FOREST & BIRD

NUMBER 293 • AUGUST 1999

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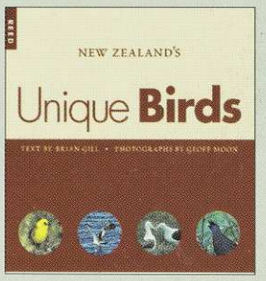

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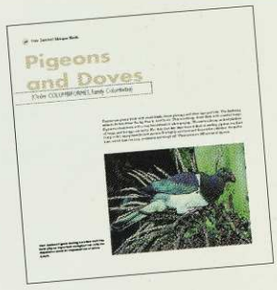
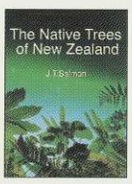
Geoff Moon is New Zealand's leading bird photographer; this book is the most extensive record of his commitment to the conservation of our unique bird life. Brian Gill is the Curator of Birds at the Auckland Museum.





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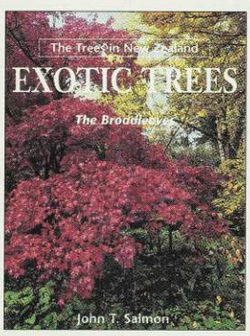

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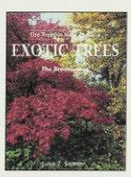

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October 1999
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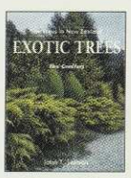
When John Salmon died earlier this year he left a legacy matched by few other New Zealanders. From his first books, published in the early 1960s, to his ground breaking *Native Trees of New Zealand*, John Salmon has been a staunch defender of our natural heritage. Assisted by his wife Pam, John completed all the work on his books prior to his death. *Exotic Trees: The Conifers* will be published in the year 2000.



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Editor: GORDON ELL
The Bush Press, PO Box 33-029, Takapuna 1309.
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Email: bush.press@clear.net.nz

Design: Danyel Simich, Microdot
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Print Advertising Ltd, PO Box 27-194, Wellington.
Ph: (04) 801-6187 Fax: (04) 801-6261
Email: printad.wgtn@xtra.co.nz

Royal Forest and Bird Protection Society of New Zealand
General Manager: Lyn Bates
Conservation Director: Kevin Smith
Central Office: 172 Taranaki St, Wellington.
Postal address: PO Box 631, Wellington.
Telephone: (04) 385-7374, Fax: (04) 385-7373
Email:office@wn.forest-bird.org.nz
Web site: http://www.forest-bird.org.nz
Field Officers
PO Box 106085, Downtown, Auckland.
Tel: (09) 303-3079. Fax: (09) 303-3514.
Ann Graeme, KCC co-ordinator, 53 Princess Rd, Tauranga. Tel: (07) 576-5593. Fax: (07) 576-5109.
Eugenie Sage, PO Box 2516, Christchurch.
Tel: (03) 366-6317. Fax: (03) 366-0655.
Sue Maturin, PO Box 6230, Dunedin.
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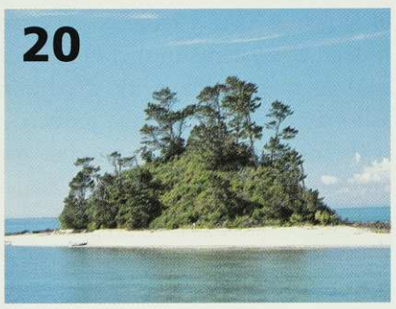
Features



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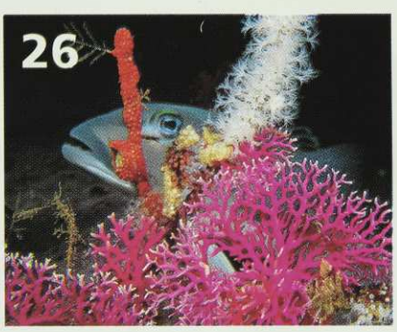


Cover: 'Orchids are Everywhere' according to author-photographer Ian St George who contributes the feature on page 32. This is the Easter Orchid, *Earina autumnalis*, photographed near Dunedin by Ian St George.

The role of central Government

Over the past 60 million years, New Zealand has developed a unique environment with its own peculiar plants and animals. Their ecological significance makes these islands an important 'centre of biodiversity' but that biological heritage has been sorely depleted since the arrival of humans. The facts are undisputed and shameful.

The ecological holocaust shows no signs of slowing. This decline goes beyond terrestrial ecosystems to include the decimation of marine life, with the biomass of salt-water species greatly reduced, along with major declines in marine mammal and seabird populations. New Zealand has not been indifferent to these losses. Each generation has sought, in its own way, to stop the decline.

Under the terms of the international Convention on Biological Diversity (to which New Zealand is a signatory), we are obliged to produce and implement a biodiversity strategy, and a draft was released for public comment earlier this year.

Potentially the strategy could lead to a major boost in conservation funding and significant advances in biodiversity protection. A weak strategy will be worse than the present, inevitably leading to an accelerating retreat of New Zealand's natural world in the face of adverse effects — for example, from alien weeds and pests, human activities such as vegetation clearance, sprawling sub-divisions, native-forest logging, and unsustainable land management and fishing practices.

For once, let us try to get it right. We may not have another opportunity.

Getting it right will require careful planning. But perhaps the 'over-arching' issue concerns the role of central Government.

The draft strategy hints that a greater proportional contribution should come from individuals acting in a private capacity, and erroneously suggests that 'little progress will be made without community support'. False impressions generally lead to false expectations. In this case they could lead to lack of policy and resource support, which in turn could lead to inefficient and ineffective conservation.

'For once, let us try to get it right. We may not have another opportunity.'

Community support is necessary at the ballot box, and there is no doubt individuals can make a difference; witness the practical conservation activities of Forest and Bird branches and many other groups. But it is not sensible to understate the role of central Government by overstating the contribution of private citizens. Neither is it sensible, or even technically possible, to ask people to deal competently with more than a tiny proportion of our biodiversity problems.

Common sense suggests that the greatest biodiversity gains will be made by targeting resources into areas where the greatest gains can be made. The issues are plainly stated. Section 6 of the Conservation Act instructs the Department of Conservation to advocate for conservation generally. DoC administers about 30 per cent of New Zealand's land mass and cares for over 1000 threatened species. It manages 4.9 million hectares of native forest compared to about 1.3 million in private ownership.

Let's not beat about the bush: DoC is the major player in the protection of biodiversity. It manages at least 50 percent, and perhaps as much as 70 percent of our existing biodiversity. Most people accept that DoC is more knowledgeable, does a better job of environmental protection and deals with issues of a highly technical nature more efficiently, than the rest of us. I cite pest control, one of the more pressing threats to biodiversity.

Pest control requires a national overview, plus good information, a lot of science, meticulous long-term planning, well-executed systems and monitoring programmes, training, experience, persistence over the long haul, considerable commitments in time and money, and the ability to forge cooperative pest control programmes with adjacent landowners. There simply isn't another organisation with these capabilities or the statutory powers.

Clearly, very significant biodiversity gains can be achieved by allocating adequate resources to the Department of Conservation. The role of central Government is to ensure that happens.

KEITH CHAPPLE *is the national president of Forest and Bird.*

mailbag

Cursed lorikeets

Your feature 'The Curse of the Lorikeet' raises relevant issues about the release of caged birds, such as the rainbow lorikeet, into the wild. (*Forest & Bird*, May 1999). But with self-introduced birds the issue is not so clear-cut.

The author certainly doesn't make it any clearer. On the one hand he suggests that many of our bird species, now considered native, at some point came from elsewhere, filling some empty gaps. He then says we should be cautious in accepting self-establishing natives. Why now should we be selective, when this process has always been occurring? Is this not a contradiction?

If new birds are filling empty niches is this not a good thing, that nature is working actively to repair itself? Is it that there is a red patch on the neck of many conservationists that they think that heavy-handed control of nature is still the way? If it is successful and aggressive or unattractive get rid of it?

James Drummond, an early naturalist, sums up the issue well, writing of introduced birds in 1907: 'Inquiries have failed to bring out any evidence of a determined or concerted plan on the part of the introduced birds to attack and drive away the native birds'. He goes on to say 'the native birds would have retreated in the same way even if English birds had not been introduced', and respondents to his questionnaire noted 'modern civilisation', 'bush clearing', 'rabbits, dogs, guns, cats and stoats and weasels' as the main reason for decline. *Scott Butcher, Christchurch.*

The article raised questions which need debate: is a self-introduced species which destroys rare birds peculiar to New Zealand to be automatically protected or not? The problem occurs with other self-introductions, for example in the insect world, but unlike birds these don't have automatic protection under statute. — Gordon Ell

Carving up the coast

Marine farming is also a form of 'Carving up the Coastline' (*Forest & Bird*, May 1999).

A place of unrivalled beauty, Golden Bay is cradled between the Kahurangi National Park, the Abel Tasman National Park and the Farewell Spit Nature Reserve. Given our surroundings, one would think our little patch of paradise was exempt from rampant industrialisation. Yet here, in the heart of the parks, we too suffer the same onslaught from coastal speculators wanting to amass thousands of hectares for commercial development.

Unlike land-based development, the target in Golden Bay is the intertidal and near-shore coastal marine area.

Mussel exports are the latest fisheries 'gold rush'. Nearly the whole of the bay is already dredged and trawled regularly. Over 2000 hectares is already allocated to subsurface spat-catching and mussel farms. Yet currently, an additional 1000 hectares are being applied for by the marine farming industry for standard mussel farm structures.

If approved, these farms will stretch many kilometres long, some within a mile of the coast. Thousands of black and orange buoys will litter the vast seascape, destroying the sense of remote wilderness. Industry will continue to cut into the very heart of Golden Bay's natural character.

The Tasman District Council recently made a sensible provision in our regional plan to keep all new marine farming three nautical miles from shore. Not surprisingly, this provision is being appealed by the marine farming industry. We are a small community, but we will continue to fight to preserve the natural character of our coastal marine environment. *Michele Surcouf, Takaka.*

Karori predator fence completed

Their boundary fence has taken three years to design and eight months to construct, but in August the Karori Sanctuary Trust celebrates the completion of the final section. The predator-proof fence surrounds Reservoir Valley in the hills behind Wellington.

The 8.6-kilometre fence will secure the valley from pest reinvasion, allowing the site (less than 3 kilometres from Parliament Buildings) to be developed as the first urban 'mainland island' sanctuary in New Zealand.

Costing $2.1 million, the fence incorporates a number of conservation firsts, according to the general manager of the Karori Sanctuary, Stephen Fuller.

'It is the first fence able to exclude all introduced mammalian pests. It does not rely on electrification, and is the first design which aims to exclude mice,' he says.

'The key to the design is the "top hat", which is effective against the most agile climbing predators, and the use of a little-known product called "woven wire" to create an extremely strong mesh wall capable of stopping juvenile mice, the size of your thumb nail.'

The design of the fence was the result of an extensive series of animal trials, which gave the design team a unique insight into the capabilities of New Zealand's destructive pests and predators. Stephen Fuller says this research has given the sanctuary trust a sense of security as to the effectiveness of the final design.

'The fence has been trialled under more rigorous conditions than that it would face in the wild,' he says. 'We tested the various components of the fence against some of the most capable predators, such as possums, feral cats and stoats.'

'The design is expensive compared to traditional predator fences, but it has the benefits of durability and low maintenance costs — absolutely essential qualities given the urban setting and high public use of the valley.'

Funding for the fence has been provided by the Community Trust of Wellington, the Lottery Grants Board Environment and Heritage Fund and the Nature Heritage Fund.

While the conservation benefits of a fence which can exclude both rodents and possums is obvious, the fence's next practical application could be securing economic sites of value which suffer from pest problems, such as power stations and food manufacturing plants. The sanctuary trust is already discussing the potential use of the fence technology with two major New Zealand companies who have particular problems with pest invasion.

Construction of the fence presented few problems, according to Stephen Fuller. 'The valley is a self-contained catchment, which meant that we did not have to fence over water courses, and 70 percent of the fence line was constructed on existing tracks along ridge lines.

'With two large Wellington suburbs on our boundary, the biggest potential problem was managing safety issues during the construction of the fence.'

The next challenge for the Karori Sanctuary is to remove all the pests and predators from the valley. Fourteen animal species are targeted for removal, the most ever attempted in a single eradication programme. It will also be the first comprehensive pest eradication ever attempted in an urban environment.

The eradication programme will be implemented by a senior conservation officer from the Department of Conservation, Raewyn Empson, who was responsible for the removal of rats from Kapiti Island. She has been seconded to the trust for two years to assist with the eradication and restoration programmes. By December 1999, the sanctuary site will be pest-free and the trust will begin restoration work and development of visitor facilities.

The Karori Sanctuary is expected to be officially opened on New Year's Day 2001, with the release of little spotted kiwi in the valley — the first time wild kiwi might be resident in Wellington for over 100 years.

'The completion of the predator-proof fence is just the first stage in a 500-year project that will result in a mature, podocarp forest, teeming with native wildlife in the middle of our capital city,' says Stephen Fuller.

'While we will not see the final result, the immediate impact on the health of the valley with the removal of pests should be dramatic. Within 10 years, Wellingtonians will wake to the noise of the dawn chorus in their backyard. It is a vision which we are determined to achieve.' – *Steve Thompson, Karori Sanctuary Trust.*

The Karori Sanctuary Trust is chaired by Jim Lynch, a former chair of Wellington Forest and Bird. The methodology of the fence trials was outlined in Conservation Briefs, in Forest & Bird, *May 1997.*

GORDON ELL, BUSH FILMS

Above: The new predator-proof fence around the Karori Sanctuary cost $2.1 million. Key elements in the 8.6-kilometre structure are the 'top hat', which prevents predators climbing over, a buried footing which prevents burrowing, and a 'woven-wire mesh' fine enough to deter even baby mice.
Below: Much of the Karori Sanctuary is in over-mature pines but the native growth along the valley floor indicates the potential for regrowth. The sanctuary trust looks forward to a dense forest in 500 years.

Public honours for conservationists

In honours recognising work for conservation, Jim Holdaway of Auckland has been created a Companion of the New Zealand Order of Merit, and Lesley Shand of North Canterbury, has been made a Member of the same order.

At 81, Jim Holdaway has only recently retired from the Auckland Conservation Board and he is still chairman of the city's active Tree Council, and a trustee of several conservation groups in the region.

A sometime local body politician (awarded an OBE as Mayor of the old Northcote Borough, now part of North Shore City), he was a member of the enlightened group who promoted the concept of regional parks during the 1950s and 1960s. (That heritage is detailed in the article 'Auckland's Regional Parks' in this number of *Forest & Bird*).

Jim Holdaway is a farmer to this day, with land on the outskirts of Auckland, but he still lives in Northcote alongside a striking patch of kahikatea forest, saved from the subdivision of an earlier farm which he took up after the Second World War. (He was decorated with the Distinguished Flying Cross while with Bomber Command).

Always a man of ideas about doing things better while protecting the environment, he recalls having promoted the first underground electrical power reticulation scheme for a new urban subdivision in New Zealand, while Mayor of Northcote. A founding member, he was 20 years on the Auckland Regional Authority, six years its deputy chairman and, at various times, chairman for finance and policy, regional planning, parks and urban transport. His position inside the political establishment gave him scope and leadership to work for better conservation in the region.

These initiatives were recognised nationally when he became a founding member of the Environmental Council, the Urban Transport Council, the Nature Conservation Council and the National Water and Soil Conservation Authority.

A particular interest in the conservation of mangroves led to several appointments with technical committees here and abroad, working for their protection in Asia and the Pacific.

After 19 years as a member of the Hauraki Gulf Maritime Park Board he was a logical appointment to the new Auckland Conservation Board in 1990. The then Minister of Conservation, Denis Marshall, appointed him convenor of the technical working party which recommended a Hauraki Gulf Marine Park, though he notes wryly that the present bill isn't the conservation-based park he and his colleagues recommended.

Retirement is not high on Jim Holdaway's list of things to do. He remains a Fellow of the World Wide Fund for Nature, a trustee of two groups concerned with the restoration of islands in the Hauraki Gulf, and member of many other organisations. Forest and Bird recognised his achievements in the region with an Old Blue award in 1994.

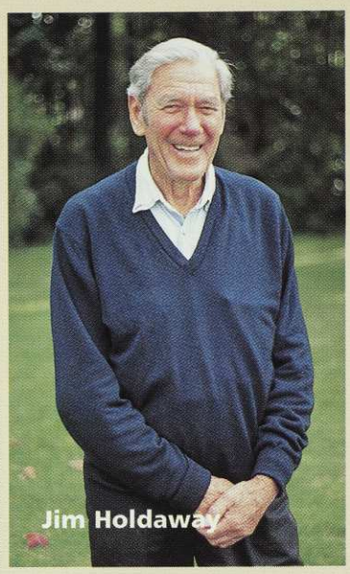
A Canterbury conservationist, Lesley Shand, has been made a Member of the New Zealand Order of Merit in recognition of her conservation work.

'Lesley's huge and generally unpaid contribution to conservation, particularly in North Canterbury and the West Coast, is greatly valued by Forest and Bird in the region,' writes Eugenie Sage, field officer of the Society in Christchurch.

Lesley Shand has been an active committee member of North Canterbury Forest and Bird for many years, and prior to that was active in the Native Forest Action Council (now the Maruia Society). In the North Canterbury branch, she is well-known as a trip leader, and for her conservation advocacy under the Resource Management Act. She has also served as a member of several public advisory bodies, including the North Canterbury Conservation Board.

'Lesley has contributed significantly to the establishment of the Hurunui "mainland island", promoting the ecological significance of the Hurunui-Lake Sumner area, and the need to protect wildlife populations with more effective predator control,' says Eugenie Sage.


Lesley Shand


Jim Holdaway

GORDON ELL, BUSH FILMS

Lesley Shand was the subject of a profile article in the *Forest & Bird* journal in November 1993.

Also recently honoured is a Wellington-based benefactor of Forest and Bird, Ron Greenwood. He becomes a Member of the New Zealand Order of Merit for services which include founding the New Zealand Institute of Management and the Parkinsonism Society. The Ron D. and E.A. Greenwood Environmental Trust regularly advertises in this journal, offering financial support for conservation projects.

Crested grebes need refuges

Declining numbers of Australasian crested grebe on high-country lakes in the South Island has led to a Forest and Bird request for their further protection on Lake Pearson in inland North Canterbury. The Society has asked for the lake to be protected as a Wildlife Refuge. The proposal has the support 'in principle' of the Minister of Conservation, Dr Nick Smith, but he says there must be a process of public consultation first.

Blame for the decline in crested grebe numbers is directed at motor-boating and jet-skiing, both of which disturb the birds and swamp their waterside nests. The noise of engines can also disturb grebes, causing them to leave the nest without covering their eggs with vegetation, making them more vulnerable to predators. Boat speed regulations are widely flouted.

Prior to 1980, Australasian crested grebe were thought to live on more than 100 South Island lakes. A survey in that year located them on only 50 waters.

Their population now has fallen to between 200 and 300 birds. The International Union for the Conservation of Nature has classified the Australasian crested grebe as 'vulnerable to extinction' in New Zealand.

Lake Pearson is the largest of a group of small lakes in the Waimakariri Basin, formed as a result of glaciation during the last Ice Age. Australasian crested grebe feed on the group of lakes, but Lake Pearson is the most significant for breeding; around seven pairs have previously bred there each year. Ironically, it seems that introduced willows may provide protection for the birds from the strong winds and waves during northwesterly storms.

Use of the lake by motorboats and jet-skis has increased dramatically over the last three years. The honorary launch warden Gavin Willis, a fisherman who has visited the lake over many years, is concerned that overcrowding has become a safety issue. The increased traffic is certainly not helping the birds. *Source: Geoff Keey*

GEOFF MOON

The Australasian crested grebe nests at water level, where it is vulnerable to the wash of motor boats and jet-skis. Noise also disturbs the birds, which may vacate the nest, exposing eggs to predators. The bird is classified as 'vulnerable to extinction' by the International Union for the Conservation of Nature. To protect the birds, Forest and Bird seeks wildlife refuge status for Lake Pearson, one of the high-country lakes where it breeds.

Eradication of Asian seaweed planned

The Department of Conservation has been asked to lead a joint project to eradicate the exotic seaweed *undaria* from Stewart Island waters. The Asian seaweed was discovered at Big Glory Bay, inside Paterson Inlet, in 1997.

The invasive algal weed is thought to have arrived in New Zealand via the hulls or ballast tanks of international ships, and was discovered in east coast harbours from Napier to Lyttelton in the late 1980s. The bottom-smothering weed has since turned up in more exposed and widespread places. Its discovery on marine farm buoys and ropes in Big Glory Bay brought a swift reaction, and the department's Southland Conservancy was called in to set up a joint eradication trial with the regional council and marine farmers.

Conservator Lou Sanson says Stewart Island marine ecosystems are recognised internationally for their relatively pristine and natural condition.

'Undaria is a very aggressive species and could displace native seaweeds and the marine life which rely on them. Kina, paua, crayfish and our indigenous fish species have evolved a complex inter-relationship which could be seriously disrupted if this seaweed is allowed to become established in Stewart Island waters. We are currently working on the establishment of a marine reserve in Paterson Inlet to protect the native marine ecology, and the last thing we want is an invasive seaweed taking over,' he says.

A team of divers has spent the last year laboriously picking plants from hundreds of metres of mussel farm ropes, buoys, fish cages and the sea floor. Marine farmers cooperated by removing a number of heavily infested barges and other floating equipment from the water, and have assisted the department's diving team.

Lou Sanson says early advice suggested eradication was probably not achievable, and that a control programme was the best that could be expected.

'The hard work over the past year has altered that perception. We are now more confident, given the results the diving team has achieved to date, that we can get the last plant in Big Glory Bay. It is, however, an expensive operation but we are going to continue for another growing season and re-evaluate the situation again later this year.'
– Tom O'Connor, DoC, Southland.

The 1999 Budget included $2.177 million to fund the costs of eradicating undaria from Stewart Island over five years. The weed will also be eradicated from Bluff Harbour on the adjacent mainland to prevent reinfestation across Foveaux Strait. Undaria has already spread along several other coasts of mainland New Zealand, however. Puzzlingly, in Wellington, the regional council has even encouraged its management as a commercial product by permitting a marine farm to harvest undaria for export. – Editor.

TOM O'CONNOR, DEPARTMENT OF CONSERVATION

A diving team works in Big Glory Bay, Stewart Island where complete eradication of the invasive Asian seaweed is planned. Undaria *has become widespread on the New Zealand coast in recent years and now threatens native marine life in Stewart Island waters.*

Solitary vigil for the last kokako

What driving force could possibly tempt a man to spend six months alone in the bush, living in a tiny tin hut, where visitors must tramp two hours from the nearest road? For half a year, Thomas Donovan woke in the heart of the forest at dawn each morning, and often heard the melancholy, haunting song of the last pair of kokako in Puketi Forest, Northland. Their evocative sound made him wonder if the birds realised their predicament, keeping him vigilant as the Department of Conservation's 'bodyguard' to a species at risk of disappearing from Puketi altogether.

Thomas Donovan spent six months, two hours tramp from the road end, in Puketi Forest, Northland, to protect its last breeding pair of kokako.

NIGEL MILLER

Last year, in October, Thomas and DoC conservation officer Steve McMannus were thrilled when they found that the last kokako pair in the forest were nesting, seeing it as a signal of a small comeback for a species on the brink of extinction in Puketi. This is a far cry from the 1980s when DoC staff ran public trips into the forest, where people could hear kokako lead the 'dawn chorus', and the forest was thought to have the third-largest kokako population in the country. A 1984 survey revealed a significant population of at least 100 kokako, including 25 pairs. By 1990 another survey located only six pairs and eight single kokako. Now, that population has diminished to just one pair and 14 male birds.

Without intervention, rats or possums will almost certainly eat kokako eggs before they hatch, and likewise, the female is most vulnerable as she nests. Thomas Donovan caught a stoat 30 metres from the last nest and believes it would have taken the nesting female, then her young.

On a typical day in the forest, nest protection was his highest priority. A kokako protection area of 100 hectares was established on the southern plateau, a predominantly podocarp-broadleaf forest studded with kauri.

Using a ridge-and-spur track system, 750 bait stations were established, and the area 'pulsed' with 1080 and Feratox. This year the grid was extended to cover about 200 hectares, incorporating the territories of one pair and six single males. Eight Fenn traps were placed on ridges leading into the pair's territory, and two lines of traps and bait stations encircled the nest. Little wonder Thomas became very fit, maintaining the traps and tramping out to fetch provisions on his two days off each week. In his spare time, he scoured the forest seeking more pairs of kokako, but none were found. Thomas looked forward to Steve's weekly visits but says his most enjoyable task was monitoring the progress of the nesting birds.

Unhindered by predation, the pair nested three times but abandoned each attempt. Their eggs proved infertile and DoC staff feared the level of genetic variation was too low. Then at the beginning of February this year, watching over a fourth nest in the lower canopy of a tawa tree, Thomas saw the first sign of a chick.

Within a fortnight, two little heads were reaching up out of the nest, begging food from the parent birds. One chick was noticeably larger than the other, and was likely to have hatched earlier. With satisfaction Thomas noted: 'the chicks seem to be thriving.'

Then disaster struck. The smaller chick fell from its nest.

Thomas found it sitting quite calmly, unharmed, at the base of the nesting tree: he climbed up and put it back. Later he witnessed it begging and over reaching the nest. It fell out again: 'I had no other option, I scaled the tree and put it back in.' The chick lasted a few more days in the nest, and then, on March 6, after torrential rain, Steve found it dead under the nest. It weighed less than when it was banded, 11 days earlier. In the days that followed Thomas spent extra hours watching over the remaining chick, afraid for its precarious life.

One baby kokako fell from the nest.

Nearly a fortnight later it fledged. Thomas observed it hopping amongst the kiekie and supplejack, flapping its wings. However, he was still concerned, knowing the chick was most vulnerable to predation at this stage, near the ground. After a few days, it made its way high up into the tawa, with small flapping flights. On the dawn of his last day in the forest, Thomas sat and watched the kokako in fruiting coprosma trees. The parents were taking bits of fruit back to their chick: 'the early morning sun shone through the trees and fell on the little trio, lighting them up. I knew then, that it was time to leave,' Thomas recorded.

Now the breeding season is over for the year, and the kokako at Puketi are on their own. In the 100-hectare area, where the ecological approach to the forest hinges on predator control, all bird and plant life is noticeably thriving. Next year, the Puketi kokako project may incorporate chick translocation from successful breeding pairs in the Mataraua Forest, south of Kaikohe.

Meanwhile, Thomas Donovan has relocated to another forest for a few weeks, to monitor rare, endangered plant species at Waima near Kaikohe. He is just one of many young New Zealanders, finding it difficult to gain employment despite a science degree, turning to volunteer and short-term contracts as a way into conservation work. – *Sandra Lee.*

Beechmast encourages breeding birds

Heavy flowering and seeding of beech trees in the upper Hurunui valleys of North Canterbury has resulted in a boost in bird breeding, according to John Kearvell, an ornithologist with the Department of Conservation.

The predicted 'beechmast year' (of heavy beech flowering and seeding) may be responsible for the successful breeding season, particularly for the orange-fronted parakeet and yellow-crowned parakeet.

'Unlike most other forest birds, which breed each summer, New Zealand parakeets breed more during beechmast years. In many ways parakeets are similar to wild budgies, which also respond to increased food abundance; in their case usually after heavy rains.

'We also suspect kaka had a good breeding season in the Hurunui as there was a lot of activity compared to previous seasons,' John Kearvell says.

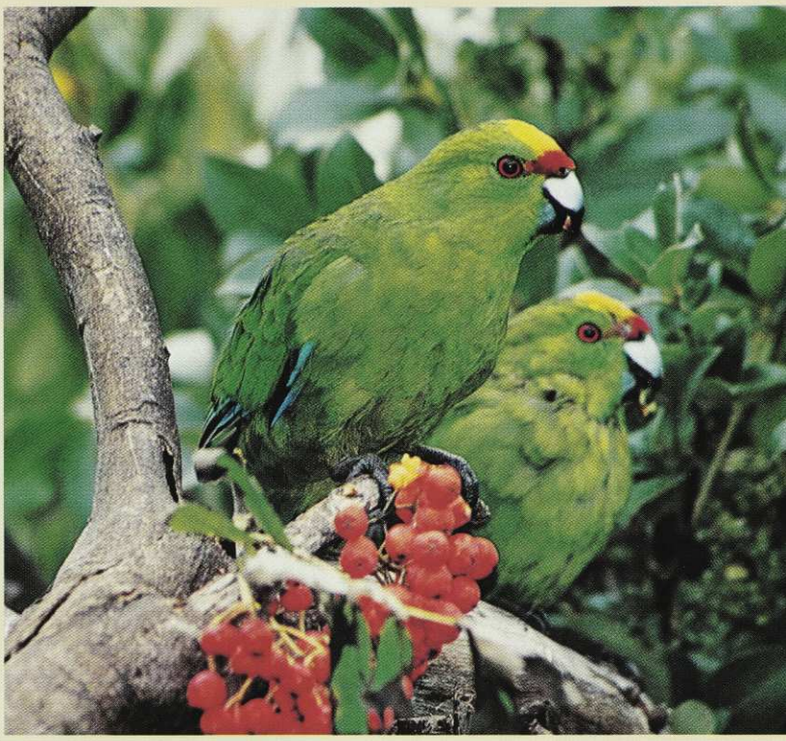
'The downside of a good beech-seeding season is the increase in the stoat population the following year. We're predicting that the stoat population, in areas where predators are not controlled, will go through the roof next year, and many birds will be at their mercy.'

DoC staff have been preparing for this by controlling stoats in the Hurunui 'mainland island' for the last four years.

'The next two years will be the real acid test', says John Kearvell.

Yellowheads (mohua) monitored in the mainland island project have also had a successful breeding season with an average fledging rate of 2.4 per pair, compared with the two previous seasons' average of 1.7 per pair.

'This is an obvious increase from previous years, and a good indicator that other insect-eating birds also had a good year,' John Kearvell says.



DPEARTMENT OF CONSERVATION

Yellow-crowned parakeets tend to breed more in 'beechmast years' when beech trees flower and seed heavily. However, stoats may also flourish as a consequence, a challenge now being faced by DoC staff managing the Hurunui 'mainland island' area in North Canterbury.

Southland's threatened plants

A garden of threatened plants has been established, near Invercargill in Southland, by Forest and Bird members Chris and Brian Rance. They report on progress:

Creation of the first display beds, with the help of Southland Forest and Bird.

The main purpose of the display garden is to teach people how to identify some of New Zealand's rarest plants, and to understand the reasons for their decline. Work on the Southland Threatened Plant Garden began in 1994, with a successful application to Forest and Bird's threatened plants programme when it was sponsored by Yates.

Initially, the project focussed on increasing knowledge of the growing requirements and propagation techniques for some of Southland's threatened plants — plants such as the endangered *Gunnera hamiltonii*, an endemic, ground-hugging coastal herb, and the endangered *Olearia hectorii*, the deciduous tree daisy. We thought if the propagation work were successful, then the plants produced could be used for restoration, thereby boosting or protecting vulnerable wild populations. The possibility of creating a display garden for advocacy purposes was, at that stage, well into the future.

Looking back, we have learnt an awful lot about threatened plants in Southland over those years. When the work on *Gunnera hamiltonii* commenced, there were only four known populations of this endemic plant in the world, each of a single sex, with the sex of each population unconfirmed. After pieces of plants from each site were taken into cultivation and studied, the mainland population flowered and was found to be female, while the Stewart Island population is male. Therefore each single-sex population is vulnerable and could only reproduce vegetatively. Further experimentation with hand-pollinating the plants in cultivation, resulted in the first-ever recorded fertile seed, and later, seedlings of this species. There are now six wild populations known, with one discovered as recently as July 1998, although the sex of this population remains unknown.

The deciduous tree daisy, *Olearia hectorii*, was known from only 10 sites in Southland at the beginning of this work. Many sites were a single tree, or trees in paddocks surrounded by grass swards. No seedlings had ever been observed and many plants were on private land, and not necessarily protected from further development. This is the plight of many endangered species — while individual plants may be protected, their habitat is not.

Gunnera seedling

Southland Conservation Board Chair, Jan Riddell, with Chris and Brian Rance at the garden opening.

In order to produce back-up populations, propagation techniques needed to be found. Initially, cuttings of the tree daisy were difficult to strike, but this is now achieved readily, while the plant is still almost impossible to propagate from seed. To date, over 50 plants have been restored to protected areas in the wild, and more will be planted out by the Department of Conservation in the coming season. Similar work has taken place with *Olearia fragrantissima, Olearia* 'Pomahaka' (an un-named species), *Melicytus flexuosus, Teucridium parvifolium,* and *Euphorbia glauca*, the shore spurge. Unfortunately many of the species referred to do not have common names — they are too uncommon for that!

Success with propagating many of Southland's rare plants, and the knowledge we gained about growing requirements, meant we could with confidence embark on the creation of the display garden. This was begun in October 1996 with the preparation of beds, paths and edging. The Southland branch of Forest and Bird helped with the work..

During that and the following year, four other display areas were created - the Chatham Islands, Southern Islands, Southland Coast, and New Zealand General displays. In total there are more than 70 garden specimens.

Since its establishment, the display garden has been used for training field staff of the Department of Conservation in the identification of plants in the wild; and also by university botany students.

Among features of the display areas are Cook's scurvy grass – not a grass at all but a herbaceous plant related to cabbage – and now almost extinct on mainland New Zealand. *Chionochloa spiralis* and *Hebe* 'akahe' are found only in limestone areas of 'takahe country' in the Murchison Mountains of Fiordland. There are also fascinating divaricating shrubland plants such as *Melicytus flexuosus* and the fragrant tree daisy *Olearia fragrantissima*. Golden pingao – the native sandbinder – is still used by Maori for weaving. Special sub-antarctic island plants, known as 'megaherbs' which have evolved largely in isolation are on display along with the spectacular Chatham Island forget-me-nots and speargrasses.

On our interpretation leaflet we call the garden 'A Modern Noah's Ark', because many plants contained within it form a back-up population in case wild populations are lost. Gardens such as this, like island sanctuaries for endangered birds, are hopefully only a temporary measure until threats in the wild can be removed – that may be a long shot but we must strive for it. Otherwise New Zealand will lose its uniqueness.

A land of exotic forests and pasture, without our unique native flora, would be a very sad outcome for New Zealand. — *Chris and Brian Rance.*

The Southland Threatened Plant Garden is open to the public by prior arrangement – phone Chris and Brian Rance, evenings (03) 213-1161.

Painting a millennium of loss

Wildlife painter and author Ronald Cometti took three months to do the striking painting of New Zealand's extinct birds which makes up the centrefold of this magazine (pages 24-25). Since people settled New Zealand about 1000 years, ago New Zealand has lost 43 species of birds, 32 of them in Maori times and a further 11 since European settlement. On top of that, land development and drainage has destroyed so much of the native habitat that many further species are threatened, rare or endangered.

'The painting is really a warning against losing any more of our threatened and endangered birds – a challenge for the next millennium,' Ronald Cometti says.

It follows another about forest birds, which he previously published as a poster.

'I spent a couple of years thinking how to go about painting the "missing" birds, working out how they might go together,' the artist says. 'Then, for three months, I researched and painted the individual birds.'

A lot of the work was done from museum specimens and photographs of skeletons in W.R.B Oliver's 1930s work *New Zealand Birds*.

'I know a moa was supposed to have carried its neck bent but I have drawn these species to full height because they obviously used the neck to reach up high to browse, and their full height is demonstrated this way,' says Ronald Cometti. 'Things like the stance of these birds, their height, and the weight of their legs was very important to me.'

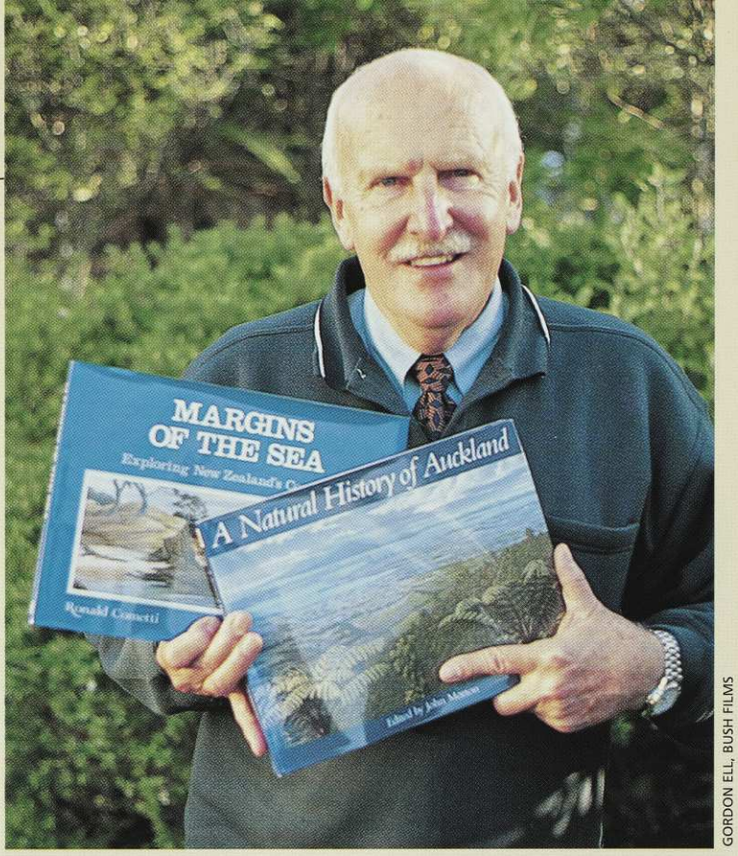
As for the colours, Ron Cometti smiles and says, 'They're mainly pigments of my imagination.'

'There's not much available to tell what the correct plumage should be, and the only surviving feathers from the Maori period are from moa. All round the world other large flightless birds have cryptically coloured young, so I made my moa chick match the striped colors of other ratites such as the emu, the rhea and the ostrich.

'I've tried to paint the moa with fine feathers, more like the kiwi than the horsehair models in some museums. They would have needed feathers like that to make their way along the bush trails which feeding birds made before the invasion of people.'

He also took inspiration from similar-looking types of bird. For example: 'I borrowed the lovely blue-and-grey plumage of the kagu of New Caledonia, because there is a superficial resemblance, though the two may not be related.

'Promoting an interest in the better conservation of our native species is what inspires me to specialise in painting our wildlife,' he says.



GORDON ELL, BUSH FILMS

Ronald Cometti, who painted New Zealand's extinct birds in this issue of Forest & Bird, *has been a full-time wildlife painter and author for the past 20 years. Previously he was a freelance illustrator in advertising. He sells his paintings through galleries, or by commission. His published work includes a book on Little Barrier, where he worked as a volunteer during the 1980s, and illustrations for* Margins of the Sea *and* The Natural History of Auckland, *both projects of Prof. John Morton, a distinguished life member of Forest and Bird.*

The Wellington Regional Council adopts a politically sensitive approach to pest destruction.

GORDON ELL, BUSH FILMS

Environmentally Friendly Packaging

Packaging and printing inks are current concerns for the environmental-labelling scheme, Environmental Choice. The Government-initiated body draws up specifications for environmentally sensitive products, to encourage their production and widen consumer choice.

In the packaging field, Environmental Choice labels have been recently awarded to Premium Packaging Ltd of Tamaki for two ranges of 'thermo-fibre' egg cartons made from 100-percent recycled paper.

At the same time, Environmental Choice has issued an evironmental-labelling specification for printing inks. Manufacturers have thereby been challenged to produce inks and processes which 'go easier on the earth'. — *Source: Melissa Arseneault.*

Part of the Matuku Reserve

A Living Legacy

In 1992 Mary and Bill Cole from West Auckland died within a few months of each other. Both were longstanding members of Forest and Bird. They shared a keen love of the outdoors and, in particular, of the native forests of the Waitakere Ranges.

In their will, the Coles made a generous bequest to Forest and Bird to assist the Society's conservation work in the Auckland area. They requested that the enhancement of Forest and Bird's Matuku Reserve in the Waitakeres be one of the projects funded by the bequest.

Enthusiastic supporters of the branch's Matuku Reserve project, the Coles had watched it grow from the original 50 hectares of goat-infested native forest and wetland alongside the Waitakere River, purchased in 1979. Led by John Staniland, the branch further extended the reserve and actively managed it for conservation. The goats were removed, possums trapped and invasive weeds eradicated.

The Coles and other branch members enjoyed the spectacular regeneration of native plants and the flourishing of native wildlife. Funds from the Cole Bequest, supplemented by $35,000 from the Nature Heritage Fund, were used to purchase an additional adjoining 20 hectares of native forest and wetland. The enhanced reserve is of significant ecological value. School groups, scientists, branch members and others all frequent the trails developed in the reserve and enjoy today the native forests and birds Bill and Mary had cared for so passionately.

Their legacy lives on beyond Matuku, however. The Society's Auckland branches formed a committee in 1993 to determine the best way to allocate the remainder of the bequest funds. A memo calling for project proposals from the Society's then northern conservation officer, Jacqui Barrington (who has since died, leaving Forest and Bird her own bequest), noted it was the Coles' wish that the money be spent wisely on conservation projects benefiting nature in the Auckland area.

Since then the Cole bequest has helped fund the purchase of Whakanewha Reserve on Waiheke Island, now a regional park managed by the Auckland Regional Council. Other Cole Bequest projects have included fencing of the Colin Kerr Taylor Reserve in Waitakere and the initiation of the proposed Te Matuku Marine Reserve at Waiheke Island.

Bill and Mary Cole have indeed left a living legacy that has made a significant and lasting contribution to the protection of the native plants and wildlife that had enriched their lives.

You too can leave a living legacy by remembering Forest and Bird in your will

South Auckland Forest and Bird Branch members enjoying a rest stop in the Matuku Reserve

To receive a bequest pack contact:
Royal Forest and Bird Protection Society
PO Box 631, Wellington
New Zealand
phone: 04-385 7374
fax: 04-385 7373
email:
office@wn.forest-bird.org.nz

FOREST & BIRD

Auckland's regional

With visitation figures probably twice that of our national park system, Auckland's regional parks are a conservation treasure. Text and photographs by GORDON ELL.

The expansion of the mainland gannet colony at Muriwai Regional Park was assisted by North Shore Forest and Bird, which gave money for fencing new areas. Still growing, the colony receives more than 250,000 visits from locals and tourists each year. White-fronted terns also nest on the cliffs, and seals from a colony on offshore Oaio Island are sometimes seen in the surf. Altogether, visitor statistics for Muriwai on the west coast exceed one million a year, with people also enjoying its dramatic coastal scenery, the challenging surf beaches, and public walkways.

parks

A park system which began as a place for city folk to relax has expanded in 30 years to become the major conservation parkland in the north. With a physical area of more than 37,000 hectares, the Auckland regional parks include two mountain ranges and more than 100 kilometres of prime coastal land. Attached to it are marine reserves, 'mainland islands' of habitat restoration, 500 kilometres of tramping tracks, and special wildlife reserves.

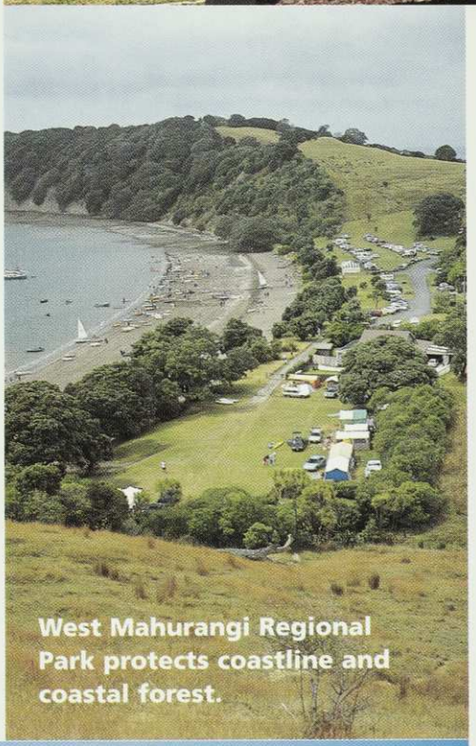
In the absence of any national park north of Tongariro, the Auckland regional parks are the major public lands available to more than a third of the country's population. Perhaps not surprisingly, statistics show they receive nearly eight million visits a year, around twice the number of all our national parks put together.

The prime driver for the initial parks system was recreation, but the habitat set aside is also vital for the survival of many native plants and wildlife, including forest and coastal species. Management of the parks increasingly takes into account these natural values, with pest eradication budgets which must be the envy of national park administrators, and wildlife habitat recovery schemes which are bringing back native populations of birds and fish.

Among the outstanding wildlife projects is the strict control of rats and other pests from the Wenderholm coastal park just north of Auckland, so that native pigeon numbers have soared to flock sizes of 40 or more, and threatened bush robins have recently been reintroduced. The Muriwai gannet colony, developed some years ago in conjunction with North Shore Forest and Bird, attracts more than 250,000 visitors a year: add visits to the nearby surf beach and this park draws more than a million people a year.

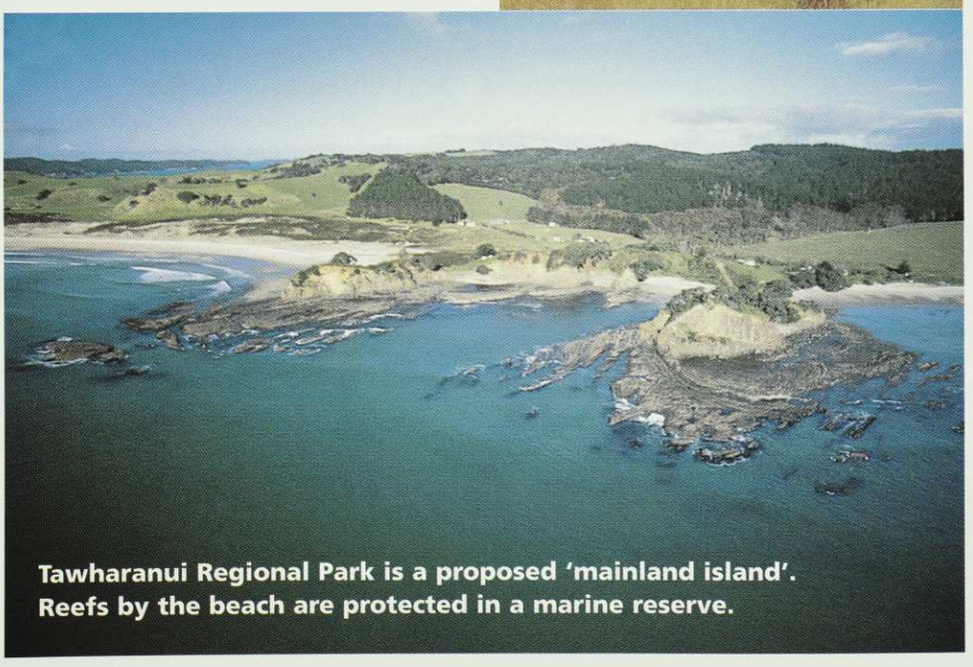
GORDON ELL, BUSH FILMS

Huge 'picture frames' have been installed at most parks, drawing attention to the scenery. The sponsored frames have been the cause of some controversy. Auckland Regional Parks cost $16 million a year to run but access is free, and $4 million is recovered from such sources as leasing water rights, farming, forestry, camping fees and sponsorship.



GORDON ELL, BUSH FILMS

West Mahurangi Regional Park protects coastline and coastal forest.



JENNY AND TONY ENDERBY

Tawharanui Regional Park is a proposed 'mainland island'. Reefs by the beach are protected in a marine reserve.

Broadly speaking, the Auckland regional park service provides what it likes to call an 'accessible countryside' of bush, beach and farmland within a 20 to 90-minute drive from central Auckland. Several parks are serviced by regular buses.

Obvious gems are the fine coastal parks, often purchased as working farms, and giving ready access to areas otherwise closed off from the populace. A string of 12 such parks extends around the eastern shores of the Hauraki Gulf from its south-west shores in the Firth of Thames to near its northern limits at the Tawharanui Peninsula facing Little Barrier Island.

These parks, which are often headlands surrounded by reefs and edged with beaches, preserve the quintessential north. While picnic grounds may front the beaches, the headlands and valleys hold substantial remnants of coastal forest. The remains of Maori pa sites and settlements are often obvious, usually interpreted as part of the park, along with the pioneer homesteads and local history. On the adjacent farmland, pathways give further access to the countryside.

Mainland Islands

The technique of securing the boundaries of a landward reserve to create a 'mainland island' has been taken up by Auckland regional park services. The idea is to protect an area from invasion by pests such as rats, ferrets and cats, so that birds (and nature generally) can live in a predator-free environment.

Borrowing the concept from the Department of Conservation, the Auckland Regional Council has tried to eradicate pests from 60 hectares of coastal forest on the south headland of Wenderholm Regional Park, north of Auckland.

Trapping possums and rats has helped the forest recover. Native pigeons benefited first, so that flocks of the birds may now be seen over the reserve.

A night walk with a torch reveals hundreds of insects moving about the forest litter, where once only rats ran. Young trees are rising from the forest floor.

This year North Island bush robin were released within sight of State Highway One. The birds were surplus from stocks which built up to maximum carrying capacity in just five years on the open sanctuary of Tiritiri Matangi Island, which is free of predators.

Now the Tawharanui Regional Park of nearly 600 hectares, and the 376-hectare Shakespear Regional Park, have been marked out as potential mainland islands. The Shakespear property at the end of the Whangaparaoa Peninsula is so close to the open bird sanctury of Tiritiri Matangi offshore that bellbirds have recolonised the mainland here from the island.

Projecting out to sea on a peninsula north of Kawau Island, Tawharanui is an exposed farm park with substantial areas of coastal forest, and good wetlands. Trapping of pests is already underway to protect its coastal areas where variable oystercatcher and endangered New Zealand dotterel breed. Hundreds of bait stations are being set up over the farm park, and trap-lines are proposed to target stoats, ferrets and cats.

A predator fence across three kilometres of inland boundary has also been discussed, though the possibility of reinvasion remains because of the broad sand beaches and tidal rock platforms which would allow predators to bypass it at low tide. ARC Parks chairman, Bill Burrill, talks of wanting kiwi, weka, robins and whitehead released here, and for an attempt to be made to re-establish bellbirds which have long been extinct in the north. The re-establishment of mainland petrel colonies is another possibility.

The council's interest in mainland islands is encouraging for conservation because several of its parks are on peninsulas. By securing them against invasion by predators, peninsulas are particularly suited to becoming mainland islands.

GORDON ELL, BUSH FILMS

The two largest parks, however, cover the mountainous forest ranges, west and south of Auckland. The Waitakere Ranges Regional Parkland of 16,000 hectares stretches from the northern shores of the Manukau Harbour and up the west coast for 50 kilometres or so. The ranges are rugged and still heavily forested, despite kauri milling there in the nineteenth and early twentieth century. It is the country seen in films like *The Piano* and the television series *Hercules* and *Xena Warrior Princess*. The coastal walks high above the seething Tasman are spectacular; some of the inland forest tracks (there are more than 200 kilometres of walking here) can be just as rugged as any back-country route, particularly after the frequent rain. This parkland includes the Waitakere Ranges Centennial Memorial Park, established by the old Auckland territorial councils in 1940 and now a regional responsibility. It also includes the watershed of a city water supply, but basically there is tramping access through the area managed by Regional Parks.

There is tramping access also to the water catchments of the Hunua Ranges, south of the city. In this rugged block of around 17,500 hectares, a few endangered kokako still survive in the wild. Under a lease arrangement with Watercare, the publicly-owned water utility, these ranges have been incorporated into the park system as the Hunua Ranges Regional Parkland. At its feet are the Whakatiwai and Waharau regional parks, running down to the waters of the Firth of Thames.

Many of the more developed parks are close to the southern margins of the metropolis. With Manukau statistically New Zealand's third most-populous city, the proximity of parks and access to the countryside is vital. Many local children get their first glimpse of farm animals at Ambury Regional Park by Mangere Mountain. Further afield there are a number of farmed (and some forest) parks

Left: Pest control on the 60-hectare headland of Wenderholm Regional Park, north of Auckland, has resulted in a 'comeback' for nature. Working with techniques similar to those applied to 'mainland islands' by the Department of Conservation, regional parks staff have controlled possums and rats to the point where the North Island bush robin has been released again. (Here Shaarina Boyd of DoC threatened species staff and parks chairman Bill Burrill share in a recent release). Native pigeon numbers have also burgeoned, the superb coastal forest is recovering, and there has been an astounding increase in native insects which in turn are food for more birds.

GORDON ELL, BUSH FILMS

Regenerating kauri forests in the Waitakere Ranges Regional Parkland are just part of a mixture of rainforest associations in this rugged country. Around 500 different species of higher plants are recorded from this botanically diverse area. The parkland protects 16,000 hectares of ranges to the west of suburban Auckland, abutting the Manukau Harbour and the Tasman Sea. Recreational values include more than 200 kilometres of walking and tramping tracks, through the forests and along the coasts.

around the shores of the Manukau Harbour.

There are some oddities, too, but they recognize the nature of a regional city. Volcanic Hamlins Hill, where sheep once unsafely grazed alongside the Southdown freezing works, is now called Mutukaroa, an oasis in the industrial district of Penrose. While the hill is only a small piece of countryside, best suited to picnics, walking and jogging, its gullies are being replanted with native trees, an activity which has involved Auckland Central Forest and Bird.

The Regional Botanic Gardens at Manurewa is another park in an urban context. Unlike those of more cohesive cities, the gardens are not so much places for civic display as an educational facility. They were begun to show Aucklanders what kinds of plants to grow in this region of difficult soil and climatic variety, and include suitable native plants.

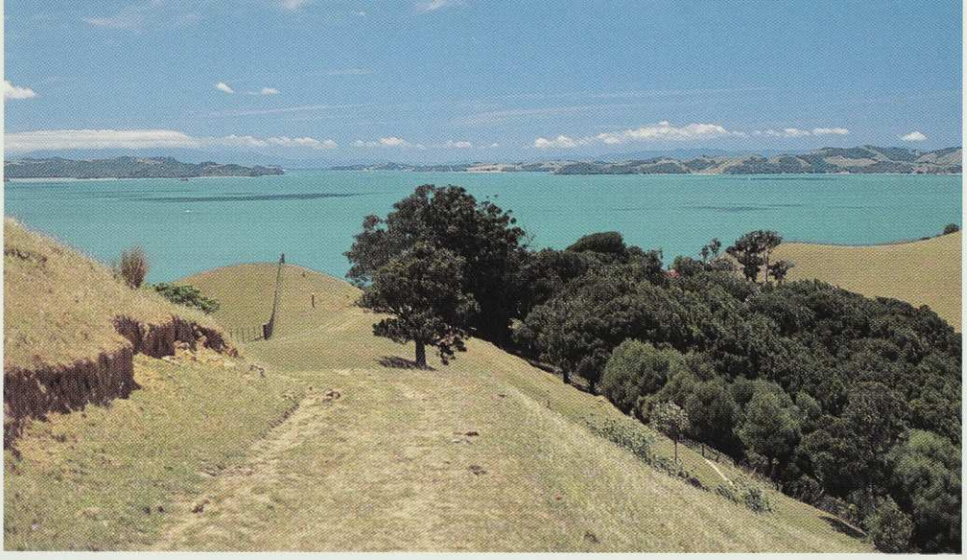
Public education in things natural is a major emphasis in managing the parks. High on the Scenic Drive which follows the bush-clad ridges of the Waitakere Range, the Arataki Environmental Centre includes the park's field headquarters, and attracts more than 200,000 people a year. From its prize-winning interpretation buildings, visitors can overlook Auckland city and the Hauraki Gulf one way, and the wilder waters of the Manukau Harbour on the other.

The surrounding forests are particularly rich in species, for it is here that the subtropical forests of the north meet those influenced by the subantarctic climate. More than 500 different native tree and plant species have been recorded.

Short interpretation walks in the forest are complemented by displays in the centre. From here, accommodation in eight outdoor centres is coordinated There are more than 300 formal school visits to regional parks each year, with children taking part in 24 'learning through experience' programmes funded by the Ministry of Education.

Brochures produced for each park generally describe the natural environment, its geology, nature and wildlife — including conservation messages — and local history. Walking guides to each park are included, along with an outline emphasizing what visitors can do to maintain the environment. Dogs are banned in many farmed parks; rules elsewhere are strict. The absence of rubbish tins underlines a 'take home your rubbish' message. The park service maintains a visible presence with uniformed rangers who combine tour-guiding and interpretation with recreation, conservation and management roles. (Contractors do the 'housekeeping'.)

On the recreational side, picnic sites and camping grounds are provided in most parks. Heavily used parks, such as Long Bay on the edge of North Shore City, are often crowded with organized picnics and booking is essential to ensure a serviced site, with a barbecue and sometimes a shelter. Camping, by con-



A recent purchase, Duders Regional Park on the Firth of Thames is typical of several coastal reserves. A peninsula probes out into the gulf with obvious Maori fortifications. Though farmed, such properties often contain significant conservation values, not only around the coastline but in residual wetlands and the remnants of old coastal forests which survive in steep gullies.

trast, is usually of the cold-water variety, with limited vehicle access, or backpacking required. Thus it is often possible to camp, 'old-style', on a beachfront, with a genuine feeling of remoteness, even at the height of summer. Altogether, there are 60 countryside and remote campsites in the regional parks.

Auckland's regional parks had their genesis in an enlightened body of politicians appointed by local councils in the late 1950s to run a new regional planning authority. This group persuaded the Government to give a £1 million ($2 million) and set up a regional council which could own reserves, in 1963. Auckland local bodies gave their Centennial Memorial Park in the Waitakeres, the Crown gave management of the surf beaches at Muriwai, and work began on acquiring coastal reserves north of the city.

A legal appeal against subdividing the pohutukawa-fringed sandspit at the mouth of the Puhoi River saw the Authority negotiate its first park purchase at Wenderholm in 1965. Shortly afterward, Long Bay at the top end of the North Shore was purchased. It now vies with Muriwai as the most intensively used regional park, with a million visitors a year. It also has a marine reserve offshore, and is at the core of an extended Great Park proposal.

The park builders had a major setback when the Georgetti family won a court case to get a fair price for the then-isolated Tawharanui Peninsula. Having their farm revalued for potential subdivision upped the ante for its purchase and gave other coastal landowners some idea of the potential value of their properties. Consequently, planning designations applied to a number of properties marked down for purchase were lifted and the focus of park purchasing shifted to cater for burgeoning populations south of the city.

Subsequent years have seen the fortunes of the parks vary with their political masters but the system has continued to grow steadily, with five new parks, and extensions to four more, in the past six years. Regional parks now exist at 23 discrete locations.

Most of the parks lack formal reserve status under the conventional conservation acts. Their role is defined under the Local Government Act: providing for the protection of regionally significant natural and cultural features, and providing recreational opportunities for regional populations. Some are also reserves under the Reserves Act, however, where the Crown has a stake, as landowner or contributor to purchase.

A distrust of central government mechanisms for park protection has brought the park service to the edge of peril on occasions. In 1991, the Minister of Local Government, Warren Cooper, threatened to disband the Auckland Regional Council and give its parks network to local councils. A 'New Deal' regional authority in the 1980s plotted to sell off farmland, while more recently there was controversy over the possibility of converting some of that farmland to plantation forests, with a consequent major impact on visual amenities and public open space. The regional council is currently in trouble over its desire to swap a portion of the comparatively new Whakanewha Regional Park on Waiheke Island for a wetland, to facilitate the extension of a privately operated airfield. Another concern is the possibility of local councils removing the 50 percent rates relief which applies to regional parks and doubling the current rates of $717,000.

The future of the regional parks relies on their demonstrable value to the region. The system costs $16 million a year to run, (compared with $9 million a year budgeted by the local conservancy of the Department of Conservation which cares for the Hauraki Gulf islands and some 5000 more hectares on the mainland). The money comes substantially from rates but nearly $4 million of the regional park budget is recovered from income — while entry is free, there are charges for formal picnic sites and camping, licence fees from water sales, and income from farming, forestry, and the Ericsson Stadium, a major sports venue at Mount Smart.

The 10-year plan for 1998-2008 includes the purchase of three more regional parks and extensions to another four. A grant from the Auckland Regional Services Trust of $10 million from the profits of former regional enterprises will help. The first $2.5 million paid for half of the latest park purchase (Scandretts near Warkworth, in April this year). Aucklanders have been asked to send in their park 'shopping lists' as part of planning for the future.

It is more than an historical accident that there are so many regional parks and comparatively few Crown reserves about the Auckland isthmus. As the regional parks network grew, the Auckland district of the Lands and Survey Department switched its attention to Northland. For a period in the 1980s, the Crown spent its annual million dollars for parkland buying up beaches and headlands in the northern half of its 'district', leaving regional government to look after the expanding city. Now, with the population predicted to double to two million in the next 50 years, there is concern that by then regional parks may be the only places where people can 'get out of town'.

Certainly, they need to be protected now as a public treasure and preserved with a rigour similar to national parks.

GORDON ELL *is editor of* Forest & Bird.

Getting Rid of Possums

A massive drive to control possums in its forests is costing the Auckland Regional Council about $700,000 this year. Private contractors and staff began in the Hunua Ranges five years ago, achieving a major knock-down in numbers, later turning their attention to goats.

Cooperation with adjacent landowners is a major part of the programme, by clearing the surrounding area of pests which might otherwise re-invade the forest. A major sweep of the Waitakere Ranges Regional Parkland is achieving a better than 90 percent knock back of the pests. The regrowth is already noticeable and bird numbers are said to be increasing.

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Forgotten isles 'small but

Thousands of this country's small islands have enormous conservation potential but most are never considered. My explorations by kayak in the Hauraki Gulf, reveal that tiny islands can be rich in birdlife, yet most of them are unknown, often nameless and usually ownerless. Conservationists everywhere face a challenge to recognize and protect such oft-forgotten places for their wildlife values.

The community has probably discounted these little islands because they are too small to exploit commercially — for instance, by turning them into 'real estate'. Conservationists may overlook their importance because of an official mindset which sets aside larger islands as refuges for species threatened on the mainland. In those cases official island 'biogeographical' theory decrees 'the bigger the better'. However, islands are something other than miniatures of the mainland. Island ecosystems are generally simpler, with fewer species and less habitat diversity than mainland systems. Their ecological processes are therefore more readily restored.

Despite extensive efforts by pioneering biologists through the years, many islets

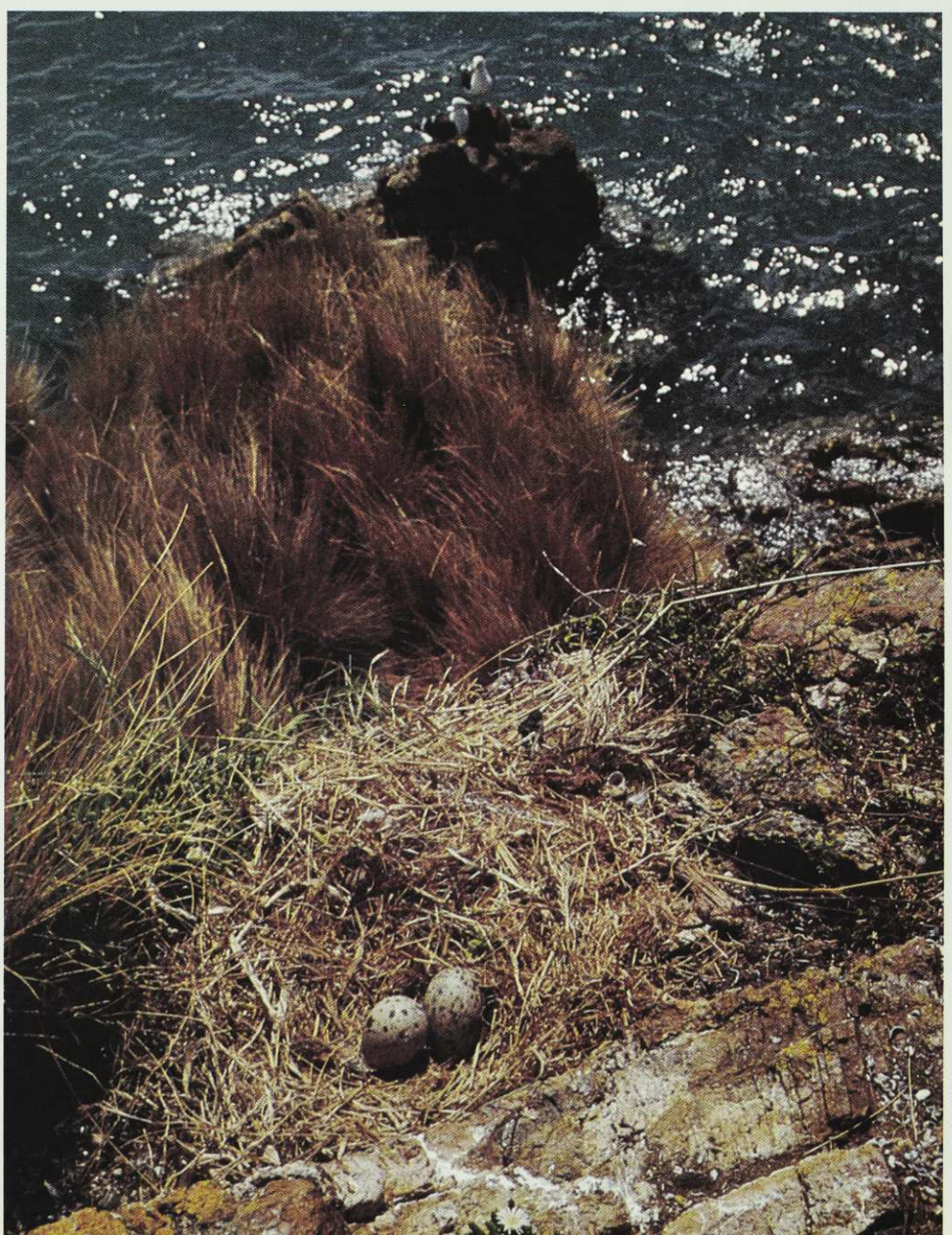
Islets in Danger

Islets are vulnerable to weeds. Mike Lee found Papakohatu and Motukaha, both off Waiheke, to be very badly infested with rhamnus, *Rhamnus alaternus*, an aggressive environmental weed in the inner Hauraki Gulf. Here it also invades coastal forests, such as those on Rangitoto. Rhamnus is reducing species diversity on several islets, following an invasion route which could spread the weeds across the Gulf from Motuihe to Waiheke Island.

Ecological values on all these islets have also been compromised to a greater or lesser degree probably by rodents. According to Mike, rodents are likely to have destroyed original lizard populations, disrupted petrel breeding, suppressed or eliminated larger invertebrates, inhibited the regeneration of plants, and predated bird nests.

Nani and Passage Rock (1200 metres off Waiheke) were found to be rodent-free, but absence of lizards there possibly indicates earlier infestation, he says.

Apart from invasive animal and weed pests, the immediate danger to the ecological values of these islets is disturbance of nesting birds by human intruders and their dogs during the summer breeding season.



DAVID LEE

MIKE LEE believes we're ignoring the conservation potential of thousands of small islands.

very precious'

and small islands in the Hauraki Gulf have received only minimal inspection. While my studies have concentrated on islets near my home on Waiheke Island in the Hauraki Gulf, there is every indication that islets everywhere are likely to be just as valuable.

Popular convention has it that there are anything from 40 to 65 islands in the Hauraki Gulf. Some of the larger islands, including Little Barrier, are internationally renowned sanctuaries for many of the country's endangered forest bird species. In reality, however, there are many more islands than this and most have some wildlife values.

Extrapolating from the Department of Conservation's Register of Northern Offshore Islands, the total number of islands inside the Hauraki Gulf, including reefs, stacks, and sandbars, is 425. The most numerically significant category among these is islets of from 0.1 hectares to 1.0 hectare — 351 in all. There are also a further 64 slightly larger islands, from one to 10 hectares. All these are potentially valuable habitats, especially for birds and lizards.

Despite this, the significance of islets and small islands has not been adequately considered in the various conservation management and local authority planning documents. Some do not appear on planning maps at all. Indeed for most purposes of society (with the practical exception of navigation), our little islands tend to be 'invisible'.

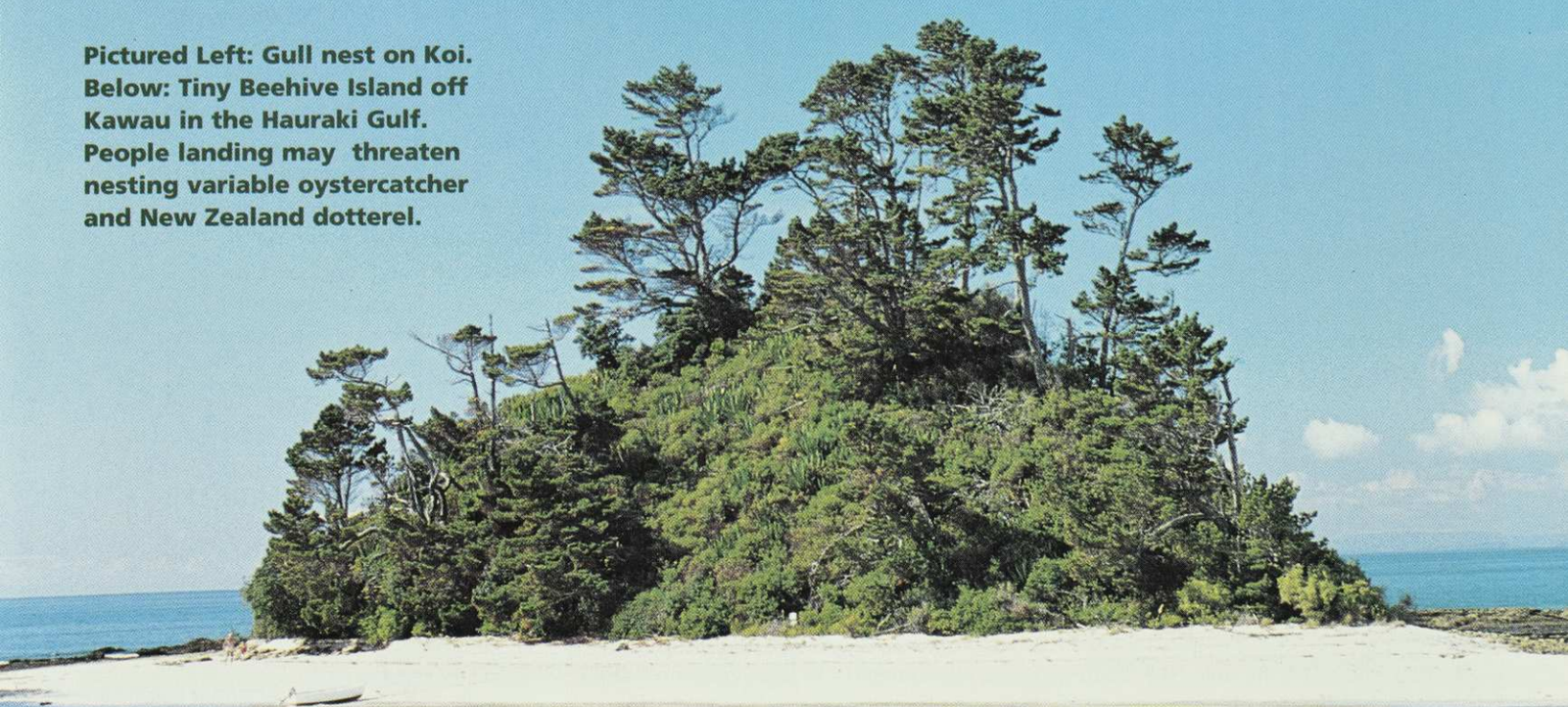
Yet, as breeding sites for seabirds, these islands are important remnants of a once much more extensive ecosystem, which in pre-human times would have included the coastal cliffs, beaches and promontories of the mainland.

These fragments of land are also interesting in a social and historic sense as they can be seen as a tiny remnant of pre-European New Zealand. In a curious anomaly, many of them are not formally owned in a property-title sense. For nearly 150 years they have existed in a legal limbo as 'uninvestigated'. They are the tiny crumbs 'left over,' and subsequently forgotten, after the extinction of 'aboriginal' communal ownership and the allocation of land into individual, Maori and Crown property titles.

With the exception of one which is privately owned, and another owned by the Crown but not managed by DoC, all the islets in my study are 'ownerless' in the formal sense. This means they are likely to be Maori customary land.

Like many islets and small islands in the Hauraki Gulf, and elsewhere, those in my survey have received only minimal inspec-

Pictured Left: Gull nest on Koi. Below: Tiny Beehive Island off Kawau in the Hauraki Gulf. People landing may threaten nesting variable oystercatcher and New Zealand dotterel.



GORDON ELL, BUSH FILMS

Threatened reef heron often nest in crevices or caves on tiny off-shore islands,

GEOFF MOON

Mike Lee likes to use a saying of Te Hikitai to indicate the value of tiny islands: 'He iti ra, he iti mapihi pounamu' – 'although small, very precious.'

Seven Unknown Islands Explored

Mike Lee's study, part of an MSc thesis, records the findings of an ecological survey of seven 'unknown' islets lying off Waiheke Island in the Hauraki Gulf. These islets are the offshore islands of an offshore island, spray-washed, wild and relatively unknown; yet from some of them you can still glimpse the commercial skyline of Auckland City.

The survey records the populations of seabirds, lizards and large invertebrates; also native vegetation, adventive weeds and the presence of rodents. (Where possible, Mike also got rid of the rats.)

A further objective was to compile any human history, including traditional Maori names and their meanings, and to record the presence of archaeological sites.

'Early on I discovered Koi Islet (0.28 hectares) lying only 250 metres offshore from the southern side of Waikeke Island,' Mike Lee records. 'It is remarkable for the species diversity it supports.

'At least eight species of seabirds and shorebirds, including reef heron (threatened), Caspian tern (rare), variable oystercatcher (threatened), pied shag, little shag, white-fronted terns, red-billed, and black-backed gulls were recorded breeding on Koi. In a follow-up visit, one year later, I observed spotted shags but it was not clear whether they also had bred there. The most numerous species were red-billed gulls and Koi appears to be their most important breeding site in the inner Gulf. The closest other significant breeding place for these birds is in the Mokohinau group, on the farthest outer limit of the gulf.

'In all, more than 250 birds were present over the summer season on Koi. I found this tiny island a veritable biological powerhouse — not only did it support a huge amount of birdlife for such a small area, but I also found ship rats in record densities — at least 78.57 rats per hectare, which is to my knowledge one of the the highest densities recorded in New Zealand for any species of rat. These rats had been able to insert themselves into the system by displacing lizards.

- Papakohatu, or Crusoe Island (0.7 hectares), lies between Motuihe and Waiheke and has a small coastal forest. It is a breeding site for seven species of seabirds, including threatened reef heron and variable oystercatcher, though in much lesser numbers than on Koi. It also supported large numbers of mice. Lying 1200 metres from the nearest land, and now rodent free, Papakohatu has a significant conservation potential ideal, for instance, as a release-site for lizard species.
- On other trips I found reef heron breeding on Passage Rock (0.3 hectares). This shy bird generally suffers from a lack of suitable habitat for breeding, but secure offshore islets are ideal.
- Nani Islet (0.7 hectares) on the northern side of Waiheke proved to be an important breeding site for white-fronted tern.
- New Zealand dotterel regularly breed on Kahakaha (Frenchmans Cap) (0.38 hectares).
- Two islets, Motukaha (0.4 hectares) and Te Whau (0.9 hectares), contain important Maori archaeological sites. Interestingly, the pa site on Motukaha, which lies close by land at the head of Church Bay, Waiheke, had never been officially recorded or surveyed until my visit.
- During the course of my research, I was able to rediscover the old Maori name of Takapu for Passage Rock, first recorded by Dumont D'Urville in 1827 but lost from charts some time in the nineteenth century.

tion in the past. Indeed, many have never been legally surveyed, nor had any formal management or protection — even islets within a few nautical miles of Auckland City.

Many small islands, more than 100 in the Hauraki Gulf alone, are 'unnamed'. The most numerous class of islands in the Gulf are therefore the least cared for and the least known — it can be said they literally 'don't count'.

These islets, though individually small, extend throughout the Hauraki Gulf and collectively add up to approximately 120 hectares; much more if slightly larger islands (from one to 10 hectares) are also included. (There would be many more islands included if the extended boundaries of the Hauraki Gulf Marine Park Bill were considered, for this proposed area stretches round the Coromandel Peninsula and into the Bay of Plenty). This is a significant area of conservation land and could present an opportunity for the practical expression of the much-talked-about partnerships between traditional Maori owners and central and local government agencies.

In light of the proposal to form a Hauraki Gulf Marine Park, I hope the 'rediscovery' of these and many other islets — effectively abandoned and neglected for at least 150 years — will lead to their formal protection and some form of co-ordinated conservation management. It could also be productive to consider the conservation value of similar islets all round the coasts of New Zealand .

MIKE LEE *is a former chair of Hauraki Islands Forest and Bird and a member of the Auckland Regional Council. This article is based on a chapter in his MSc thesis, 'New Zealand, the 10,000 island archipelago', Auckland University, 1996..*

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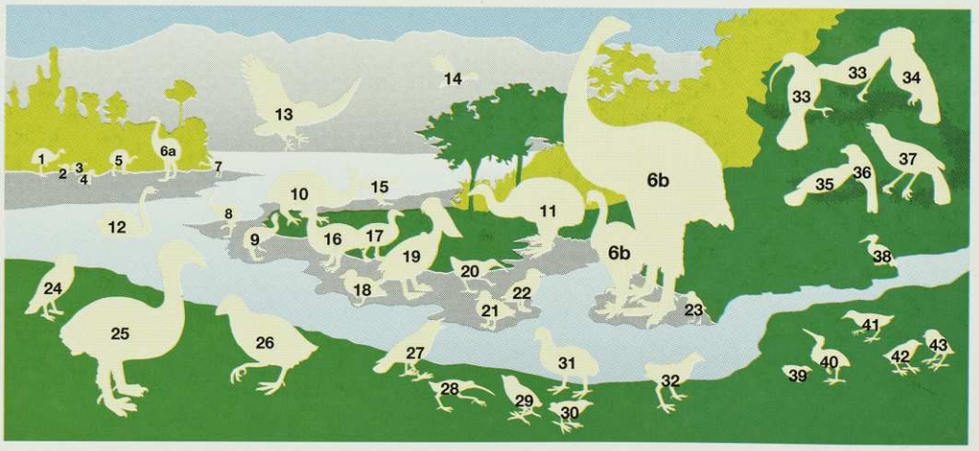
A Millennium of Lost Birds

Over the past 1000 years New Zealand has lost some 43 species of native birds, from giant moa to tiny bush wren. The 32 birds to the left of the waterfall were lost in Maori times; those to the right since European settlement, but the painting takes no account of the widespread decline in numbers of many more species, now threatened, rare or endangered, following land clearance and drainage. Artist Ronald Cometti painted this picture as a warning against further losses in the next millennium. (See Conservation Briefs page 12).



● Extinct moa species from top left to the waterfall are: 1, slender bush moa; 2, coastal moa; 3, Mappin's moa; 4, eastern moa; 5, stout-legged moa; 6a South Island giant moa; 7, crested moa; 8, little bush moa; 9, upland moa; 10, large bush moa; 11, heavy-footed moa; 6b, North Island giant moa (and young).

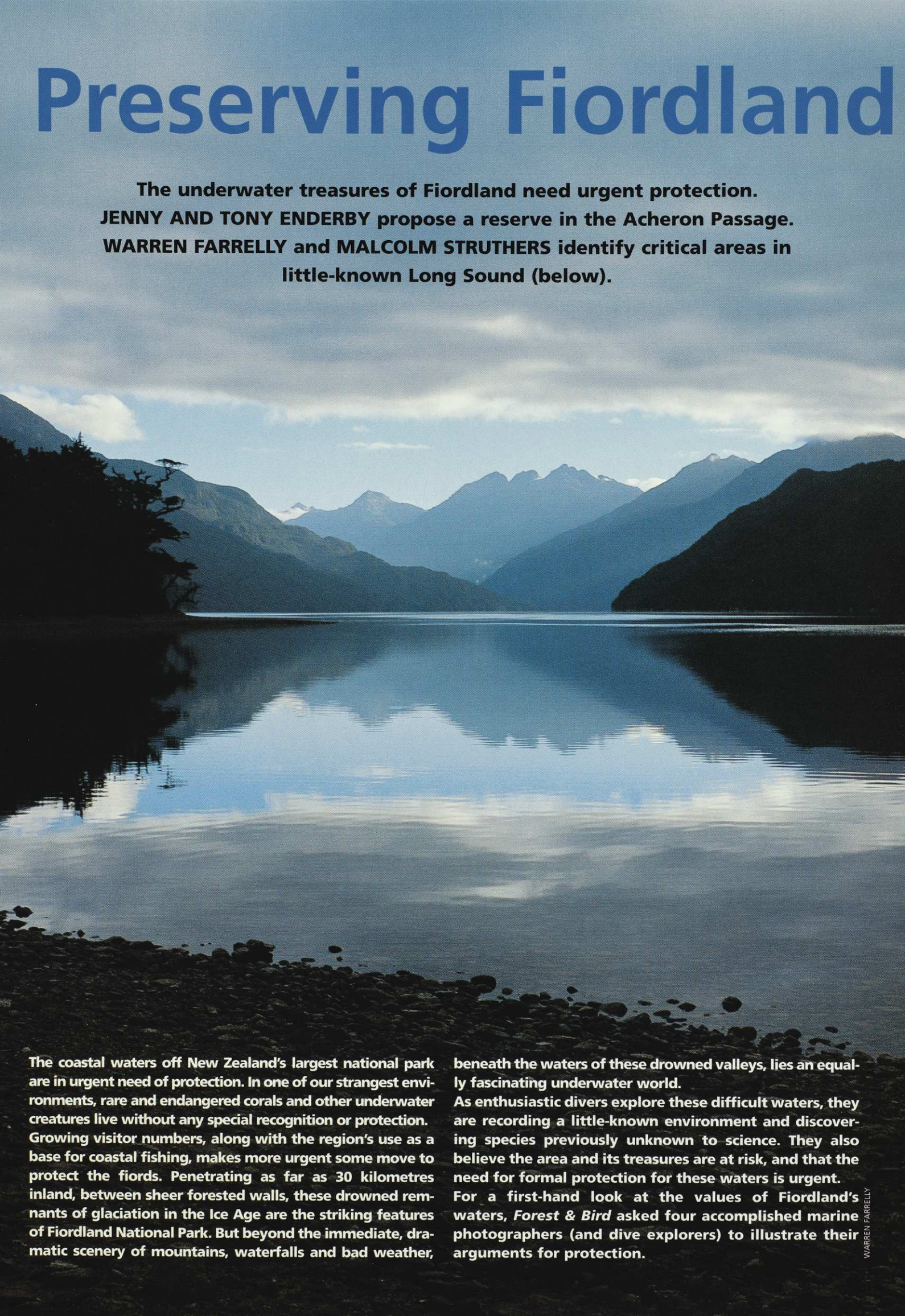
● Other extinct species from stream at left are: 12, NZ swan (on water); 13, NZ eagle (in flight); 14, Eyle's harrier (also in flight); 15, Chatham Island sea eagle (on lakeshore); 16, South Island goose (across stream); 17, North Island goose; 18, Chatham Island duck; 19, NZ pelican; 20, giant Chatham Island rail; 21, Finch's duck; 22, Scarlett's duck; 23, snipe rail (by waterfall).

● Foreground birds from left: 24, NZ owlet nightjar; 25, adzebill; 26, North Island takahe; 27, NZ crow; 28, great Chatham Islands snipe; 29, Yaldwyn's wren (South Island stout-legged wren); 30, Grant-Mackie's wren (North Island); 31, NZ coot; 32, Hodgen's rail.

● Extinctions in the past 150 years (right of the waterfall) include from top down: 33, huia (pair), last seen 1907; 34, laughing owl (1914); 35, South Island piopio or native thrush (1900); 36, North Island piopio (1902); 37, South Island kokako (1950); 38, Auckland Island merganser (1902); 39, NZ quail (1869); 40, NZ little bittern (not reliably recorded this century); 41, Dieffenbach's rail (1840); 42, bush wren (1972); 43 Stephens Island wren (1894).

Preserving Fiordland

The underwater treasures of Fiordland need urgent protection. JENNY AND TONY ENDERBY propose a reserve in the Acheron Passage. WARREN FARRELLY and MALCOLM STRUTHERS identify critical areas in little-known Long Sound (below).



The coastal waters off New Zealand's largest national park are in urgent need of protection. In one of our strangest environments, rare and endangered corals and other underwater creatures live without any special recognition or protection.

Growing visitor numbers, along with the region's use as a base for coastal fishing, makes more urgent some move to protect the fiords. Penetrating as far as 30 kilometres inland, between sheer forested walls, these drowned remnants of glaciation in the Ice Age are the striking features of Fiordland National Park. But beyond the immediate, dramatic scenery of mountains, waterfalls and bad weather, beneath the waters of these drowned valleys, lies an equally fascinating underwater world.

As enthusiastic divers explore these difficult waters, they are recording a little-known environment and discovering species previously unknown to science. They also believe the area and its treasures are at risk, and that the need for formal protection for these waters is urgent.

For a first-hand look at the values of Fiordland's waters, *Forest & Bird* asked four accomplished marine photographers (and dive explorers) to illustrate their arguments for protection.

WARREN FARRELLY

Underwater

Protecting the Acheron Passage, by Jenny and Tony Enderby

Fiordland National Park is one of New Zealand's great natural wonders, recognized by having World Heritage Park status. Yet the unique world beneath the waters of its fiords is largely unprotected. Unlike the mountains surrounding the fiords, only two small areas — Piopiotahi in Milford Sound and Te Awaatu Channel in Doubtful Sound — have marine reserve status.

Some of the fiords, such as Dusky and Doubtful sounds, are home to bottlenose dolphin pods. The dolphins often ride the bow of any boat travelling through the area. Yet, while this is an inspiring sight, it is the underwater world which makes Fiordland different from anywhere else.

Fiordland's heavy rainfall sends huge amounts of fresh water, carrying tannin from fallen vegetation, into the fiords. This discoloured fresh water does not mix with the salt water but sits on top, filtering out sunlight from the salt water beneath. Although the tannin is the colour of cold tea, divers looking back to the surface see the sun as a vivid emerald glow. The water temperature varies, with the fresh water normally at least three degrees colder than the salt water below it.

It is the lack of sunlight which makes Fiordland's waters unique. Species like black coral, normally found in other seas at depths of 50 metres or more, live here in less than 10 metres of water.

The Acheron Passage between Breaksea Sound, Dusky Sound and Resolution Island has magnificent black coral. These animal colonies grow very slowly, with some hundreds of years old. They live from the shallows below the fresh water down to beyond diveable depths. The largest tree we've seen was three metres in height and probably as wide, but they grow to twice that size.

Black coral and the beautiful red coral, also found in Fiordland, are both protected in New Zealand. (Overseas black coral is highly prized and used for making jewellery.) The shiny black trunks resemble ebony and are carved into ornaments which sell for high prices.

Underwater, the name black coral is a misnomer. The first view a diver gets after passing through the fresh water layer is a glowing white tree against the green water.

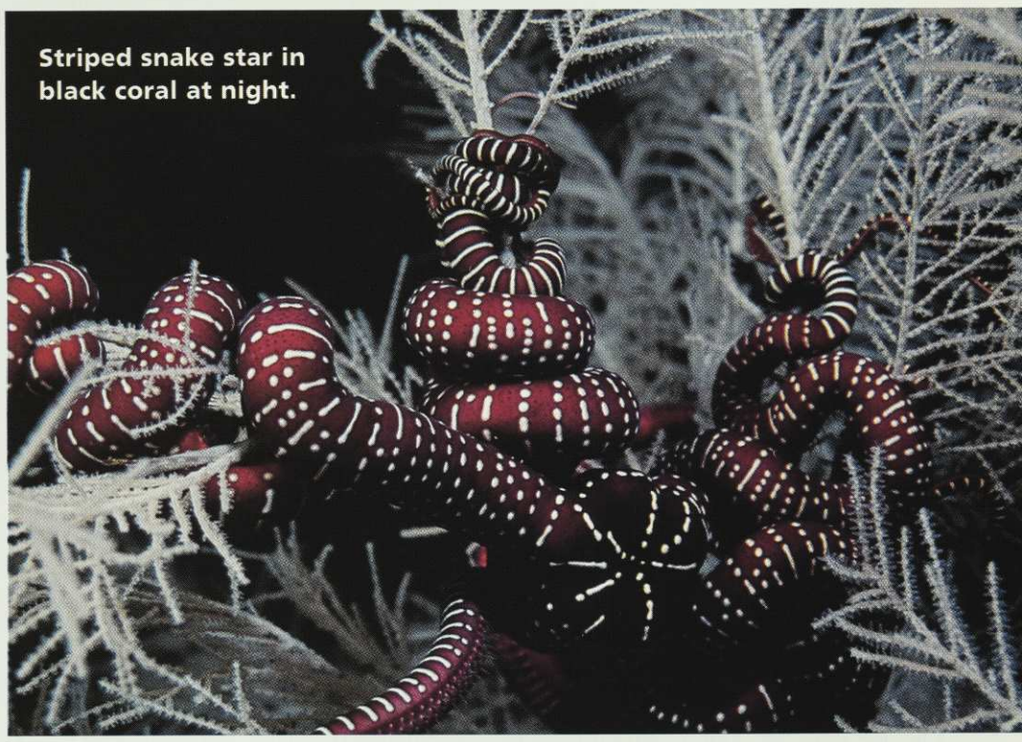
Forest and Bird seeks special marine park

Forest and Bird wants to see a proper assessment of Fiordland's underwater environment and the declaration of extensive protected areas matching the national park status of its coast.

Its proposal for a Fiordland Marine Park includes a significant proportion of 'no-take' reserves (80 to 90 percent of the inner fiords) and a representative area (20 to 25 percent of the outer fiords).

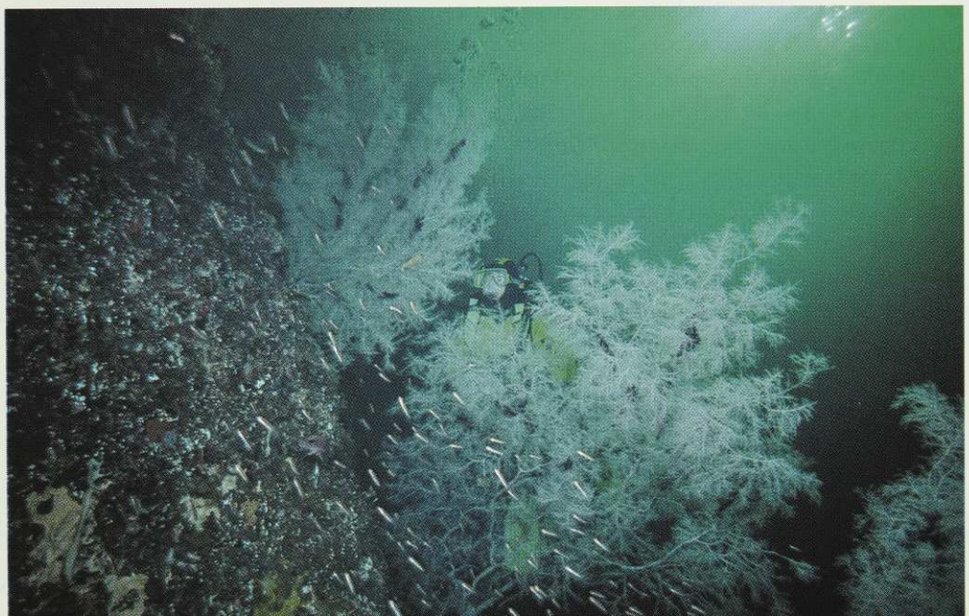
Areas should be set aside for recreational and commercial fishing, and for diving. Anchorages and existing shore-based facilities should be recognized.

As on land, remote areas should be set aside to prevent overcrowding. Scientific reserves would be desirable so the health of these waters could be monitored. — *Sue Maturin.*



Striped snake star in black coral at night.

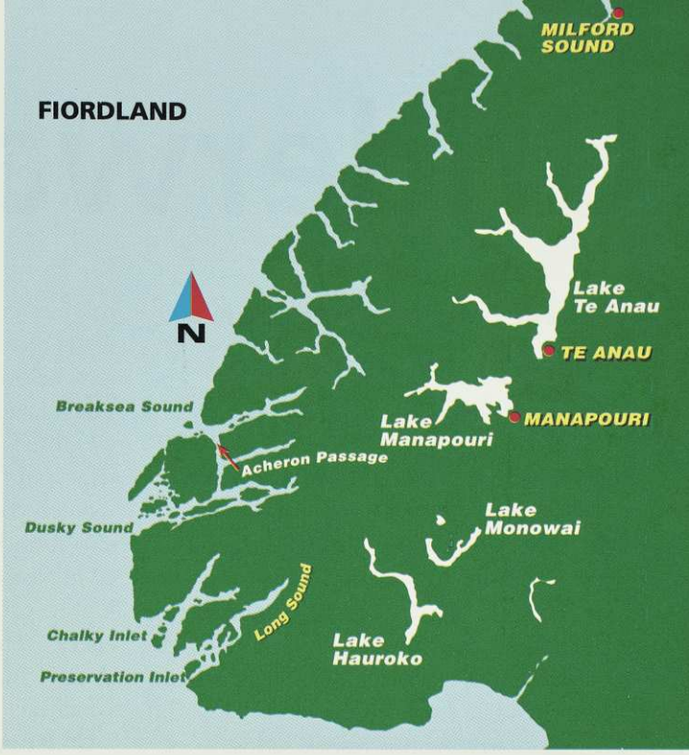
JENNY AND TONY ENDERBY



JENNY AND TONY ENDERBY

Black coral is one of the underwater treasures of Fiordland. Any changes to local environmental conditions could affect such species living on the shallow rock walls. These corals do not occur elsewhere in New Zealand — nor have they been found in fiords in any other part of the world.
Left: Jenny Enderby is dwarfed by three large black coral trees.

JENNY AND TONY ENDERBY



The flowery polyps of the black coral are white and cover almost every living part of the tree. They are extended to catch minute food particles that drift past in the current.

For divers, the Acheron Passage is an easy drift-dive, but good buoyancy is essential. The passage drops vertically to over 100 metres and a poorly weighted diver crashing down a cliff can do much damage to the fragile black coral colonies.

Currently only a small number of divers visit the area. Most of the charter boat operators taking dive parties are very environmentally conscious, trying to educate those diving on the wall to be careful and not to take or damage anything.

Numerous small invertebrates make their homes amongst the branches of black coral. Snake stars are found on almost every tree, wrapped tightly around the branches during the day. At night they unravel and start to feed. Snake stars live in a symbiotic relationship with the black coral, cleaning off unwanted particles and microscopic plankton. Their colours range from yellow to red, some plain and others patterned.

On our dives we found beautiful yellow anemones with brilliant blue centres on some of the dead branches. Lower on the trunk were several tiger shells with the animals fully extended even though it was daylight.

Scarlet wrasse hovered around the black coral during the day, but at night we found them sleeping among the branches, safe from the predators of the open water.

Although the fish life was sparser than on some of our shallower dives there were still good schools of butterfly perch and tarakihi drifting below us. Blue cod, leatherjackets, and sea perch (Jock Stewarts) sat on the walls and the occasional big conger eel glared from a hole in the cliff face.

The many vertical cracks in the wall were home to crayfish. We had heard stories of 'hundreds of crays' here but the most we saw in any hole was about ten.

The fiord walls are a mosaic of colour with yellow and orange sponges, zoanthids, gorgonians and hydroids. Living amongst these are a wide variety of shells, sea stars and nudibranchs. The aptly-named circular saw shell lives here in big numbers. Huge horse mussels, normally found on mudflats, live attached to the walls. The brilliantly coloured nudibranch *Jason mirabilis* also found in the north, grazes on the *Solanderia* hydroid.

To us, the Acheron Passage portrays the magnificent underwater world of Fiordland. The black coral for which the area is acclaimed is at its best here. The accompanying life is largely also unspoilt.

It will be increased pressure from divers, fishermen and sightseers that will cause damage to the fragile underwater environment of the fiords. Currently the major damage is totally natural. Huge avalanches of rocks and trees fall from high on the hillsides into the fiords. These take with them everything in their path, both above and below the water, but as with all natural disasters nature eventually restores everything to its original condition.

But what about the future of the fiords? Should more of the Fiordland underwater world have marine reserve status? While the corals of Fiordland are protected, their habitat also needs protection. There are many parts of the sounds that could be considered for marine reserves. In our view the Acheron Passage with its black coral inhabitants, is one obvious area for consideration.

JENNY *and* TONY ENDERBY *are underwater photographers based at Leigh in lower Northland. Their last story in* Forest & Bird *was about mangroves (February 1998).*

Exploring Long Sound, with Warren Farrelly and Malcom Struthers

Long Sound is a sinuous narrow fiord. It begins at an impressive waterfall in Cascade Basin, 26 kilometres inland, and ends as the most southern of Preservation Inlet's waterways.

On a fine sunny day, its still surface mirrors perfect reflections of gaunt rock, trees and overhanging mountains. Mostly though, cloud blots out the lot.

Everything in this place centres on weather. For instance, the northwest wind which funnels down Long Sound whips up individual williwaws at 60 kilometres an hour. When this same wind rises to a scream, at about 120 kilometres an hour, the individual williwaws come together as a 20-30 metre vertical blanket of raised water careering towards us. We had three days of this in one storm.

Diving in the narrows of Long Sound ranks with the best in Fiordland (and elsewhere). Because the narrows were once only a branch of a greater glacier, the bottom here is shallow enough to be diveable. It gave us the chance to find some different, delicate and extremely rare marine life, of the kind usually only encountered at much greater depths.

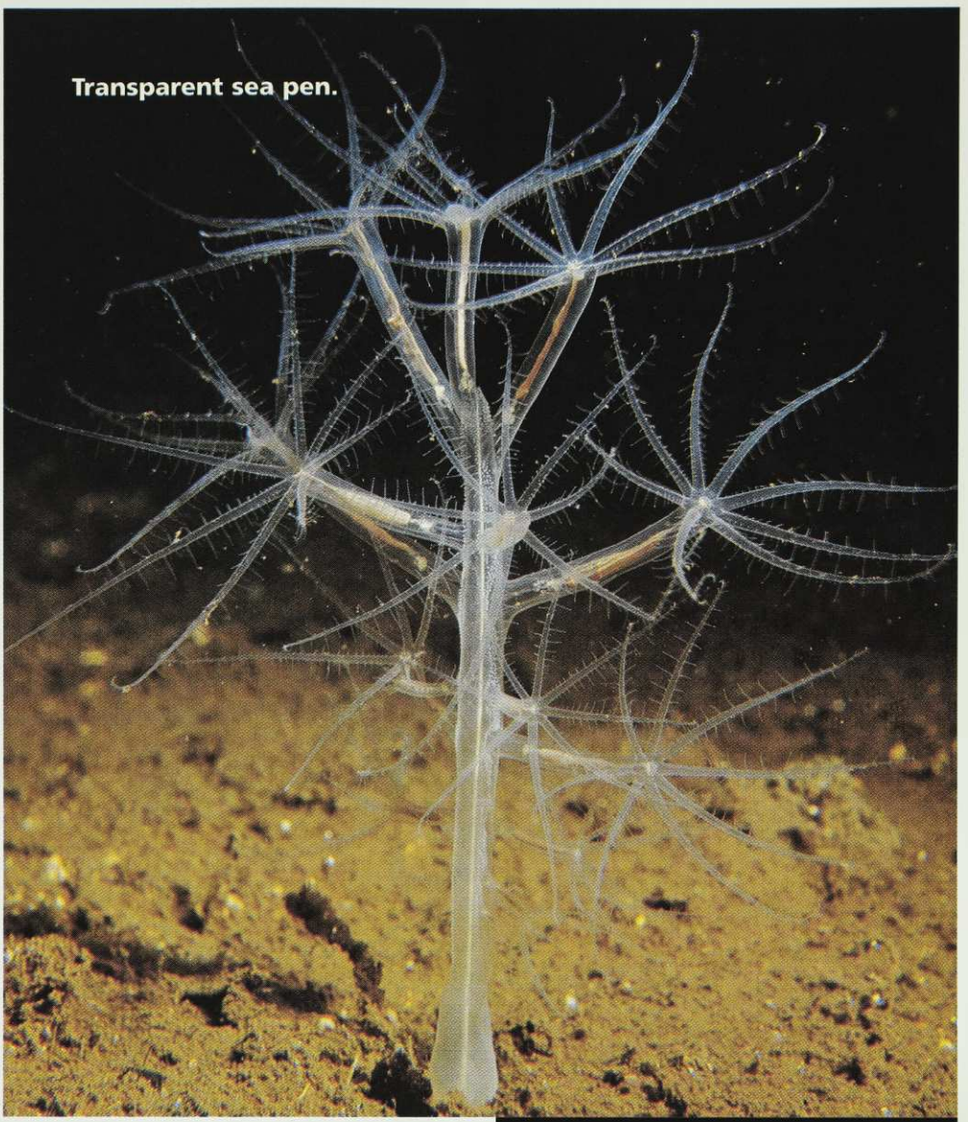
The outer curve of the fiord wall is steep and swept by strong tidal currents. The inner wall by contrast has less tidal current and is easily diveable at all times. Many rock pinnacles exist on this side, further breaking down the tidal movement.

The inner wall of the fiord and all these pinnacles are coated in red coral. Sometimes this coral is a brilliant cochineal red and chunky. It can also be the palest pink colour and very delicate. This variability in colour and shape makes for some interesting pat-

terns and perhaps indicates a range of different species or sub-species. On one dive we found red coral growing on brachiopod shells. When wiped with our exhaust bubbles these ancient shells would close, wafting the red coral wands in a progressively upward wave of motion. In other places, fish would perch among the red coral, creating striking colour and texture patterns. Red coral was also found growing out of black coral trees. The contrast between the white external colour of the much bigger black coral and the squat red coral is eye-catching. Add wandering anemones, yellow gorgonians, snake stars, and other sea creatures and you have a diver's heaven — somewhat moderated by a water temperature of 9-10 degrees Celsius. Rare marine life, much of it not found anywhere else, is common here.

Leaving the rock wall and pinnacles took us out over the sloping bottom of loose sediment. Here the rare life included several species of sea pen. We eventually found three different species in this area. No other Fiordland dive provides more than one.

The typical and most common sea pen in Long Sound is a stout, dense, pink/apricot coloured beast attached to the bottom by a foot. Its branches are like plane aerofoils that direct water across and into the waiting anemone tentacles on the lee edge of each branch. This sea pen swivels to face always into the current of the moment. Ken Grange, having studied these, believes them



Transparent sea pen.

Below, Red coral. At right, sea pens swivel with the currents. Bottom right, elegant snake stars on gorgonians.

PHOTOGRAPHS THIS PAGE BY WARREN FARRELLY

Southland's coastal plan proposes protection for Fiordland waters

Protective provisions of a coastal plan proposed by the Southland Regional Council for Fiordland are already being put into effect, prior to their formal approval.

Marine farming is now banned from the internal waters of the Fiordland area.

The plan notes the unique underwater ecosystem of Fiordland and recognises the scenic and natural beauty of the region.

New charter boat operators must obtain a resource consent before beginning charter operation in Fiordland. The upper level of charter boat numbers operating in Fiordland will be set following a hearing process.

Foreign vessels of more than 100 tonnes are banned from the internal waters of Fiordland, apart from Milford Sound, Thompson Sound, Doubtful Sound north of Rolla Island, Breaksea Sound west of the Acheron Passage, Acheron Passage, and Dusky Sound west of Acheron Passage.

Heritage site protection covers the wreck of the ship *Waikare* which sank in 1910 near Stop Island in Dusky Sound. This forbids the removal, modification or destruction of the wreck. The site of the first recorded shipwreck in New Zealand, that of the *Endeavour* in 1795, is also covered, totally protected under the Historic Places Act 1993.

The Southland coastal plan has a section noting that Fiordland is a popular scuba-diving location. The objectives of this section of the plan are 'to recognise, maintain and enhance the diving values of Fiordland's waters.'

The expected outcome from the policy is to ensure 'the diving values of Fiordland's water are maintained and enhanced.'

— Jenny and Tony Enderby

Scorpion fish, Long Sound.

WARREN FARRELLY

to be a different but closely related species from the larger, less dense and less colourful ones found in some other fiords.

On our first trip into Long Sound in January 1995 we found a very different sea pen. This one was white and smallish. It had fewer branches which each ended in a single large anemone with long tentacles. It is a beautiful, delicate-shaped sea pen the main trunk of which is transparent.All its internal organs are visible, and so is its descending lunch.

Our second dive holiday to the area, from December 1997 to January 1998 , gave us four specimens of a third type of sea pen. These were much harder to find, being very scattered and low in density. In the photos they are apricot in colour, with a 'vein' from the foot to the top of the main stem. The 'vein' we thought was blue until the photos proved that wrong. This sea pen was more feather-like than the first Long Sound one. Its 'aerofoils' are more widely spaced, very thin but wide, with rows of delicate anemones along its back edge. Like all sea pens this one could rotate toward the current.

Diving Long Sound is more than red corals and sea pens. For instance we also dived a rock wall that was dramatically undercut. It was a pitch black dive for the sloping rock ceiling above let no light through. Marine life was not prolific; in fact it was sparse but interestingly different. Gorgonians here had so many snake stars entwined in them that they looked like intricate Celtic knot tapestries. A different and lone snake star photographed on the dive proved to be a new species for New Zealand. Its legs have colour bands, similar to another snake star found in Acheron Passage. Surely other unusual lifeforms will also be found here.

In more than nine weeks of diving Long Sound we have no more than probed its secret places. We know a little of what is there, particularly in the narrows, but much more remains to be explored. Yet, already, it has proved a place too unusual and unique to risk, and risks do exist.

Fishing for crayfish with pots along the red coral walls could cause considerable damage to that coral. Sea pens could be uprooted and destroyed by dredging. Clumsy divers would likewise pose problems to the fragile corals and sea pens. At present, luckily, it is undisturbed and all but pristine, but for how long?

It is certain that more and more people, including divers, will find their way into Long Sound. Protection is needed now before damage changes this unique, complex, and fascinating underwater world.

The best protection would be a marine reserve extending the full length of Long Sound, from the entrance at Colt Head to its headwaters at Cascade Basin. This would help the grouper to grow large again, and protect all the other marine species, some of which are undoubtedly yet to be found and described.

WARREN FARRELLY *and* MALCOLM STRUTHERS *are divers and underwater photographers who live and teach in Northland.*

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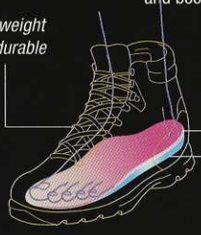

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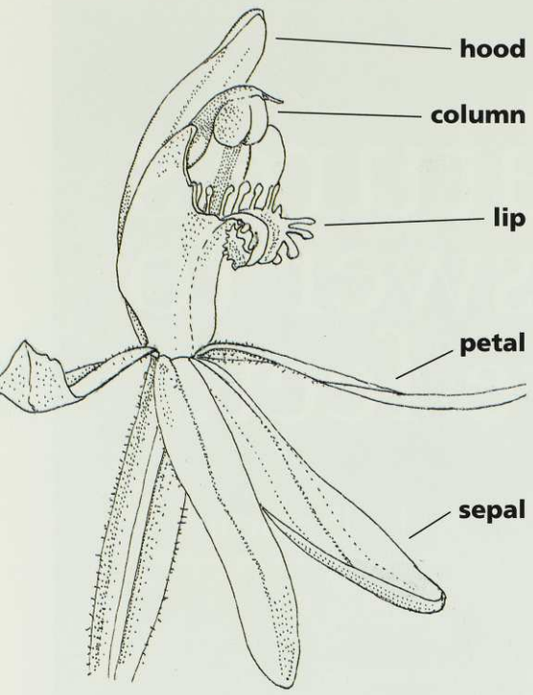


orchids

New Zealand has more than 120 native orchids, 'all beautiful', according to IAN ST GEORGE.

ILLUSTRATIONS BY IAN ST GEORGE

Wild native orchids are common plants in New Zealand if you know what to look for. Far from being flowers of the tropical jungle, most orchids originate in temperate zones and New Zealand has more than 120 species.

While a few are rare, many are in some places as common as grass. True, most of the native orchids are not brightly coloured, nor do they generally have a strong fragrance to attract insect pollinators (uniquely, two thirds of our orchids are self-pollinating), but their beauty takes your breath away.

Orchids are everywhere. They occupy just about every habitat in New Zealand from brackish estuarine swamps to alpine herbfields. In between, they may be found in front lawns and dark forests, on tree trunks, road verges, rocky outcrops, scrubby hillsides, and dry banks along bush tracks. Orchids may take root on traffic islands in cities, in the spray zones of waterfalls, on moss hummocks, or in exotic pine forests. There are more than 40 species in the far south, even more in the far north, and everywhere between. Stewart Island alone has dozens.

Identifying orchids is probably harder than finding them but knowing what to look out for helps sort them from other small plants. Their shapes vary from the tiny ground-hugging spider orchids, to more familiar sprays which hang from forest trees, and the upright, flowering stalks of the grass orchids. What they all have in common is the unique structure of the orchid flower.

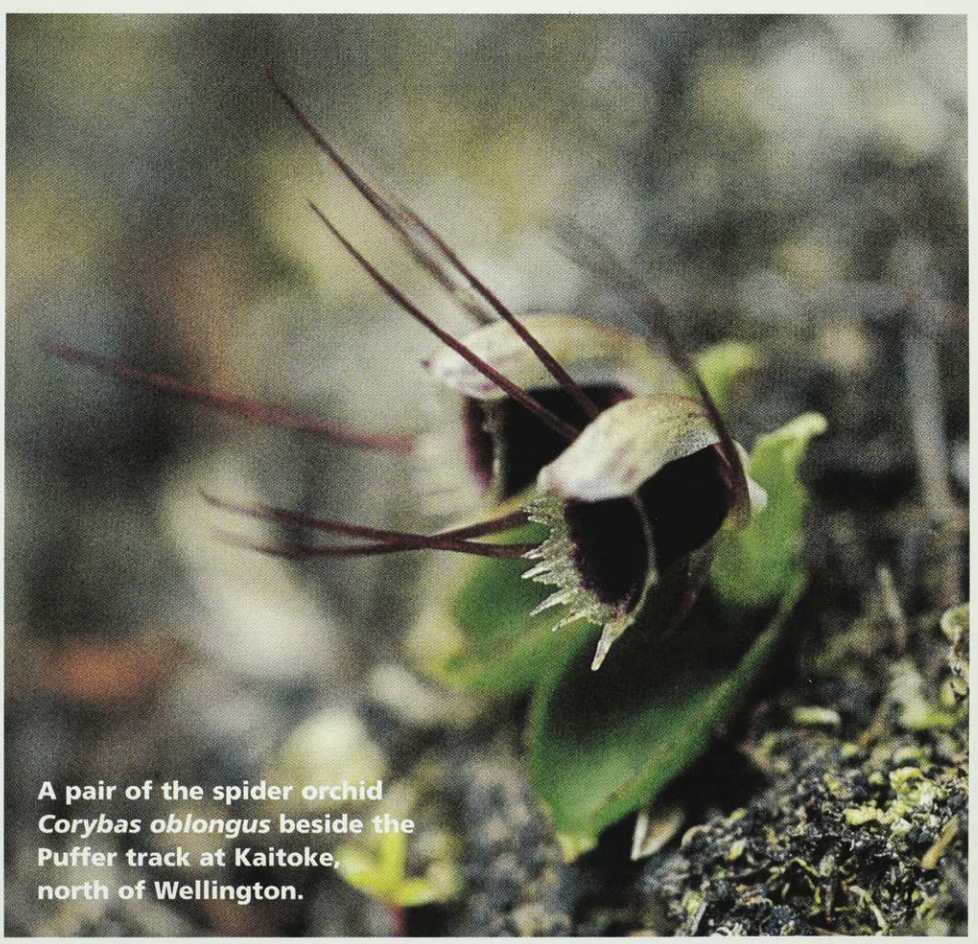
Orchids have evolved from lilies, which have three petals and three sepals of the same shape, surrounding six stamens (male parts) and three stigmas (female parts). In orchids, at some inspired evolutionary moment, the male and female parts joined into one central floral structure called the column. The three sepals and three petals surround this single column.

Furthermore, in orchids the petals and sepals are often different from each other, with one sepal forming the hood protecting the flower, and one petal, the lip, which, especially in exotic orchids, is often curiously coloured and shaped to lure insects. The pioneer botanical writers, Laing and Blackwell, thought their variety looked like 'swans, pelicans, the skin of the tiger and of the leopard, the eyes and teeth of the lynx, the face of the bull, the grin of the monkey, the head of the serpent, the tail of the rattlesnake, frogs, lizards, even the head of the extinct *Dinotherium*'.

To be given a common name plants must be common (or if they are uncommon they have to be dangerous or delectable). Several of the New Zealand groups (genera) are common, and deservedly recognised with common names; in contrast, only a few individual species are. To study and discuss orchid species at anything more than the most superficial level, you simply have to learn the scientific names. Here are samples of some of the major groups. —

CORYBAS (below)

'Spider orchids' is a term used in many countries for orchids with long petals and sepals. Our spider orchids are *Corybas*. There are 13 named species and about another half-dozen so far unnamed. Most have a broad flat leaf with a flower where the hood and lip form a tube surrounded by long 'feelers' formed from the other sepals and petals. *Corybas oblongus* grows at any shaded trackside, often in moss, its mottled leaves flat to the surface, its flower a fringed purple gem.

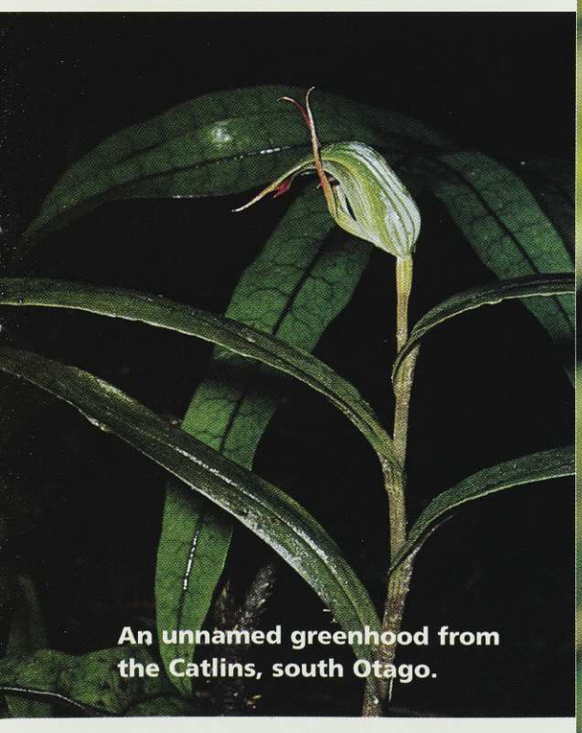


A pair of the spider orchid *Corybas oblongus* beside the Puffer track at Kaitoke, north of Wellington.

are everywhere

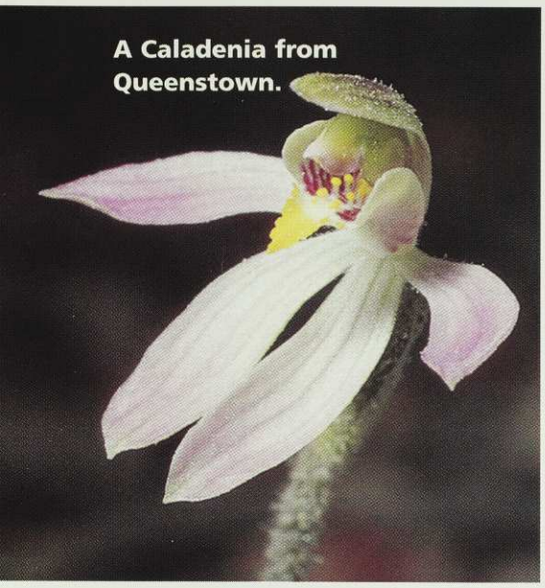
THELYMITRA (right)
The New Zealand 'sun orchids' are called *Thelymitra*. There are 15 named species and another six unnamed forms. Here the flower parts are similar, as in lilies, and it is the central column that varies from one species to another. The flowers range from white to pink to blue and open best on warm, humid, sunny days. *Thelymitra cyanea* startles with its brilliant blue flowers as you walk through the alpine bogs above Lake Dispute near Queenstown.

PTEROSTYLIS (below)
Our 'greenhoods' are *Pterostylis*, with 27 species and a few yet to be named. The biggest is tutukiwi, the standing kiwi, *Pterostylis banksii*. In this orchid the flower is a curved tube of its zipped-together parts, the lip mobile within, a spring-trap for insect pollinators. The hood and sepals are elongated in most species. Many have red markings on the mostly-green flowers, as this unnamed form from south Otago's Catlins shows.



An unnamed greenhood from the Catlins, south Otago.

The sun orchid *Thelymitra cyanea* near Lake Dispute, Queenstown.



A Caladenia from Queenstown.

The beardie, *Calochilus robertsonii*, Iwitahi, Taupo.

CALADENIA (above)

The *Caladenias* are perhaps the most beautiful. Six species have been described, and there is still controversy about which is which. Most are hard to find, being small and few-flowered, with a preference for a solitary existence in undisturbed scrub habitats. A sudden awareness of the bright pink stars against a drab background of leaf litter and debris is always a delight.

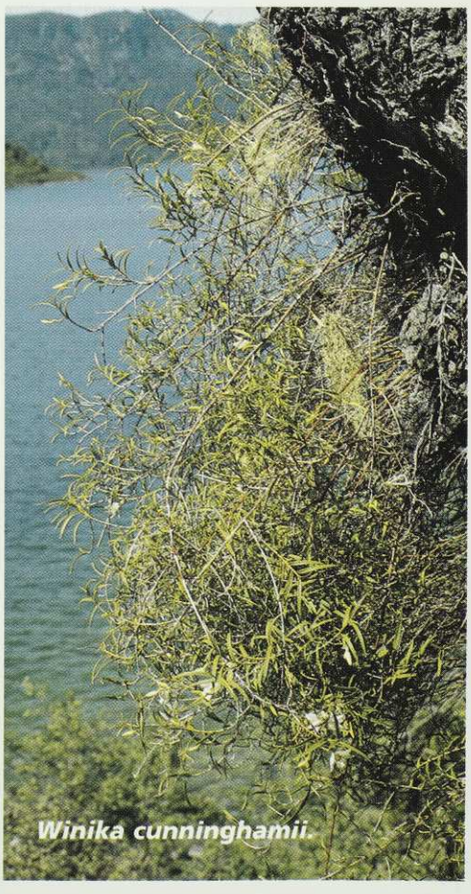
CALOCHILUS (above right)

Weirdest are the 'beardies'. *Calochilus* is a group of three transtasman vagrants which have established themselves in New Zealand, but nowhere in great numbers. All have hairy lips which, when associated with the dark shiny 'eyes' on the column-wings, give flowers the remarkable appearance of a bearded face. *Calochilus robertsonii* grows in sparse grass under introduced eucalypts at the roadside at Iwitahi near Taupo.

EARINA AUTUMNALIS (right)

We have seven perching orchids — plants with long rhizomes that cling to the surface of trees or rocks. Two are *Bulbophyllum*, bulb-leaf orchids, growing in often quite big mats of tiny connected bulbs, the new ones topped by leaves, with inconspicuous flowers in the spring. They grow on the trunks or low branches of trees, or on rocks. Two more are *Drymoanthus*, growing out on the smaller branches and even twigs of smaller trees, with rosettes of 10 centimetre-long green leaves, beneath which arise stems bearing many small flowers. Two are *Earina*: raupeka, the Easter orchid (pictured), flowers through autumn into the early winter, its racemes of fragrant white flowers filling the evening air with perfume. Peka-a-waka has grassy leaves and branching stems of cream and yellow flowers forming large clumps in the trees.

The Easter orchid, *Earina autumnalis*, near Dunedin.



Winika cunninghamii.

GASTRODIA (below)

The 'potato' orchids, *Gastrodia*, are brownish plants, tall and many-flowered, quite lacking in the green pigment chlorophyll, and so unable to photosynthesize. As a consequence, potato orchids are obliged to depend on a close association with a soil fungus for nutrition. All four of the New Zealand *Gastrodia* are 'epiparasites', infected by fungi and living on the carbohydrates the fungi break down from the soil and from the roots of other plants. The tubers of *Gastrodia* are the size of kumara, and were roasted, dried and eaten by Maori, notably the foraging Tuhoe.

The flower is a tube of fused parts containing the column and lip. Dull and unattractive perhaps, but one of them delights incongruously with the fresh smell of freesias; its tall stems and multiple flowers buzz with insects attracted to that heavy fragrance on the evening air.

The onion orchid *Microtis unifolia* in a trackside bog.

Gastrodia cunninghamii

WINIKA (left)

The most showy of our perching orchids is the genus *Winika* which often forms colonies of two or more metres across. The yellow-branching canes, feathery green leaves, and white flowers with purple markings make a stunning sight as they droop into lakeside water, or feather the trunk of a great rimu.

MICROTIS (above)

The 'onion' orchids and the 'leek' orchids (*Microtis* and *Prasophyllum*) are perhaps the most common. Certainly *Microtis* can be found everywhere in New Zealand, occupying every well-lit ecological niche you can think of, even infesting urban flower-pots, suburban lawns, city traffic islands, and every trackside in the country. Stems of many tiny, insignificant, green flowers at first seem like weeds, but close study shows the tiny structures and tidy symmetry of the orchid flower.

A number of our orchids are Australian migrants, their light seed carried over on the westerlies. Some thrive; others, lacking either their insect pollinator or the right soil fungus, survive for a time then disappear.

Since the New Zealand landmass separated from Australia, between 80 and 55 million years ago, we have drifted a long way apart. Many of our species have evolved to show differences from their transtasman siblings, and several genera of orchid, a number of them with a single species, have developed exclusively here. The odd-leaved orchid, *Aporostylis*; the non-green epiparasite *Danhatchia*; the alpine *Waireia*; and *Winika* itself, exist only in New Zealand. The isolation of our islands has resulted in the evolution of many orchids peculiar to this country.

IAN ST GEORGE *is editor of the New Zealand Native Orchid Group's* Journal, *and the author of* Nature Guide to the New Zealand Native Orchids, *published this month by Random House. He is a medical practitioner in Wellington.*

Orchids at Risk

The latest revision of the New Zealand threatened and local plant list was in 1995, and knowledge of orchids has advanced even since then.

One is now extinct: *Chiloglottis formicifera* is a common Australian orchid that has made landfall here several times, though not since the 1940s. Four others are threatened in New Zealand but common enough in Australia (one, *Pterostylis nutans*, regarded as extinct in 1995, has since been rediscovered at a single site, though at last visit was grazed off by rabbits or possums).

Caleana minor is critically threatened, hanging on at one site in Rotorua, and rare in Australia too. It raises the question, what should our conservation policy be? Should it be left to the Australians?

Corybas carsei and *Pterostylis micromega* are endemic wetland orchids, much of their habitat destroyed by drainage and the encroachment of weeds. *Corybas carsei* (critically endangered) now survives in one Waikato swamp. The endangered *Pterostylis micromega* occurs in several swamps in the central North and northern South Islands. Both are regarded as Category A for conservation purposes: the highest priority for the conservation of threatened species.

Thelymitra matthewsii and *Pterostylis puberula*, regarded in 1995 as critically endangered, have now been found in greater numbers though they are still rare.

Pterostylis aff. patens remains 'vulnerable' and *Thelymitra tholiformis* 'rare'. We simply don't know enough about another four taxa to classify them, and another six are regarded as 'local'. — *Ian St George.*

Zero Waste

profiting from rubbish while saving resources

ZERO WASTE challenges business to protect the environment by going easier on the earth, reports GORDON ELL.

Ultimately, business must 'green' itself or risk destroying its customer base, according to a new philosophy of commercial caring for the environment embraced by the charitable trust, Zero Waste New Zealand.

Zero Waste is 'greening' local authorities to recycle community rubbish while it encourages business into better ways of using resources. Along the way it helps people into new jobs in new enterprises based on the 'waste stream'.

Based in Takapuna, Zero Waste operates throughout New Zealand as an offshoot of the Tindall Foundation, a trust fund established by The Warehouse founder, Stephen Tindall, to benefit families, employment and the environment. About a quarter of the foundation's budget of $3.5-$4 million annually is spent on environmentally based projects.

In the past four years, Zero Waste has developed several areas of activity, each carefully devised to help clean up the environment and provide employment. It works largely in setting up new recycling industries based on the 'waste stream', but its consultancies also include helping businesses to reduce waste per se.

One of its messages is aimed at local government — encouraging councils to be come 'zero waste councils' and showing them how. Suggested technologies for better rubbish disposal lead to reduced pressure for expanding rubbish dumps, and makes commercial use of the waste.

At Kaitaia, the Far North Recycling Project is a classic example of what can be developed out of the waste stream, according to the manager of the Tindall Foundation, Warren Snow. He was involved with others in setting up business opportunities using the town's waste as the initial resource. A joint venture with the council now employs three staff and after 18 months 30-50 percent of the local 'waste stream' is being recycled.

Since the new business took over running the rubbish dump several other business have been 'spun off' it. Support from Zero Waste has provided workers with both technical knowledge and business skills.

Similar projects are underway elsewhere in New Zealand. Local authorities at Opotiki, Christchurch and Hamilton have signed on in the past year with the aim of becoming 'zero waste cities'.

In the case of Opotiki, Zero Waste noted the problem of an overfull rubbish dump. The tip was obsolete and no alternative sites presented themselves. A Zero Waste consultant has given the district council a model of what to do to start recycling and reprocessing. Talking with councils and Government departments about the principles of Zero Waste is part of the organization's advocacy programme.

'We're allocating significant funds to communities, groups and councils for projects focussing on creating jobs and starting projects re-using waste,' says Warren Snow. 'We're funding projects which concentrate on creating a zero waste environment — spending on recycling programmes, waste reduction, community education and cleaner production. We fund pilot projects, educational programmes and provide start-up and development funds for new initiatives.

'In Timaru they're working on an executive strategy to change their emphasis away from waste as something to be got rid of, to seeing it as a resource which will create jobs and economic opportunities.

'The Tindall Foundation wants New Zealand to gain a benefit too in terms of its trading profile: we should be producing goods and services from a truly green country,' says Warren Snow. 'We're researching the key strategies and interventions a community has to put in place to achieve waste reduction and create consequent employment, where the goal is zero waste. Funding is the key element in making such changes.'

'Over four years, the work of Zero Waste has shown two common threads: an incredible energy among the unemployed which has not generally been realised, and significant employment oportunities in using wasted materials,' according to Warren Snow.

He instances a sample employment project based around crushed up wooden pallets, often damaged in the process of shifting goods in bulk. Thousands of these pallets, formerly wasted, are now crushed and coloured to resemble artificial bark then sold as ground cover for gardens and roadsides.

'We're focussing at the community level, where groups have an interest in work but are not making much headway,' Warren Snow says. 'We help them develop a plan, making use of their talents and potential.' In this way Zero Waste has helped start up many small businesses, including a recycling drop-off and sorting centre; also a business in "vermiculture", breeding and feeding worms in reclaimed organic rubbish.'

Pictures from Zero Waste's case files include from top: the Kaitaia recycling station, 'making money from the waste stream'; sorting materials for recycling generates employment and income; a 'green bike' scheme in Palmerston North offers the loan of rebuilt cycles, on an 'honesty basis', as an alternative to using cars; and (bottom) a range of products made from materials recycled from a rubbish dump

ALL PHOTOGRAPHS: ZERO WASTE

At Mangere, in Auckland, another scheme employs six people in a 'resource recovery park'. Based at Te Wharewatea Marae, this recycling company sorts waste materials from industry, handling large tonnages of offcuts and packaging, then sells them back to industry as still useful materials .

Waste Not Limited is a not-for-profit consultancy, initiated by Zero Waste but now self-funding, which advises business on cleaner production and 'waste minimization'. Employing from three to four waste-reduction experts, it has also proved a useful intermediate step for young environmental scientists forging a career path.

Warren Snow demonstrates the effectiveness of Zero Waste with a diagram he calls the recycling loop. He breaks the straight-line link between Disposal and Landfill with a diversion called Recycling Opportunities.

'A landfill doesn't pay for itself — in fact it is subsidized 100 percent by ratepayers,' he observes. 'Therefore we have to stop seeing recycling as an added cost and see it as an alternative disposal option.'

Zero Waste spreads the message that the good corporate citizen must take care not to destroy the environment on which its customers depend. The philosophy, which in many ways counters that of the Business Round Table, comes from a conscience which believes that working only for maximum profit is likely to destroy the necessary environment for business to operate successfully. Such ideas are being spread by authors like Paul Hawken (see box) whom the Tindall Foundation brought to New Zealand last year to talk to business leaders. According to Warren Snow, the ideas are catching on.

'We want to reverse the usual way of looking at rubbish disposal and look on rubbish as a resource.'

Changing Minds in Big Business

Much of the philosophy of Zero Waste is articulated in a recent book by Paul Hawken, *The Ecology of Commerce.* In it he argues 'the ultimate purpose of business is not, or should not be, simply to make money.' Business should also 'increase the general well-being of humankind through service, a creative invention and ethical philosophy.'

'Business people must either dedicate themselves to transforming commerce to a restorative undertaking, or march society to the undertaker,' he says. The book provides an intellectual counter to the philosophy of the totally free market economy, and provides a strong economic argument for going easy on the earth.

'Markets are superb at setting prices but incapable of recognizing true costs,' writes Hawken. 'The market of today is free but its freedom is partially immune to community accountability. Because markets are a price-based system, they naturally favour traders who come to market with the lowest price, which often means the highest unrecognized cost.'

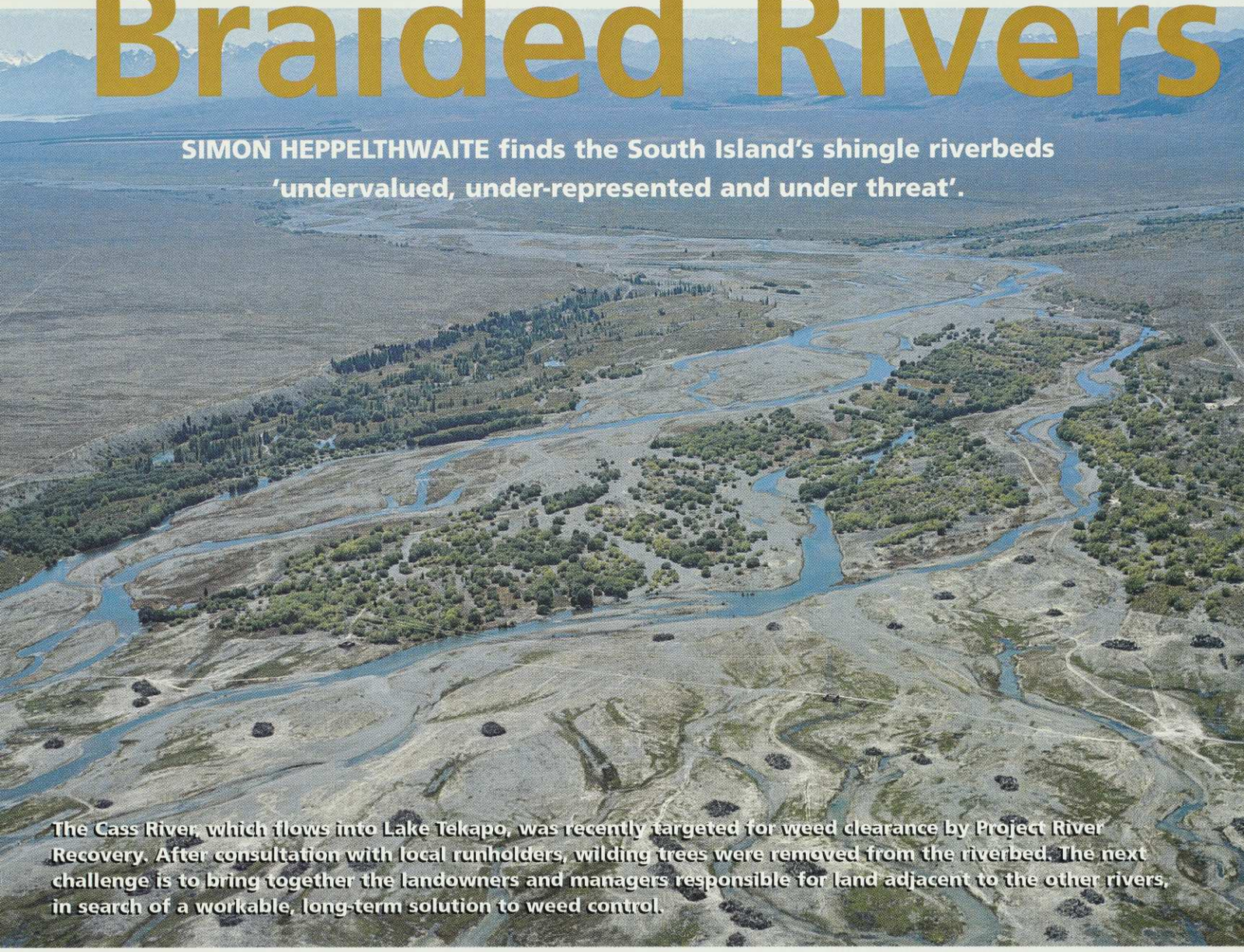
Paul Hawken argues that the real cost of producing goods needs to be included in their price. Efficiency shouldn't become synonymous with destruction of the environment. Business must change to serve the needs and wants of its customers, not destroy their environment in the interests of making maximum efficiencies.

'A restorative economy will have as its hallmark a business community that evolves with the natural and human communities it serves. This necessitates a high degree of cooperation, mutual support, and collaborative problem solving.'

As part of its work, the Tindall Foundation brought Hawken to New Zealand to meet with the leaders of big business. Hawken's book, *The Ecology of Commerce*, is published by Weidenfeld and Nicolson at RRP$69.95, but watch out for occasional copies of the paperback edition at around half the price.

Restoring Braided Rivers

SIMON HEPPELTHWAITE finds the South Island's shingle riverbeds 'undervalued, under-represented and under threat'.



The Cass River, which flows into Lake Tekapo, was recently targeted for weed clearance by Project River Recovery. After consultation with local runholders, wilding trees were removed from the riverbed. The next challenge is to bring together the landowners and managers responsible for land adjacent to the other rivers, in search of a workable, long-term solution to weed control.

PROJECT RIVER RECOVERY

Who is responsible for braided rivers?

There is virtually no formal protection for any braided river habitat. They are currently all designated as Unalienated Crown Land. Land Information New Zealand administers the riverbeds, whilst the regional council carries out flood protection work. The Department of Conservation is responsible for native plants and animals. Ngai Tahu Maori, district councils, Meridian Energy, Forest and Bird, Fish and Game and neighbouring landholders are the other major players in restoration efforts.

The braided river habitat and surrounding wetlands of the Upper Waitaki River catchment is disappearing fast, and its unusual wildlife is in consequent decline. Here, as in similar habitat throughout the South Island, the homes of some of New Zealand's rarest birds (and animals) are under threat.

This is a place drowned and dewatered by hydro development, and often drained for farmland. It is also extensively invaded by weeds, predators, exotic fish, and people. The Department of Conservation's Project River Recovery is about piecing together the fabric of this degraded landscape to restore the rich tapestry which forms the braided river habitat.

The complexity and scale of this dynamic landscape is daunting. Sinuous strands of icy water, loosely woven into braids across vast shingle riverbeds, issue forth from glacially carved valleys. The rivers flow across the largest inter-montane basin in New Zealand, and their shifting boundaries are dotted with ponds and wetlands.

Among the broad, barren beds of rounded riverstones are the last feeding and breeding grounds of the critically endangered black stilt, one of the world's rarest wading birds. Threatened black-fronted tern and wrybill also nest here, although they migrate to coastal areas for the winter. During spring and summer these braided rivers are home to 26 species of water birds.

Wrybill, in particular, have adapted to this environment by becoming the only bird in the world to have a bill which curves to the right. This allows them to more easily catch

insects on the underside of river stones.

All of these species, however, have requirements so specific to this habitat that extracting them to the sanctuary of predator-free offshore islands is not an option. Nor can they be isolated from the surrounding farmland or the pressures of recreational pursuits such as angling and off-road driving.

The challenge to reverse the decline in numbers of black stilt, combined with the loss of other braided river species, led to the concept of Project River Recovery conducted by the Department of Conservation in the Mackenzie Basin, near Aoraki/Mount Cook. Its goal is to retain the habitat and native ecological communities of the Upper Waitaki River catchment and stabilize or increase the populations of native animals under threat. Since its establishment in 1991 it has made significant gains, setting the pattern for future river recovery here, and elsewhere on the South Island's shingle riverbeds, which are found from Marlborough to Otago.

'The tools we have developed for the restoration of rivers in the Upper Waitaki catchment could be applied to other restoration projects,' says Kerry Brown, manager of Project River Recovery. 'The project will continue to focus on the key tasks of weed control, predator research and wetland enhancement. Through weed control we can retain habitat, but we need to know more about predators to achieve cost-effective predator control. Our assessment of constructed wetlands with predator-proof fences is very encouraging.'

Exotic weeds such as crack willow, gorse, broom, lupins and wilding (weed) trees seriously degrade the value of the riverbeds by covering feeding and breeding grounds. As they stabilize the normally shifting river channels, these weeds limit the positive effects of freshes and floods which once regularly eroded islands and channels and flushed the habitat clean. The weeds also attract rabbits: predators following them find nesting birds, eggs and chicks easy prey.

Weed control has so far resulted in more than 11,000 hectares of riverbed being maintained or restored as prime feeding and breeding grounds for birds. Targeted use of chemical herbicides has produced the best results on lupins, gorse and broom. On the productive deltas where the Tekapo and Ahuriri rivers flow into Lake Benmore, large areas of crack willow, which were smothering the riverbeds, have been mechanically removed and burnt.

Lupin and willow control is controversial. Many locals regard the plants as attractive additions to the landscape. There were also fears that both spraying and willow removal would degrade trout stocks. Stringent ecological monitoring of herbicide applications found no negative impacts on introduced trout, native fish, insects, birds or water quality.

To accommodate the concerns of the community, Project River Recovery reduced the spray area while staff of the Fish and Game Council surveyed trout numbers. They identified a long-term decline in all size classes of trout which began before willow removal occurred. The decline also occurred in areas not affected by willow, or other weed control, which suggests a natural process is the cause.

Herbicide application provides safe, cost-effective management for Russell lupin. More than $100,000 was spent investigating biological control without discovering any other viable options.

Measuring the benefits of weed control has not been easy or cheap. Aerial photography of weed distribution is expensive. Superbly camouflaged chicks also make it difficult to measure increases in bird productivity.

Monitoring breeding birds in the Tekapo and Ahuriri deltas shows black stilt, black-

MARK SANDERS

The extension of the Ruataniwha wetland adjacent to the Upper Waitaki River is a major achievement of Project River Recovery. Stop-log weirs control water levels through the seasons. As summer advances the wetlands are progressively lowered exposing fresh areas of the bottom for birds to feed on.

Removing willows from the Tekapo Delta, to restore the natural run of the river. Weed-infested shingle beds, and clogged waterways, destroy bird habitat. After clearance, threatened and endangered species have returned to feed and nest in the delta.

ROD MORRIS, DEPARTMENT OF CONSERVATION

M.F.SOPER, DEPARTMENT OF CONSERVATION

ROBIN SMITH, DEPARTMENT OF CONSERVATION

Wrybill (ngutu parore) at nest with chick(top right). The only bird with a bill bent sideways, this feature is often described as a special adaptation for hunting insects beneath stones in this harsh environment.

The impact of weed and pest invasion also affects the unusual wildlife and plants which have evolved in this extreme environment. The endangered grasshopper Brachaspis robustus *(below right) is found only along the riverbeds of the Mackenzie Basin.*

Project River Recovery

The restoration of the braided rivers of the Mackenzie Country began in 1991. Project River Recovery was set up by the Department of Conservation and ECNZ after consultation with the Waitaki Water Rights Working Group, of which Forest and Bird was a member. The compensatory-funding agreement between ECNZ (now Meridian Energy) and DoC will continue until 2024. It aims to work with Meridian Energy to create or enhance areas of river and wetland habitat similar to those lost through hydro development in the braided rivers of the Upper Waitaki.

Predator Research

'Video photography identifies the main predators at birds' nests as cats, ferrets and hedgehogs. Stoats, a hawk and a magpie also preyed upon chicks and eggs,' says project scientist Mark Sanders.

Video cameras set up at nest sites provide indisputable proof of the impact predators have on nesting birds. Little is known, however, of the survival rate of mobile chicks that leave the nest.

Using radio-transmitters on black-fronted tern chicks and juveniles, and banded dotterel juveniles, PhD student Rachel Keedwell is measuring chick and juvenile mortality to establish population models. Banded dotterel chicks are too small for transmitters, so a muzzled tracker dog will be used to locate them next season.

More than 1000 hedgehogs were caught in a trapping campaign which was undertaken in response to the illegal introduction of rabbit haemorrhagic disease (RHD, formerly known as RCD). Videos also identified them as important predators.

Over two summers hedgehogs were tracked by research student Kirsten Moss, who found they ate a wide range of insects. However their guts also contained feathers, egg shells and lizards. She also discovered that they have large home ranges, but mostly use a core area of about eight hectares. This is important information for designing hedgehog-control operations.

Several other predator research projects are underway in the upper Waitaki, by Landcare Research, university students and DoC. A regular research meeting run by the project brings these parties together to discuss methods, findings and directions, and helps to avoid unwanted overlaps between experiments.

PROJECT RIVER RECOVERY

Caught by a night-sight video camera, a hedgehog (centre) preys on the riverbed nest of a banded dotterel. Research demonstrates that predation is the main cause of nesting failures.

ROD MORRIS, DEPARTMENT OF CONSERVATION

Top: Black stilt (kaki), at nest on the Tekapo River. This is the only known breeding area of this 'critically endangered' bird, of which only a few more than 100 exist. Above: Black-fronted tern with eggs. This is an inland bird usually seen hawking insects over fields, and the shingle riverbeds where it nests. It winters on the coast.

Shock waves from RHD (RCD)

The introduction of RHD (RCD) was a huge pebble in our ecological pond. Rabbits have declined (at some places and at various times) and, as expected, predators have switched to eating more native fauna. In some areas up to 36 percent of rabbits are already immune to RHD. There are fears that fluctuations in rabbit and predator numbers could result in repeated prey-switching events, with hungry predators turning more to birds. Alternatively, reduced rabbit and predator numbers could mean reduced predation pressure but it's too early to tell. Fewer rabbits can also mean more weeds, especially in riverbeds. More vegetation means more lizards and invertebrates, with a probable increase in their predators (rats, stoats and hedgehogs) and a corresponding decline in the rabbit-eating cats and ferrets. Due to the complex nature of the system it will be decades before the net gain or loss to native fauna is known.

fronted tern, and many other species nest in the restored habitat. Studies comparing foraging and nesting behaviour, between cleared, uncleared and willow free areas, conclude that willow removal is beneficial to birds. Predator control may also be required, however, to increase populations.

Along with habitat loss, predation is a major threat to birds in braided rivers.

'Project River Recovery now has the tools to provide quality habitat for these species to feed and breed,' says Kerry Brown. 'The challenge is to provide enough protection from predation and disturbance to allow their populations to grow.'

Initially there was little definitive evidence of population decline among many riverbed species. Project managers set out to determine the importance of predation and to identify the key predators; and to measure bird population trends. Over a five-year study, video cameras recorded the causes of death at 138 nests of black stilt, black-fronted tern and banded dotterel. Cats, ferrets and hedgehogs caused 89 percent of predation. All except one raid occurred at night.

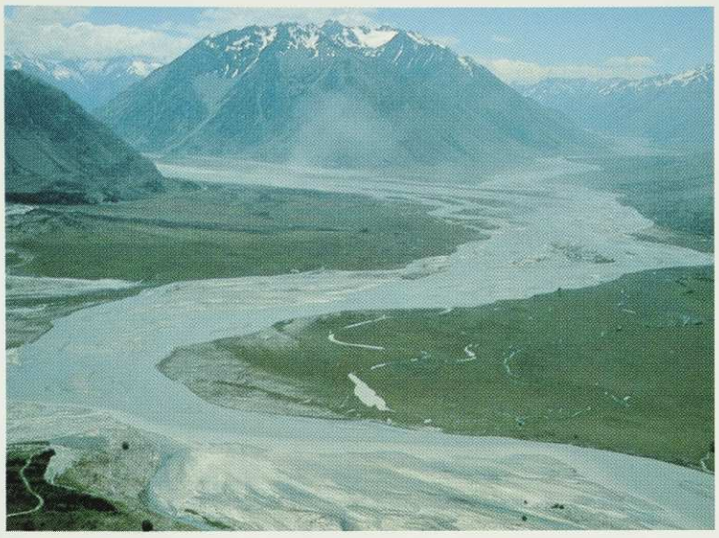
Simply eliminating these predators is not an option, however, due to constant re-invasion from surrounding land. Research now aims to identify how much predator control is needed to enable threatened bird species to recover. (See box).

Fences to control predators may be an alternative to trapping but they cannot be applied to braided rivers because of the unpredictable, changing courses of the river channels.

The option of fencing adjacent wetlands was tested at seven sites by Mark Sanders, who was based at Canterbury University in 1993 and 1994 (prior to joining the project staff). He found that new or modified wetlands could provide large quantities of suitable prey species for wetland birds.

During the 1970s pioneering work on predator fencing was undertaken at two high-country lagoons by South Canterbury Forest and Bird, along with the Wildlife Service and Ray Pierce. The fences and lagoons have since been enlarged and updated as part of Project River Recovery, and water levels are better controlled through stop log weirs. By gradually lowering the level of water, to create fresh shallows, the maximum feeding habitat is provided during the breeding season. The weeds, which sprout up in the freshly exposed areas, become food for microbes and insects when the ponds are refilled during winter.

On a terrace above the Ohau River, the 11-hectare Ruataniwha Wetland was created and fenced in 1993. So far 98 hectares of



PROJECT RIVER RECOVERY

Braided river landscape typical of the Mackenzie Country, where rare and endangered birds are breeding. Project River Recovery aims to restore this form of landscape by removing weeds and researching effective pest control and creating protected wetlands. Picture shows the Hopkins and Dobson rivers and their associated wetlands, near Lake Ohau.

wetland and surrounding breeding areas have been predator fenced. Another 19 hectares of wetland have recently been created at two further sites, although they have yet to be fenced. A six-year study is currently underway to determine the relative conservation gains of wetlands with predator fences.

Wetland enhancement and creation, along with predator fences and trapping, have already proved highly successful, with a variety of birds making immediate use of them. Some wetlands have been used as release sites for captive-reared black stilt. A colony of 80 black-fronted tern nesting in the new Ruataniwha Wetland was another notable success. The birds nesting in the fenced wetlands have a much higher breeding-survival rate — over 90 per cent. Birds nesting outside the fences typically have less than a 40 percent survival rate.

Fenced wetlands also have the advantage of keeping out people, who are another major factor in disturbing the birds. There has long been conflict between some anglers and river birds, while the growth of 4WD use has dramatically increased interaction and conflict in the riverbeds. The spring fishing season clashes with the breeding season and disturbance from anglers, walkers, drivers and dogs can cause birds to abandon nests and chicks. Four-wheel-driving can crush eggs and chicks, and the wake from a jet boat can swamp nests.

It is difficult for recreational users to see braided rivers as fragile nurseries for threatened species when they look like barren wastelands. To increase awareness of the needs of wildlife, an advocacy programme has been established to alert the public to the impacts of weed invasion, predation and disturbance. Signs, articles, pamphlets and press releases have been produced and riverbed access roads have been clearly marked to encourage the use of established tracks. A liaison officer was based at the Ohau-Tekapo delta last summer when adjoining campgrounds were full. A 'braided river care code' has been produced and efforts are directed at educating anglers to recognize bird disturbance, and respond appropriately.

Project River Recovery is producing the hard facts about conservation and the techniques which could save our threatened braided rivers elsewhere in the South Island.

SIMON HEPPELTHWAITE *is community relations officer for the Department of Conservation at Twizel in the Mackenzie Country. His background is in ecotourism, education and ecological restoration.*

Reading the Rocks

Beyond the ken of most of us, and almost beyond our imagination, great forces within the Earth shape our land. The surface of the Earth lies on crustal plates, which bump and slide and buckle against each other, riding over or descending beneath the adjacent mass.

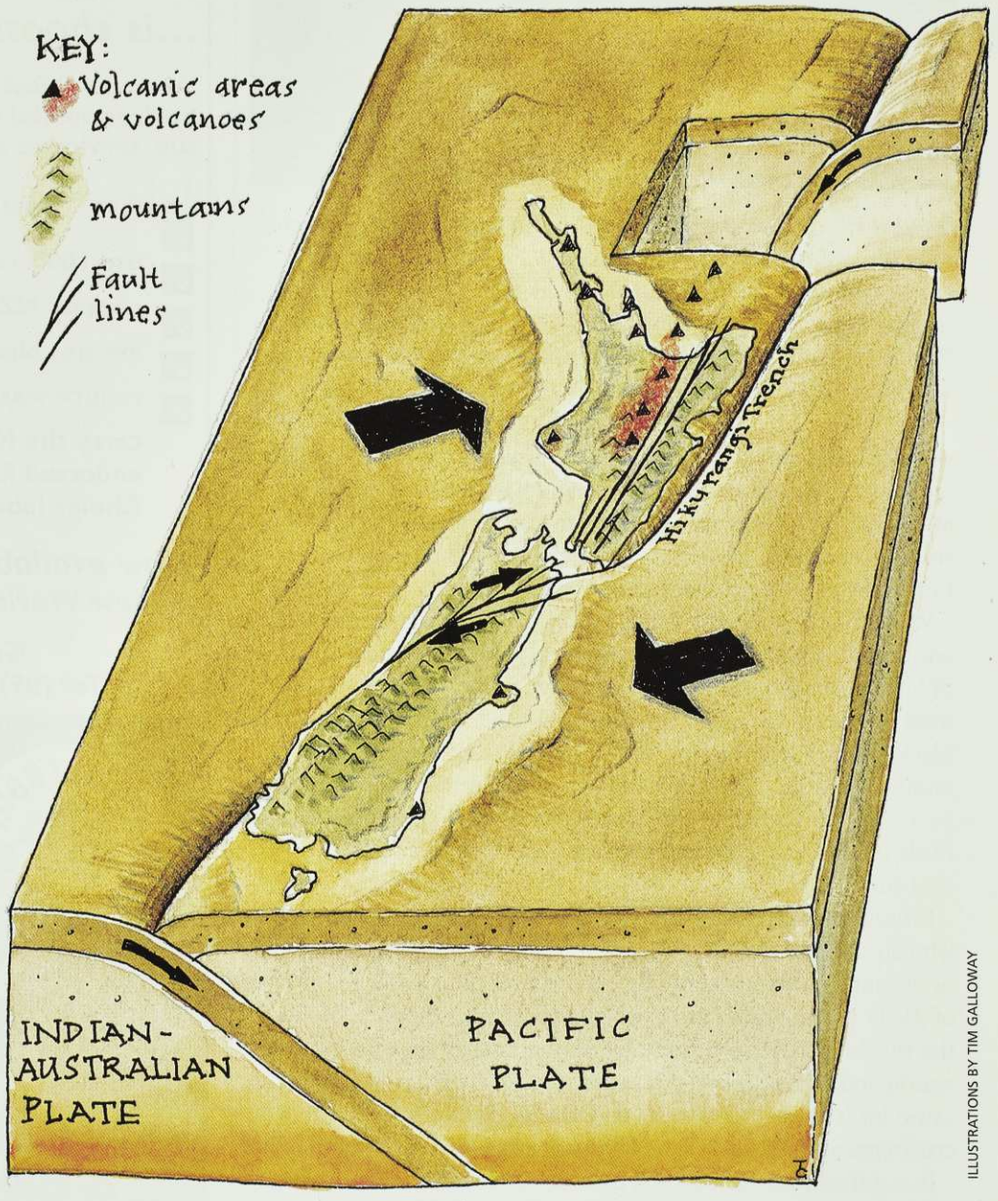
The gradual effects of mountain building are so slow that we do not notice them. The violent episodes of earthquake and eruption are long remembered but, when the earth is still, we overlook the marks they leave. Yet all around us is a landscape bearing witness to the subterranean power.

Our country lies on the boundary where the Pacific Plate to the east meets the Indian-Australian Plate to the west. The plate boundary skirts the North Island, curves west to cross the South Island about Kaikoura, and then turns south again down the west coast of the South Island.

East of the North Island the Pacific Plate is being pushed deep under the Indian-Australian Plate, while south of the South Island, the situation is reversed: the Indian-Australian Plate graunches into and under the Pacific Plate. The plates carry sediment, washed over aeons to the sea floor from the erosion of previous land masses. As one plate goes down, its sediment is shorn off and rucked up by the over-riding plate. It doesn't happen quickly — a mere centimetre or two a year, yet this merry-go-round of erosion and rebuilding has created range after range of mountains, from the Raukumara of East Cape, to the Kaweka, Kaimanawa, Tararua and Ruahine ranges, and the Southern Alps. From high above, it looks as if a wave of wrinkles is travelling across the land.

The foothills on the margins of these uplifted mountains are often made of the most recent sediment raised from the sea. They are soft rocks — mudstone and sandstone — and easily eroded, as seen in the hill country of Taranaki, Taihape and Gisborne.

From Taranaki north, the forces of volcanism also mould the land. These forces overlay the processes of erosion and mountain building. Imagine that the Pacific Plate is diving steeply beneath the Indian-Australian Plate, like a conveyor belt going down. Sometimes the belt jams, then moves again, and an earthquake rocks the land above. Then the conveyor drives on, carrying deep into the Earth its harder crustal plate of ocean floor, and sometimes sediment too. At a depth of about 85 kilometres, the crustal rock becomes molten. Directly above is the zone of volcanic activity, where molten rock rising through cracks and weak places bursts out as volcanoes.

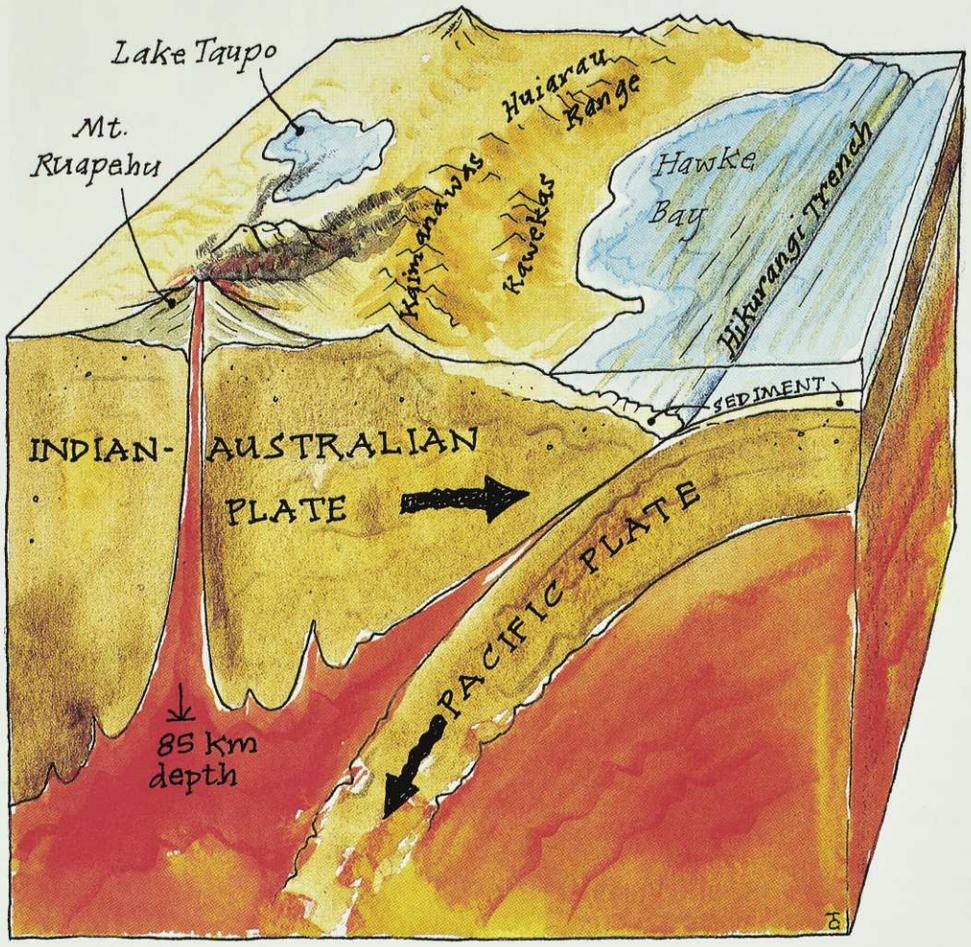


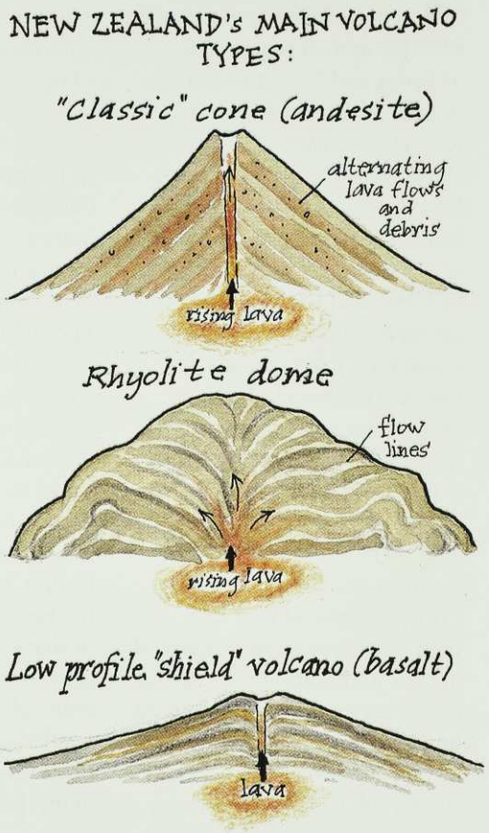
ILLUSTRATIONS BY TIM GALLOWAY

At present, the zone of volcanic activity is about 250 kilometres west of, and parallel to, the boundary line where the Pacific Plate is pushing under the Indian-Australian Plate. This volcanic zone runs from the mountains of Tongariro National Park northward to the thermal area of Waimangu and the craters of Tarawera, to White Island, off the coast, and beyond to the string of undersea volcanoes named 'Rumble 1' to 'Rumble 5'.

There are older extinct volcanoes to the west of this, such as the Coromandel Ranges. A theory that explains this pattern is that the orientation and position of the plate boundary has moved over time.

The youngest volcanoes, which arise in the Rotorua and Taupo regions, are made of andesite or rhyolite. Andesite forms from lava derived from a mixture of land sediments and heavier, basalt material from the ocean floor. Rhyolite rock is dif-





Interpreting our mountains is further complicated by the plates sliding sideways against each other along the Alpine Fault through the South Island. Once, Dun Mountain near Nelson and the Red Mountains of Fiordland were side by side. Their identical and dramatic red rock composition betrays their early relationship.

ferent; it is a melt mainly of land-based sediments, which have rafted down the conveyor belt deep into the earth and become molten lava.

Far back to the west of the active fronts of andesite and rhyolite volcanoes are the basalt volcanoes. Basalt comes from melted and recycled sea floor. Some of the basalt rock of Northland was erupted at the same time that the Coromandel volcanoes have been active. The basalt volcanoes of Auckland were recently active, though they are 'resting' at the moment. Rangitoto erupted just 600 years ago.

It isn't always easy to recognise a volcano. The shape depends on the type of rock.

The classic cones of Taranaki and Ngauruhoe and the jagged peaks of Ruapehu are typical of andesitic volcanoes.

Rhyolite domes such as Ngongotaha and Mount Maunganui occur where thick lava has bulged up and flowed out like treacle, or sometimes never flowed at all.

Other rhyolitic volcanoes are so explosive that they blow themselves out as vast clouds of hot pumice and then collapse, leaving a sunken basin or caldera. One such 'master blaster' created the deep caldera of Lake Taupo. Another resulted in Lake Rotorua. These eruptions can be so hot that the loose pumice and ash are welded together when they come to rest on the ground to form flat, ignimbrite plateaux such as the Mamaku.

In other forms of volcano, runny basalt lava builds up low profiles such as Rangitoto Island, while gassy basalt explodes as in the red scoria of Auckland's Mount Eden.

Not all volcanoes fit these shapes; nor do they retain their shapes after millions of years of wind and rain have worn them down and dissected them into hills and gullies. Between 12 million and six million years ago, low cones of basalt rose over the sites of the Otago and Banks peninsulas. Today the gullied crater walls form the hills of the peninsulas, with the sea making harbours of the eroded craters.

From the eroding mountains of our island chains, the rivers have carried sediment and the winds have blown dust to build the plains of Canterbury, Southland, Hawkes Bay and Hauraki. We now farm these rich spoils, in the brief flicker of geological time which we humans occupy, before they return to the sea to begin the cycle of mountain building again.

— by Ann and Basil Graeme.

BASIL *and* ANN GRAEME *live in Tauranga. Basil is a former Forest and Bird conservation officer, while Ann is national organiser of Forest and Bird's Kiwi Conservation Club.*

Old Blue Awards for 1999

The Society's 1999 awards recognising services to conservation were presented at the annual general meeting of Forest and Bird at Wellington in June. The recipients were:

Ron. D. Greenwood (Wellington). In recognition of his exceptional generosity in helping fund many important conservation projects undertaken by Forest and Bird branches, and for his enthusiasm and keen interest in the protection of nature. The Ron D. and E.A. Greenwood Environmental Trust devotes the major share of its cash resources directly to activities at Forest and Bird branch level. In recent times this has included: purchase of trees to plant; purchase of land for a native tree reserve; stimulation of interest in marine area preservation; preservation of native forest; information signs; water treatment units; acquisition of wetlands; tools used in a planting project; boat-fares for volunteers to a replanting site; protection of a marine reserve; identification signs on a walkway; conversion of a bog to a planted area; preservation of penguins; education of school pupils; potting mix, tools and planter bags; restoration of bush areas; construction of shade houses; underwater surveys for a marine reserve; and measures to reduce possum populations.

Michael Winch (Far North). Recognising his dedication for conservation over the past decade in a remote and important part of New Zealand, and particularly his advocacy for nature on general conservation issues and through Resource Management forums. Michael is the chair of the Far North Branch and has devoted virtually all his spare time to Forest and Bird for many years. Most significantly, he has 'battled' in an area that is sometimes hostile to conservation.

Jenny Treloar (Te Puke). For her outstanding contribution to the Te Puke Kiwi Conservation Club and her inspiration to countless children, encouraging them to learn and care for natural New Zealand, and also for leadership in branch activities for many years. Jenny Treloar has been the leader of Te Puke KCC since its inception and has led dozens of trips, organised camps and evening meetings. Her teaching skills are reflected in the games she devised to teach children to be observant and know the names of native plants and animals. She has been on the Te Puke branch committee since the branch began and was chairman for several years. A farmer's wife, she is a role model of Forest and Bird in the rural sector.

Don Chapple (Hauraki Islands). For his 'extraordinary commitment' to conservation on Waiheke Island, in particular the extensive revegetation programmes, and work with school groups, the Conservation Corps, community service workers, Task Force Green and in community education. His latest, most ambitious project, now five years on, is revegetating a 16-hectare area of hillside donated to Forest and Bird. At age 69, he works for at least five days a week on this self-imposed task and cycles to and from 'work' every day with a packed lunch and a thermos of tea.

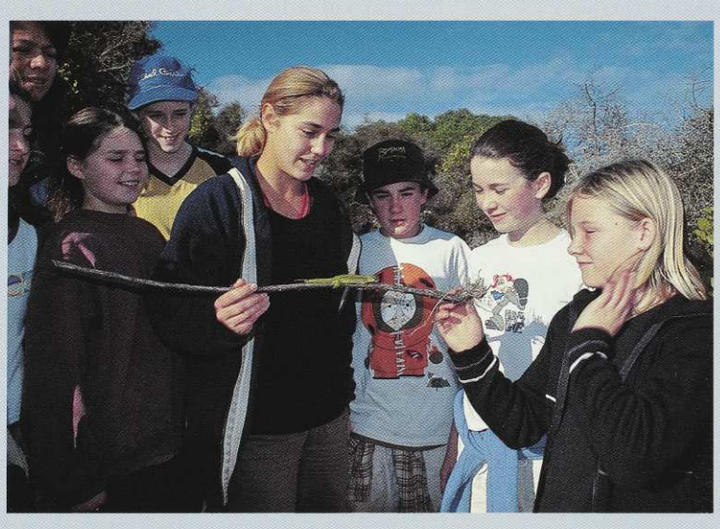
Graham Falla (South Auckland). In recognition of a 'sterling voluntary effort' for Forest and Bird over 25 years, and an ongoing commitment to the protection and restoration of New Zealand's natural heritage, and for planting projects using eco-sourced seedlings. Graham Falla was on the inaugural South Auckland branch committee, has been the chair and is still a member of the committee. He has led many revegetation projects, including Totara Park, Olive Davis Reserve, Clevedon Polo Grounds and Maketu Pa.

Christine and Brian Rance (Southland). Recognising their exceptional work as botanist and horticulturalist and their dedication to the conservation of New Zealand plants, including the 'modern Noah's Ark', a threatened plant garden which propagates plants for native plant restoration. (See Conservation Briefs, page 10). Brian is a botanist and Christine a horticulturalist both working for the Department of Conservation. Brian has to his credit the discovery of three entities — subalpine herbs — formerly not named or described; Christine has interests in Otatara Landcare, Te Rere, Riverton Estuary Care, Southcoast Environment Centre and Women in Conservation.

LYN BATES

Four of the winners of Forest and Bird's annual Old Blue Awards for conservation work received certificates at the annual general meeting in Wellington. They are (from left), Graham Falla (South Auckland), Jenny Treloar (Te Puke), Ron Greenwood (Wellington) and Michael Winch (Far North). 'Old Blues' were also awarded Brian and Christine Rance (Southland) and Don Chapple (Hauraki Islands).

Hunt for jewelled gecko



NEVILLE PEAT

Young conservationists from Broad Bay School on Otago Peninsula learn about threatened jewelled geckos from Otago University scientist, Nadja Schneyer. The Forms One and Two students were studying geckos at the Every Scientific Reserve at Broad Bay, as part of their activities with Forest and Bird's Kiwi Conservation Club. From left are: Jenna Dickson, Danielle Ingle, Nadja Schneyer, Oliver Wates, Olivia Raffils and Jenah Ferguson. Nadja Schneyer is conducting her M.Sc research into predator impacts on the geckos in the reserve. The shrub-dwelling jewelled gecko Naultinus gemmeus *is found only on the east coast of the South Island and possibly at Stewart Island. The small Every Reserve, purchased in 1993 with the assistance of the Dr Marjorie Barclay Trust, has been a stronghold for the species. — Neville Peat*

Replanting the Port Hills

Celebrating Arbor Day, more than 250 children from Christchurch schools joined efforts to restore native forests to the slopes of the Port Hills above Christchurch. The replanting is part of the Port Hills 2000 project chaired by a former Forest and Bird executive councillor, Di Menzies. Crusader's player Con Barrell was a special attraction to the day, organized by North Canterbury Forest and Bird.

DI MENZIES

Bats in South Canterbury

Members of Ashburton and South Canterbury Forest and Bird have joined the hunt for long-tailed bats begun last year by Waikato members. The Department of Conservation has initiated a national monitoring programme for long-tailed bats, focussing on populations at the Eglinton Valley (Fiordland), Hanging Rock (near Geraldine) and Te Kuiti.

Naturalists first noted declines around the turn of the century and today they have disappeared from many of their old haunts. The primary aim of the current monitoring programme is to assess the size of these three populations and to determine whether they are stable or declining, and the factors relating to those population trends.

Historically, long-tailed bats were much more widespread than they are today. Along with short-tailed bats, they are our only native land mammals and are unobtrusive and easily overlooked by most people. Weighing in at only 10 grammes and with a total wingspan of about 20 centimetres they are as acrobatic as the fantail, but travel much greater distances, at speeds of up to 60 kilometres an hour, as they forage for insects along forest margins and over the canopy.

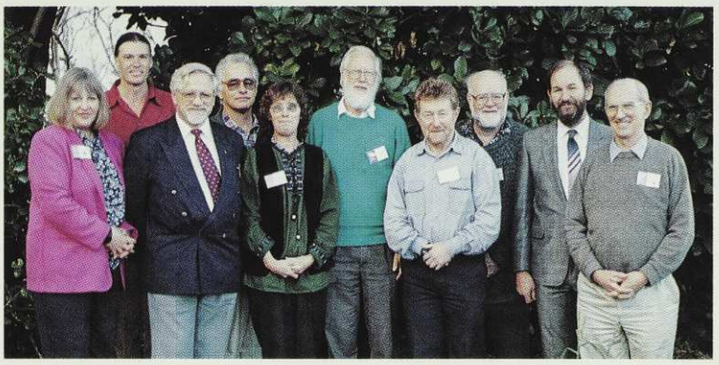
Their nocturnal habits make them difficult to observe, but as Forest and Bird helpers have recently found out, there is more than one way to track them down.

First and foremost in any bat-researcher's tool kit is a bat detector — a small black box that converts high frequency bat calls into a sound that humans can hear. Also important in the kit are several harp traps — large rectangular aluminium frames strung with vertical nylon fishing line with a catching bag underneath. Echolocation signals from the bat are confused by the vertical strings, the bat flies into them and drops into the collecting bag where they are collected the next morning and banded, weighed, measured, aged and sexed.

Some are fitted with tiny radio transmitters weighing only 0.8 gramme, with another important tool in the research kit, being an aerial and receiver. Bats can then be followed around at night, and tracked to their roosts the next day. Forest and Bird members from Mayfield, Pleasant Point, Geraldine, and Ashburton districts have recently assisted with bat counts using this equipment. They undertook walking surveys around roads at each site to assess bat activity in the surrounding landscape. Most members were happy to spend two to three hours each night surveying and were rewarded by seeing bats close up in the hand. Some enthusiastic Forest and Bird members were determined not to get any sleep at all and helped track bats during their nocturnal wanderings.

Such work helps gather information about how many bats there are, and what habitat they are using for foraging and roosting. Ongoing monitoring will allow population trends to be assessed and provide information necessary to manage any threats to these and other populations of long-tailed bats. – *Ines Stager.*

New Executive Declared



GORDON ELL

The new Forest and Bird executive, declared without need for an election, at the 1999 annual general meeting. The executive councillors from left are: Christine Henderson (Southland), Peter White (Hauraki Islands), Keith Chapple (King Country) president, Derek Schulz (Wanganui), Linda Conning (Eastern Bay of Plenty), Philip Hart (Waikato), Chris Peterson (Wairarapa), Peter Maddison (Waitakere), Bill Gilbertson (Nelson) deputy president, and David Underwood (Wellington) treasurer.

With nominations equalling vacancies, there was no election for the Society's executive councillors at the annual general meeting. Two executive members, Kit Howden of Central Auckland and Di Menzies of North Canterbury did not stand again: they are replaced by Dr Peter Maddison of Waitakere and Chris Peterson of Wairarapa.

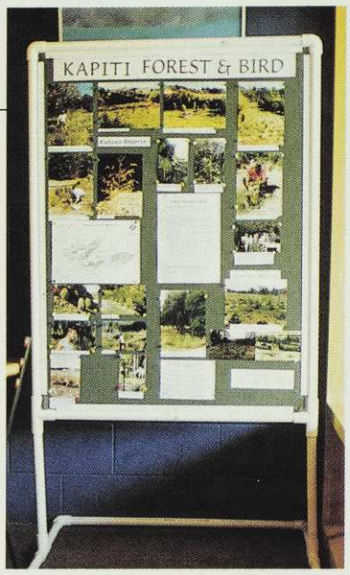
The executive for 1999-2000 comprises the national president, Keith Chapple, King Country; deputy-president Bill Gilbertson, Nelson; treasurer, David Underwood, Wellington; and executive councillors, Linda Conning, Eastern Bay of Plenty; Philip Hart, Waikato; Christine Henderson, Southland; Peter Maddison, Waitakere; Chris Peterson, Wairarapa; Derek Schulz, Wanganui; and Peter White, Hauraki Islands.

Kapiti Branch Display Board

Kapiti Branch has a new display board which was used to publicise some of the branch activities at an open day at the Paraparaumu Community Centre. It is presently doing the rounds of libraries, cafés, etc.

The current display shows photos of joint Kapiti Branch/Kapiti Coast District Council planting projects at Kaitawa Reserve, Paraparaumu, and at Greendale, Otaihanga. There is also a map showing the plantings at Kaitawa Reserve, a summary of branch attractions and activities, a branch contact list and a copy of its winter programme, with new-membership forms.

The display board was made by a member from 40mm plastic waste pipe, 15mm aluminium channelling and half a sheet of pinex covered with green hessian. — *David Gregorie*

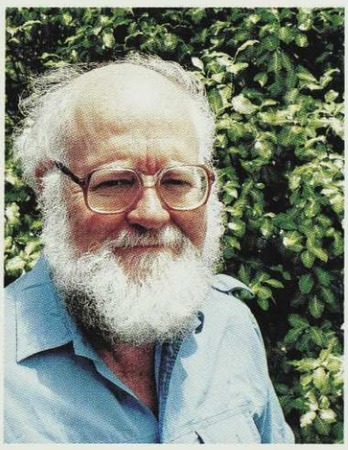


DAVID GREGORIE

Chris Peterson (left) who joins the executive for 1999-2000 is chair of the Wairarapa branch of Forest and Bird. He is also a Masterton district councillor and manages the Holdsworth facility in the Tararua Conservation Park under contract to the Department of Conservation. Among other things he has been a biology teacher, a deerculler, and has established an outdoor and environmental trust.

Waikato Branch Funds for Conservation

Grants of up to $6000 are available from the Waikato Branch of Forest and Bird, for conservation projects to be undertaken next summer. The grants (from a pool of $10,000) could help fund research, practical projects, or advocacy for conservation. There is no restriction as to the type of project, provided it contributes to nature protection; relevance to the Waikato-Coromandel region could help, however. There is no application form. Send details of the project along with a budget to Tracey Greenwood, Secretary, Waikato Forest and Bird, PO Box 11-092, Hillcrest, Hamilton. Applications close on September 30.



GORDON ELL

Dr Peter Maddison (above) previously served on the national executive in the early 1990s, and is on the committee of the Waitakere branch of Forest and Bird. He is an environmental consultant and has previously been a Government entomologist. He recently completed his second term as a Waitakere City Councillor where he chaired the hearing committee.

Auckland Office Changes

The Auckland office of Forest and Bird is now located at Suite 501 on the fifth floor of the T&G Building, at the corner of Wellesley and Elliott streets in central Auckland. The box number (PO Box 106-085, Downtown) and telephone/fax numbers (303-3079/303-3514) are the same as before. Unfortunately, the lift only goes as far as the fourth floor, with stairs to the fifth. As the office is only staffed part-time please ring before calling to ensure it is open.

RON D AND E.A. GREENWOOD ENVIRONMENTAL TRUST

The trust provides financial support for projects advancing the conservation and protection of New Zealand's natural resources, particularly flora & fauna, marine life, geology, atmosphere & waters.

More information is available from the Trust at PO Box 10-359, Wellington

Kiwis for Kiwis

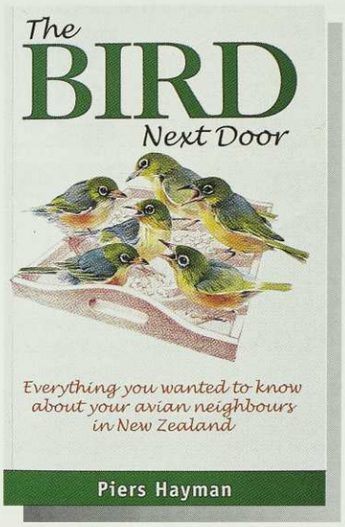
ENVELOPE SAVERS

Napier branch has a supply of pads of these. Each contains 50 sheets, gummed on the back. Cost $3 per pad; bulk orders of 10 or more to branches $2.50 per pad. Send orders to "Envelope Savers", 160 Vigor Brown St, Napier. Make cheques payable to Napier Forest and Bird.

Conservation Cards for Christmas

Send 'Seasons Greetings' this year on attractive photographic summer holiday or nature cards. For details send SAE to Conservation Cards, PO Box 33-029, Takapuna 1309

bookreviews



The Bird Next Door

by Piers Hayman, 160pp, New Holland, Auckland,1999, RRP$19.95.

No book could live up to this one's subtitle of 'Everything you wanted to know about your avian neighbours in New Zealand' but it's certainly full of interesting gossip. Piers Hayman, artist and writer, long contributed a column of information about birds to the *New Zealand Herald* during the 1980s and the kind of subjects he featured appear again here. The book is basically a selection of tales built around commonly asked questions about birds.

A section, 'Trouble with the neighbours', answers frequently asked questions such as 'How can I keep the birds off my building?', 'Why do birds keep crashing into my windows?', and 'Why can't I let my dog run in the park?'. 'UFOs, freaks and strangers' picks up on blackbirds with white feathers, 'Is that a sparrow with a strange looking beak?' and 'Are all white herons, white herons?'

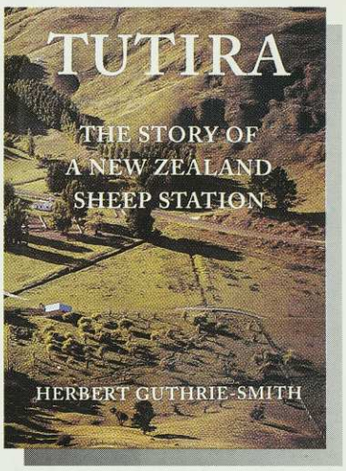
Other sections of the book deal with bird features (why birds have feathers, why some migrate), threats (disasters), bird-watching tips, and a section on helping wild birds, (Piers Hayman was a founder of Bird Rescue).

Purposely, there is little science. Piers Hayman's black and white scraperboard illustrations (72 in this book) are a particularly attractive complement to the 64 questions answered.

Tutira, the Story of a New Zealand Sheep Station

by Herbert Guthrie-Smith, 464pp, Godwit, Auckland 1999, RRP$39.95.

Probably New Zealand's most unread 'classic' Tutira is rediscovered here by an American academic and published simultaneously with the University of Washington Press. Guthrie-Smith farmed around Lake Tutira in the Gisborne back country late in the nineteenth century and into the twentieth, making all those mistakes with farming techniques which have



turned this region into the fragile place it is today. He loved nature, however, and kept detailed note of what was done to make a farm, and the effects this had on the land.

Tutira lies in the tradition of the country diary, the meticulous recording of wildlife and nature through the seasons and the years: for comparison, Gilbert White's *Natural History of Selborne* comes to mind. Like White, Guthrie-Smith looks at the form of the land and its changing condition; he describes the history, wildlife and plants, and notes their inter-relationship with his farming adventures.

Unlike *Selborne*, the New Zealand story is less a lasting record of a vanished arcadia: it is more a documentation of change and degeneration, as overstocking, weeds and pests and natural disasters reshaped the land.

By the standards of his time Guthrie-Smith was a conservationist, and his record of the changing natural history of a sheep farm is still valuable.

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Kids love learning about the natural world and how to protect and enjoy it. The Kiwi Conservation Club is for young people aged 5 to 12 years. It encourages an appreciation of nature, and promotes fun, conservation-based activities. Membership is available to individuals, families and schools.

KCC members receive:

- Five copies annually of the KCC magazine, packed with interesting stories, games, jokes and projects.
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- Notification of activities and trips held in most areas by local KCC groups.

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☐ senior citizen	☐ senior family		$35.00
☐ student/schools	$30.00	☐ libraries	$47.00
☐ corporate	$100.00	☐ life (single only)	$675.00
☐ overseas	NZ$67.00		

Kiwi Conservation Club membership category *(all prices include GST)*

☐ single	$12.00	☐ family (no. of children _____)	$20.00
☐ mini set (4 magazines)	$22.00	☐ class set (30 magazines)	$55.00
☐ overseas	NZ$22.00		

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branch*directory*

lodges*accommodation*

Arethusa Cottage
An ideal place from which to explore the Far North. Near Pukenui in wetland reserve. 6 bunks, fully equipped kitchen, separate bathroom outside. For information and bookings send a stamped, addressed envelope to: Pat Platt, Waterfront Road, Pukenui, RD4, Kaitaia. (09) 409-8757.

Tai Haruru Lodge, Piha, West Auckland
A seaside haven set in a large sheltered garden on the rugged West Coast, 38km on sealed roads from central Auckland. Close to store, bush reserves and tracks in the beautiful Waitakere Ranges. Double bedroom and 3 singles, plus large lounge with open fireplace, dining area and kitchen. The self-contained unit has 4 single beds. Bring food, linen and fuel for fire and BBQ. For details and rates send stamped addressed envelope to Ethne Richards, 1/109 Fredrick St, Hillsborough, Auckland. (09) 625-8627.

Waiheke Island Cottage
The cottage at Onetangi has comfortable bunk accommodation for 8 people and has a stove, refrigerator and hot water. Adjacent to a 49ha wildlife reserve, it is in easy walking distance from shops and beach. It is reached by ferry from Auckland City. Everything is supplied except linen and food. No animals. For rates send an addressed envelope to the booking officer, Maya Spence, 16 Hobson Tce, Onetangi, Waiheke Island. (09) 372-9333.

Ruapehu Lodge, Tongariro National Park
Situated 600 metres from Whakapapa Village, at the foot of Mount Ruapehu, this lodge is available for members and their friends. It may also be hired out to other compatible groups by special arrangement. It is an ideal base for tramping, skiing, botanising or visiting the hotpools at Tokaanu. The lodge holds 32 people in four bunkrooms and provides all facilities except food and bedding. Bookings and inquiries to Forest and Bird, PO Box 631, Wellington. Tel: (04) 385-7374, fax: (04) 385-7373. Email: office@wn.forest-bird.org.nz

William Hartree Memorial Lodge, Hawkes Bay
Situated 48km from Napier, 8km past Patoka on the Puketitiri Rd (sealed). The lodge is set amid a 14ha scenic reserve and close to many walks, eg: Kaweka Range, Balls Clearing, hot springs and museum. The lodge accommodates up to 15 people. It has a fully equipped kitchen including stove, refrigerator and microwave plus tile fire, TV, hot showers. Supply your own linen, sleeping bags etc. For information and bookings please send a stamped addressed envelope to Pam and John Wuts, 15 Durham Ave, Tamatea, Napier. (06) 844-4751, email: wutsie@xtra.co.nz

Matiu/Somes Island, Wellington Harbour
Joint venture accommodation by Lower Hutt Forest and Bird with DoC. A modern family home with kitchen, 3 bedrooms, large lounge and dining room, just 20 mins sailing by ferry from the centre of Wellington or 10 mins from Days Bay. Ideal place to relax in beautiful surroundings, with accommodation for 8. Bring your own food and bedding and a torch. Smoking is banned everywhere on the island, including the house. For information sheet, send stamped addressed envelope to: Accommodation officer, PO Box 31-194, Lower Hutt. (04) 567-1686.

Tautuku Lodge
State Highway 92, Southeast Otago. Situated on Forest and Bird's 550ha Lenz Reserve 32km south of Owaka. A bush setting, and many lovely beaches nearby provide a wonderful base for exploring the Catlins. The lodge, the Coutts cabin and an A-frame sleep 10, 4 and 2 respectively. No Animals. For information and rates please send a stamped addressed envelope to the caretaker: Miss M Roy, Papatowai, Owaka, RD2. (03) 415-8024

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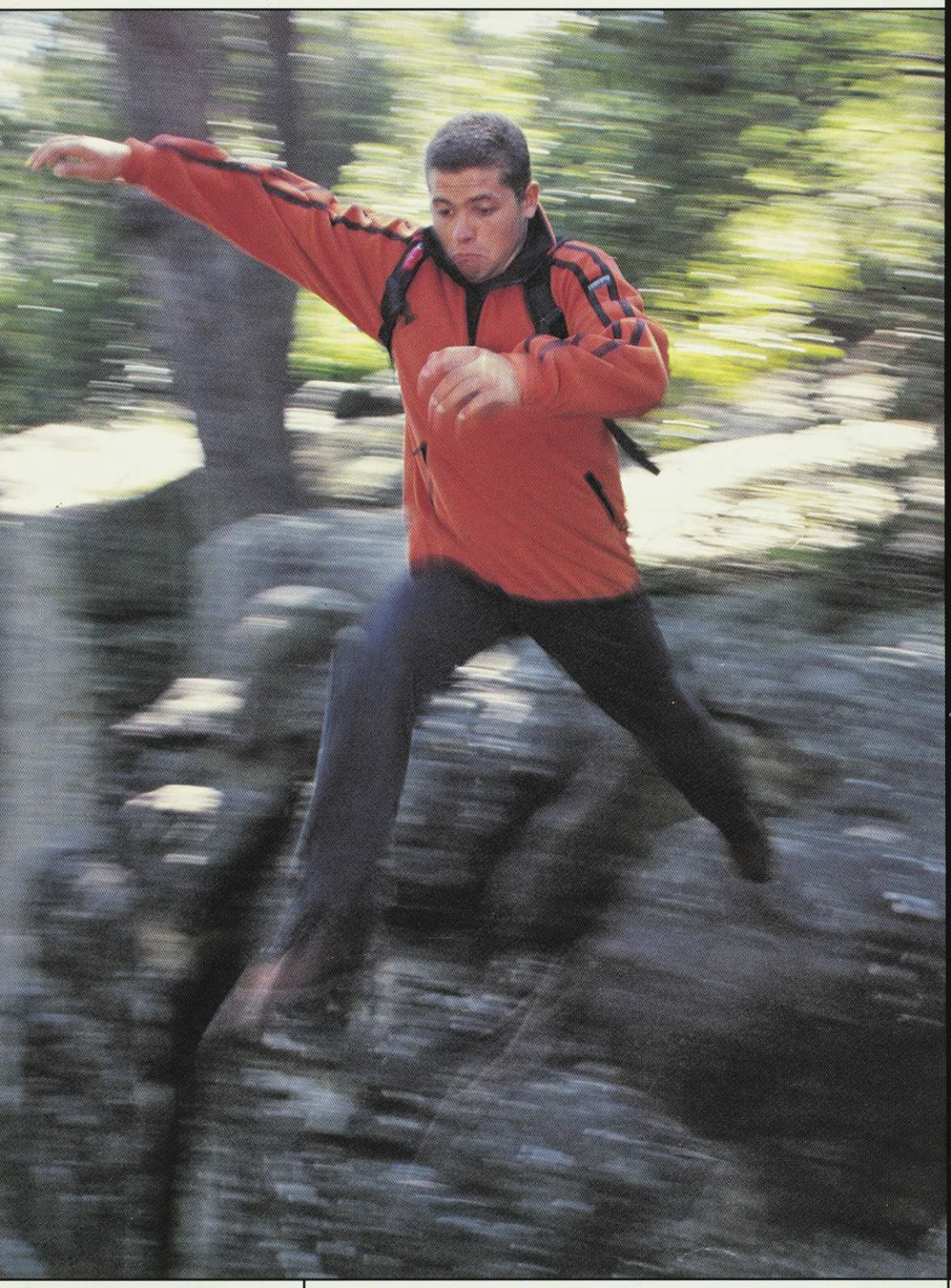

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