

TE KAAHU O TUAWHENUA

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Overview and updates in brief

This newsletter follows on the heels of a hui recently held in Ruatāhuna on research in the Tuawhenua Trust forests – see article in this issue. It is a bit surprising that a year has gone by since our last issue of Te Kaaahu o Tuawhenua. The content of this newsletter revolves around our research, but it would be useful if readers could suggest or contribute a wider range of articles relevant to their forests. Our research also needs to look for new opportunities and that was an important reason for our hui last December.

PROJECT UPDATE:

PODOCARP RESTORATION

Past issues of our newsletter have focused on individual studies we have undertaken in Trust forests on

podocarp (e.g. rimu) restoration. As podocarp restoration is a primary goal of the Trust it seemed appropriate in the first article in this issue to present an overview of all the research that may be necessary to successfully restore podocarp trees in logged-over forests.

SNOW DAMAGE

The snowstorm in June is not something we could plan for in our research. Although it had some bad effects it also provided an opportunity for some interesting observations in the forests. We briefly report on those in this issue.

FUNDING

Support for our research comes from various funding agencies for various lengths of time. While some of our work is supported long-term, for example, climate change effects on the forests funded by the Foundation for Research, Science and Technology, other work has funding that finishes quite soon. We must rebid for some of our existing research as funding will soon end, and put up proposals for new pieces of work. To justify ongoing funding we must show our goals for the forest are being achieved. For this reason the Trust has recently put up a proposal to the Ministry for the Environment to begin planting rimu in logged-over forests.



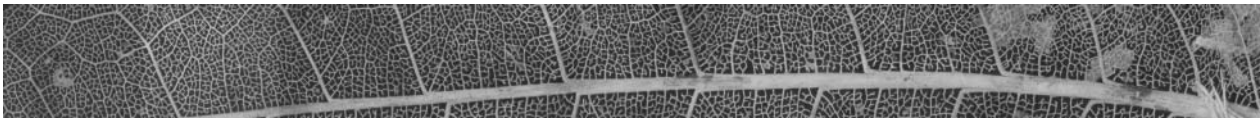
Credit: Susan Wiser

Snow damage in Tuawhenua Trust forests.



Landcare Research
Manaaki Whenua

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Podocarp (e.g. rimu) restoration in logged Tuawhenua Trust forests

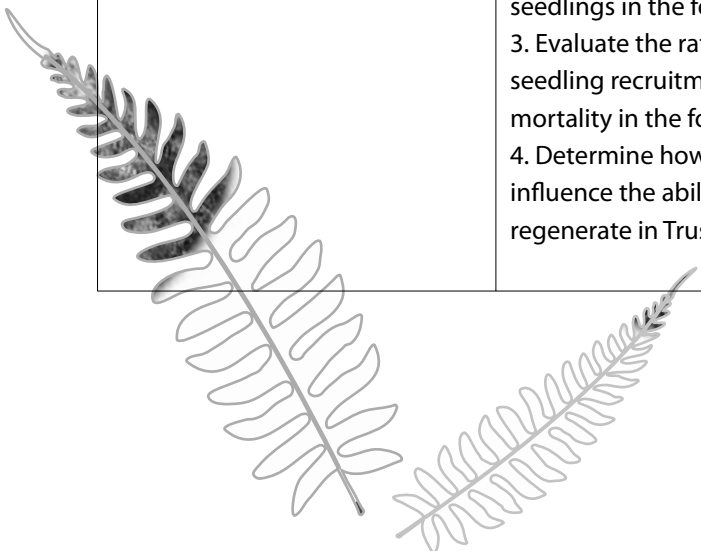
When Manaaki Whenua first began research in Tuawhenua Trust forests the Trust posed the question “how can we restore podocarps back in our forests?” The podocarps (e.g. rimu, mataī, toromiro) were logged about 40 years ago over about half of the Trust’s forest area. The Trust was concerned that there were only a few podocarp seedlings in the forest and

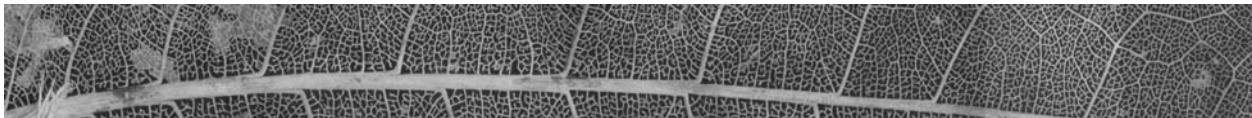
that it was unlikely the podocarps would regenerate in future. Podocarp trees live to be 500–1000 years old and so regeneration of podocarps is a very long term process.


Our collaborative research with the Trust is targeted at providing the understanding necessary to re-establish podocarps in Tuawhenua

Trust forests to the level they would now be without past timber harvesting. This level includes similar structure (e.g. spatial distribution, abundance, and size) and species composition. We consider that providing the understanding to restore Trust forest comes from addressing the five questions in the accompanying table.

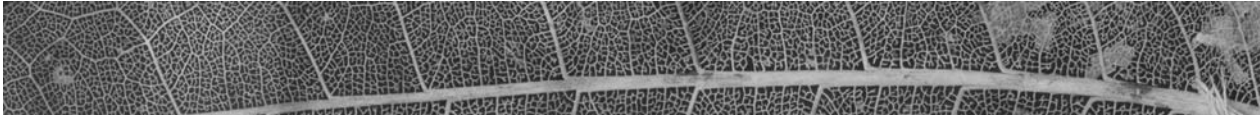
Questions	What could be done?	What has or is being done?
<p>What is the restoration goal?</p> <p>If Tuawhenua Trust forests had not been logged in the past what podocarp species would be present today, how abundant would they be, how would they be distributed, and what size would they be?</p>	<ol style="list-style-type: none"> 1. Reconstruct the unlogged forests based upon knowledge of local people and a survey of cut stump distributions 2. Determine the importance of podocarps in similar unlogged forest 	<ol style="list-style-type: none"> a. We have compared data on the abundance and size of podocarps in logged and unlogged Trust forests
<p>What limits podocarp regeneration?</p> <p>What conditions are required for podocarp seedlings to establish in the forest and what factors control their success in the forest understorey?</p>	<ol style="list-style-type: none"> 1. Determine the level of podocarp seeding and the fate of seeds in the forest 2. Establish the number, distribution and site requirements of podocarp seedlings in the forest 3. Evaluate the rates of podocarp seedling recruitment, growth and mortality in the forest 4. Determine how climate change will influence the ability of podocarps to regenerate in Trust forests 	<ol style="list-style-type: none"> a. Restoration of kererū being studied as dispersers of seeds b. Distribution of seedlings in relation to parents, logging impacts, soils and ferns studied c. Impact of podocarp removal on soil fertility, soil organisms, decomposition, and plants determined d. Influence of light and root competition on podocarp seedling growth and mortality measured





<p>What controls podocarp trees in the forest canopy?</p> <p>How are podocarp trees influenced by competition with other trees and what is the impact of disturbances, like snow and wind storms, on their mortality rates?</p>	<ol style="list-style-type: none"> 1. Determine what controls the recruitment, growth and mortality of saplings, trees below the main canopy, of the various podocarp species 2. Measure mortality rates of podocarp trees to establish how rapidly individuals are being lost from the canopy 	<p>a. Podocarp tree mortality rates are being established through the remeasurement of tagged individuals on plots established in Te Urewera forests in the 1960s</p>
<p>What long-term changes are possible in Trust forests?</p> <p>Given the short-term measurements we make on changes in seedlings, saplings and trees – what are the likely long-term (>500 years) changes in the forest? These long-term changes match to the lifecycle of the trees</p>	<ol style="list-style-type: none"> 1. Explain the historical events that have resulted in most podocarp trees found in Trust forests being large 2. Model podocarp abundance in the Trust forests into the future in relation to climate change, pests, and historical logging 	<p>a. We are initiating a study using pollen in lake sediments to reconstruct the dominance of podocarp trees in Te Urewera forests over the last 10 000 years</p>
<p>What active management could restore podocarps?</p> <p>Ultimately our research needs to develop efficient and effective management options to restore podocarps in Trust forests</p>	<ol style="list-style-type: none"> 1. Determine the effectiveness of distributing podocarp seeds or planting seedlings in establishing podocarp trees 2. Establish whether canopy or understorey manipulations would improve the recruitment, survivorship, and growth of existing podocarp seedlings. 	





Clearly there are many gaps to fill in our research – for example, we are doing little on pest impacts on podocarp regeneration. However, the research by nature has many facets and is long term – our strategy is to progressively resolve the questions outlined. A key challenge will be to find the resources necessary to implement restoration.

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A cut rimu stump photographed near Tarapounamu. In the background a dense tawa overstorey is visible. The concern by the Trust is whether podocarps, like rimu, will regenerate under such conditions to form a part of the forest canopy like in the past.

Mātauranga korerū o Tūhoe

If you remember from the very first Te Kaahu o Tuawhenua newsletter, we outlined some work on the collection and analysis of mātauranga korerū with Tuawhenua kaumatua. We want to use knowledge Tuawhenua elders have about the korerū and the forest to assist us with our restoration efforts for the korerū. We needed to gain an understanding of what korerū numbers were like in the past, when changes in korerū numbers occurred, what foods korerū prefer at certain times of the year, how the forest has changed over the years and whether this affected the korerū, and whether other factors like climate have affected korerū, and if so, how?

We also asked about aspects of harvesting because this is where much of the contact occurred

between korerū and people. Changes in harvesting practices and methods can often reflect changes in the resource. Also, mātauranga is different from science because it often includes ideology or the spiritual aspects in its explanation of why things happen in the environment. It is considered wrong to separate the local knowledge of plants and animals from the spiritual context because this can alter the meaning and interpretation of the knowledge. This is why we asked questions relating to respecting the mauri of korerū and its spiritual significance.

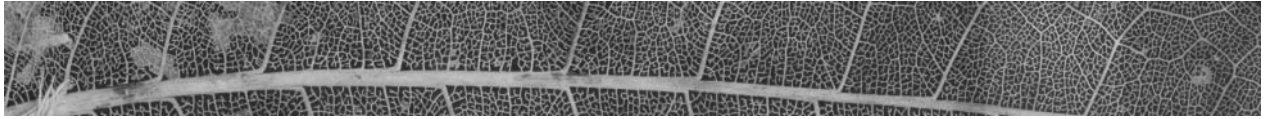
PROJECT UPDATE

We have now completed the interview phase of the mātauranga korerū project thanks to the hard work and commitment from Spady Kutia, Moehau Kutia, June Tihi and

Motoi Taputu. We have interviewed 11 kaumatua over the course of the research, and our sincerest thanks to those elders for speaking to us. The plan now is to collate and analyse all the information and write a report for the elders and the Tūhoe Tuawhenua Trust. We will also write a peer-reviewed journal paper about certain sections of ecological knowledge relating to the korerū.

The report will include information like the annual food requirements of korerū:

Table 1: Seasonal native food preferences of korerū in the Tūhoe region of Te Urewera (**Note:** This list is incomplete and not to be quoted)



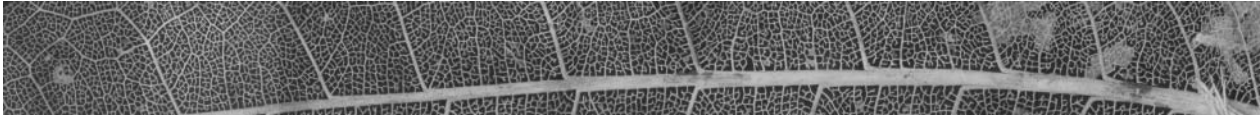
Months	Food
January – March	Karamuramu fruit Kowhai leaves Houwhi leaves Makomako leaves and fruit Tutu fruit Tawa fruit Kotukutuku fruit Black maire fruit Parapara fruit Tātārāmoa fruit Kaikomako fruit Hīnau fruit Toromiro fruit Rimu fruit Totara fruit Matai fruit Rohutu fruit
April – June	Hīnau fruit Toromiro fruit Tawa fruit Rimu fruit Pirita fruit Kahikatea fruit Rohutu fruit Patatē fruit
July – September	Hīnau fruit Toromiro fruit Pirita fruit Patatē fruit Kowhai leaves Katokato leaves Houwhi leaves Kotukutuku leaves Makomako leaves Hanehane leaves Nikau fruit (coastal)
October – December	Kowhai leaves and flowers Houwhi leaves Makomako leaves Kotukutuku leaves

It will also contain explanations about how fruiting might affect kererū numbers. Jim Doherty provided us with this account in 2004:

Now, kereru numbers in certain areas can also be regulated by the fruiting of different trees. Trees like toromiro, tawa, and hīnau don't fruit every year. The toromiro may fruit here at Ngaputahi, but not over in Ruatahuna. This may happen in even smaller areas. The trees could fruit right where we are here in Opaheru, and not up at Tarapounamu. Of course, these effects have quite an impact on the numbers [of kererū] in those given areas because the kererū follow the toromiro around. If there were no toromiro in Opaheru, the kererū might all shift to Tarapounamu, but they don't just immediately return to Opaheru after the fruiting finishes. No, it can take quite some time for them to slowly migrate back to Opaheru. So please realise, it's not straightforward to ask about the numbers of kererū. The fruiting of the trees has quite an impact on where the kererū are depending on the time of year.

PROTECTION OF KNOWLEDGE

Those Tuawhenua and Manaaki Whenua researchers involved in the mātauranga kererū project recognise that the protection of



knowledge is hugely significant for the community. Therefore we have in place regulations about information protection and release to guide us. These regulations state:

- (a) Ownership of all knowledge remains the intellectual property of each Tuawhenua kaumatua.
- (b) Information will be kept confidential unless verbal or written consent is obtained from the kaumatua or representative(s) designated by the kaumatua – refer Consent Form for Participants.
- (c) Information gathered for the purpose of informing and guiding kererū research and restoration will be available to use through the discretion of the kaumatua.
- (d) Information collected will only be released after the researcher has verified the information and context in which it is used; and received approval of the kaumatua.
- (e) Researcher(s) will make no statements to the media or other agencies unless specifically requested by the Tūhoe Tuawhenua Trust to do so, or unless permission has been granted by the Tūhoe Tuawhenua Trust.
- (f) Transcribed, video, or audio copies of interviews will be provided to kaumatua if requested.
- (g) Verbal reports will be provided to the Tūhoe Tuawhenua Trust at annual community hui.



Credit: Phil Lyver

Jim Doherty beneath a large rata recalls mātauranga relating to the kererū and the forest.

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Snow damage to forests in Te Urewera

BACKGROUND

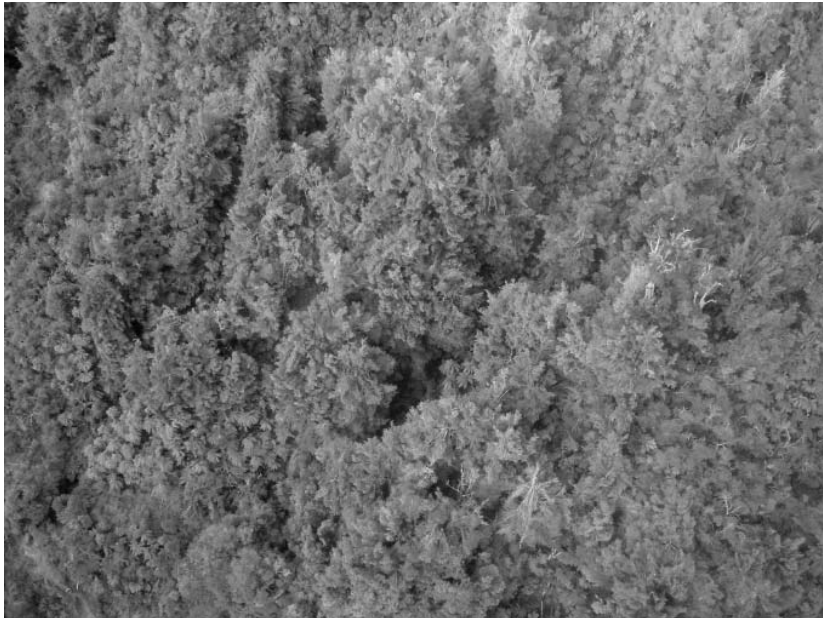
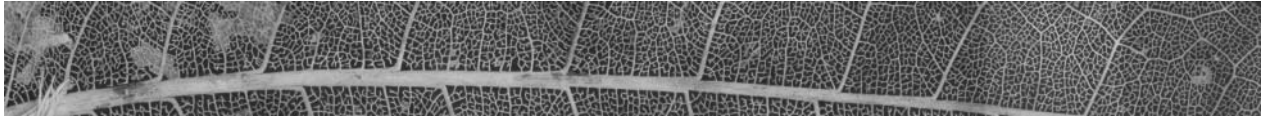
On 20–22 June 2006 snow fell heavily in eastern parts of the North Island. Although snowstorms can be expected in Te Urewera snowfall is usually light and confined to relatively high altitude forests in the east. The June storm was unusual for Te Urewera in that heavy snow (>30 cm) fell to low altitudes (500 m) and penetrated further west than normal (e.g. to Ngaputahi and Minginui). The fact that elders

in the local communities had not previously experienced such an event was testament to the unusual nature of the storm. The wet heavy snow caused damage to power lines, road access and forests. This note reports on field observations made during fieldwork around Tarapounamu and from a helicopter inspection of forests. The helicopter flight went east from Murupara to the Okahu Valley, then south-east to the head of the Waiau Valley, north

along the western slopes of the Huiaarau Range, west from near Maungapohatu to the Whakatane Valley, and finally south to Te Umukahawai and Ngaputahi.

OBSERVATIONS

The most intensive damage was not widespread and occurred east from the Okahu Valley through to the head of the Waiau Valley and north to Ruatāhuna. Certainly field parties have described such damage to the south in the Waiau



Snow damage



Melissa Brignall-Theyer in snow damage

Valley and also in the head of the Whirinaki Valley. But to the north and west of Ruatāhuna the damage is less pronounced. Below we describe the nature of only the most intensive damage in the forest types affected.

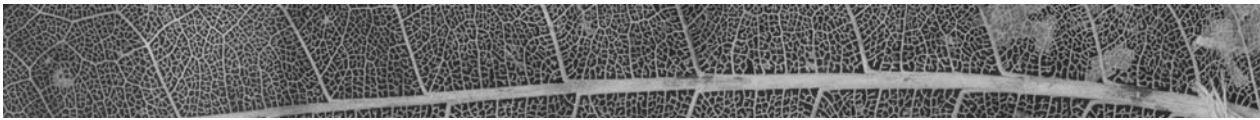
1. Podocarp–tawa forest

Canopy damage is most marked on tawa and tawhero trees. This usually takes the form of snapped upper crown branches (as shown). Such damage occurs in patches but certainly does not affect all forest. Relatively few podocarp or beech trees were affected, and very few trees of any species were killed outright. There are small landslides in places apparently caused by tree toppling during the storm. Logged forest did not appear to be worse affected than unlogged forest.

Snow damage to the forest understorey is widespread. Over 30% of tagged toromiro, rimu and tawa seedlings near Tarapounamu were covered by falling branches and foliage to some degree. No doubt the increased light may advantage the seedlings if they survive the inundation. The pulse of litter to the soil will also have consequences. The weight of snow and falling debris has so far killed relatively few seedlings and saplings, although some are badly damaged through snapping (as shown).

Credit: Susan Wisser





2. Mānuka and kānuka scrub

In contrast to the beech forests east of Ruatāhuna and emergent podocarps in tall forest, these scrubland species did not appear resistant to the heavy snowfall. The scrublands, although covering a relatively small part of the landscape, were compressed by the weight of snow (as shown at Te Umukahawai). Although much of the foliage appears dead now, it is likely many of the plants will resprout in the next growing season.



Credit: Susan Wisser

3. Short scrub in gullies

We found the most intensive and widespread damage had occurred in gullies where short vegetation is dominated by small trees of māhoe, patatē, kaiweta and horopito. Many stems were broken off and others snapped but still attached. Surprisingly there was little damage to the tree ferns and visually they now appear the dominants with the removal of the small-tree overstorey. It is likely that many of the small trees will sprout and so recover within a few years. This short gully-scrub may cover 20% of the forest area.

Snow damage

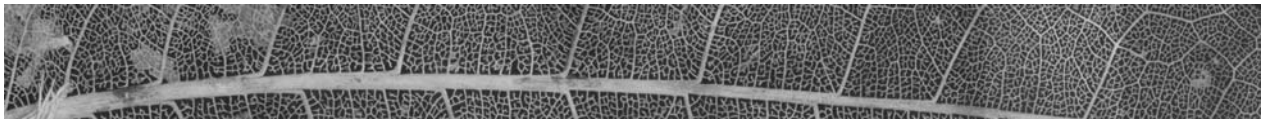


Credit: Susan Wisser

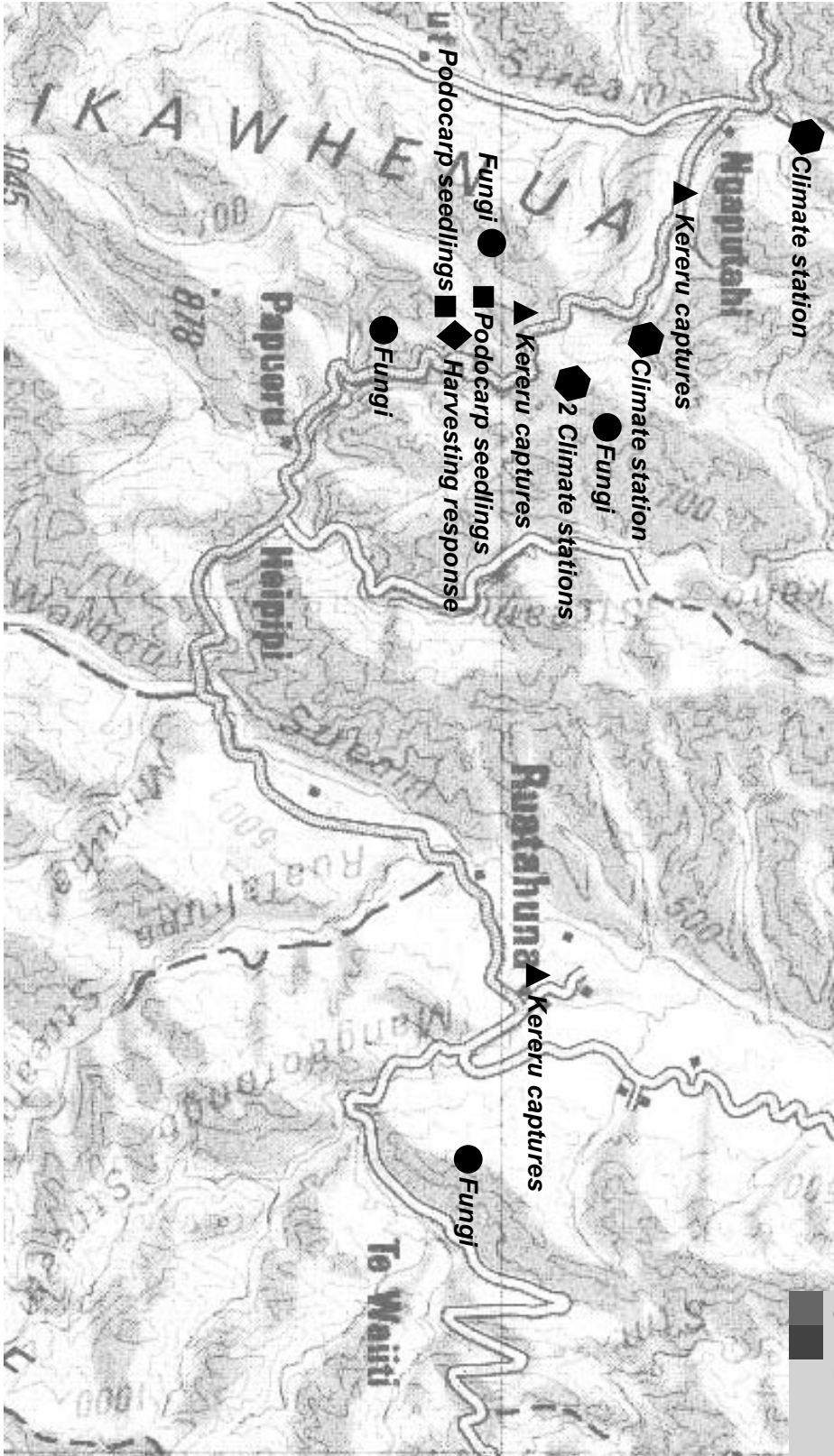
Snow damage



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Research Study Sites



This map represents all the areas where research has been established and is ongoing. If you are in these areas and notice markers, such as flagging tape, metal tags, signs, fences, equipment etc, please do not remove or tamper with any of these. If you are interested and want to know more about these sites please contact Jim Doherty or Rob Allen.

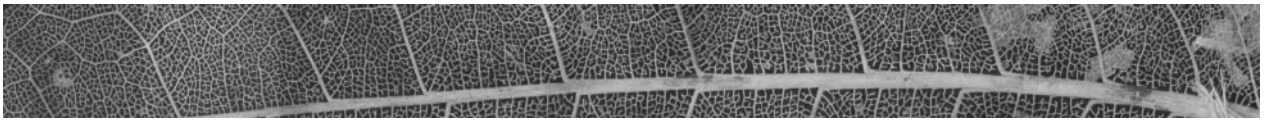
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Hui on research

In December of last year 15 Manaaki Whenua - Landcare Research staff met with members of the Tūhoe Tuawhenua Trust and Ruatāhuna locals for a two-day hui at Mataatua Marae. The hui had two purposes. Firstly, it allowed the Landcare Research team to present recent science results. Secondly, it provided an opportunity to plan implementation of those research results and to look at what research is still needed.

On the first day, nine research presentations were given. These included talks on podocarp (e.g. rimu) regeneration and the many factors that have been found or suggested to limit regeneration (including the effects of competition with other trees such as tawa); kererū nesting success and the influence of predators such as the possum; fungi in Tūhoe forests and the possible impacts of past logging; tourism and Tūhoe; and lastly, an introduction to some new work on the prehistory of Tūhoe forests over the last millennia including dating rat arrival in these forests.

Some key findings/highlights were:

- The few rimu seedlings present in Tuawhenua Trust forests grow rapidly where the canopy is open. Toromiro and tawa seedlings do not occur in these open areas and are more shade tolerant than rimu seedlings. Seedling growth is strongly influenced by competition with



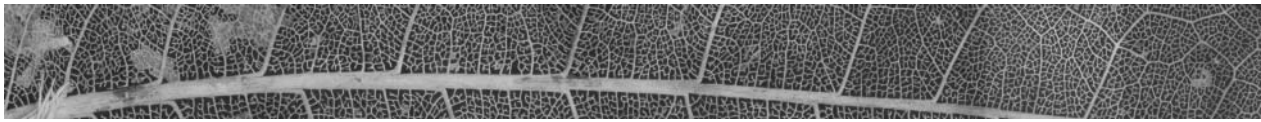
Mataatua Marae in Ruatāhuna

- other plants. It appears deer browse is having an impact on the growth of toromiro seedlings.
- Soils and soil organisms found around the stumps of rimu trees harvested nearly 40 years ago remain similar to those found around remaining rimu trees. This means the effects of

centuries of litter inputs etc. to the soil are not lost within 40 years.

- There is a diverse range of fungi in the understorey of Trust forests and it appears that past logging has impacted on the types of fungi found.
- Our kererū research has moved to field studies of





predator movements and nest predation. For this we are using transmitters to track kererū, possums and rats over several years.

- Surprisingly it has been found that a uniquely Māori component of current tourism ventures was not a key success factor. Price and safety were the key drivers and a Māori component was seen as an added-value element.

On day 2 Trust representatives presented three overarching goals for Tuawhenua:

- Be the centre of knowledge for the management of Trust lands and forests
- Ensure the protection and restoration of Tuawhenua bushlands
- Pursue economic development for the benefit of current and future generations without compromising our conservation principles

These goals, combined with the presentations by researchers, provided those attending the hui with a basis for identifying some priorities and actions needed for the future.

1. Ongoing funding is essential! Several sources were identified and will be pursued. It was agreed that Landcare Research needs to continue to advise and



Kererū fitted with transmitter

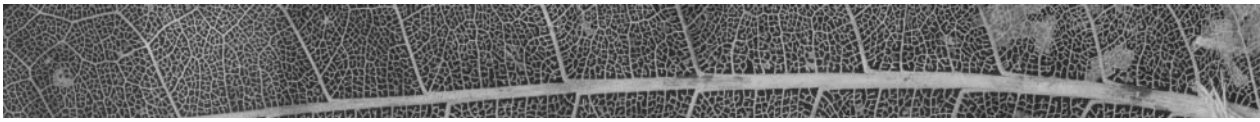
Credit: Morgan Coleman

share expertise in identifying these funds and in proposal writing. However, the plan is for Tuawhenua to increasingly lead this process and to improve dissemination of information. Since the meeting the Trust and Manaaki Whenua have developed a Trust proposal to MfE's Sustainable Management Fund on podocarp plantings. Much of the research on podocarp regeneration to date will feed into that project.

2. It was also decided to use our knowledge of kererū populations and predation to demonstrate management for their recovery. It was agreed a strategy would be developed for this. In addition there is clear need for kererū monitoring, which will also need to be funded. This is to be investigated and collaborative proposals and applications will be made. In addition

intervention methods will be investigated (pest control, rearing) and there is an intent to increase DOC's involvement in this area.

3. Baseline measures for establishing if changes are occurring are missing. Baseline monitoring of podocarps, kererū, weeds and pests is necessary to enable decisions on priority work and action. To address this Manaaki Whenua and the Trust will work together to conduct a scoping exercise. This will include analysis on what and where we should measure and monitor, as well as a cost-benefit analysis. In addition there is a need to find long-term funding to support this.
4. Ensuring a mutually beneficial relationship is a priority for both the Trust and researchers. To enable this there are plans



for another hui later this year, as well as for some smaller meetings that link with current fieldwork trips. There is commitment from both groups to increase the lines of communication and if possible develop more community involvement in the research.

5. There was strong interest by the Trust to increase the role of matauranga in all our projects. To do this involves creating opportunities for ongoing input by Tūhoe on existing projects as well as targeting some proposals specifically at matauranga.
6. Finally, it was recognised that we need to better manage existing knowledge and that which is being generated. The group decided it was easiest not to develop a whole new information system for our work but rather to establish what already exists in other databases, get access to these,



Credit: Trent Hiles

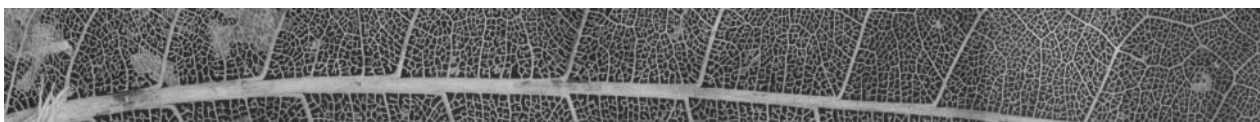
Antoni Nicolas and Larry Burrows measuring trees

and integrate the various sources. In this way there is no need to build or service a new system. In the near future a funding proposal will be submitted to build a knowledge management system for Tuawhenua that draws on available data sources.

The hui was a great time to consolidate the relationship between the Trust and Manaaki Whenua and benefited all those

involved. It's going to be a busy year while the teams work on the actions above. Again the hospitality was exceptional (homemade cake and roast pork is always a winner!) and the chance to spend time at Mataatua to meet, catch up, and get to know each other better was thoroughly enjoyed.

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