the lake and rivers to fish, or who have family holiday homes or live in the district, we don't often stop to think of how important the fishery is to the area. Imagine Taupo or Turangi without trout! It is difficult to because trout are entwined into many of the things we value most about Taupo.

How do you put a value on trout? Value is a misleading word to use because we tend to equate it in monetary terms. Although the trout fishery at Taupo is very important to the local and national economy, there are other values to the community from the fishery that are less easy to define, and therefore easier to forget. When put together, these make the fishery an incredibly valuable asset.

Take for example, the fact that the fishery is wild and self sustaining. A popular misconception is that Lake Taupo is stocked with hatchery grown trout. And yet we have this fantastic wild fishery that (with careful management) looks after itself providing lots of wild fish for anglers to catch. In many places around the world it is almost impossible to catch a wild trout any more, the fisheries instead maintained by stocking regimes that have been in place for many years. The Taupo District is special in that it still has all the necessary elements in the environment to support the habitat and life cycle of trout. Lots of rivers

and streams feeding into the lake mean plenty of spawning areas and habitat for young fish. And what we often take for granted about Taupo trout are the perfect specimens that are caught. New Zealanders tend to measure fishing success by the size and number of fish caught; however many overseas anglers see catching the perfect specimen as just as important. The Taupo environment is a relatively harsh setting in which only the best fish survive, producing outstanding specimens. Taupo trout do not have the characteristic deformed dorsal fin trait of fish that have spent time in hatchery conditions. The perfect example of a wild trout represents to overseas anglers what they see New Zealand as - a clean, green and pristine environment.

Below: Taupo provides a wide variety of fishing experiences, all in the one geographical area. (Photo: Rob Hood/DOC)

What about the recreational value? The Taupo fishery supports two very different species of trout, each providing their own unique challenges. Not only is there a very productive rainbow fishery, but also trophy brown trout. This allows for a range of fishing techniques and challenges. Within a relatively small geographic area, anglers can choose from a wide selection of fishing methods including flyfishing on the rivers and around the lake edge, trolling, jigging, harling and downrigging on the lake. In all, Taupo provides 40% of the freshwater fishing enjoyed in New Zealand each year.

How often do we remind ourselves how fortunate we are to have a 'year-round' fishery? It is like a full year sporting event that everyone can take part in. In many other fisheries around New Zealand rivers are closed over the spawning season and 1st October each year is eagerly awaited by river anglers. The lower parts of the major rivers at Taupo are open even during the spawning season and there is great summer fishing on the lake when trout return to feeding on smelt. And once again, within a relatively small geographic area is a wide variety of fishing landscapes – the strong current and deep pools of the Tongariro River, the small stream mouths on the western and southern bays, the open spaces of Lake Taupo, the solitude of Lake Kuratau and the wilderness fishing of Lake Otamangakau.

Often though, the social value of the fishery is forgotten. As a food source, providing sustenance and a meal for the table, trout fulfil

Above: What is often taken for granted at Taupo are the excellent wild trout specimens the environment produces, the envy of overseas anglers. (Photo: Rob McLay/DOC)

a basic need. Local iwi regard the trout resource as a taonga or treasure, as it is intrinsically interwoven with the values of their communities. A trout features prominently on the crest of the Tuwharetoa Maori Trust Board along with images of the lake and mountains. Trout are something held dear and close to the heart of the local community.

And let's not forget that the fishery encourages people to interact with others – whether it is a group of anglers gathered at the side of a popular Tongariro pool, or those participating in a social fishing competition, or people congregating at one of many angling clubs in the district. Trout provide social opportunities as a recreational pursuit the whole family can enjoy and a chance to hand down knowledge (and fishing stories!) from generation to generation. The fishery provides employment and business opportunities which help towards a positive feeling in the local community.

Trout also give the community a sense of responsibility and the need to protect and value a resource. When the community was asked what they value most about Taupo in the Taupo-nui-a-Tia 2020 project, one of the 14 identified values was "good trout fishing". This sat alongside water quality and recreational opportunities. Trout are often seen as an indicator of the health of the area – if the fishery is doing well, then other things such as the environment must be in good shape. If lots of anglers are seen coming in to the area to fish, then the economy must be buoyant and tourism will be doing well. Even if people in the community do not fish for trout themselves, it is just as important to them that the fishery is in good condition as it represents a guide to how the whole of the district is faring.

But what about the monetary value? Just what does the Taupo trout fishery contribute in monetary terms into the economy? In 1991 the National Research Bureau did a survey on the annual economic expenditure on recreational fishing in NZ. At that time, expenditure annually was estimated to be 745 million dollars. This amount was apportioned out to each area relative to the estimated percentage of people that fished in that area. At that time, 8.2% of people fishing in NZ fished at Taupo. Assuming that annual expenditure related to the Taupo fishery is proportional to the number of people who fished here, this equated to $61 million dollars in 1991. Adjusting this figure to account for changes in the Consumer Price Index gives a conservative estimate now of $70 million per year into the national economy. This is a large amount of money! If divided into the amount of licences sold each year at Taupo, this equates to an average expenditure per year of approximately $1100 for each licence sold. This is money spent on airfares, car travel, boat fuel and running costs, boat charters, accommodation, food and equip-

Above: The Taupo fishery draws a huge amount of visitors into the area, generating $70 million for the local and national economy. (Photo: Rob Mclay/DOC)

ment. However it does not include capital expenditure. Think of the person who bought a boat specifically so they could fish Lake Taupo, or the family that loved their fishing holiday so much they decided to buy a bach in the area. Imagine if we could factor capital expenditure on items such as these into the equation! And with tourism the largest economic contributor to the Taupo District in 1998, bringing in $90 million to the local economy, it is safe to assume that a large part of this is associated with the fishery. As a 'year round' sporting event, the fishery contributes to the local economy all through the year, rather than just seasonally as most other activities do.

It is interesting to look at who makes up the angler melting pot at Taupo. Analysis shows only 25% of anglers fishing the lake are locals from the Taupo/Turangi area. Everyone else travels into the area, largely from around New Zealand with a smaller percentage of anglers coming from overseas. This same pattern is reflected in river fishing. For example on the Tongariro River, 19% of those fishing are locals with 72% coming from around New Zealand and 9% from overseas. This means a huge number of visitors come into the area all through the year, generating value to the local economy, drawn by the lure of a fantastic trout fishing experience.

And who pays to provide and look after this valuable resource? Well, it's the anglers at Taupo themselves. The fishery is totally funded by revenue from fishing licence sales. It receives no other money from central or local government, unlike many other elements of the recreational and commercial sector. All the benefits that come in from a team of people providing access tracks and structures, conducting monitoring, research and law enforcement in the area, providing angling information and fighting battles to protect the habitat and environment, is paid for by anglers. The whole community benefits – in fact the whole country benefits, as a result.

So the fishery has many values – physical, recreational, social and monetary. All benefit the community at Taupo and Turangi, and all come together to produce the trout experience enjoyed by thousands of people each year. Let's stop and take a minute every now and then to pinch ourselves and relish how lucky we are to have this valuable asset, right on our back door step!

Recreating on solid water - snow management on Ruapehu

Snow making has changed the face of the ski industry in New Zealand. Industry commentator, Scott Lee, looks at how the Department of Conservation and ski area operators work closely together on the development of snowmaking and other snow management techniques to ensure the objectives and values of both are maintained and enhanced on Mt Ruapehu inside the Tongariro National Park. Scott has recently been appointed General Manager of Destination Lake Taupo.

500,000 visitors pour into Mt Ruapehu's two ski areas, Whakapapa and Turoa, over the winter months, making these the most popular in the country.

Together the ski areas employ 750 staff at the peak of the season, making them the area's largest employer.

In addition the ski industry generates $50 million annually for the surrounding area as visitors purchase accommodation, food, and petrol, and local trades people and businesses work to service the growing infrastructure.

The ski industry is clearly critical to this local and regional economy (just ask anyone that was around during the eruption year of 1995-96), and to be successful the most important ingredient is reliable snow.

The term "Snow Management" has been coined by the industry to encompass all those activities undertaken by ski area management to enhance what nature provides naturally.

It encompasses snow making, snow farming, snow moving, and snow grooming (see terminology below).

It's not rocket science, but it is expensive and, like all activities inside a National Park, development must be balanced with minimal impact on the park while maximising the enjoyment, safety, and utilisation of users.

The close cooperation between the Department of Conservation and the ski area operators, Ruapehu Alpine Lifts, represents a textbook case as a solution to the 'sustainability versus protection' scenario.

Tongariro National Park has a dual World Heritage listing because of its unique geological makeup and cultural significance, so it was imperative to get it right the first time.

Working together

The park and ski area management started working closely together in the late 80s while developing the 1990 Tongariro National Park Management Plan.

An integrated approach to long-

term development planning was pursued, allowing for the best utilisation of existing disturbed areas, terrain modification and snowmaking. "This management plan had a different philosophy to previous documents and included a much greater acceptance of 'ring fencing' the ski area with a slight freeing of attitude to snow management compared to what had existed in the past." says Dave Mazey, General Manager for Ruapehu Alpine Lifts.

"At the time, there was a push to go higher and higher on the ski area, but as a management company we felt there was limited advantage in that. The weather conditions are just too extreme. We were far better to focus on getting better utilisation of existing terrain and part of that argument was to look at lower mountain slopes that were being used less and less due to intermittent snow cover. We looked at all the possibilities and concluded that it wasn't environmentally acceptable or commercially viable to go higher. The simple fact is, the lower mountain is open more days. While the upper mountain may be closed 25-30 days a season due to inclement weather, the lower mountain only loses 10-12 days.

Look at the Far West on Whakapapa and old Moro T-Bar on Turoa. They are only open 30-40 days a season. It would have been a bad investment to put multimillion dollar chairlifts into the upper mountain."

Has it worked? It certainly has according to Mazey. "When planning the snow making for the Rockgarden area, recent historical information showed the Rockgarden being skiable for an average 20-25 days per season. Now with modest terrain modifications and snowmaking, the Rockgarden enjoys a 120 day season from mid July to the end of October."

This snow making has other positive impacts on skiers and their utilisation of the mountain, in addition to the longer season on the lower mountain. Skiers progress from learners to intermediates to advanced, and the Rockgarden is renowned as a lower intermediate level area. By increasing the usability of this area, intermediates can now progress from Happy Valley (a beginner's area) to the Rockgarden, rather than going to the upper mountain, which was too big a leap. The beginners are now happier in Happy Valley, the intermediates on the Rockgarden, and the advanced skiers can enjoy the upper slopes with fewer crowds. Everybody wins.

Good integrated planning is the key, as with any business. Ski area management and park management, by working closely together, can ensure the orderly development of the ski area with minimal effect on the environment and a balance between the needs of the ski area and its visitors with the values of the park.

Above: Snowguns fill the clear sky, and slopes, with snow at Hut Flat.
Top left: Despite the heavy machinery used to lay the pipes and facilities for servicing the snowguns there's always a job for someone on a shovel!
Top right: Restoration of disturbed areas was a priority and careful planting, protected by weed matting ensured disturbance was kept to a minimum.
Middle Left: The sides of the water pond are shaped prior to lining.
Middle right: A lot of attention was given to shaping of the pond verges and replanting.
Bottom left: Metres and metres of weed cloth were used to give replanted areas protection.
Bottom right: Aerial view of the water pond, situated below the Happy Valley ski area.
(Photos: Ruapehu Alpine Lifts)

The location of services for sewage, power and telecommunications into the snow making trenches is a good example. Once these trenches have been covered and landscaped and have had the chance to weather, minimal evidence of their location remains.

Happy Valley, Whakapapa's beginners' area, is another example of a development with a restoration and conservation focus.

This area has developed in a hotch potch fashion over the past 50 years, but new lifts, terrain modification, and a snow making installation have been achieved in a development that has enhanced this sheltered valley.

A restoration and replanting process was started once construction was complete. Lichen, mosses, and tussock seeds are collected locally and grown in Taupo. They are then transplanted into Happy Valley and in a few years will cover the valley floor. This is a program that will be ongoing for up to eight years after completion of construction. RAL has even water blasted some of the rock faces to quicken the weathering process.

The removal of many old buildings and lifts no longer required for the efficient management of the ski area is yet another example of the improvements to the park that can be achieved with the cooperation of all parties. Once these facilities have been removed, the area is restored as close as possible to its natural state. Even years later, as pieces of concrete the size of 50 cent coins come to the surface; they are removed from the park. The restoration process is an ongoing commitment.

Ruapehu Alpine lifts and the Department of Conservation are working together to achieve the

TERMINOLOGY

Snow making – Making snow by spraying water particles through the air to freeze and fall as snow. This is either done with compressed air or fan jets.

Snow farming – Building snow fences to catch the snow that falls and drifts naturally. The snow is later moved to areas where it is needed.

Snow moving – Shifting large amounts of snow by truck or trailer from deeply drifted areas where it's not needed, to high traffic areas where it is.

Snow grooming – Pushing snow to develop and enhance ski trails and lift loading areas. Specialist snow grooming makers (worth up to $500,000 each) have a variety of attachments to push and compact the snow and to groom the snow surface to provide the best possible snow conditions.

RAL Advert

aims and objectives of both organisations and ensuring the values of the park are maintained and enhanced.

With all the talk of tourism sustainability, the boffins need look no further than Mt Ruapehu for an example of cooperation and success. These two organisations share philosophies, work practices, and aspirations to ensure protection of the park and mountains are maintained and protected now and in the future.

Mt Pihanga – Rotopounamu Project

Right: The North Island Robin is one of the delightful birds found in the Pihanga-Rotopounamu area.
(Photo: Iris Broekma)

By Kathryn Grayston

Longterm Volunteer
Tongariro Natural History Society

Mt Pihanga with her green forest robe clad around her curved form sits just south of Turangi and helps make up the northern volcanoes. Te wahine o Tongariro, the beautiful Pihanga wears around her neck a stunning greenstone pendant, Rotopounamu.

The enchanting walk around Rotopounamu (meaning Greenstone Lake) takes around two hours in total and takes you through swathes of podocarp/hardwood bush and areas of red beech woodland. Several places along the track have access to the pumice beaches, the most notable of which is long beach that sits just over half way round and with its shallow waters make for an ideal lunch stop and swimming spot in the summer.

This is one of the best kept secrets of Tongariro national park and despite the car park often being very busy, only occasionally will you come across others on the track.

Unfortunately, in recent years the bird populations in this area have been drastically reduced due to predation by introduced pests such as stoats and rats. Despite remnant populations of the original inhabitants remaining, a range of species such as Kokako, Kakapo and Petrels have become locally extinct, and other notable species like Kaka and North Island Robin are continuing to decline with recent data suggesting the loss of the North Island Robin within the next five years if nothing was done.

Since 2003 The Tongariro Natural History Society (TNHS) along with DOC have been working together on the Mt Pihanga – Rotopounamu restoration project. This has initially involved the collection of baseline data such as nesting success of selected bird species, presence/absence of pest species, and the implementation of a small number of mustelid traps around the lake which is all generally undertaken by TNHS long term international volunteers with technical back up by DOC.

The information gathered has since enabled TNHS to secure funding for an infrastructure of bait stations to be established in a 250ha area around the lake which will provide a safe haven for the birds from predation, securing the remaining populations.

This is however just a small part of the long term restoration project that is aiming to restore both indigenous flora and fauna of not only the vicinity around the lake but eventually of Mt Pihanga and the surrounding areas too. This year work has also included trying to identify species numbers of bat and weta populations present

at the site. This ties in with the protection and hand pollination of the wood rose (*Dactylanthus*) that was also undertaken this year, the pollen from which being a staple in the short and long tailed bats diet.

The vision is to "*restore the mauri of Mt Pihanga and Rotopounamu*" and return this site back to its pre-European state, to have weka greet you on the track as you walk around, to see large flocks of native birds roosting in the tree's around you, and at night to be able to hear the kiwi calling or spy bats as they feed on the nectar of the *Dactylanthus*. This is just the start of an amazing project and hopefully within the next few years this enchanting walk will become an even more outstanding experience.

Tongariro Natural History Society New Publication

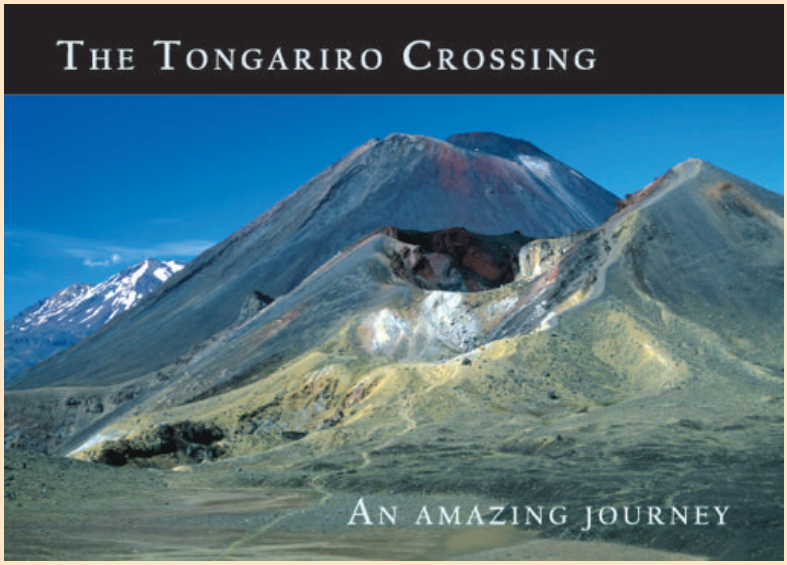
By Paul Van Miert

Taupo Weekender
February 3, 2005 page 5

The Tongariro Crossing, an Amazing Journey, the new booklet published by the Tongariro Natural History Society, is full of colour photographs and information.

Anyone considering walking the Tongariro Crossing will find this book a helpful guide to what they can expect and for those who have already been on the walk it will make a wonderful souvenir of the experience.

The 30 page booklet includes the history and maori legend of the Tongariro National park and World Heritage area.



The period covered is from 1887 when paramount chief Horonuku Te Heuheu Tukino IV Ariki of Ngati Tuwharetoa gifted the land to the people of New Zealand through to the most recent eruptions.

The book presents Tongariro as a place of extremes but despite the harshness the colour photographs illustrate a variety of life from lichens, moss, tussock, shrubs, flowers, insects and birds.

The second half of the book is devoted entirely to information about the walking tracks. It describes the geography of the area, gives a guide as to how long it will take you to walk and rates the various stages from easy, moderate to difficult.

There is also a map and a checklist of the equipment required before setting out on the Tongariro Crossing. The new book is available from tourist outlets and retails for $9.95.

Monitoring visitor use

Above: Trampers enjoy lunch on the Tongariro Crossing, one of the sites being monitored for physical and social impacts of visitor usage. (Photo: Iris Broekma)

By Peter Devlin

Technical Support Officer
Recreation Planning

The chances are, that if whilst enjoying all Tongariro National Park has to offer, you are approached to take part in a survey, it will be part of the visitor monitoring programme being undertaken by the conservancy.

There is no doubt that visitor presence in the national park has a physical and social impact – just how much is one of the objects of the survey.

The physical environment of the Tongariro / Taupo Conservancy has been, and continues to be, highly influenced by the volcanic mountains, Ruapehu, Ngauruhoe and Tongariro. Volcanic ash and pumice dominate the geology of the Conservancy and are highly susceptible to erosion when exposed to the physical environment. The combination of high visitor numbers and the physical environment has, in places, exposed volcanic ash and pumice. This has led to damage at sites over a number of decades.

Visitors can be affected by overcrowding of a site, loss of solitude, noise and changes to facilities leading to a reduction in the quality of the recreational experience.

The Tongariro /Taupo Conservation Management Strategy - 2002 is clear on our commitment to visitor research.

"The Department will continue to collect visitor numbers and assess visitor needs as resources allow. Priority will be given to high use areas or areas where visitor use could potentially impact on high natural and

historic values and the present information is inadequate.

Monitoring of visitor impacts on the environment will remain a key management function with adverse effects to be avoided, remedied or mitigated".

The survey sets out:

- To determine the levels of visitor monitoring required between 2004 and 2009 to monitor adverse change resulting from visitor use and effects on key sites
- To define the relationship between management actions and intervention, monitoring activities and research and investigation
- To identify and prioritise key recreational sites which require routine numeric data collection for the purposes of this Plan
- To identify and prioritise sites that require social and physical Impact monitoring projects for the purposes of this Plan
- To identify long term patterns and change over time in visitor patterns
- To meet the Conservancy's obligations under the Statement of Intent, Visitor Strategy, Conservation Management Strategy and Management Plans with regard to visitor impacts on natural and historic sites
- To undertake, where appropriate, joint monitoring with key users or interest groups, e.g. concessionaires and interest groups.

Information will be collected from approximately 10% of all other visitor sites. This 10% shall be represented proportionally across each visitor group. At the discretion of Managers, more sites can be monitored to provide information for decision making.

Visitor monitoring will provide staff with information for good strategic and operational planning. It is important to gather visitor information about sites where visitor information can assist with management decisions.

Information on visitor tends is important for future planning. Visitor statistics complement and provide support for other components of a comprehensive visitor monitoring programme, such as that gathered by on site visitor research.

Data collection will assist management with specific issues, such as the impact of visitors on the physical environment, or the effect of new policies or decisions.

The principle objective of numeric data collection is to provide information regarding trends of visitor use over time. This set of information becomes more meaningful when used in conjunction and analysed with information about the visitor and their visit. Management is better informed and able to make decisions about priority setting and resource allocations.

If you are approached by a surveyor remember that your responses may influence the management directions of DOC staff in providing safe, efficient and environmentally and socially acceptable facilities.

Lakes, rivers and tourism

By Dave Wakelin

Senior Community Relations Officer

In my earlier years I never paid much attention to Taupo. My childhood memories of Taupo are of dusty pumice roads, limited accommodation, a small shopping area and not much else, somewhere you drove through to get to somewhere else! In my late teens and early 20s I was usually in a hurry travelling somewhere north or south. Taupo was just one of the last stops on a long journey.

Times change!

Taupo now is a thriving tourist town with great council community facilities, a vibrant central shopping area, a complete range of accommodation and a smorgasbord of restaurants and cafes. One of the greatest views in New Zealand has to be looking south across Lake Taupo to the mountains of Tongariro National Park, a view unimpeded because of a wise council decision years ago to block encroachment onto the lake shore along Lake Terrace.

Every weekend there is at least one event happening in and around Taupo and Turangi. Little wonder Taupo is known as the event capital of New Zealand. Many of the major sporting codes hold regular or annual events in and around Lake Taupo. One of the largest events in the country, the Wattyl Great Lake Cycle Challenge attracts more than 10,000 cyclists and an equal number of supporters on the last Saturday of November each year. The International Ironman is a major event on

A few Taupo facts:
Lake Taupo is 359 metres above sea level, 40km long and 30km wide with an area of 616 sq. km.
Yearly sunshine hours: 2002
Yearly ave. rainfall: 1045mm
Average temperatures
Summer: 22.8°C
Winter: 11.7°C

the international sporting calendar, one which Taupo it proudly wrestled off Auckland some years back. In March each year superbly fit athletes swim cycle and run to the enthusiastic support and assistance of thousands of volunteers and supporters.

What is the attraction?

Taupo has always had an appeal. Early Maori settled around the shores of the lake, attracted to the plentiful food supply from forest and lake, the abundant thermal heating and cooking and cultural significance of the central North Island Mountains. Legends tell of the two great explorers Ngatoroirangi and Tamatea-arikinui (Tia) who explored the Lake Taupo area and were taken by the beauty of the area, its lake and mountains. Many local place names originated from the travels of these two.

Early European settlements at both ends of the lake saw the start of a fledgling tourist trade. Tourists, jauntily dressed in their finest attire, cruised up the Whanganui River to the small riverside settlement of Pipiriki before taking a bumpy dusty ride by stage coach and horse up onto and across the Desert Road. The stage stopped at Waihohonu to change horses and allow the weary passengers a chance to clear their lungs and have a cup of tea before the final leg to Tokaanu and the hotel. The thermal pools at Tokaanu would have been a welcome tourist attraction for tired bodies. Steamers such as the Tongariro plied their trade transporting tourists up and down Lake Taupo. Tourism in those days was a very small affair but nonetheless established the seeds for

Opposite page right: One of the iconic scenes in the Taupo area is the 'picket fence' at the outlet of the Waitahanui River on Lake Taupo where anglers form a line across the river mouth in the hope of catching some of the trout that make their way upstream.
Opposite page background: Calm waters on Lake Taupo, New Zealand's largest lake.
(Photos: Dave Wakelin/DOC)

A few Taupo tourism facts

- Tourism is one of New Zealand's largest and fastest growing industries and the Taupo District is an established destination for domestic and international visitors.
- Lake Taupo is one of New Zealand's largest visitor destinations, attracting over 726,000 visitors annually, including 582,000 domestic and 143,000 international visitors.
- The domestic market is approximately 78% of the total market, with the international market being 22%.
- These visitors generate over 1.484 million nights each year and the average length of stay is two nights.
- They directly spend over $139 million each year. With downstream spending this increases to $222 million.
- These figures include only those staying in commercial and private accommodation and in particular do not include an unknown number who frequently stay in holiday home accommodation, timeshare, homestays or visit the region on day trips.
- Visitor expenditure supports an estimated 1,600 jobs in the district.
- Despite the summer peak, there is market strength through much of the year.
- Visitor activity and the industry is heavily concentrated on urban Taupo (76% of visitor related employment), and its immediate environs including Wairakei.
- There are secondary concentrations at Turangi (12% of visitor related expenditure)
- The visitor market is growing steadily - since 1996/7 it has grown 24% in visitor numbers but only 20% in visitor nights, indicating that while more people are visiting Lake Taupo they are staying less time on average. The domestic market is growing steadily whereas the international market is growing more rapidly.

what is now a multimillion dollar industry. It been estimated that tourism is worth at least $222 million to the local economy.

Protecting tourism

It has been a carefully balanced and calculated process that has given tourism in the Lake Taupo district its strength. The protection of vast areas of the central North Island is clearly part of the key to a very successful tourist industry. Tongariro National Park, New Zealand's first, was set aside as the National Park in 1887. Other areas around Lake Taupo were established as reserves and the vast Kaimanawa Forest protected as a Forest Park.

Those who released a handful of rainbow trout fry into the headwaters of the Tongariro River back in 1898 had no idea that this simple act would place Lake Taupo and its rivers on the world stage as a holy grail of freshwater fishing. The establishment of trout fishing as a major recreation and tourist industry has not only brought dollars to the area but the realisation that our rivers and lakes must be cared for if we are to continue to maintain the reputation as the world's greatest trout fishing area. Central to all this is the Department of Conservation. The department is responsible for administering and managing vast areas of natural and historic resources in the central North Island in what is known as the Tongariro Taupo Conservancy. A network of tracks is maintained by DOC staff along with accommodation that ranges from four bunk bivvies through to 24 bunk huts, well used in the summer months. Staff maintain viewing tracks and look out points at most of the key scenic spots in the area. Often DOC works very closely with local authorities such as the Taupo District Council and the Ruapehu District Council and volunteer organisations such as the Tongariro Natural History Society and Ohakune 2000 on specific community projects that enhance tourist attractions.

Above: The central North Island offers plenty of walking opportunities from short paths to viewpoints to longer higher level walks over mountains and through forests. A boardwalk on the southern slopes of Mt Ruapehu crosses over alpine bog and past Rotokawa, an alpine tarn, en route to Waitonga Falls. (Photo: Julie Oram)
Above right: Few areas of the world offer the level of thrill, skill and excitement afforded by the range of trout fishing in the Taupo area. (Photo: Dave Wakelin/DOC)
Opposite page: The Tongariro Crossing offers physical challenge and in fine weather some of the most spectacular scenery in the region. (Photos: Iris Broekma)

Taupo's earthly origins

Central to the tourist attractions of Taupo is the very reason for its existence — a disturbed and brittle earth. New Zealand lies astride two large tectonic plates that make up the outer skin of the earth — the Pacific plate to the east of New Zealand and the Indo Australian plates to the west. Parts of New Zealand straddle both plates. Pressure between these plates to the east of the North Island where one slides down under the other, folded and crumpled the old sea floor then raised this to form the folded mountain ranges and valleys of Kaimanawa Forest Park.

Deeper down in the earth molten rock or magma periodically forces its way up to burst forth as fountains of lava and clouds of ash along a 30 kilometres wide band known as the Taupo volcanic zone. This zone begins with the volcanoes of Tongariro National Park and makes its way north eastwards through Lake Taupo, the Rotorua Lakes and out to sea past White Island towards the Kermadec Islands and Tonga.

Tongariro's volcanoes have their origins as a series of volcanoes going back almost 300,000 years, successive eruptions spreading volcanic debris across the North Island. The eruptions of Ruapehu in 1995 and 1996 show that process is continuing.

Magnificent Lake Taupo as we see it today began life in violent fashion as a series of eruptions 26,000 years ago which probably created much of the shape of present day Lake Taupo. About 1800 years ago in 186 AD a major eruption poured vast quantities of pumice and ash high into the atmosphere blanketing much of the North Island, The collapsing eruption column, said to have reached heights of more than 50km, smothered much of the central North Island in hot volcanic debris, changing the landscape in an instant. The scenic wonderland we are familiar with today - thermal areas, forests , lakes and rivers - owes much of its origin to those events of 1800 years ago.

Above and opposite page left: Whether throwing yourself down a snow slope on Ruapehu with boards attached to your feet or launching yourself into space over the Waikato River with bungy cords around your ankles there's plenty going down in the Taupo area.
(Photos: Ruapehu Alpine Lifts Destination Lake Taupo)

The centre of Middle Earth!

If you enjoyed the movie trilogy "Lord of the Rings" then you may recognize some of the scenes as you travel round the national park for much of the movies was shot in the area. Mt Ngauruhoe featured as the dreaded Mt Doom although through digital wizardry it was made to appear volcanically active and taller.

The park's popularity owes much to its accessibility. You can drive around the national park on a circle of highways in several hours. Alternatively look down into the volcanoes from above on a breathtaking scenic flight. If you are moderately fit, have the right gear and love the wide open spaces the 17km Tongariro Crossing is a wonderful trekking experience amid volcanoes and thermal areas.

Winter is snow time. Turoa and Whakapapa ski areas on the slopes of Mt Ruapehu together make up the largest ski area in New Zealand with 1,800 hectares of groomed snow. Thermal spas at Tokaanu and Taupo offer the ideal way to ease tired muscles after maybe a day skiing or tramping or just sightseeing. Just minutes north of Taupo Craters of the Moon thermal area offers a pleasant and exciting close up look at boiling mud pools, fumaroles and veils of steam. A little further north of Craters of the Moon near Wairakei Hotel is Wairakei Terraces where you can see silica terraces, a replica Maori village, treasured Maori carvings, indigenous cultural performances and enjoy a traditional hangi feast.

Activities galore

The list of activities in the Taupo region is seemingly endless. Besides sightseeing - waterfalls, native bush, bubbling mud pools and stunning lake views - the more adventurous can try jetboating, 4WD motorbiking, white water rafting, kayaking, jet skiing, tandem skydiving, bungy jumping, horse trekking, parasailing, replica racecar driving, mountain biking, abseiling, rock climbing, skiing and snowboarding.

Turangi at the southern end of Lake Taupo is described as "Adventure Central". Outdoor activities are all around. Close at hand are the Tongariro River, Tongariro National Park, Kaimanawa Ranges, Lake Taupo and the Whakapapa and Turoa Ski Areas. If it's an outdoor adventure you're after, start here. A few kilometres south of Turangi is the National Trout Centre beside the Tongariro River with its display centre, bush and river walks and under river viewing room that lets you lets you get a trout's-eye view of the action.

On the western side of the Lake is the Pureora Forest Park - see what the world used to be like. To the east of the Lake, the Kaimanawa

Hang around in Taupo for a while ... you'll love it!

Forest Park contains vast ancient beech forests. At the Pureora Forest Park you can walk through ancient rainforest so untouched, some of New Zealand's rarest flora and fauna still thrive here.

In the beautiful Whirinaki rainforest, local Maori offer a fascinating and illuminating eco-cultural experience with fully escorted walks, treks and wonderful manaakitanga (hospitality).

This region's scenery is legendary but so is the hospitality. On, over, around or beside the great lake or magnificent rivers you'll find locals willing to share with you their love of the region and all it offers.

Want to know more about the Taupo district?

Check out www.laketauponz.com one of the most comprehensive tourism websites in the country. A little further south log onto www.ruapehunz.com for what to do in and around Ruapehu. For conservation information don't forget www.doc.govt.nz

World Heritage Visitors

By Lianne Fraser

Programme Manager
Community Relations

Our World Heritage connection meant a number of special visitors to the Conservancy during 2004.

In February the Director General of UNESCO, Koichiro Matsuura visited New Zealand as a guest of the New Zealand Government. Mr Matsuura had expressed a particular wish to visit Tongariro National Park and to meet with kaumatua in order to learn more about the area's associated cultural landscape and to better understand intangible cultural heritage.

He was hosted in Tongariro by Tumu te Heuheu, Paramount Chief of Ngati Tuwharetoa and New Zealand's Head of delegation to the World Heritage Committee. Mr Matsuura was officially welcomed at Waihi Marae and spent time in talks with local kaumatua discussing a number of issues including cultures sharing their heritage with other cultures.

In October more than 60 delegates from Pacific Island nations, as well as representatives from UNESCO, DOC and other heritage organisations, met at Whakapapa to launch the World Heritage Pacific 2009 programme. The Department of Conservation hosted the six-day workshop on behalf of Tumu te Heuheu and UNESCO Apia.

It was the first time Pacific Island territories and countries had met to discuss World Heritage issues, in particular how best to meet

Above: Tumu te Heuheu, UNESCO DG Koichiro Matsuura and Minister of Conservation Chris Carter outside Tapeka Wharenui on the Waihi Marae during the Director General's visit to the conservancy
Right: Giovanni Boccardi, Chief of the Asia Pacific Unit of the World Heritage Committee, accepts the wero or challenge during the powhiri at Waihi Marae for the World Heritage Pacific 2009 Workshop (Photos: Dave Wakelin/DOC)

the challenges of putting the Pacific on the World Heritage map. It was also the first time many had encountered snow, which fell, almost on cue during the first day of meeting.

Above: Warriors from Ngati Tuwharetoa haka as part of the powhiri for the workshop delegates.
Above right: For many workshop delegates the hongi was a new experience.
Below: Delegates from UNESCO pose in their ski gear during an evening of entertainment at Waitetoko Marae.
(Photos: Dave Wakelin/DOC)

From their initial welcome at Waihi, delegates were captivated by their experience of Maori culture which many found deeply moving.

The group worked hard to achieve the aims of the workshop which included a progress review regarding implementation of the World Heritage Convention in the Pacific; the development of an action plan for the implementation of the programme; identifying how each stakeholder can contribute to the action plan and how to assist each Pacific country prepare a five-year strategy for the enhancement of World Heritage.

Throughout the workshop DOC's Kaupapa Atawhai managers guided, sang, entertained and shared their culture with the visitors. This, together with entertainment at Waitetoko Marae by the young students from Te kura o Hirangi Middle School kapa haka group, became a highlight of the week. Although throwing snow balls, for some, came a close second!

During the week delegates learned and experienced first-hand some of the many partnerships between DOC staff and local iwi. These became a strong motivational point of reference for the group. Experiencing living Maori culture and seeing Maori culture connected to conservation was another and many delegates left the workshop inspired to share this experience in their own countries.

In thanking Mr te Heuheu for hosting the Pacific 2009 workshop, Francesco Bandarin, Director of UNESCO's World Heritage Centre, said that Tongariro National Park has become a remarkable symbol of the changed perceptions and understanding of heritage.

Above all, he said, the meeting had provided participants with an outstanding opportunity to understand the cultural and natural values of Tongariro as well as the importance of the World Heritage Convention.

Tumu te Heuheu and the World Heritage Committee

Above: Tumu te Heuheu, New Zealand's delegate on the World Heritage Committee. (Photo: Dave Wakelin/DOC)

By Lianne Fraser

Programme Manager
Community Relations

In 2003 Tumu te Heuheu, Paramount Chief of Ngati Tuwharetoa, headed New Zealand's delegation in its successful bid to gain a seat on the 21-country World Heritage Committee. New Zealand received the highest number of votes of any country.

As well as participating in the annual World Heritage committee meeting, attending the biennial General Assembly and special congress meetings, Mr te Heuheu and his team liaise with Pacific Island neighbours on World Heritage issues.

In particular Mr te Heuheu says it is important to establish values and attempt to understand what the next 100 years might be like and to consider which parts of all the world's cultures should be saved. World Heritage involves cultures sharing their heritage with other cultures. In doing so it perhaps gives us a better chance of surviving the next 100 years.

Ensuring the World Heritage convention recognises intangible heritage especially when it is associated with land is important. Mr te Heuheu acknowledges that understanding intangible cultural heritage challenges many traditional European values but increasingly there is a real desire throughout the world to try and understand what it means.

This, and the myriad of issues facing indigenous peoples, in particular from Pacific Island nations, are a priority for his work on the World Heritage committee. Mr te Heuheu says much of his future work with the committee will be to make certain that the World Heritage convention recognises and deals with indigenous people's involvement in World Heritage in the best way possible.

In the 2005 New Year Honours list Mr te Heuheu was made a Distinguished Companion of the New Zealand Order of Merit for his services to conservation. He considers that in much of his present effort he is carrying work started by his late father, Sir Hepi te Heuheu.

Earlier this year Mr te Heuheu was given a ministerial appointment of the Historic Places Trust Board and the Maori Heritage Council, both of which he was already a member. He has been chair of Nga Whenua Rahui since its inception in 1990, sits on the Tongariro Taupo Conservation Board and the Waitangi National Trust Board. He also chairs the Tuwharetoa Maori Trust Board, Lake Rotoaira and Taupo Forest Trust and the Taupo Development Trust. He is a member of the Maori Committee to the Law Commission.

Aquatic hitchhikers not welcome here

By Julie Ashton

Pest Fish Public Awareness

To report anyone releasing or breeding unwanted fish or to report any sightings of unusual fish, contact the Department of Conservation's Tongariro Taupo office on 07 386 8607 or Environment Waikato's Free phone 0800 800 401

Pick up a durable quick reference ID guide from the Environment Waikato Taupo office or the Tongariro/Taupo DOC office.

Pest fish are fish species in the wrong place and their status is classified by several pieces of legislation. Aquatic pests are a serious biosecurity threat to New Zealand's fresh water heritage and over time, have continued to increase the extent of their range. Few, if any water bodies support a biota entirely native, including Lake Taupo, although currently the lake is free from Koi carp, Rudd and Gambusia. Not all introduced fish cause problems but impact from these particular species would be significant by out competing native species, degrading water quality, introducing diseases and tolerating deteriorated aquatic conditions not withstood by existing delicate ecosystems.

In addition to a wide range of environmental catastrophes, economically and recreationally aquatic pests create unacceptable concern.

People are the primary means of unwanted species transfer from one water body to another and once established, eradication is rarely achievable particularly in larger water bodies such as Lake Taupo. Prevention is absolutely better than cure.

How are aquatic pests spread and what can be done?

Accidental transfer seems most likely and therefore it is always important to check and wash your boat and trailer (anchor, rollers, axle, motor and propeller, cockpit and bins) fishing gear (waders and downriggers) and recreational gear (kayaks, jet skis and towropes) between water bodies. Fish, eggs and weed can get easily caught and even small fragments of weed can reproduce and colonise new water bodies. Put any weeds you find in the rubbish or compost. Remind and encourage others to also take these steps.

Indoor and outdoor artificial ponds and tanks can also pose a threat, as there is always the potential for water flow to natural waterways by outlets, flooding or storm water avenues. Never collect plants from the wild nor from friends nor liberate them into storm water drains or directly into a waterway.

(Continued on Page 43)

Above right: Koi Carp, definitely not wanted in Lake Taupo.
Below: Places on your boat and trailer to check for aquatic hitchhikers
(Photos: DOC)

Milestones met in the Karioi Rahui

Right: Keith Wood of Ngati Rangi looks on while trainee ranger Doron Whyte and Community Relations and Technical Support Manager, Sean Goddard examine their find from Lake Rotokura with great interest.
Below: Mt Ruapehu from Lake Rotokura.
(Photos: Francis Ponga)

By Katrina Knill

Ranger Community Relations

A number of milestones have been reached in the Karioi Rahui ecological restoration project over the last 12 months. This partnership between the Department of Conservation (DOC) who administer the land and the Ngati Rangi iwi (tribe) who hold tangata whenua and mana whenua status over the land is now in its ninth year.

Possum browse is a large threat to ecosystem functioning and the life of a forest. Possum control has continued throughout the entire 5 300 hectare block via bait stations baited with cholecalciferol pellets, enabling possum numbers to be kept at a low level of just 3.7% residual trap catch (RTC). This means that just 3.7 possums have been caught per 100 traps per night. Low possum numbers will give native vegetation including the threatened red and scarlet mistletoes a greater chance of natural regeneration.

Possibly the most important milestone over the last year was celebrated in October 2004 when the first chicks born to Karioi Rahui Operation Nest Egg (O.N.E.) kiwi were released back into the forest. It is a great achievement to now have breeding kiwi in the rahui.

O.N.E. in the rahui has been a multi-agency and community project involving the Bank of New Zealand Kiwi Recovery Trust, Ngahere Development Trust, Tamahaki Council of Hapu, Winstone Pulp International and Enviro Research sponsored by Ohakune New World. To date,

31 kiwi have been released into the Karioi Rahui.

450 tunnel boxes and traps in the core area (1800ha) of the Rahui have now been in operation for one year, primarily targeting stoats. As at 11th February 2005, 211 stoats, 1006 rats, six hedgehogs, two rabbits and one ferret had been caught. Whilst it is too early to accurately determine the true impact of this trapping on the stoat population, August 2004 tracking tunnel results were encouragingly low, at 3%. Low stoat numbers may allow the number of rats in the core area to increase, posing a threat to passerines (small forest birds) and invertebrates. DOC staff and Ngati Rangi iwi will be looking into rat control options over the coming year.

In addition to ecological restoration work, a further aim of the Karioi Rahui project has been to build conservation skills amongst local people so that they can contribute to this and other conservation or kaitiakitanga work in the future. Steps toward this have been achieved via a pilot Hands on Conservation Course run for a second year in 2004 by Ruapehu College. To date, 13 students have had the opportunity to learn skills such as plant and animal identification, predator trapping and foliage and bird population monitoring. A local person – Moana Bell has also been sponsored through and successfully completed the 2003/04 Trainee Ranger course at Nelson Marlborough Institute of Technology and has since been working on a blue duck recovery project for DOC, Wanganui.

Visitor access to the Karioi Rahui is via a walking track to Rotokura (approx. 15 mins to the upper lake) off State Highway 49, east of Ohakune. The Round the Mountain track near the Mangaehuehu Hut also passes through the upper reaches of the Karioi Rahui area on the Rangataua lava flow.

Continued from Page 41

Although deliberately first introduced in to New Zealand, intentional transfer of pest fish is illegal and the relatively recent legislation reflects the gravity of this offence. Interested persons have however demonstrated considerable determination and imagination to secure their objective.

Conservation Act 1987:

To introduce any live aquatic life (native or introduced fish, plants or invertebrates) into an area where they don't already occur you need a permit from the Minister of Conservation, otherwise you could be liable for a fine of $5,000.

Noxious species:

(Freshwater Fisheries Regulations 1983). People who possess, control, rear, raise, hatch or consign Koi Carp or Rudd without authority are liable for a fine of $5,000.

Unwanted organisms:

(Biosecurity Act 1993) It is illegal to release, spread, sell or breed Gambusia or Koi carp. There is a $100,000 fine or five years imprisonment for people caught doing so.

Volcano watch

Dr Harry Keys

Conservancy
Advisory Scientist

2004 was a quiet year for Ruapehu Volcano. The Institute of Geological and Nuclear Sciences (GNS) recorded little volcanic seismicity during the year, with only minor events such as bursts of tremor lasting for hours to days. This remains a significant difference from before the 1995-1996 eruption when volcanic tremor was very common. The 2003/04 Crater Lake heating cycle peaked at 35˚C (less than usual) in mid March and the lake temperature cooled to 15˚C by late September/early October (Figure 1), which was the lowest measured for at least ten years. However the heating events post 2001 have tended to be aseismic (Brad Scott personal communication) consistent with a model developed for behaviour of the lake in the late 1980's, with activity being controlled by the layer of molten sulphur that underlies Crater Lake.

The 2004/05 heating cycle started in mid November when GNS recorded the strongest burst of tremor since April-May 2003. A slight increase in grey sediment-laden water was seen upwelling over the main vents and the water temperature rapidly rose a few degrees. So far this summer temperatures have reached 39˚C (compared to 42˚C in January 2003 and the seismically-related April-May 2003 peak, see Figure 1). Steam clouds have been seen wafting above the crater but no steam bursts have been reported yet. Routine gas flux measurements by GNS have detected some volcanic gas.

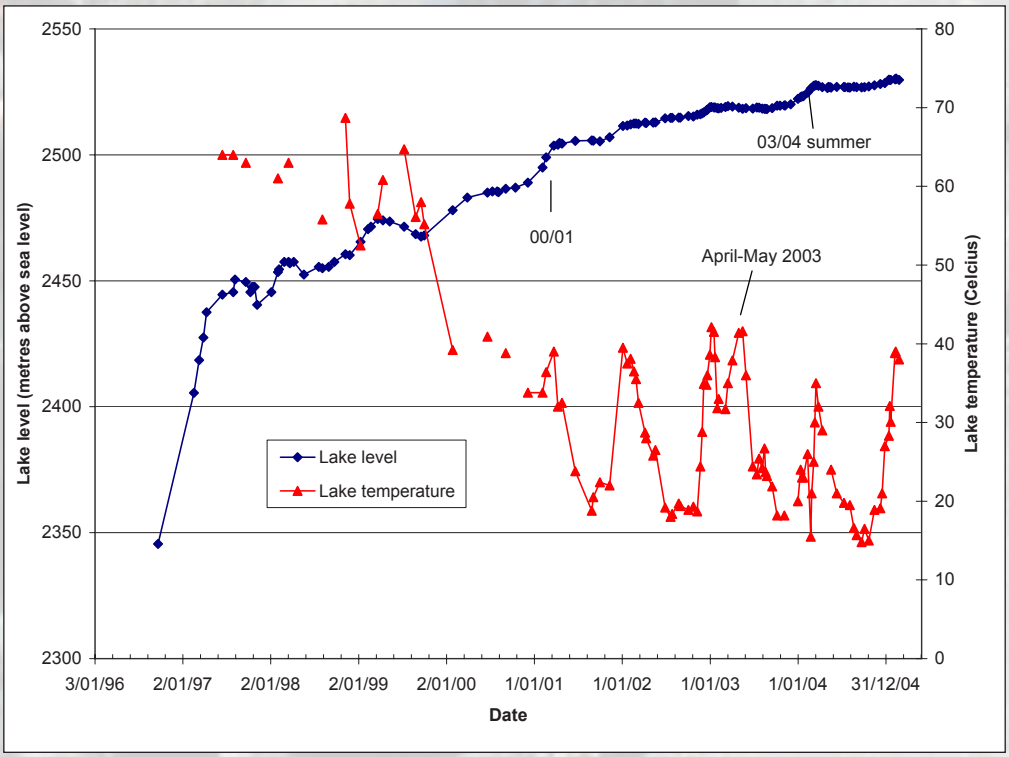
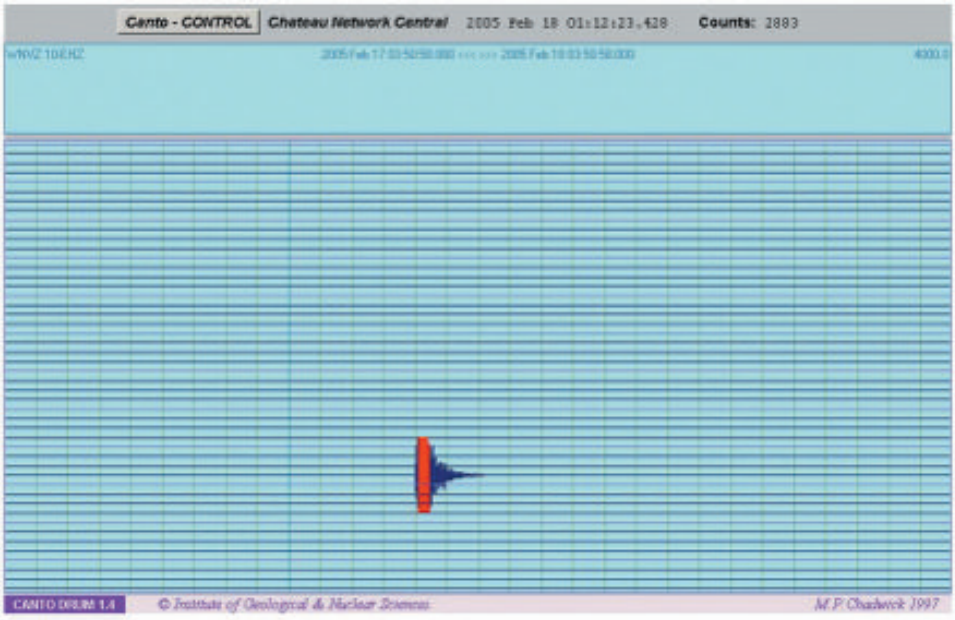


Figure 1. Crater Lake level and water temperature since 1996. Note how regular heating cycles that were a characteristic of the Lake before the 1995 eruption have developed again in the Lake since 2001.

Above: Snow groomer operated by Ruapehu Alpine Lifts removing 2-3m thick accumulation of rime ice from Dome Shelter on 19 November. (Photo: Nicki Hughes)

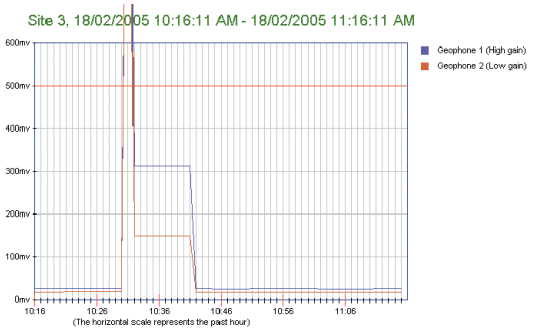
Crater Lake has continued to fill more slowly than the refilling after the 1945 eruption. The former lake level (2530m) was reached in January 2005, more than eight years after the 1996 eruption ended. This same level was reached only about five years after the 1945 eruption. Glacial retreat meaning less glacial meltwater now flowing into a larger Crater Lake can explain most of the difference from the 1945-1953 period, but factors such as relative heat flow and evaporative losses may also be contributing.. The net filling rate also remains near the low end of the envelope of filling projections for the new lake. These take account of the shape of the crater basin which is the main reason why the graph of lake level is becoming flatter now (Figure 1). The extent of exposed glacier ice available to produce large volumes of meltwater may be critical.

The two lahar warning systems on Ruapehu (EDS and ERLAWS) continue to operate well but challenges sometimes arise due to the severe operating environment. Response plans have been tested in major exercices involving each system. Removal of the winter ice from Dome Shelter which houses critical parts of both systems led to a marked improvement in the reliability of data flow from site 1 of the East Ruapehu lahar Alarm and Warning System (ERLAWS). Previously performance of this site, one of three in ERLAWS, deteriorated in late winter as ice thickness increased over the Shelter. Minor glitches with parts of both systems are more



Right: Figure 2a. Magnitude 5.2 earthquake on 18 February centred 100 km southwest of Ruapehu as recorded at the GNS-Geonet seismometer at near Wahianoa Stream, southeast Tongariro National Park.

Below: Figure 2b Plot of signal level produced by the M 5.2 regional earthquake at ERLAWS site 3 (Tukino Skifield). A LAHAR POSSIBLE alarm was raised when the voltage exceeded the 500mv threshold



rapidly being solved as operator readiness increases. On 20 January testing of ERLAWS site 2 at the NZ Alpine Club's Whangaehu Hut and near concurrent vibration at site 1 led to the first full ERLAWS false positive alarm. These alarms are more serious now that all front line agencies are connected to ERLAWS. A moderate regional earthquake centred 100 km

Above: View from shore of Crater Lake by lake level monitoring pole, to crest of tephra dam where helicopter is waiting, 23 February 2005. Note low cliff formed by erosion by waves and beach formed by recent fall in lake level (Photo: Brad Scott)

southwest of Ruapehu on 18 February (Figure 2a) created a partial ERLAWS false positive alarm.

Modelling of past and future Ruapehu lahars and magma production continues. Monitoring of the tephra barrier is ongoing. Dr Vern Manville of GNS (2004) has re-examined the 1953 lahar using models developed to understand floods of water bursting from glacier ice dams overseas. He believes that the Crater Basin Glacier made little difference to the hazard posed by the 1953 lahar. This challenges some of the debate over lahar mitigation in recent years which are based partly on the assumption that the absence of glacier ice now means a probable dam-break lahar will be larger than 1953. Dr Shane Cronin (Massey) is applying a new lahar flow model to theoretical events down the Whangaehu valley, to better understand lahar flow characteristics and subsequent hazards. Drs Richard Price and John Gamble have proposed (1997-2005) that eruptions from long-lived andesite volcanoes like Ruapehu are fed from progressively smaller volumes of magma from an increasing number of shallower storages in dikes and sills beneath the crater system, rather than the classic view of single larger balloon-shaped magma chambers. This might help explain the changing magma composition, variablity and lack of precursory activity of Ruapehu eruptions.

Ngauruhoe

The bare ground on the northern pre-1954 crater rim illustrated last year continues to evolve. It was no longer visible in winter from the BP petrol station in National Park, possibly because of greater ice accumulation last winter. Snow cover receded extremely rapidly from the northern slopes in the spring consistent with an expanding area of warm ground there. The Department is assisting GNS with an aerial infrared survey of this area and near active craters on Tongariro, so that future changes in warm areas may be determined more reliably and possibly provide additional warning of increased volcanic activity.

Tongariro

The distinctive unusual seismic signals under Upper Te Maari crater reported last year have continued but their long-term significance is no clearer. They may be a normal characteristic of this volcano-geothermal system (Brad Scott, GNS personal communication). Dr Mike Hagerty (2002, formerly of GNS) and colleagues developed a model in which a low frequency component of these signals comes from about 300m depth at the base of a 100-300 m thick layer of condensate under the Tongariro peaks. This energy may act as a trigger for the release of stress at about 1500 m depth beneath a vapour dominated region, possibly relating to rock fracturing near a magma body.

Lahar, lahar!

By Dave Wakelin

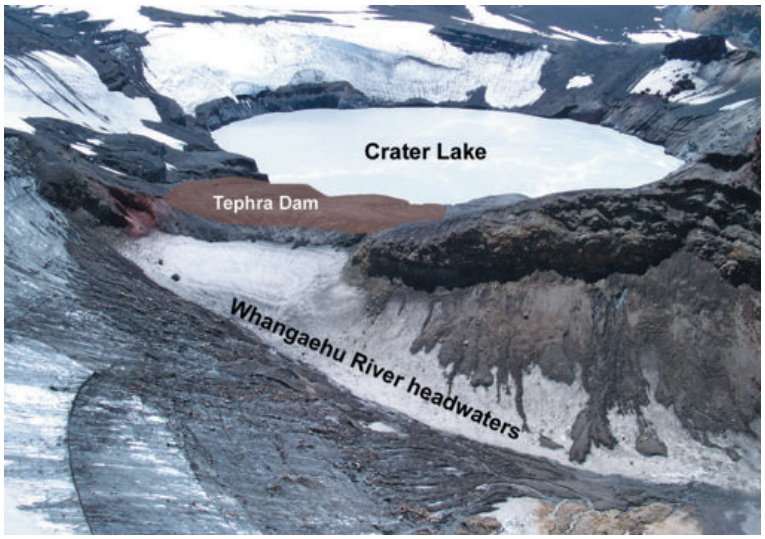
Senior Community Relations Officer

"Lahar, lahar!" is the message response agencies will receive on their pagers when the sensors of the Eastern Ruapehu Lahar Alarm Warning System (ERLAWS) are triggered by collapse of the barrier of volcanic debris (known as tephra) lying over the pre-1995 lake outlet and the release of Crater Lake water down the Whangaehu River.

Lahar is an Indonesian term that describes a hot or cold mixture of water and rock fragments flowing down the slopes of a volcano and river valleys. When moving, a lahar looks like a mass of wet concrete that carries rock debris ranging in size from clay to boulders more than 10m in diameter. Lahars vary in size and speed. Small lahars less than a few meters wide and several centimeters deep may flow a few meters per second. Large lahars hundreds of metres wide and tens of meters deep can flow tens of metres per second - much too fast for people to outrun.

What does a lahar do?

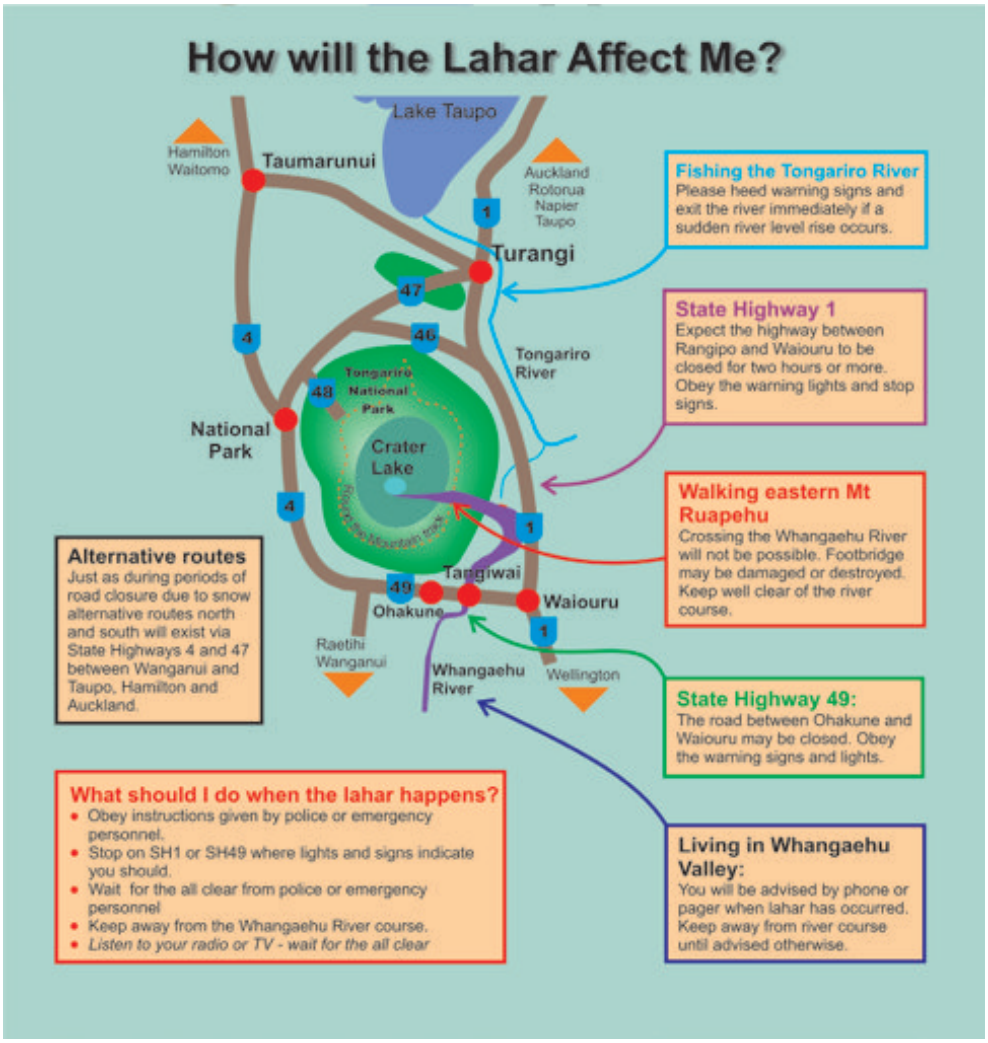
As a lahar rushes downstream from a volcano, its size, speed, and the amount of water and rock debris it carries constantly change. The beginning surge of water and rock debris often erodes rocks and vegetation from the side of a volcano and along the river valley it enters. This initial flow can also incorporate water from melting snow and ice (if present) and the river it overruns. By eroding rock debris and incorporating additional water, lahars can easily grow much larger than their initial size. But as a lahar moves farther away from a volcano, it will eventually begin to lose its heavy load of sediment and decrease in size. The Crater Lake lahar is expected to bulk up in size by about five times as it picks up material from the Whangaehu gorges on Ruapehu. Once it flows out onto the more level fans across the Rangipo Desert and heads towards Tangiwai it will lose much of its bulk. By the time Crater Lake's lahar travels past the Tangiwai bridges it will have lost much of its extra volume.



Above: Mt Ruapehu's Crater Lake showing (coloured brown) the tephra dam and the headwaters of the Whangaehu river down which the lahar will travel. Three geophones buried in the tephra, a trip wire across the face of the dam and a lake depth gauge are all part of the ERLAWS sensor system at Crater Lake. (Photo: Dave Wakelin/DOC).

What damage can lahars do?

Hundreds of lahars were triggered by heavy rain after the 1991 eruption of Mount Pinatubo in the Philippines. The rainwater eroded loose, pyroclastic flow deposits that filled river valleys around the volcano to depths of 220 metres. The lahars not only covered large areas downstream with sediment, destroying homes and farmland, but also temporarily blocked tributary streams.



Right: This graphic forms part of a brochure *"Mount Ruapehu Crater Lake Lahar"*, produced by the Lahar Information Group (LIG) , a body representing the Ruapehu District Council, Taupo District Council, Department of Conservation, Horizons Regional Council, the New Zealand Police and the Ministry of Civil Defence and Emergency Management. (Graphic: DOC)

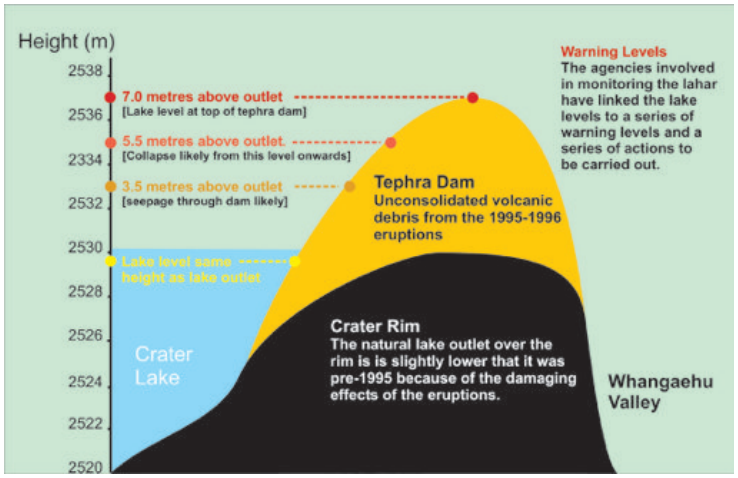
Nevado del Ruiz in Colombia had glacial caps, high relief and a long history of lahar activity. On September 13, 1985, Nevado del Ruiz released a lahar triggered by a glacial outburst from a small eruption the previous day. This lahar travelled at a speed of 10-30 km/hr down the Azufrado River valley and buried the town of Armero and approximately 24,000 of its residents before they knew what was happening.

Fortunately the natural path of the Crater Lake lahar travels through sparsely populated areas and below the Tangiwai bridges it is expected to remain within the river banks reducing considerably in size and present no more of a rise in river level as it nears the coast than a 3-5 year rain induced flood.

However agencies associated with the national park and surrounding area and those who have infrastructure in the lahar's path have been working on contingency measures and emergency response plans for a number of years.

Can the size and destructiveness of the lahar be predicted?

The likely size and destructiveness of a lahar cannot be predicted accurately because of the complexity of the dam failure process, and of lahars themselves. There are several possible scenarios:



Above: A profile of the Crater Lake rim showing the tephra dam overlaying the pre-1995 lake outlet and warning levels that relate to the lake depth. The size of the lahar will depend on how high above the old lake outlet the waters rise before the tephra dam breaches. (Graphic: DOC, adapted from an Environment Waikato graphic)

The lake water could percolate through the loosely compacted tephra, creating a tunnelling effect that empties the overfill as a dribbling outflow, of no threat to anything and anyone. The lake could erode through when the levels have reached only half the maximum height of seven metres and create a moderate lahar.

The worst case would be if the tephra dam were to collapse suddenly when the water level reaches its top, and the full volume of overfill (approximately 1.5 million cubic metres) was released into the Whangaehu. Planning for the consequences of a lahar has been based on this eventuality. It is projected that in this situation the lahar will be up to 90% larger than the 1953 event. This lahar would take about 20 minutes to reach the top of the Whangaehu outwash fan at 1200m. The flow would begin to wane soon after and, within an hour, the flow would have decreased by about 80%. The wave travelling at an average speed of 21 km/h would reach Tangiwai in about two hours.

What protection measures are in place?

Measures taken to mitigate the effects of the lahar, predicted to occur ever since volcanic debris or tephra blasted out of Ruapehu's vent during the 1995 and 1996 eruptions and built up a seven metre high barrier over the old lake outlet, will be put to the test. Carefully written and tested emergency response plans will be swung into action by police, local authority and civil defence staff to ensure roads track and all points of access to the path of the Whangaehu River down which the lahar will travel are safe.

The following protection measures are in place:

- The installation of a robust, sophisticated warning response system to give nearby people as much warning as possible.
- Construction of an embankment to protect State Highway 1
- Establishment of lights and gates on State Highway 1 and State Highway 49 to close roads if necessary
- Raising the State Highway 49 Bridge at Tangiwai so that it is out of the reach of any lahar
- Enhancing the TollRail Train stopping system to allow trains to stop quickly
- Ensuring that people have easy access to information about lahar and how it might affect them

NB: At the time of publication the lake level was 0.2m above the old lake outlet, and dropping, and a lahar was considered not likely before late in the 2005/2006 summer at the earliest.

Revolving doors – Ruapehu staff changes

By Katrina Knill

Ranger Community Relations

A number of long term staff have left us over the last year for various reasons and retirement. Their contribution has been great and their various skills, knowledge and passion will be missed but no doubt put to good use elsewhere.

Bill Rollerson - Ranger, Visitor Assets:

Employed by the Department of Lands and Survey as a carpenter, Billy contributed 19 years of quality workmanship to the various structures and assets of what became the Department of Conservation. Billy has remained local, working in National Park and living in his new home with his young family in Raurimu.

Paul Edhouse - Ranger, Visitor Assets:

Paul started in the Ruapehu area some 14 years ago and has been instrumental in providing the excellent network of tracks and huts that we have in the Park. Paul's practical building skills and experience have been invaluable as has his contribution toward the community as National Park fire chief. He will be missed greatly from Ruapehu but continues his good work for DOC as a Visitor & Historic Assets Ranger at Hauraki Area Office near Thames.

Mike Brown – Ranger, Biodiversity Assets:

Mike took well-earned early retirement this year after more than 15 years working for the Department. Early in his employment, Mike worked on the weeds crew. More recently, Mike was working with kiwi in the Tongariro Forest and has contributed greatly to the increased knowledge about kiwi and improved species recovery techniques that we now have. Mike has plans to complete the building of his new house, do lots of fishing and spend more time on his real passion – NZ falcon research.

Top right: Bill Rollerson spent 19 years working in most parts of Tongariro National Park.
Middle right: Paul Edhouse at the site of one of his earlier projects - building the Mangatepopo Shelter at the start of the Tongariro Crossing.
Bottom right: Mike Brown using radio tracking equipment to locate one of the many 'tagged' kiwi in Tongariro Forest.
(Photos: DOC Whakapapa)

The grand old lady of Ruapehu gains a wing

Above: The Grand Chateau, resplendent in evening light was built 75 years ago in 1929. (Photo: Grand Chateau)

By Gareth Pearce

Marketing Manager
The Grand Chateau

When the Ruapehu District Council formally approved a Resource Consent for a 40 room extension to the famous Grand Chateau Hotel in Whakapapa Village, Tongariro National Park a commitment made more than 30 years ago was met. Mark Davies, Ruapehu Area Manager commented that it was satisfying to see the proposal finally being implemented. The proposal was allowed for by the current and the present draft review of the park management plan. The original commitment had been made to the hotel owners over thirty years ago.

The development has been 18 months in the planning and due to the hotels location within a Dual World Heritage National Park, involved consultation with parties such as the Department of Conservation, local iwi and the Historic Places Trust.

The Department of Conservation, in considering key aspects of the design wanted to ensure the overall hotel's historic heritage and integrity were maintained and that the extension fitted well into the broader village and park environment. While making use of modern building materials and techniques every effort has been made to make the extension appear as though it was designed and built 75 years ago. The extension had also been allowed for in the recent upgrades to the village services and infrastructure of sewage and water supply. This has been a major plus

Above: An ingenious building technique meant that the bulk of the new 40 bed wing of the Grand Chateau was built in Auckland as modular room units before being transported to Whakapapa, hoisted into place and connected one to another. (Photo: The Grand Chateau)
Below: The Grand Chateau showing the new 40 bedroom extension wing. (Photo: Gareth Pearce)

in this proposal and future proofing of these services has been achieved as part of the planning exercise. All the parties involved, the Grand Chateau, Ruapehu District Council and the Department, have worked together as an integrated team to ensure this extension was appropriately planned in this unique setting.

Kathy Guy, General Manager of the Grand Chateau says that the new wing is an exciting development for not only the owners of the hotel, but for New Zealand in general'. The new wing will retain the ambience and look of the existing building. "We have tried hard to replicate the look and feel of what the Grand Chateau is famous for".

Construction is a modular build rather than conventional. The rooms were built in a factory in Auckland as complete units. They were then transported to Mt Ruapehu in blocks of four to six and lifted into place. The benefit of this construction method says Kathy is that fewer on-site construction workers were required through the harsh winter period' The modular process also cut the construction period from 18 months down to six months.

The building of the 40 new rooms is the largest single tourism project in the Ruapehu Region in the last 20 years, costing over $6 million. The closest recent project was undertaken by Ruapehu Alpine Lifts in the summer of 2002/2003 when $4 million was spent on installing the Rock Garden snowmaking system, ground work in Happy Valley and installation of the Happy Valley chairlift.

Chris Ryan, Chief Executive Officer for the Ruapehu District Council,

noted that "the 40 room extension project represented a significant milestone for the District. The Grand Chateau is a much valued and internationally recognized New Zealand icon. The contribution The Grand Chateau makes to the ongoing economic development of the Ruapehu District is held in high regard."

Chris said the Ruapehu District Council offered its congratulations to the owners and management of The Grand Chateau on the extension project as it represented a prime example of an excellent consultation process which ensured strong community support for the project. The extension represents a significant investment in the future of the Ruapehu District that will produce positive economic and social benefits for the community.

Sales and Marketing Manager for the Grand Chateau, Gareth Pearce said that the Grand Chateau is recognised both domestically and internationally as a tourism icon. Whilst the extension wing is beneficial to the local economy he sees it as equally important to New Zealand's international markets' says Gareth. 'With over 100 rooms we become the second largest hotel in the Ruapehu/Taupo region, second only to our sister hotel Wairakei Resort in Taupo. This allows us to develop new markets and also expand on existing markets such as conference and incentive. We can also put more emphasis on our strong Australian ski market throughout winter.'

2004 was also important for the hotel as the hotel celebrated it's 75th anniversary.

Grand Chateau Advert

Walking to wet places

By Katrina Knill

Ranger Community Relations

From the mountains to the sea wetlands are beautiful, diverse and useful – they work for us in many ways. Wetlands store and purify freshwater, control floods, replenish ground water supplies, stabilise the shoreline, protect against storms, act as nurseries for freshwater or marine fish, are a transport medium and provide us with food, water and a place for recreation and education.

Wetlands are areas of shallow water containing specially adapted plant and animal communities. They occur on land-water margins, or on land that is temporarily or permanently wet.

Introduced weeds are a major problem for wetlands. Weeds like willow, spartina and water hyacinth displace native species and disturb the structure of wetland habitats. Altitude, volcanic soils and extreme climate have prevented weeds from becoming established in many of Tongariro National Park's wetlands. These areas therefore remain excellent examples of native alpine wetland, unique because of their elevation above sea level, habitat structure, rare species of plants and animals and the absence of weeds. Sundews, sun orchids, fern-birds and koura are just some of the wetland species to be found in these areas.

Sundews *(Drosera spp.)* are an insectivorous plant characteristic of bogs. The leaves of the sundew are equipped with tiny "hairs" that enable it to catch and devour small insects. Bogs are low in nitrogen and this is a way for the sundew to supplement its need for this nutrient.

Another wetland plant is the sun orchid *(Thelymitra spp.)*. The beautiful blue/purple flowers of sun orchids can be seen during January and February.

A rather elusive species, North Island fernbirds (*Bowdleria punctata*) are more likely to be heard than seen. Their call is a distinctive "u-tick"- often the "u" sound is made by one bird, which the mate quickly answers with "tick." Koura (Paranephrops planifrons), or freshwater crayfish, can be seen in the alpine bogs on the Silica Rapids track at night. Koura are important to their habitat, recycling plant material and flushing away sediment, improving the water conditions for other invertebrates.

A number of good walking tracks ranging in length from 15 minutes to five hours will lead you to some attractive wetland areas in or near the park.

Silica Rapids Track:

Starting 200m above the Whakapapa Visitor Centre, this seven kilometre track takes two to three hours round trip. Board walks will lead you through alpine bogs approximately 30 minutes along the track.

Lake Surprise:

This nine kilometre track starts 15km past the Ohakune Ranger Station on Ohakune Mountain Road and takes approximately five hours return along the Round the Mountain track. The walk through alpine rockfields is best

Above: Lake Surprise, nestled above the Mangaturuturu Valley (Photo: Sonia Frimmel)
Below: Ohinetonga lagoon, close to the township of Owhango. (Photo: Katrina Knill/DOC)

done in the summer months as the track can sometimes be covered in snow during the winter. After sidling around open country from the Mountain Road, the track descends into Mangaturuturu Valley beside a beautiful cascade. After a river crossing and a steady climb, Lake Surprise emerges amongst a landscape of beech forest and tussock. Return via the same track or follow the Horopito track to Horopito

Waitonga Falls:

On a calm day the southern face of Mt. Ruapehu is reflected in Rotokawa, the pools of a ridgetop alpine bog over which the track to Waitonga Falls passes. Part of the Round the Mountain track, the four kilometre return walk to Waitonga falls (39 metres high) takes approximately 90 minutes. The track starts 11km past the Ohakune Ranger Station on the Ohakune Mountain Road.

Enjoy walking in our wetlands, but please remember that they are extremely vulnerable to disturbance. Maps and further information about the previously mentionedwalks are available at the Department of Conservation Visitor Centres at Whakapapa & Ohakune.

For more information about wetlands visit the following websites: www.doc.govt.nz www.ramsar.org

Rotokura:

Lakes, beech forest and plentiful bird life feature on this short walk. The track start is signposted from SH49, 12km from Ohakune en route to Waiouru. Approximately 30 minutes return, the track leads first to Dry Lake – where a flat grassed area is perfect for family picnics and then on to the tapu (sacred healing) waters of Rotokura. Surrounded by ancient beech forest Rotokura is of great cultural significance to local tangata whenua, Ngati Rangi. This area is within the site of the Karioi Rahui ecological restoration project.

Rotopounamu:

Nestled on the side of Mt Pihanga, Rotopounamu (the greenstone lake) is a special favourite of tree lovers, birdwatchers, walkers and swimmers. The track starts opposite the carpark, 11km from Turangi or 34km from Whakapapa Village on State Highway 47.

It takes approximately two hours to walk this five kilometre loop track.

Ohinetonga Lagoon:

This two hour (4km) loop track meanders through the Ohinetonga Scenic Reserve, situated between the village of Owhango and the Whakapapa River. The track leads past some excellent examples of native trees as well as picnic areas and swimming holes. The stunning Ohinetonga Lagoon is found on the upper south-eastern section of the track. To find the track start, turn right off State Highway 4 and follow the road sign-posted "Walking tracks".

Conservation Awards for 2004

By Dave Wakelin

Senior Community Relations Officer

The twelfth Tongariro Taupo Conservancy Conservation Awards were announced in December at the Taupo Yacht Club, before a large gathering, which included the Tongariro Taupo Conservation Board. In all five awards were made.

Vodafone New Zealand

Conservancy Landscape Architect, Herwi Scheltus, saw Vodafone as an example of a large company who realised the need to treat conservation lands as special places when wishing to carry out corporate undertakings. "For them to put installations on conservation land they needed to prove to the department that they couldn't do it elsewhere."

Their solutions were often visually creative, ranging from having to co-locate equipment with Telecom on Mt Pihanga, designing small yaggi aerials on staff quarters at Whakapapa Village, and false cedar panels on Knoll Ridge Cafe. "At Tukino they threw out alternative power sources ideas such as diesel/wind/solar, and with Genesis Power Limited (recipients of a Conservation Award last year) put in eight kilometres of underground power cable from the Desert Rd. As a company they were really aware of the special environment they were working in.

Tongariro Mountain Clubs Association

The Ruapehu Area Manager, Mark Davies, credited much of the success of the multimillion-dollar Whakapapa ski area and village sewerage scheme (see article on page 67) to the efforts of the Ruapehu Mountain Clubs Association which represents the ski lodges. He said, "In particular I wish to recognise three RMCA individuals, Bill Crystall, Brian Anderson and Alan Thompson for their dedication and commitment over that ten year period, volunteering their time and travel to see the project through to its completion. These three were instrumental in successfully negotiating with all the club lodges to gain acceptance in principle for a scheme designed to reticulate and remove all sewerage from the Whakapapa ski area and Whakapapa Village."

Below: Te Kanawa Pitiroi accepts the Conservation Award to Ngati Te Rangiita on behalf of the iwi. (Photo: Dave Wakelin/DOC)

Ngati te Rangiita

Ngati Te Rangiita, representing Ngati Tuwharetoa, received an award for their partnership approach to the management of Motutaiko, an island in Lake Taupo with unique qualities. The island is in the rohe of Ngati Te Rangiita, a hapu of Ngati Tuwharetoa and is private land protected under Maori reserve status. In 2003 a partnership was formed between the Department of Conservation and the owners to protect and enhance the cultural and natural values of the island by jointly providing advice, expertise and support. Turangi Taupo Area Manager, Dave Lumley, said just how significant the island was in terms of biodiversity was

Right: The Conservation Award winners for 2004 (from left to right), Doreen Abraham, Larry Stent, Bill Christie, Brian Anderson and Alan Thompson (RMCA), Pauline Sullivan, Greg Turner and Owen Burns (Vodafone New Zealand). Ngati Te Rangiita were unable to stay for the photo because of a tangi. (Photo: Dave Wakelin/DOC)

not fully realised until an ecological survey showed that there were no animal pests such as possums, rodents, or mustelids on the island. The island also contains significant species such as a native carnivorous lands snail and two species of mistletoe which have survived the onslaught of possum on mainland New Zealand.

Dorothy Abraham

Conservancy Botanist, Nick Singers, described Doreen Abraham as one of those who have spent more than 30 years educating herself about many of our small and endangered plants such as orchids and dactylanthus and quietly doing her bit to protect them. "She possesses an enormous wealth of knowledge about the botany of the reserve areas around Lake Taupo." She has been involved with the Iwitahi orchid reserve since 1987, locating, protecting and caging dactylanthus since 1993 and exploring the reserves and plants around the Kawakawa Bay area. Even though she is in her eighties this is not stopped her still being actively involved in guiding and sharing her knowledge with anyone who is interested. On several threatened wetland orchid surveys she often discovered the first orchid while the rest of the group had competitively rushed passed in a hurry!

Larry Stent

Larry Stent retired some years ago to live at Pukawa. "Larry was not content just to take it easy," said Bette Davies, a member of the Tongariro Taupo Conservation Board, "He built a delightful bush walk on the steep hillside above the village. Parts of this have been named Stent's Way and Larry's Lookout in recognition of his efforts." From Pukawa he moved to Taupo where he became one of the volunteer workforce enhancing the Waipahihi Botanical Reserve. "As a driver and innovator for the group he collected seeds from native trees during his walks with the Monday walking group and exchanged these for seedlings from plant nurseries. He found the best way to improve the survival of plants in the area and later organised the planting of northern and southern rata. Today there are about 400 trees growing strongly and in a few years time they should provide a great splash of summer red visible from the town and lake."

Wetlands are wonderful!

Above: The swamp leek orchid (*Prasophyllum aff. patens*) is acutely threatened and has a threat rank of "nationally vulnerable". The wetlands within Tongariro-Taupo Conservancy and wider volcanic plateaux are the national stronghold for this species. It is a large orchid and can grow to 90cm high with many scented flowers. (Photo: Nick Singers/DOC)

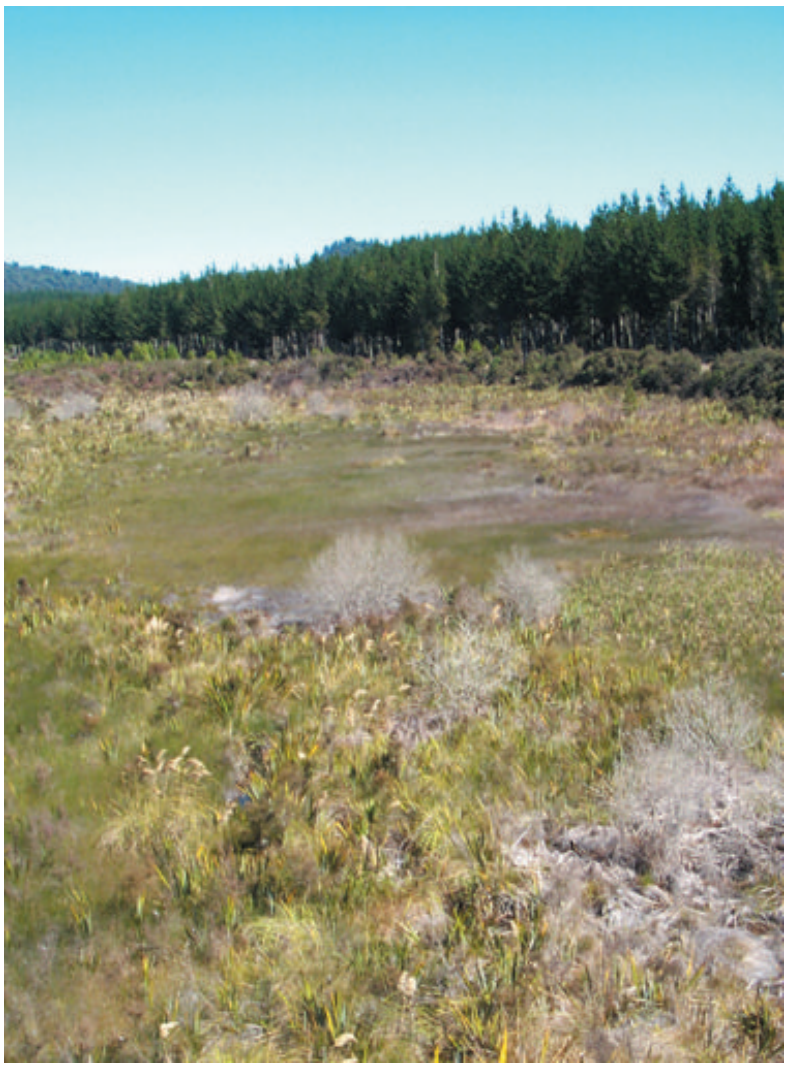
By Nick Singers

Conservancy Botanist

New Zealand's wetlands are more diverse than all of the different types of native forest. They are not just the typical flax and cabbage tree swamps with squawking pukekos, which everyone associates with the word *"wetland"*. They range from coastal estuaries dominated by mangroves and salt loving herbs, to alpine seepages above the tree line, where our spectacular mega-herb buttercups and foxgloves grow. Their fertility ranges from highly fertile riverine swamps nutrient poor and highly acidic bogs. A large range of plants grow in wetlands including many trees and shrubs, several hundred species of rushes, sedges and reeds, many native herbaceous plants as well as ferns, mosses, and liverworts. Wetlands are also home to a large variety of native birds, fish, lizards and invertebrates. Most of our wetland birds aren't loud and obvious like the pukeko, but are more secretive and nocturnal like the spotless crake.

To most people wetlands aren't the most favoured place to recreate unless you want to shoot a few ducks in the season or paddle a kayak around a lagoon. It's not as easy to go for a Sunday stroll through a wetland as you can do in a native forest. They are often wet, muddy and smelly and to the greater population are still regarded as being "wasteland" which could be better used as a dairy farm. Wetlands however are not wastelands, they are wonderful places full of fascinating plants and animals and provide important ecosystem functions. Wetlands filter water, soil in floods and strip nitrogen and other pollutants from entering waterways. This helps to prevent eutrophication of rivers and lakes. In standing water in wetlands much of the nitrogen returns to the atmosphere through being used and released by aquatic bacteria. This is one of the reasons why artificial wetlands are the most advanced method for treating urban sewerage. Wetlands soak up water during floods and slowly release it back to streams during dry periods. Coastal estuaries and wetlands are nurseries for many species of fish and are essential for maintaining healthy populations of some species.

In comparison to forests we know little about wetland ecology, threats and how to manage them. They are one of the most threatened habitats



Above: The Mangaharakekenui Stream wetland in Rotoaira Forest where New Zealand Forest Managers have removed all willows in several hundred hectares of wetlands. This photo was taken six months after the spraying. Nativewetland vegetation has now recovered where it was killed.
(Photo: Nick Singers/DOC)

in New Zealand and it has been estimated that greater than ninety percent have been lost to agricultural production. Additionally, introduced "Transformer weeds" now threaten their very existence. Many wetlands that were natural with a large number of native plants and animals, have been transformed into willow forest dominated by exotic weeds and birds. These wetlands are no longer good habitat for native wetland plants and animals. This is one of the main reasons that wetland species disproportionately contribute to the New Zealand's rare and threatened species lists. Almost half of all threatened plant species that occur in Tongariro-Taupo Conservancy are found in wetlands, and the conservancy is now the national stronghold for several species.

The Tongariro-Taupo Conservancy has a large number and variety of wetlands remaining, with most being in a high natural state. This is because of; the geomorphology that has created a large number of wetlands; the land development history and the later spread of key weeds such as grey willow. The largely flat volcanic ring plains of Mt.s Ruapehu and Tongariro provide ideal conditions for wetlands to form. Extensive wetlands are present around the margins of Lake's Taupo and Rotoaira and adjacent to some rivers. Additionally, very few wetlands were ever completely drained for agriculture in the conservancy. Land development in the Taupo catchment focused on exotic forestry leaving wetlands largely untouched. Additionally, with the Lake Taupo catchment protection work that started 30 years ago, many wetlands were fenced off to protect water quality.

Wetland protection and management in the Conservancy has increased in the last five years. Management has largely concentrated on controlling the spread of grey willow in the Rotoaira – Otamangakau basin, and the wetlands of the central volcanic plateau. Much of this work has been in partnership with private landowners and forestry companies (N.Z. Forest Managers and Winstones Pulp International) as a result of their commitment to environmental accreditation. Grey willow has also been largely removed from two western Lake Taupo wetlands and the Te Papa mire at Rangitaiki. This has removed

Above: Wetlands however are not wastelands. They are wonderful places full of fascinating plants and animals and provide important ecosystem functions. The south Taupo wetlands. (Photo: DOC)

the single greatest threat to these areas, though surveillance will be needed to ensure they stay that way.

In the last five years most large wetlands have now been surveyed and more accurate information is known about what plants are present. More detailed threatened plant surveys have been conducted for three species of highly threatened wetland orchids (the swamp greenhood, *Pterostylis micromega*; the bog greenhood *Pterostylis paludosa*; and the swamp leek orchid *Prasophyllum aff. patens*). These surveys occurred in collaboration with members of the New Zealand Native Orchid Group and included two knowledgeable members who were over 80 years old! These surveys identified areas that are now regarded as the best populations remaining in New Zealand. At one site were a small population of the swamp greenhood orchid was found, targeted vegetation cutting over three years reduced competition allowing the orchids to thrive. This resulted in a 5-fold increase in the population to over 200 plants in the last four years. It is likely that this species of orchid and other threatened wetland plants could be removed from the threatened plant list, through carefully managed disturbance regimes such as using small prescribed fires.

During these surveys several separate sightings of native forest geckos where seen, with six seen at one site in 30 minutes. These observations may indicate that geckos are now more abundant in wetlands compared to adjoining forests, as predators are potentially less common and efficacious in this habitat type. This theory has also been suggested for why many native wetland birds are still common such as the fernbird. Information however is critically lacking about many of our native wetland birds. We know very little about how widespread some species are, if they are threatened, why they are threatened and if so how quickly they are declining.

Wetland conservation and management is still in its infancy, however the conservancy aims to rectify this. Future management will be focused at the South Taupo Wetland, where willows dominate approximately one third of the fifteen hundred hectare wetland. The removal of willows from a large part of this wetland should allow native plants and animals to increase as the habitat becomes more suitable for them. Predator control may also be established if research shows that native species are being impacted and are declining. Additionally, removing willows here should help to protect Lake Taupo's water quality, as native wetland vegetation is more effective at stripping nitrogen than willow forest, thus willow control will contribute to ensuring Lake Taupo remains clean and clear!

Using Trout to Educate Tomorrow's Decision Makers

A new education programme, '*Taupo for Tomorrow*', has been initiated at the Tongariro National Trout Centre (TNTC) through a partnership between the Department of Conservation (DOC), Genesis Energy, and the Tongariro National Trout Centre Society. '*Taupo for Tomorrow*' is a hands-on, learning experience outside of the classroom for students from primary to secondary school level. The tranquil native bush bordering the clear, fast flowing Tongariro River offers an ideal setting for students to explore the concept of sustainability by learning about the Taupo fishery and the importance of fresh water conservation in New Zealand.

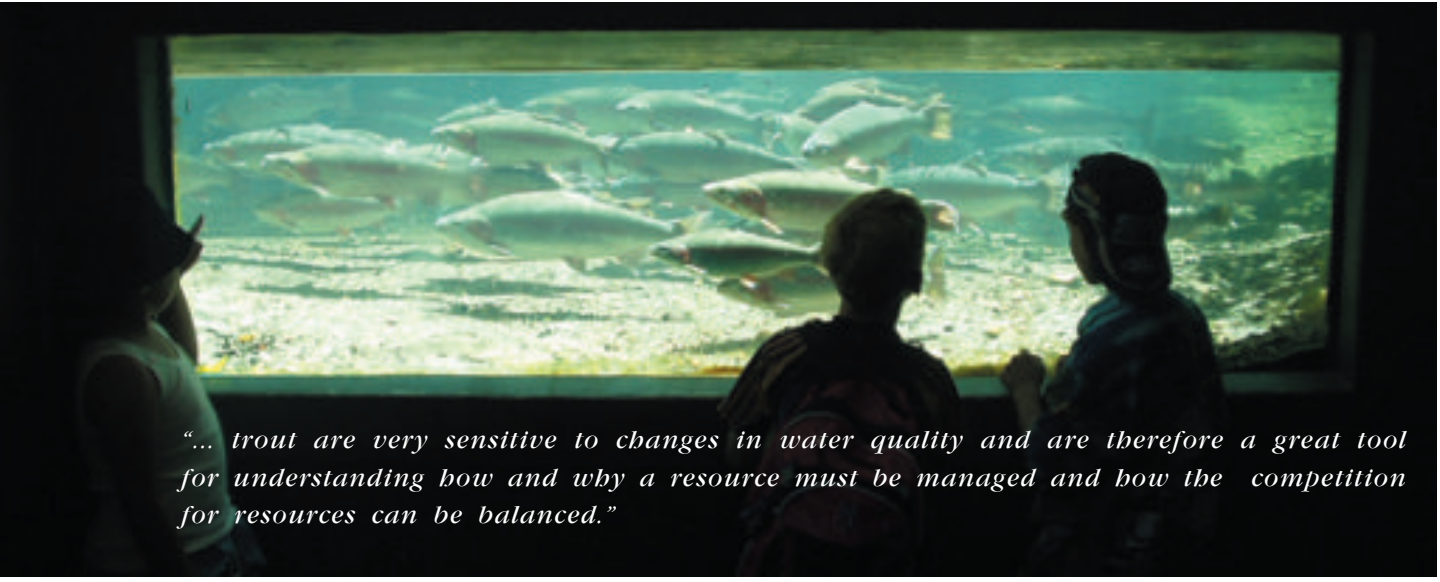
By Thea DePetris, Educator, Tongariro National Trout Centre

Why should school students be taught about Taupo's wild trout population? I pondered this question when I first heard that the Department of Conservation Taupo Fishery Area team was looking for a registered teacher to set up an education programme at the Tongariro National Trout Centre. Were there really important lessons to be learned from studying the management of the fishery? And if so, could these messages be told in a way that captured the attention of the students? Now, three months into the job, I am very excited about delivering this new education programme and the valuable lessons that can be offered through a case study of the Taupo fishery and its wild trout population.

The term sustainable has become a common catch phrase for those concerned about the future of our planet and its inhabitants. We see it being used in official government documents like the *'2020 Taupo-nui-a-Tia Plan'*, an integrated sustainable development strategy for the Lake Taupo catchment. The New Zealand Parliamentary Commissioner for the Environment has used the term in his 2004 report *'See Change- Learning and Education for Sustainability'*, a report written to explain the concept of sustainability and how people can learn to live in sustainable ways. This year even marks the start of the '*United Nation's Decade of Education for Sustainable Development'*. Western cultures are awaken-

The Department of Conservation Fishery Area team acknowledge Genesis Energy as the primary sponsor for this education programme. For more information or bookings, please contact Thea DePetris at 07 386 9246.

Right: Students from Churton School identifying invertebrates underneath rocks by the clear, fast flowing Tongariro River (Photo: Petrina Francis)



"... trout are very sensitive to changes in water quality and are therefore a great tool for understanding how and why a resource must be managed and how the competition for resources can be balanced."

Above: The underwater viewing chamber offers close up views of wild trout swimming in the Waihukahuka Stream (Photo: Thea DePetris)

ing to the fact that we are living in an unsustainable manner as we clear landscapes, burn fossil fuels, fill landfills and pollute waterways year after year. The youth of today are the decision makers of tomorrow. For this reason, it is vital that they are introduced to the concept of sustainability and the need to alter the ways in which we live.

Locally, population growth and the intensification of land use in the Taupo region are increasing pressures on the area's physical and natural resources. Inherently the natural habitat is of a very high quality, epitomized by the wild trout population which supports the world renowned Taupo fishery. The fishery is exceptionally important to the Taupo region as a recreational resource, as a food source, culturally and for the economic benefits. However, trout are very sensitive to changes in water quality and are therefore a great tool for understanding how and why a resource must be managed and how the competition for resources can be balanced. For example, during the planning of the Tongariro Power Development scheme, Genesis Energy and the Taupo Fishery Area team spent a large amount of time, money and effort determining how to balance river flow levels and operation in the best interest of both the trout population and the nation's energy production needs. Today, as a consequence of this intense planning process, a healthy trout population coexists alongside the Tongariro Power scheme. Introducing students to such cases as this will help them to develop the environmental awareness, values and skills necessary for wise decision making about future resource use.

Sustainability refers not only to the physical environment and its resources but also to the social, cultural and economic connections people make as a result of their decisions and actions. Management of the trout population and angler opportunities have been an important component to developing a strong relationship between the Crown and tangata whenua in the Taupo region. The Maori Land Amendment and the Maori Land Claims Adjustment Act (1926) put into law a negotiated arrangement between Ngati Tuwharetoa (the land owners) and the Crown (the fishery manager) to provide access around the shoreline of Lake Taupo, use of its waters for general public, and access for licensed anglers over designated river areas. This Act and the relationship that developed between the two parties are the principal reasons why the Crown continues in its role as the fishery manager of Taupo rather than delegating the func-

School groups will be able to book a *'Taupo for Tomorrow'* programme starting in June 2005. All programmes are matched to the New Zealand Curriculum Framework by achievement level and objectives. School groups will have three options to choose from when booking a programme. The best option will depend upon the group's timeframe and desired learning outcomes. A unique feature of *'Taupo for Tomorrow'* is that the setting of the education programmes is flexible. Trips that utilize the local environment and professionals working in the area may be used to enhance learning. For example, students may be taught while rafting down the Tongariro River, working with Department of Conservation fishery staff, or during a site visit to a hydro-energy power plant.

tions to a fish and game council. It is important for students to reflect upon such historical accounts where different social groups have built successful relationships and become stewards of the environment.

Trout are valuable as they offer an avenue to study the region's changing environmental conditions. There is no doubt that the health of Lake Taupo is declining due to development of its surrounding rural and urban land. Increased amounts of nitrogen entering the lake are giving rise to potentially toxic algae and reducing water clarity. Sedimentation due to erosion, impact of pest fish and weeds, and the increasing demand for water are all other factors that affect the area's waterways. Rainbow trout are a sensitive species and the size and condition of the population reflects the quality of the habitat they live in. Management of the fishery involves comprehensive monitoring of the trout production and angling harvest. A significant change in the trout population can indicate a change in the region's environmental conditions. Therefore, an education programme about the fishery is also a study about a fascinating range of issues facing freshwater conservation.

Finally, the fishery provides a real-life opportunity for students to observe the ongoing, sustainable management of a natural resource. Students can see the application of scientific methods and principles being used in a practical sense, rather than just imagining a theoretical example. In order to detect and measure changes in the Taupo Fishery, managers collect information using a systematic and extensive monitoring programme. Today, the techniques used in the monitoring programme are highly developed and often involve cutting edge technology. For example, radio tracking and acoustic technology enables managers to estimate the number of fish in the lake at certain times of the year, and to track the movement and behaviour of fish in both river and lake environments. In selected streams, fish traps are used to gather important information on fish condition, size, spawning numbers and any shifts in the population structure that may be occurring. Electric fishing, smelt monitoring, and habitat surveying are all other methods used to collect data about the fishery. Each of these monitoring measures provides managers with information about a particular component of the fishery and after statistical analysis, provides a comprehensive overview of the Taupo fishery.

Below: Students at the entrance to the Tongariro National Trout Centre, the location of the 'Taupo for Tomorrow' classroom. (Photo: Thea DePetris)

Tongariro Kiwi

By Jonathon Miles

Programme Manager
Biodiversity Assets

Thirteen years of data collection in Tongariro Forest has shown that in the absence of management the Tongariro Forest kiwi population (a stronghold of kiwi in the central North Island) could be extinct within our lifetime. In 1995 the population of kiwi within Tongariro Forest was estimated at 200. Tongariro Forest statistics show that three out of every 100 adult kiwi die each year. This would mean that without the work done to date, just 139 adult kiwi would be left in Tongariro Forest by 2005. Each pair of Tongariro Forest kiwi produce on average three to four eggs per season, only half of these hatch and of those chicks that hatch as few as 5% will survive to adulthood – insufficient recruitment to replace an aging kiwi population.

Above: Cindy Jenkins, Ranger Biodiversity Assets with a ONE kiwi.. (DOC Whakapapa)

In 1999, a new government funding package facilitated the set up of five kiwi zones; Northland, Coromandel, Tongariro, Okarito and Haast – to test and refine methods of kiwi management, as well as to protect kiwi.

Each one of these kiwi zones had specific roles to play in testing a variety of different management options to protect kiwi. Many adopted solely stoat trapping as a way of protecting kiwi, or a combination of trapping, operation nest egg (ONE) and poison.

In 2000 the goal for the Tongariro kiwi sanctuary was to test the effects of aerial 1080 possum control operation on stoats and therefore on the survival of kiwi chicks. An equally important second goal was to increase the population of kiwi in the Tongariro forest by 12% using the 1995 population estimate of 200 kiwi. This meant 36 juvenile kiwi needed to have survived. Today 37 kiwi survive and of these we are still monitoring 23 kiwi (60%).

In 2001 an Animal Health Board (AHB) possum control operation, which involved aerial application of 1080 in Tongariro Forest, provided the opportunity to study the effect of 1080 on kiwi chick survival in the 2001/02 breeding season. This opportunity provided an insight into the potential benefits of 1080 not only for kiwi but for other native species as well. In the year of the 1080 operation, no other management work was conducted and 40% of all monitored (transmittered) kiwi chicks survived. The sample size of chicks monitored however was insufficient to draw robust and conclusive results. ONE was resumed in subsequent years.

The 1080 drop study, recent call survey results, many nights spent trying to locate and catch kiwi, and the change from lifting eggs during the day to lifting them at night when the incubating male leaves the nest, has revealed however, that there are a lot more kiwi in Tongariro Forest than initially thought. We now estimate the population to be approximately 400 adult kiwi. Of these we have transmitters on 11% or 44. This increased population estimate does not mean cause for complacency, all this means is that if we do nothing kiwi will become extinct in some

Above: Seeing small kiwi chicks survive through to adulthood makes the effort all the more worthwhile. (Photo: DOC)

of our lifetime of some of us rather than all.

Since it was set up in 2001, the Tongariro kiwi staff have made a significant contribution not only to protecting kiwi but also in refining methods of kiwi management. The Tongariro kiwi sanctuary has been associated with Rainbow Springs in Rotorua, and through this association and collaboration has helped develop and improve upon captive incubation (ONE) and rearing of kiwi. Rainbow Springs are the leading ONE institution in the country and 100% of all good eggs lifted from Tongariro Forest last season hatched. The second main contribution was looking at the effect of 1080 on kiwi chick survival, which was completed in part.

In recent years, all four other kiwi sanctuaries have been applying ground-based predator trapping, the associated monitoring results suggest that large-scale predator control for kiwi can create increased abundance of rats (a product of competitive exclusion), which in turn may have a detrimental impact on other forest birds. While kiwi sanctuaries are managed primarily with the intention of promoting recovery in kiwi populations, it was expected that there would be wider ecological benefits.

For kiwi management to be sustainable in the long term it is important that management is not detrimental to the survival prospects of other native biota. Having not yet embarked on predator trapping, Tongariro kiwi sanctuary has emerged as the ideal candidate to trial and study management techniques which may have wider ecological benefits.

The goal for the next five years in Tongariro kiwi sanctuary is to increase the number of monitored breeding pairs from our current 19 to between 30 and 35. This will enable us to determine conclusively whether 1080 does benefit kiwi chick survival. ONE will continue to be used in order to maintain and continue to increase the numbers of kiwi in Tongariro forest.

The partnerships between Bank of New Zealand Kiwi Recovery Trust, DOC, Rainbow Springs, Warrenheip, and the wider community continue to be essential to the success of this programme.

Tongariro Forest is on the Animal Health Board schedule for ongoing possum control in order to control the spread of bovine tuberculosis (TB). The next pest control operation is planned for 2006, again offering the opportunity to re-look at alternative management strategies, to principally protect kiwi but also other forest species. We can do this by re-testing two hypotheses/management questions:

1. *Aerial 1080 operations do benefit kiwi chick survival.*
2. *Aerial 1080 operations do benefit other forest birds.*

These hypotheses are based on the assumption that 1080 will lower rodent numbers, thus having a positive effect on other components of the forest system. Additionally the rodents will act as poisoning vectors targeting stoats, in turn lowering the numbers of stoats in the environment.

Recreation Opportunity Review

By Derek Thompson

Recreation Planner

The Tongariro/Taupo Conservancy is often considered as the playground of the residents of the North Island. As well as providing a resource for residents, it is a major destination for overseas tourists. This mix of users creates a demand for many varied recreational opportunities.

Public consultation was undertaken as part of the Department's recreation opportunity review 'Towards a Better Network of Visitor Facilities'. Proposal documents and background resource material were provided as publications and on the DOC website to provide the basis for making submissions and meeting held with interested groups.

Above: Tauranga Taupo Waterfall in Kaimanawa Forest Park is one of the new day walks proposed, arising from the Recreation Opportunity Review. (Photo: Dave Wakelin/DOC)

Over 200 submissions were received. Following analysis of submissions and input from the Conservation Board final decisions have now been made. Public scrutiny and input on the departmental proposals has confirmed, modified or, in some cases, reversed the original DOC proposals.

The key points to arise out of the review were:

- Development of four new day type walks in the Conservancy.
- Public rejection of one proposed Day Visitor opportunity.
- Public rejection of a proposed camping opportunity.
- Confirmation of the desire for community management agreements for four huts.
- Large (relatively) numbers confirming the proposed replacement of Ketetahi Hut.

Initially there will be an emphasis on the tackling of repair work and deferred maintenance. This will remain a focus of work over the next ten years in the Conservancy.

There will be growth in accessible interpreted high standard day use facilities (e.g. Old Coach Rd & Hapuawhenua Viaduct Walks). Further provision of Day Walk opportunities in Taupo, the Kaimanawa Forest Park, and the Tongariro National park will also occur. Two huts will be replaced in the Tongariro National park and two shelters will be removed from here.

In general, there will be very little removal of facilities but the Department will cease maintaining some opportunities. Submissions have influenced the reversal of some original proposals, which now will no longer go ahead. These include a campground, two hut upgrades and a thermal viewing opportunity.

In summary, over the next ten years the focus of work in the Conservancy will be the tackling of repair work and deferred maintenance.

Whakapapa Ski Area and Village Sewerage Scheme Development

By Warren Furner

Programme Manager
Community Services

The mountains of Tongariro National Park are sacred to the Maori, especially Ngati Tuwharetoa and Ngati Rangi who have lived at their feet for almost a thousand years.

"*This matter of tapu is important. We want to see people enjoy the mountain but we do not want it desecrated.*" (Sir Hepi Te Heuheu, in Tongariro a Sacred Gift, Craig Potton; 1987).

The most challenging task facing the managers of Tongariro National Park lies in establishing a level of use at which public access can be facilitated and commercial operations permitted within the park without compromising the 'intrinsic worth' or tapu of this precious landscape.

Waste Water Challenges

Whakapapa and Iwikau villages are the two main sites of development and occupation within the Park, and as such they pose the greatest challenge of waste water and sewage disposal. Post-war development in the 1950s and 1960s saw the construction of numerous huts on the mountain – something which the park board of the day encouraged with a view to assisting development and interest in the ski field and promoting recreational use of the park.

Above: Consultant Engineer Ian Smith oversees the placement of panels for the buffer tank on the Whakapapa Ski field . (Photo: Warren Furner)

The Whakapapa Village sewage treatment plant is located north of the Chateau golf course. Built in the 1940's, this plant has been upgraded over time to handle increasing numbers of people but in recent times has not met contemporary environmental or cultural requirements.

At Whakapapa skifield and Iwikau village the sewage from the 48 club lodges and lower ski field facilities has been treated in approximately 50 separate (in a few cases combined) septic tanks with deep disposal soakage pits within the upper catchment of the Whakapapanui stream. There have been ongoing problems with the operation of these systems as well as difficulties of sludge removal from an alpine environment. Backflow of effluent has occurred leading to surface discharge and odour problems at the start of high-use periods.

Disposal of human sewage on a sacred mountain is clearly unacceptable and considered culturally insensitive to iwi.

Investigation

In 1990, the Department of Conservation began considering possible alternatives for the disposal of wastewater at Iwikau and Whakapapa Villages and established a Sewage Working Group with representatives from

Tangata Whenua (Ngati Tuwharetoa), user groups (Ruapehu Alpine Lifts, Ruapehu Mountain Clubs Association, KAH (Chateau), Skotel, Manawatu-Wanganui Regional Council, NZ Forest and Bird Society, King Country Energy and the Ruapehu District Council.

Following environmental and engineering studies and proposals for alternative solutions and a call for submissions the Tongariro Taupo Conservation Board resolved that a reticulated scheme should proceed for both Iwikau and Whakapapa Villages in recognition that it was best practice to remove all of the effluent from the National Park. The initial investigation indicated that the scheme would cost $3.5 million and the community and the Department of Conservation considered this a feasible amount.

Land purchase problems and objections delayed progress and it wasn't until April 1999 that the Department of Conservation requested a meeting of the Working Group including representatives of Ruapehu District Council, iwi and the Tongariro Taupo Conservation Board to discuss the future of sewage treatment for Iwikau and Whakapapa Villages. The meeting resolved to progress with the investigation of an alternative treatment site within the boundaries of the Whakapapa Village amenity area, an area within Tongariro National Park.

A feasibility study was carried out by consulting engineers who confirmed a feasible engineering solution was possible that utilised final effluent disposal to ground using the area adjacent to the Chateau Golf Course. At an estimated $3.75 million the proposed scheme now looked more achievable and the Working Group approved further engineering investigation to confirm assumptions made in the feasibility study.

This option involved collecting and piping all sewage for treatment and disposal in an upgraded mechanical treatment plant at the existing Whakapapa treatment plant site followed by a subsoil infiltration system at a site to the north of the golf course in the Whakapapa Village amenity area. This site was previously modified and grazed during the 1940's.

In 2000 a decision was made that the Department of Conservation would construct and commission the scheme. The scheme has been funded by

Right: The shoulder of the Bruce Road was used to lay the sewerage pipeline from Iwikau to Whakapapa.
(Photo: Warren Furner/DOC)

Right: Even snow showers didn't deter those gathered to celebrate the opening of the Whakapapa Sewerage Scheme. Paramount Chief of Ngati Tuwharetoa, Tumu te Heuheu, Minister of Tourism and Defence and local MP Hon. Mark Burton and his wife Carol and Ruapehu District Council Mayor Sue Morris at the blessing of the scheme at Iwikau. (Photo: Dave Wakelin/DOC)

way of a special purpose Government loan which is being serviced by all parties that are connected to and will benefit from it over time. The new sewerage scheme is a community service, owned and operated by the Department of Conservation on behalf of the contributors and paid for by the contributors.

In June 2001 all parties including iwi agreed and committed to the proposed scheme and resource consents were applied for and obtained mid 2002.

In April 2004 the scheme was commissioned with trials continuing within the irrigation field and finally opened in August of that year, at a completed cost of approximately $4.0m.

Schematic Overview

Effluent from Ruapehu Alpine Lifts (RAL) ski area cafes and facilities, ski accommodation complexes at and above Iwikau and Whakapapa village effluent including that generated by the soon to be completed 40 room extension of the Grand Chateau is treated at the upgraded Whakapapa Village treatment plant.

A buffer tank has been installed at Whakapapa Ski Area base to provide additional storage for periods where wastewater inflow exceeds the capacity of the main collection pipe or where maintenance requires termination of inflow for a period of time. This will safeguard the environment in the event of emergency operations.

Sewage is treated at the Whakapapa village treatment plant, located 0.6 kilometres north-east of the Chateau. The treatment plant uses natural processes to separate solids from water and degrade raw sewage then allows the final effluent to be safely discharged to the environment into land.

This collection of sewage from the Iwikau and Whakapapa Villages and high standard of treatment and land-based disposal minimises the potential for future human effluent contamination of the stream catchments.

The mauri of the waterways is restored and protection of the tapu of the mountains of Tongariro National Park ensured.

Careful measures were in place during the entire construction phase to

minimise any potential for environmental accidents and reduce ground disturbance.

The line for the pipeline between RAL facilities and Iwikau village was carefully chosen where there was very little natural vegetation. Previously disturbed areas and areas to be modified again in the future were selected for pipe routes. Advantage was taken of the opportunity to co-locate pipes and cables for snow-making, power and telecommunication in the same trench, whereby 'future-proofing' other infrastructure.

The main conveyance pipeline was located and buried within the road and shoulder of the Bruce Road for the whole length from Iwikau to the Whakapapa village treatment and disposal site. The pipeline route crossed Whakapapanui Stream using existing road bridge structures.

Environmental disturbance within the Whakapapa village was kept to a minimum by utilising the existing reticulation system which had sufficient capacity to accept the increased volume of effluent from Iwikau village.

In order to avoid freezing and mechanical damage during the winter months the conveyance pipe had to be protected. This was done by burying it to a depth of 600-900mm. Where the pipe was exposed such as at the Whakapapanui Bridge, it was inserted into another lined pipe for extra insulation.

Due to seasonal snow cover, and high visitor numbers during winter there was a limited timeframe over the summer months in which construction of the reticulation route could be undertaken. In order to complete construction within the limited timeframe, three concurrent contracts were tendered:

1 Installing the buffer tank and reticulation system at Iwikau, using conventional diggers and helicopter support. This was carried out from November 2003 – June 2004.

2 Laying of the reticulation pipe using conventional methods along the Bruce Road corridor. This was conducted from November 2003-May 2004.

3 Upgrading the Whakapapa Treatment Plant and installing the irrigation field using conventional civil construction methods on site of existing disturbance. This was carried out from December 2003 – May 2004.

Restoration of disturbed areas

Reinstatement of vegetation and the removal of all redundant septic tanks and structures is the final stage of the project. While restoration of the more remote sites has already been completed, the majority is expected to be completed over the summer of 2005/06. Significant assistance from the clubs and community is expected to reinstate land impacted on by construction and removal of old infrastructure in the immediate vicinity of their lodge or club hut. A community approach to this phase of the project will demonstrate a commitment to the environment and willingness to be part of a very unique community in one of New Zealand's and the world's most protected environments.

Tongariro Natural History Society Members make a difference

By Sarah Gibb

Director
Tongariro Natural History Society

The Tongariro Natural History Society acknowledges the generous support given by the Symphony Group.

The Members of Tongariro Natural History Society want to be involved in the protection on Tongariro National park and its environs.

To some of these people, that includes giving of their time to volunteer on practical conservation tasks. These tasks have been worked into a programme with the Department of Conservation and are generally done between September and June.

The partnership we have built up with DOC has encouraged us to take on some quite major projects. This season that has included the continuation of the Mt Pihanga-Rotopounamu Restoration project and a survey of whio (Blue Duck) on the rivers in and around the Tongariro National Park and the Kaimanawa Forest Park.

Being a volunteer is fun. You also get to work as part of a team, share your skills and learn new ones, and experience conservation in action.

Below: During the year the Tongariro Natural History Society organise a number of excursions into Tongariro National Park and beyond, such as this climb to Crater Lake. (Photo: Julie Oram)

Our volunteer goals:

1 Provide volunteer opportunities so the community can assist in the conservation of Tongariro National Park's natural, cultural and historic resources;

2 Provide opportunities for people to safely experience the values of the natural and historic environment, and to become more sensitive to those values;

3. Support and strengthen links between tangata whenua, conservation and recreation groups, the community and the Department of Conservation;

4. Enable conservation tasks that otherwise would not have been done, to be completed through the assistance of volunteers.

Highlights for 2004 – 2005 to date:

Tussock Revegetation

800 tussock plants were planted as a means to secure the dunes and to replace the Marram grass DOC has eradicated at Tukino Rd. Some of last year's efforts were ruined by hares as well as 4WD vehicles driving over the planting, so this year a sign is going up to show TNHS's involvement and hopefully inform people to stay clear.

Whakapapa Visitor Centre roving interpreters

We have a core of people who are very happy to share their knowledge and love of the park with visitors. Over Labour week-

end, Christmas, Anniversary weekends and Easter these people rove around the visitors centre and offer people suggestions on how to get the most from their visit to the area. All with a smile!

Flora species monitoring

This has ranged from crawling on the ground under trees to find *Pittosporum turneri* seedlings to tramping in four hours to monitor a vegetation plot for mistletoe. Protecting *Dactylanthus* is another favourite with our volunteers. The volunteers always seem to come back even more enthusiastic, the influence of the DOC staff who work with them.

Tongariro Collectable Auction

This was held in October and gathered together a variety of books and memorabilia on the Tongariro National Park. A good turn out of about 70 people to the Taupo museum and $2200 was raised. Much thanks to our auctioneer Maurice Perry and Advisor Dave Bamford.

Summer Programme

Thirteen members assisted DOC in the delivery of their recent Summer programme, a contribution DOC is very grateful for.

Mt Pihanga-Rotopounamu Restoration Project

This is the second year of this project to protect the native biodiversity of the area. So far it has been about finding out about what is and is not there. In January however, we received a grant of $45,500 from the Pacific Development and Conservation Fund to begin to reduce the pests around Rotopounamu and bait stations will be in place by spring. Over the summer, four international volunteers have come to Turangi and helped us to manage this project.

Whio (Blue Duck) Survey

The Department of Conservation asked the Tongariro Natural History Society to co-ordinate a survey of Blue Ducks in 2004-5, as we have networks with the community groups to ensure a complete survey is achieved. It sounded easy enough, but some of our volunteers have good stories to tell!

The outcome though will be analysed in April. We can confidently say that we have a good knowledge of the rivers now with very worthwhile trip descriptions. Hopefully we have the whio too.

International Volunteers

This season seven international volunteers will have assisted TNHS in conservation projects in the park. These people are resourceful, enthusiastic and grateful to have the opportunity to participate in conservation projects. Other projects they have helped DOC staff with are: monitoring the Powelliphanta snail in Kaimanawa Forest Park, researching and recording historical sites in the conservancy, monitoring Crater Lake on Mt Ruapehu, planting, building weta boxes, surveying for bats and generally meeting the visiting public to Tongariro national park and sharing their experiences with them.

Funding

In the past year TNHS has received more than $80,000 in grants and sponsorship to support projects in the park.

Want to know more about the work of the society and perhaps become a member? Check the society's website www.tongariro.org.nz or write to:

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Tenon

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Tongariro Natural History Society