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LEAD ARTICLE

In DOC we have high regard for those staff who save lives and rescue visitors, but we should also salute our knowledge heroes: men and women whose knowledge of how the world works help to save the plants and animals that make up New Zealand's unique biodiversity. One of those people is Peter de Lange, a scientist working to save indigenous plants.
Since 1998 Peter de Lange has described solely or jointly and/or made new combinations for 33 taxa, including the recognition of a new seriously threatened shrub Achryanthes margaretarum from Phillip Island in the Norfolk Island Group. He has been honoured by the formal naming of a type of kawakawa endemic to the Three Kings Islands—Macropiper excelsum subsp. peltatum f. delangei—by Dr Rhys Gardner in 1997. Currently he is involved in resolving the status of kanuka (Kunzea spp.) and the degree to which hybridism threatens the genus. For this and additional contributions Peter has just received a well-deserved honour from his colleagues in recognition of the new knowledge that he is responsible for discovering.—Editor

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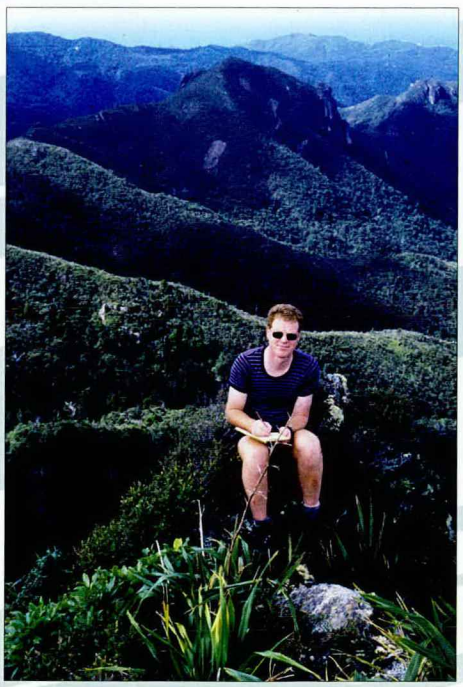
On the mountain

Peter de Lange, Department of Conservation (DOC) threatened-plant scientist, has just been accorded one of science's greatest honours—appointed a Fellow of the Linnaean Society of London.

The 18th century father of modern species' classification for whom the society is named, Swede Carl Linnaeus, created the first concise survey of the world's then-known plants and animals, bravely, for the time, basing his classifications on his subjects' sexual parts—and was vilified as a result.

De Lange clearly empathises with the Linnaeus' achievement, and the fact that he had to fight for his research to be appreciated. Now he has been honoured for his own work on bio-systematics (classification of species) and plant conservation.



Peter de Lange hard at work. *Photo: P. de Lange*

Peter started work as a threatened plant scientist with DOC in 1990. At the time there were 14 conservancies and 10 botanists. 'Wonderful overworked and over-

Department of Conservation
Te Papa Atawhai

Opinions expressed are those of the contributors, and do not necessarily represent the policy of the Department of Conservation

stretched souls' he says, 'who had to cover threatened plants, weeds control, general ecology, and Protected Natural Area surveys'.

'Nobody told me what needed to be done. We had to start from scratch. For the first couple of years I worked at getting recognition for plant conservation. Many threatened plant species are hard to 'sell'; they aren't pretty, cute, or endearing.'

More than 13 years on and de Lange is more likely to be known for his landmark role in revising the way we perceive insular rarity. The Swiss-based International Union of Conservation of Nature (IUCN), producers of the famous Red Data Books, developed a new classification system in 1994 to assist with rating species according to threat. However, as de Lange was quick to observe it had a continental focus, and also, they weren't that interested in what island-dwelling people had to say.

The IUCN system was absolutely wonderful for elephants in Africa, but seriously misrepresented the true state of things in tiny New Zealand where common species still occupied small habitats, and so by default were classified as threatened.

Of New Zealand's approximately 2300 flora species (of which 80–85% are endemic), less than 5% are in serious trouble, if we use the New Zealand threat classification system de Lange helped devise. Yet according to IUCN, 30–40% are in trouble. That's the problem, they just don't understand insular rarity.

In 1991 a gathering of botanists hosted by the Department advised that we 'should go it alone' and set up our own system for deciding what was at risk and what was not. This request resulted in the formation of the New Zealand Threatened Plant Committee, which had a first crack at deciding what was threatened in 1993, using a system still loosely based on IUCN requirements. In 1998, de Lange and Canterbury University School of Forestry Associate Professor David Norton, published the basis for a New Zealand Threatened Species Classification System that divided biota according to what was actually or poten

Figure 1. *Hebe perbella* de Lange. A threatened species, originally discovered in 1980 by the late John Bartlett, growing on steep sided gorges on the Ahipara Gumfields. The species was formally described in 1998. It is assessed as a Nationally Vulnerable species and is now known to be a Western Northland endemic, with strongholds in the Herekino, Warawara, and Waima Forests. It is threatened by browsing animals and through competition by weeds. The name 'perbella' means 'beautiful' and refers to the attractive coloured flowers of the species. *Photo: G.M. Crowcroft*

New Zealand has a vascular plant flora of about 2200 named taxa. It is estimated that a further 20% still require formal description. In the most recent assessment of New Zealand's threatened vascular flora, 208 of these are considered to be threatened with extinction or at risk. In our quest to retain representative examples of biodiversity it is important that we acknowledge that research into the biosystematics is an important tool assisting in the ultimate goal of managing our biota without risking further loss. The illustrations with this article are examples of recently described taxa. This information has greatly assisted the formal protection and management of these, and associated taxa within their distinctive habitats.

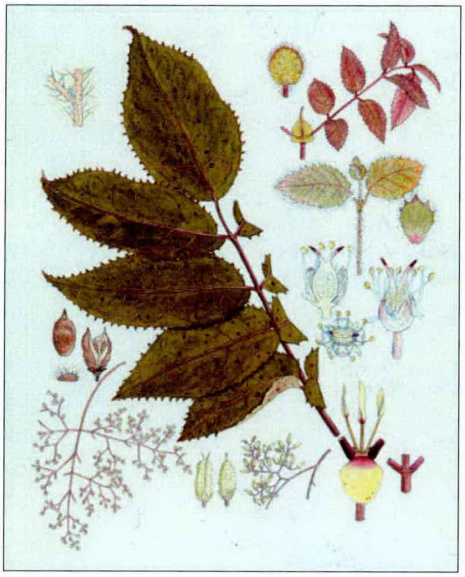


Figure 2. *Ackama nubicola* de Lange. Rated as Nationally Endangered, this distinctive tree was discovered on the margin of the Waima Forest by DOC worker Karen Riddel during February 2000 and formally described in December 2002. At present we know of 545 trees, all found in one site where they are seriously threatened by possum browse. This, the newest tree to be described for the New Zealand flora, belongs to a genus of 4 species, 2 found in Australia and 2 in New Zealand. The specific epithet 'nubicola' means 'dwelling in clouds' and alludes to the often foggy cloud-girt habitat the species grows in. The painting by Audrey Eagle is from the type specimen held in the Auckland Museum.

Figure 3. *Pittosporum ellipticum* subsp. *serpentinum* de Lange. Rated as Nationally Endangered this distinctive *Pittosporum* is endemic to the ultramafic rocks of the Surville Cliffs, North Cape New Zealand, and was formally described in 1998. At present between 1000 and 1500 adult plants are known, but seedlings have yet to be recorded. This shrub is one of 12 formally described plants endemic to the 120 ha exposure of serpentinised peridotite. For their area, the Surville Cliffs support more endemic plants than anywhere else in New Zealand. The recognition of this *Pittosporum*, and a further five species and subspecies, by de Lange and Landcare colleague Peter Heenan has done much to assist in the recognition of the National Significance of this fragile ultramafic ecosystem, which still remains at risk from fire, weed invasion, and browsing animals. *Photo: G.M. Crowcroft*

tially threatened. This was trialled by the Plant Committee, and, as the saying goes, 'we have never looked back'. de Lange has many other achievements, notably the naming of several new species of kowhai and hebe. He also has to his credit groundbreaking research demonstrating that fire plays—or should play—an important part in peat and wetland conservation. 'Not many would set fire to the only known population of a critically endangered orchid. It was a risk debated for over 10 years. Someone had to try it. We (David Norton, Canterbury University, and de Lange) did, and soon showed that that particular orchid (and other associated nationally scarce species) flourished as a result.' But in an interview he seems happier about discussing present and pressing plant management problems. 'Twenty per cent of our flowering plants still don't have names. Insufficient value is placed on biosystematic work and yet until we know what we've got, it's ludicrous to try and manage it.'

One of the burning threatened plant issues is how to manage, what are effectively seral species within greatly reduced, postage stamp sized ecosystems. 'We need to get proactive, and try and recreate past disturbance regimes using new ideas and tools, and recognising that weed and pest species are here to stay. Instead of trying to remove them all, we need to learn how to work with them. Perhaps we should be accepting that some habitat deterioration is the price to pay to prevent further extinctions.

In the process of finishing a PhD into the 'threat' of hybridism, de Lange points out that New Zealand's flora contains many stable hybrids. 'We're on an island, so these things have been blown here. They have to breed with distant relatives because the alternative is extinction. They have to adapt. Hybridism is just another pathway to speciation, for island plants it's a sensi-

ble strategy, and our flora seems to be extremely good at it. Threat comes when humans accelerate hybridism rates and add closely related exotic species. This has happened with ngaio and Tasmanian boobialla, and also with close relatives of pohutukawa and kowhai. Problems are compounded when native plants are planted outside their natural ranges. Clearly hybridism is a complex topic, and more research into this area is needed.

Part of de Lange's work has been investigating the threat of hybridism to the Great Barrier Island kanuka (*Kunzea sinclairii*). 'Here the issue proved to be much less serious that first thought. Hybrids were common enough, certainly, but only in sites of former or current human disturbance—such as old logging areas, and track sides. I soon found that, as the island's original forest canopy was restored, Great Barrier Is. kanuka returned to its specialist habitat, rhyolite rock tors. Any hybrid swarms are simply being eliminated by taller forest species, or subsumed into the gene pool of the more common kanuka (*Kunzea ericoides*).' For Great Barrier Is. kanuka, de Lange concludes, hybridism is not an issue.

Listening to de Lange, the scale of the task at times seems overwhelming. He tells of an extremely rare species of hebe—Bishop's Waitakare rock hebe—being sprayed with herbicide during track widening. This species, then treated as a hybrid, was shown by de Lange to be fully functioning stable species: results since confirmed by a Te Papa-based biosystematic investigation into the genus *Hebe*. As a result of that work, last-minute intervention resulted in a unique council-led recovery plan and, in his words, a 'spectacular turnaround'. It might be added here that de Lange did that research in his weekends, wrote the recovery plan and still provides scientific advice when needed for its continuing implementation.

de Lange is back to his starting point: the lowly regard in which plants are held in this country. 'I could chop down a tree in my back yard even if it was the very last of its species, but shoot a native pigeon and I could go to jail' he says. 'To me it's a huge, burning frustration that our flora is not adequately protected.'

'At times it still seems that whales, birds, frogs, lizards, and even invertebrates are more important than plants. In the Department we have a lot of really productive and innovative conservation work going, including work by our botanists. It would be nice to see a bit more recognition and appreciation for their effort and results.'

With his Linnaean fellowship, de Lange's name is now alongside zoologist Thomas Huxley, botanist Joseph Hooker, and Charles Darwin. Very notable recognition for his work indeed!

Alan Samson and Kaye Green*
SRU, Victoria Street

Further reading

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* Alan Samson, formerly a science writer at SRU, is now at Massey University, Palmerston North, teaching journalism and working on his Masters degree.

REPORTING BACK

Invading the US!

Dave Towns reports on the 2003 meeting of the Society for Conservation Biology in Duluth, Minnesota.

The 17th Annual Meeting of the Society for Conservation Biology was held in Duluth, Minnesota from 28 June to 2 July 2003. SRU's Dave Towns took the opportunity to attend this meeting as part of a privately funded trip to the Northern Hemisphere. With over 1200 conservation biologists from 40 countries, it seemed like a great chance to exchange ideas and learn about other people's work. And there was plenty of it, presented in 15 symposia, 8 workshops, and 15 sessions of contributed papers as well as dozens of poster presentations.

The conference was conducted with some interesting neighbours. For the first part of the week, the Duluth Gun Show was held next door. The appearance of some interesting characters in camouflage jackets and carrying long packages eventually led the conference organisers to post a sign on the doors outside our meeting: 'This is NOT the entrance to the Duluth Gun Show'. This seemed very reassuring.

'Not the entrance to the Duluth Gun Show!' The conference centre in Duluth.

The theme of the conference was 'Conservation of land and water interactions', which made sense, given Duluth's location on the shores of Lake Superior. The paper Dave presented with Ian Atkinson as co-author: 'The sign of an ancient mariner? Seabird effects on island restoration in New Zealand' was linked to this theme (the abstract is available on the SCB website: www.conbio.org/2003/).

However, the real theme of the conference was unveiled in a plenary address by Michael Dombeck, a former leader of the Bureau of Land Management and Chief of Forest Service. He identified 10 conservation issues of global importance, although in reality many of them were specific to the USA. Among these latter were: urban sprawl, forest fire management, loss of old growth forest, the damage caused by 36 million Off Road Vehicles, the lack of ecological literacy (community buy-in to conservation), and lack of legal protection against mining. The more global issues were water quality, biodiversity loss, and invasions by exotic species.

This problem of exotic species eclipsed much of the other conference material. For Dave it began at the immigration queue at Chicago's O'Hare Airport, where attempts at keeping out aliens are so ponderous he missed two connecting flights and lost all of his baggage for 24 hours.

Three conference sessions were devoted solely to invasive species. Some astonishing results are now being recorded. In one example, wild pigs in South Carolina (called hawgs by the speaker) are such effective predators and browsers they have wiped out chipmunks and, through predation of acorns, have significantly modified forest structure. As a result, white tailed deer numbers are declining. In a second example, European earthworms have invaded the forests of the

Wild pigs in South Carolina are such effective predators and browsers they have wiped out chipmunks.
Photo: John Maloney©

northern USA and Canada, largely spread by fishermen who were using farmed worms as bait. These forests have no native worms, and therefore had clearly stratified soil horizons which the imported worms have since destroyed. The effects of this on seedling and tree density were dramatic.

However, the most bizarre example of an invasion was reported from Florida. A cargo of black tailed jackrabbits (hares) native to the western US was imported through Miami International Airport, but made a successful breakout—perhaps after hearing that they were destined to be greyhound bait. They then did what rabbits do best. No-one took much notice until migrating turkey buzzards descended on the airport to harvest wounded and dead hares hit by planes. Buzzards are big birds and make big holes in aircraft, so the US Department of Agriculture was called in to shoot the hares. This is when the coalition for hare protection got busy. But after 315 hares were live-trapped and returned to Texas, the job has still not been completed. A Broward County dermatologist has now taken out an injunction to halt the destruction of the remainder. Strangely, no-one seems to have suggested that, like armadillos, the hares could become yet another in Florida's huge list of invasive organisms. It is an excellent example of the ecological literacy problem identified by Dombeck. It would be nice to think that this literacy is higher in New Zealand. Perhaps it is, but we still struggle against determined attempts to introduce rainbow lorikeets and spread deer whose detrimental effects are well documented. Education remains a significant challenge.

Dave Towns
SRU, Auckland

Black tailed jackrabbits (hares), native to the western US, could become yet another in Florida's huge list of invasive organisms.
Photo: Ron Storey ©

POINT OF VIEW

The need for contingency planning in Wellington Conservancy

Shortly after we had published our lead article in ConScience 47 *(Bruce McFadgen's views on the effects of sudden catastrophe—earthquakes and tidal waves—on conservation) we independently received this article by Steve Urlich, which continues and deepens the discussion of 'sudden impacts'—Editor*

Natural disturbances

Wellington is a geologically and climatically active region, and stochastic events have been historically recorded such as flooding, land sliding, wind storms, earthquakes and tsunamis (Goff & McFadgen 2002). These catastrophic disturbances periodically influence ecosystems in the Wellington region.

Wellington Conservancy has data on the extent of the 1936 western Tararua storm and the 1968 Wahine storm. Other significant climate-induced events in the Wellington region include the landslide triggering rainstorms that occurred in 1976 along with flooding, and the 1981 Wairarapa floods.

Geological events include the 1855 earthquake (8+ M_w)* which has been documented as having widespread effects on catchments within the Rimutaka range (Grapes & Downes 1997). Other major earthquakes include the 1934 Pahiatua earthquake (7.6 M_w), and the 1942 Masterton quake (7.1 M_w). The simple explanation for the regular seismic activity is the leading edge of the Pacific plate is forcing itself below Wellington at a depth of 20–30 km, causing earthquakes as it uplifts the land and forces it northwards (Crozier & Aggett 2000). The Tararua range is being uplifted at about 2.0 mm a year, and the high rainfall leads to high erosion with accompanying high sediment yields (Pillans 1986). Large earthquakes coinciding with flood events have been advanced as causing tsunami, vegetation disturbance, rapid coastal dune building, river aggradation and abandonment of coastal settlements in the 15th century throughout much of central New Zealand (Goff & McFadgen 2002). The extent and nature of these disturbances on vegetation patterns has not been quantified.

The Wellington region is cut by five active right-lateral strike-slip faults: Wairarapa, Wellington, Ohariu, Shepherds Gully/Pukerua, and Wairau faults (Van Dissen & Berryman 1996). No evidence of fault creep has been found on any of these faults, so it is likely that movement of these faults occurs in earthquakes (Van Dissen & Berryman 1996). Although these faults have all ruptured over the last 5000 years, they do not appear to have ruptured at the same time. However, these authors caution that the seismogenic picture is incomplete, and there is no paleoseismic data available for the section of the Wellington Fault north of the Wellington-Hutt Valley segment. It is also not clear how prehistoric movements of the Alpine Fault have affected the region.

The probability of the Alpine Fault rupturing has been estimated at 80% over the next 50 years. Previous ruptures (8+ M_w) have been reconstructed as taking place in: 1717, 1620 ± 10 years, 1450 ± 20 years and around 1150 ± 50 years (Wells et al. 1999; Rhoades & Van Dissen 2000). The consequences of a rupture in the region are likely to be severe for the Wellington Region.

Probable consequences and areas of concern

Loss of life and damage to property is likely to be severe (Crozier & Aggett 2000). Land sliding, soil liquefaction, seiche waves, tsunamis, flooding, and ground ruptures are inevitable. In addition, there will be widespread vegetation mortality and the probability of subsequent weed invasion into damaged, exposed

* **Moment magnitude** (M_w)—Derived from the Richter scale, but more physically based. Involves the average slip movement over the ruptured part of the fault. Favoured because it can be used for all depths. For more details see: Aitken, J.J. 1999: Rocked and ruptured: Geolocial faults in New Zealand. Reed Books and Inst. Geological and Nuclear Sciences, Lower Hutt. Pp. 31–38.

substrates, particularly in lowland patches. The Wellington central business district is in the area where the highest casualties are predicted in a daytime quake (Crozier & Aggett 2000). This is where Wellington Conservancy, Po-neke Area Office, Head Office, and Central Regional Office of the Department of Conservation (DOC) are located.

In the 15th century, Kapiti Island experienced a tsunami around 11 m in height (Goff & McFadgen 2002). An Alpine Fault rupture will also affect the Kapiti Coast where the Kapiti Area Office is located.

Severe shaking leading to widespread tree falls are likely to affect the Mt Bruce Field Centre area, and land sliding followed by widespread flooding appears to be a real risk for the Wairarapa Area Office.

Operations in the aftermath

There is a need to institute planning and operational contingencies in the event of an earthquake. Current planning relates to immediate effects of an earthquake, with the use of evacuation drills and assembly areas. However, a co-ordinated response by DOC to the communities it serves, and the wildlife it manages is also required. DOC also has a duty towards it employees.

A contingency plan needs to be drawn up and staff trained in its execution, with regular simulated 'dummy runs' instituted. The plan should deal with such things as:

- Co-ordination with Civil Defence.
- Allocation of staff to assist with search and rescue, first aid and rubble clearance.
- Allocation of staff to accounting for all DOC staff, contractors working for the Department on site, concessionaires, and any volunteers. This will include working through a process to contact the police, next-of-kin, etc. It will also include assessing the health of each person.
- Allocation of staff to restoring communication.
- Allocation of staff to arranging temporary premises, and a contingency site for Head Office away from Wellington, where national operations can still be run in unaffected areas.
- Allocation of staff to enact priority responses at key conservation sites (such as Mt Bruce aviary).
- Allocation and training of staff external to Wellington to assist with search and rescue and restoring operations. (In the event of an Alpine Fault earthquake in the South Island, Christchurch and the West Coast will be even more severely affected, and the same contingency plan needs to operate there.)

In addition, there should be caches of essential and back-up equipment stored at key locations in the Wellington region so they can be accessed in times of disaster.

Summary

Research into the effects and extent of earthquakes, and their associated consequences, has advanced rapidly over the past 10 years. The consensus is that it is more likely than not a major event will occur within the next 50 years. DOC needs to plan for this unfortunate and distressing reality.

Steve Urlich
Wellington Conservancy

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LETTER FROM SOUTH AFRICA

On the road again

The first letter from South Africa from our correspondent Greg Sherley, who we last heard from while in Samoa—Editor

Greetings!

As many of you will know I am now in Cape Town heading the Global Invasive Species Programme—a collaboration between IUCN, the Scientific Committee on Problems of the Environment (UN advisory body), CABI (Commonwealth Agriculture and Biodiversity International—or close to it) and the CBD (Convention on Biological Diversity). The National Botanical Institute of the Republic of South Africa have contributed by providing (almost gratis) the buildings and institutional support, like administration and a legal base for the World Bank funds which has set up the Secretariat which I head. So we have one year's guaranteed funding and expect to get more for the following two years. But my contract is for only a year. There will be up to eight of us including a programme officer, communications officer, three working group coordinators, and two administration clerks. The working group coordinators are like programme officers, making sure that (at the start) three of the six areas identified as needing priority action get done: pathways (how invasive species get to where they do); information, evaluation and assessment (read science and research and development); and economics. In practice one or two of these positions will be merged. So the big plan is to implement the 'phase two' plan which was written during the first phase along with a global strategy. It is all about capacity building and working in primarily developing countries, protecting native biodiversity. We are supposed to be 'filling the gaps' like setting up marine invasive species programmes or helping others to do so.

Cape Town is beautiful—we are based in the Kirstenbosch Gardens which will be the venue for the Southern Connections conference in January next year. If you are coming along, you will be in for a pleasant surprise: nearly 100-year-old gardens, immaculate and technically brilliantly set out at the foot of these huge bluffs which rise more or less vertically to 3,500 feet! In the distance opposite are even more mountains, with Cape Town itself in between. Never far from the sea, the climate is heavily influenced by the Indian and Atlantic oceans, with temperatures and humidity which differ dramatically.

The South Africans are incredibly hospitable. Today a scientist from the Parks Service at Kimberly dropped by. (One of only seven scientists for the

LETTER FROM SOUTH AFRICA

entire country's national parks—can you believe it?) He was told by Jonah Lomu's ex wife that I was here, and he should look me up to say that if I wanted to see any of the national parks, then just give him a call: he would arrange it. Don't ask how I know Tania—Jonah's ex now living in Kimberly—in fact I don't, but it shows what New Zealand links will do.

South Africa is still coping with the after-effects of apartheid. It is referred to frequently in the news, in terms of 'repairing the damage'. The social ramifications go on and on. Basically it is all about equalizing opportunity and wealth. The country certainly has its problems: about 40 million people, of which 6 million youth are unemployed, 20% HIV positive or with full-blown aids, extremely high crime rate against property and persons, etc. Certainly a downside of living here is continually having to safeguard one's self and one's property. Everything is locked up or chained down. Many properties have razor wire fences or high-tension electric fences atop the walls. Armed response companies provide the real security in suburbs. The police have a very low profile here, being under-resourced in terms of staffing and equipment. It seems to me the criminals know they have a high chance of getting away with crime and so it pays off. So there is every extreme of society here—incredibly rich to extreme poverty and lots of both. South Africa is a very rich country with 'old' money (mainly, but certainly not only, white) and minerals to back it well into the future, but a majority struggling to get into the economy and make a decent fist of it.

On the conservation front: weeds, weeds, weeds. Australian and northern hemisphere weeds such as pine everywhere and displacing huge tracts of native (down here as diverse as anywhere on earth) plant communities and their invertebrate fauna. There are at least two huge conservation programmes underway to get rid of many of them. Working for Water (tied up with catchment protection and hence water abstraction from the woody weeds) and Ukuvuka which is all about removing woody weeds to minimize fuel loading and hence fire risk about greater Cape Town. Both are heavily into job creation for unemployed, training, and secondary income generation from such things as fire wood and charcoal production. Schools and day care are provided so people in disadvantaged sectors, such as women, can go to work.

There is heaps to do (although I am working many hours overtime), including bird watching and tramping Table Mountain National Park. I have a distant second cousin here to check out, and I have perked a trip to Kruger National Park for a few days 'to check out the weed problem'. So I am keeping pretty fit running the miles of tracks in the Gardens (1000 ha) and the tracks which abound in the National Park proper. There is some serious mountain biking here, and I have brought over a second bike.

Yours, Greg

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RESEARCH IN PROGRESS

The role of long-term population studies of threatened species in conservation research

Several longer-term population studies, on species such as mohua and albatrosses, are revealing new and sometimes unexpected threats that are critical to the survival of threatened species.

In the mid 1980s, a 3-year study of the ecology of mohua was extended for a year. It wasn't until that 4th year that the mohua population crashed and the first indication that stoats were a critical threat to this declining hole-nesting forest bird was found. Since then, researchers have discovered that stoat numbers irrupt in southern beech forests every 4–6 years, and in those summers up to 50% of breeding female mohua are preyed upon. These statistics were entered into population models, and the models indicated that mohua would become extinct unless the predation rate was reduced in 'stoat years'. Research then focused on practical ways of predicting these irruptions, and controlling stoat numbers sufficiently to improve breeding success and survival of the birds. The mohua study also showed that many other forest birds faced similar threats, and forest-bird communities as a whole required integrated predator control programmes to reverse population declines.

Monitoring of mohua has continued now for nearly 20 years. Through that time three other factors have been revealed as being just as critical to the viability of mohua. An exceptionally cold year in 1996, combined with high stoat numbers, reduced over-winter survival of mohua considerably. Cold winters reduce survival of mohua below normal levels, making the population more vulnerable to elevated levels of predation. This interaction between predation and cold winters has also been found in long-tailed bats. Between 1999 and 2000, a plague of ship rats irrupted in some southern beech forests. This resulted in the highest levels of predation on mohua so far detected. Predation continued through two summers and the intervening winter, reducing mohua numbers by over 90% and having a significant impact on other forest wildlife. In hindsight, it was apparent that irruptions of rats had occurred regularly, though infrequently, in the past. However, it was unlikely that during these previous events that forest bird populations were as small, or as vulnerable, as they are today. The latest potential impact on mohua is a major defoliation event of red beech trees in mohua study areas. During the summer of 2003, an epidemic of leaf roller caterpillars resulted in over 60% of trees in some areas being affected. Precisely what impact this defoliation might have on survival of forest wildlife populations has yet to be determined. Reductions in survival of mohua resulting from interactions between cold weather and stoat predation, irruptions of rats, or defoliation of forest habitat appear to be rarer and less predictable events than stoat irruptions. They will require management less frequently, but demand vigilance over very long time frames to determine when and where their effects should be managed.

Lengthy response times

Working recently on albatrosses on Adams Island reminded me that many of our threatened species are very long lived and breed slowly, even during favourable conditions. Thus, measuring the response of such species to threats can be a lengthy process. Once management to reverse decline is implemented, it takes a correspondingly long time to detect whether the populations are responding to mitigation measures. This problem is at its extreme in species like the wandering albatross. An immediate threat is the impact of longline fishing, which results in a bycatch of albatrosses and other

seabirds. Satellite tracking is showing where and when albatrosses interact with fishing fleets. It is also identifying seasonally important foraging sites for different ages and sexes of birds; habitats that are potentially vulnerable to stochastic events, and changes in the marine environment. There is a significant delay in the response of albatross populations to such threats. This is because birds take a full year just to raise their single young, and if successful, only breed in alternate years. Once fledged, young albatrosses disappear to sea for 4–8 years. They then begin returning regularly to their breeding islands to form pair bonds, but still might not begin to breed until they are 10–20 years old. To get accurate survival estimates to time of first breeding for just one cohort takes well over ten years—representing a large, but realistic, commitment of people and resources. Therefore, building a convincing population model for long-lived threatened species, and beginning to answer questions like: 'Is our management working?' represents one of our biggest challenges. Given the experiences with mohua and other species, it is likely that factors not being studied at present will also impact on survival of albatrosses. These factors will need to be determined as well.

Investments for the future

Much of our threatened species research focuses on the immediate and significant threats that are apparent, such as predation by key introduced pests. However, the projects described above remind us that there is an important place for longer-term studies in DOC's research portfolios, especially as they reveal unpredicted, yet critical threats or interactions among different threat processes. It is becoming increasingly apparent that single-threat systems are rare, and that different threat processes function over quite different time scales. We have yet to determine the relative impacts of long-term habitat degradation, such as fragmentation or reductions in biodiversity, on ecosystem health. Such events include those related to climate change. In beech forests, we are seeing increasing frequencies of beech masting with likely increases in stress on plants and animals as well as increasing frequency of predator irruptions. In the sea, we are seeing raised sea temperatures with consequent impacts on food sources for many species including those that are already classed as threatened. Many of our threatened species are likely to be important bioindicators because of their sensitivity to specific threat processes.

Longer-term investigations can be used as case studies for illustrating critical factors which threaten whole communities or similar species. Deciding on which, and how many, such studies we can afford, balanced with finding management responses to immediate and sometimes more obvious threats, will need to be debated. However, some of our longer-term investments are just beginning to 'pay off". They are starting to reveal the complexity of factors affecting the long-term viability of threatened species and are highlighting the significance of sometimes unsuspected threats, especially rarer events that impact on long-term ecosystem functioning.

Colin O'Donnell
SRU, Christchurch

SCIENCE COMMUNICATION

Conservation Week tours in Sign Language

For the first time, DOC has provided an opportunity for the Wellington Deaf community to be involved in Conservation Week 2003 (4–10 August 2003). Theresa Newson from SRU, who is Deaf herself, was delighted to organise tours to historic sites for Deaf children and adults. She was also the tour guide and had stories to tell in New Zealand Sign Language about the historic sites. It is unusual for Deaf people to have this experience because they usually have an interpreter translating English into sign language if a hearing person conducts the tours. Theresa organised two different historic sites for Deaf people to attend. These were the Old Government Building, currently used by Victoria University Law School, and Matiu/Somes Island.

Figure 1. The group of Deaf adults who went to Matiu/Somes Island on Saturday 9 August. Photo is by David McKee, one of the participants in the group.

A few Deaf people came to the tours at the Old Government Buildings during lunch times through the week. On one of the tours there was an elderly woman (with hearing) who was enthusiastic about the stories Theresa was telling about the Old Government Building. Luckily, there was an interpreter in the group who was happy to interpret Theresa's signing for her.

A group of 11 deaf and hearing people (including a 6-weeks-old baby boy) were lucky to go on a trip to Matiu/Somes Island for the day on Saturday 9 August. Theresa explained about the island's history and historic sites on the island. It was an enjoyable day and other tours like this are already recommended for the near future.

After two postponements due to bad weather, a group of four Deaf children aged 8–12, two teachers, and a parent from Te Aro School went on a school trip to Matiu/Somes Island on Wednesday 20 August. The children were very excited about visiting the island. They enjoyed the ride on the Dominion Post ferry and seeing the

Figure 2. The group of Deaf children and Deaf teacher from Te Aro School with Theresa (at right) on the ferry to Matiu/Somes Island. Photo is by Richard Buckley, a teacher from Te Aro School.

Figure 3. Theresa explaining to Deaf students why there are so many children's names on the memorial stone in the cemetery. *Photo: Richard Buckley*

Figure 4. Theresa explaining to the Deaf children about the heavy anti-aircraft artillery battery on Matiu/Somes Island. *Photo: Richard Buckley*

historic sites especially the cemetery and the anti-aircraft emplacements. The children said they wanted to go back to the island to see weta, tuatara, and blue penguins one day!

After a few months of organisation and preparation, the events for the Deaf community went really well, and Theresa is pleased that Deaf people who were involved in the events enjoyed the experience. It is hoped the Deaf community in Wellington and other areas may have similar opportunities in the near future to get involved in events in New Zealand Sign Language organised by the Department of Conservation.

SRU scientists in the south now have a home!

The newly opened Southern Regional Science Centre is located at Level 5, Medlab Building, 137 Kilmore Street, Christchurch. PO Box 13-049. Phone: (03) 371-3776

Shown here on their first day at the new location, are (*L to R*) Jane Sedgeley, Terry Greene, Peter Dilks, Derek Brown, Moira Pryde, Fraser Maddigan, Jennifer Christie, and Margaret McTanish. Seated in front is Colin O'Donnell and, perched above his head, is the house gnome representing Rod Hay and Ian Westbrooke, who were absent at photo time.

A First Class Defended Port. The History of the Coast Defences of Auckland, its Harbour and Approaches

Author

By Peter D. Corbett

Department of Conservation,
Auckland Conservancy Historic
Resources Series no. 17
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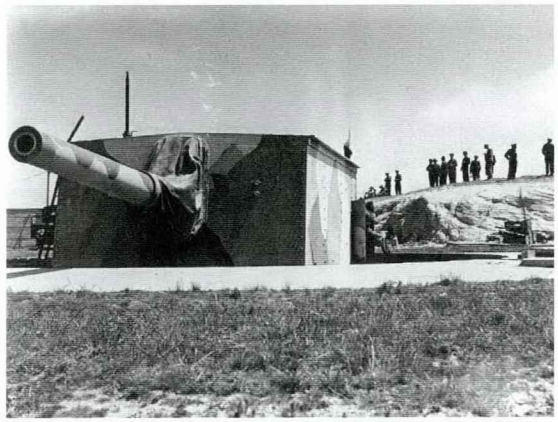

9.2-inch Mk XV gun Whangaparaoa, March 1945

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7-inch RML and crew, northern gun Fort Cautley, in early 1885.

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