FOREST & BIRD

NUMBER 294 • NOVEMBER 1999

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Beach-nesting Birds
Penguin Preservation
West Coast Forests
Saving the Kakerori
Insects at Risk
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FOREST & BIRD

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Lyn Bates, General Manager

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"I saved enough on my insurance to pay for my Forest and Bird membership!" *Linda Conning, National Executive Member, Eastern Bay of Plenty Branch*

Thank you for assisting the Society protect New Zealand's natural heritage.

NUMBER 294 • NOVEMBER 1999

FOREST & BIRD

Forest & Bird is published every February, May, August and November by the Royal Forest and Bird Protection Society of New Zealand Inc.
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FOREST & BIRD

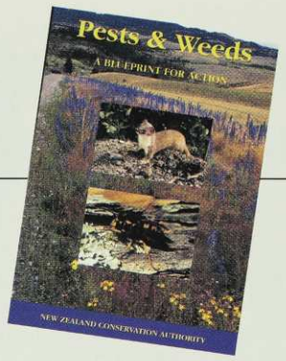
Features

Regulars

Cover: Forest gecko, one of 19 different lizards reported from New Zealand gardens. Photograph by Tony Whitaker who writes about lizards from page 14

comment

The high costs of pests & weeds



The real costs to New Zealand of pests and weeds have at last been quantified in terms the politicians (and the nation) can understand. A commendable report from the Government's advisory body, the Conservation Authority, puts the total cost at in excess of $840 million a year, or about one percent of New Zealand's gross domestic product.

The report breaks new ground with its economic analysis: it's both scholarly and accessible, and a very useful tool in the fight for better conservation.

The report doesn't stop with identifying the problems. Entitled *Pests and Weeds: A Blueprint for Action*, it goes on to detail a whole raft of possible measures for arresting and, where possible, repairing the present situation. It reviews the historic invasion of New Zealand by pests and weeds and identifies how their spread might have been prevented. It also makes suggestions for measures which could make our border controls more effective, while recognizing the current push for even freer trade. And it reveals the likely additional costs of doing nothing.

One of the most frightening messages is the need to protect our borders not only against the more obvious pests and weeds, but also the pathogens which spread disease in plants and animals, including human beings.

In all, the report suggests more than 40 ways in which New Zealand should improve its controls and protect itself against the alien invaders. These include better biosecurity and preparedness for such emergencies as the recent invasion of tussock moths. It also suggests sanitary procedures to protect our offshore islands from further invasions, and regulations to stop overseas ships introducing weed species to our waters through their ballast tanks.

Some of the recommendations are so simple and comparatively inexpensive that it is hard to imagine why they are not already in place: for example, requiring importers to clean up second-hand vehicles before letting them into New Zealand. The report is full of topical examples of avoidable importations. It is also rich in ideas to put things right.

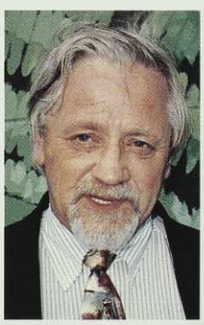
While levels of funding in the war against pests and weeds need to be increased, there is an economic benefit from this spending. Besides preventing the preventable invasions, better pest and weed control will help preserve the intangible base of an healthy environment, and put some meaning back into the popular belief in a 'clean, green, New Zealand'.

The *Pests and Weeds* document (to which Forest and Bird made a contribution through its membership of the drafting committee) goes well beyond the usual concerns about what pests and weeds are doing to the conservation estate, though this is important. Conservation is only one of the sectors which are suffering from the invasion of foreign species. It puts a price on what these organisms are costing our industries too: identifying risks to agriculture, horticulture, forestry, tourism and the marine environment. There are also potential dangers in the fields of human health when creatures which can carry debilitating diseases, such as dengue fever and Japanese encephalitis, are accidentally introduced into New Zealand.

Here, for the first time, there is an analysis of what pests and weeds actually cost us in terms of economic losses and the costs of control. The economic analysis by Dr Geoff Bertram of Victoria University estimates that the New Zealand economy loses around $440 million a year due to existing levels of animal pests, weeds and pathogens. On top of this, the private and public sectors spend around $400 million annually to prevent an increase in the level of infestation. It is the sum of these two figures, plus 'intangibles' such as the cost of pest damage to the conservation estate, that puts the costs close to one percent of gross domestic product.

While scholarly, the report is written for the general reader (by Kevin Hackwell). It shows that with our present knowledge, legislation and money could be used more effectively in the war against pests and weeds.

The recommendations should be required reading for those who prepare the nation's budgets, and all those who are in a position to help reverse the damage that pests, weeds and pathogens can do.



KEITH CHAPPLE is national president of Forest and Bird.

mailbag

Auckland's Parks

The publicity given to Auckland's regional parks in *Forest and Bird* August 1999 is timely. They are important in conservation terms as well as for their recreational value. However, the Crown did very little to create this 'conservation treasure'.

Over the years, some Crown land has been incorporated in the network, and the Crown has made some modest contributions towards the cost of some of the regional reserves. But by far the greater part of Auckland's regional parkland has been provided entirely by means of the rates and gifts of the people of the Auckland region. It is entirely owned by them and is not subject to the Reserves Act. Auckland relies on the fact that the land is regional parkland 'to be held in perpetuity' as is declared in what is now the Local Government Act.

It is ironic that because the Crown contributed money to the purchase of Whakanewha Regional Park, and consequently that park is subject to the Reserves Act, it is the powers contained in that act which are being invoked to authorise the proposed exchange of part of that park for other land.
Arnold Turner CMG, Chairman (1963-68), Auckland Regional Parks Committee

Forest & Bird *welcomes comments on items in the magazine or on environmental matters generally. Please address letters (maximum 200 words, preferably shorter) to the Editor, Forest & Bird, Box 33-029, Takapuna, Auckland. We reserve the right to edit letters for length and space. Deadline for February letters is December 7.*

ROSS GRANT

Landscape Frames

I am amazed that my favourite magazine has included a large plastic frame in its pages. (Auckland's Regional Parks, August 1999). I expect we can soon expect to see these awful things on every hilltop up and down the country. Heaven help us — they're straight out of Disney World. I shall not be able to take overseas visitors to see the gannet colony or Arataki the frames look so yucky.
B.D.Jones, Titirangi

Don't shoot the messenger. Send your protest to ARC Parks — Editor

Who's Responsible?

While Keith Chapple is right to argue for more funding for the Department of Conservation, his comments about the relative roles in conservation of central government and the community (*Forest & Bird*, August 1999) may unintentionally devalue the conservation efforts of everyone else.

DoC and government funding will help save our endangered species and ecosystems. DoC's species recovery plans, pest control, and offshore and mainland island projects, are world-leading conservation initiatives and deserve much more than their current funding.

The conservation of biodiversity isn't just about endangered species and ecosystems, however. It's about managing and valuing the native diversity around us all. DoC manages 30 percent of New Zealand; the other 70 percent is in our hands. It contains the under-represented lowland forests, the gardens in which our lizards dwell, and the flax that tui and bellbird feed on. More importantly it's where most of us meet the natural world.

It's the belief that we are just as important as DoC and Government in the conservation of biodiversity that drives the conservation efforts of the Wellington Branch of Forest and Bird. The Karori Sanctuary, our home-nursery programme, South Coast Marine Reserve, Mana Island restoration, the purchase of Long Gully, the Kiwi Conservation Club, and the 'Bring Back the Bird's' campaign are community initiatives.

The future of New Zealand's biodiversity is in all our hands. Government and citizen alike have an equally important role to play.
Dr Michael Harte, Wellington

Magazine Packaging

I question the need for the magazine to be wrapped in plastic for mailing. It's a bit like an F&B or Greenpeace sticker on a motorcar.
D.S. Boyes, Dunedin

The journal is flow-wrapped in low-density polyethylene, a 100 percent recyclable material produced as a by-product during the refining of petroleum. Some years ago the Forest and Bird Executive agreed this was less wasteful than using paper envelopes which also allow the Journal to get wet during delivery.

Ancient sea creatures at risk in Spirits Bay

On a May afternoon in 1996, a fishing vessel took a slow, deliberate course across the broad sweep of Spirits Bay at the northernmost tip of New Zealand. Behind it, some 30 metres below, a scallop dredge bucked and shovelled along the sea floor, steel tines grubbing sand dwellers from the soft sediment.

Marine biologists were aboard the vessel, conducting a scallop assessment for the Ministry of Fisheries to help set the scallop quota for the coming season. A series of tows across neighbouring Tom Bowling Bay had yielded encouraging numbers of scallops, but little else of scientific interest. Here in Spirits Bay the story was quite different. Amidst the scallops in the sorting tray, clapping their valves in protest, was a sponge like none seen before. Eight tows and many more specimens later, they knew they were steaming over a very special piece of seabed.

Back in the Wellington laboratories of NIWA, the National Institute of Water and Atmospheric Research, the Spirits Bay specimens were scrutinized. Aside from the strange sponges, there were bryozoans, two puzzling kinds of octopus, an unrecognized species of crab, a tiny barnacle, a starfish and a hydroid.

The identification of some of these creatures resisted the combined knowledge of experts both here and overseas: they were simply unknown to science. More than a third of the sponges were peculiar to one small area of Spirits Bay. The octopus was a first for New Zealand. One of the hydroids, itself very rare, was the exclusive host to a new barnacle the nearest known relative of which had gone extinct nearly 300 million years ago.

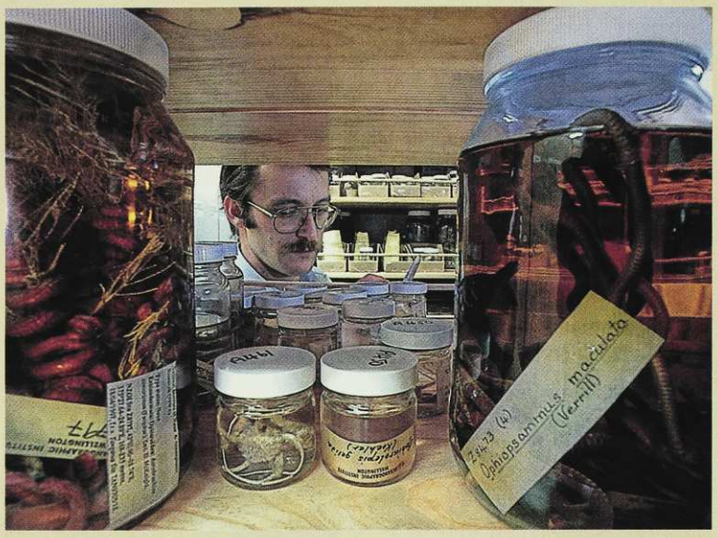
Of those animals known, some were unusually isolated — hydroids otherwise found only in New Caledonia, sponges and octopus from Australia's Great Barrier Reef. The most bizarre occurrence was the bryozoan that lives in just two places on earth — Spirits Bay, New Zealand, and Tierra del Fuego, South America.

NIWA researchers produced a report for the Ministry of Fisheries outlining the biological wealth of the area and the consequences of continued commercial scallop dredging. Protection was recommended until the coastal communities could be surveyed. The advice was not taken, however, and dredging continued.

In fact, despite ever more insistent recommendations by NIWA scientists following their pre-season assessments in 1997 and 1998, both scallop dredging and trawling continue today in Spirits Bay. Scientists and environmentalists now fear the worst for the 27 species that are either peculiar to Spirits Bay, or of very restricted range or rarity.

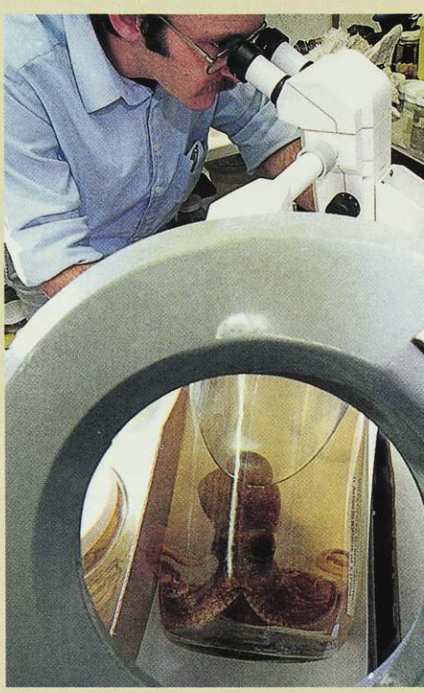
It is not all bad news. In response to NIWA's 1997 report to the Ministry of Fisheries (Mfish), the scallop fishermen agreed to voluntarily close an area of some 100 square kilometres off Spirits Bay and neighbouring Tom Bowling Bay 'pending further research'. The Mfish policy manager, Graeme McGregor, says the scallop fishermen agreed to the non-policed closure because many of the animals typical of the Spirits Bay seabed, particularly hydroids, are thought to play a critical nursery role in the life cycle of the scallop spat.

Mfish celebrated the voluntary closure as a step toward achieving a balance between protecting the environment and allowing sustainable scallop fishing, but environmentalists did not agree. Cath Wallace, co-convenor of the environmental umbrella group ECO, says the closed zone protects only 13 percent of the invertebrate communities so far discovered. The vast bulk of the bryozoans, the meadows of hydroids and their barnacles, and a good proportion of the sponges are outside the area, at the mercy of the scallopers' dredges. Most of the closed area encroaches only slightly onto the scallop beds.



DAVE HANSFORD

Previously unknown sea creatures dredged up from Spirits Bay in the Far North are immediately 'at risk' from fishers disturbing the seabed. Sixteen of these creatures were new to science and 45 are restricted just to Spirits Bay. Specimens of these rarities have been examined at the National Institute of Water and Atmospheric Research in Wellington, where Dave Hansford took these photographs. Scientist-curator Steve O'Shea of NIWA is seen working on various specimens, including a newly reported octopus species, below foreground.



DAVE HANSFORD

As well, trawlers continue to tow nets through the zone. Bruce Young, spokesman for Pagrus Auratus, an organization representing snapper-quota holders in the Northern Area Fishery, says trawlermen do not recognize the closed zone and do not accept they are damaging the animals.

Professor John Buckeridge, Auckland Institute of Technology, who is describing the new barnacle, says preserving the new species matters. 'People don't seem to understand that the whole biosphere is interrelated. Recent research hints that marine species hold great medical potential. With every extinction another option for the future is lost.'

NIWA scientists are worried that protection may now be too late. Last season's scallop numbers were so low that NIWA recommended a reduction in the annual take from 188 to 106 tonnes; dead hydroids, and scallops with shell damage, were also hauled up out of the closed area. The damage was consistent with having been struck by a scallop dredge or the weights of a trawl net.

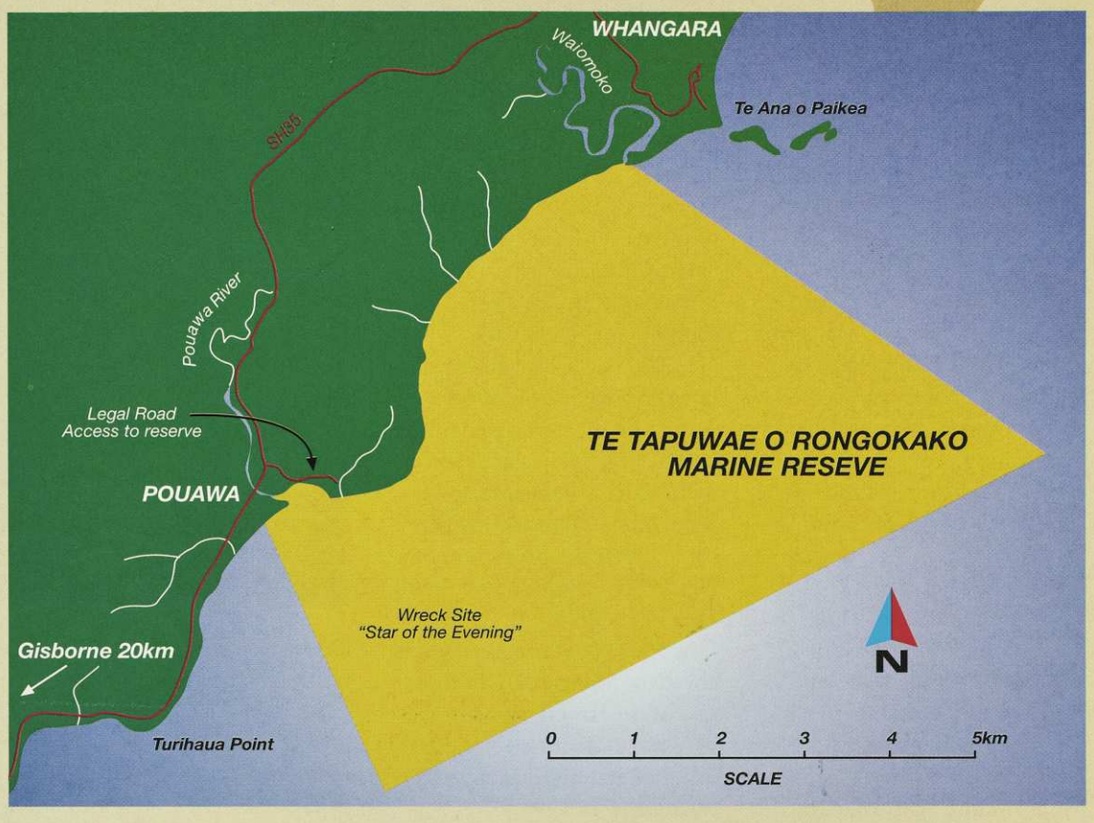
— Dave Hansford, Origin Natural History Media.

Marine Reserve for East Coast

New Zealand's sixteenth marine reserve is to be established off the East Coast of the North Island. The reserve, named Te Tapuwae o Rongokako, comprises an area of 3450 hectares, near Whangaroa, north of Gisborne.

Th proposed reserve results from a joint application by Ngati Konohi and the Department of Conservation, and is the culmination of nine years of leadership and work by the late Jack Haapu, a kaumatua of Ngati Konohi. His wish was to see his tribe's traditional food-gathering area protected 'as a nursery and a sanctuary for the benefit of future generations.'

The name, Te Tapuwae o Rongokako, recalls the legendary footsteps of a famous ancestor. Those 'footsteps' still hold a rich diversity of marine habitat, ranging from sandy beaches to intertidal reef platforms, inshore reefs, kelp forests and sediment flats. The area is regarded as one of the most spectacular and interesting marine environments in the Gisborne region.



Covenant on East Cape forests

The protection of 8503 hectares of native forest on Maori land near East Cape should provide local children with a 'living university', according to the trust board chairman, Aubrey Tawhai, who helped negotiate the covenant. Under an arrangement with Nga Whenua Rahui, the covenant protects forests in the Mangaroa /Ohutu Blocks adjacent to the Raukumara Forest Park.

The covenanted land will be a place young people can learn to appreciate the forests and 'learn about unconditional commitment to the land,' Mr Tawhai says.

The covenanted forest lies in the hinterland southeast of Te Kaha, between the Motu and Waikakariki rivers. It is rich in wildlife, which includes the New Zealand falcon, various native fish including giant kokopu, and many invertebrates.

At higher altitudes, the forests consist of unmodified hard beech, tawa, rewarewa, tawari, kamahi, with some rimu. Silver beech dominates the highest points Control of pests, such as possums, goats and deer, is part of the trust's future plans.

The forest forms part of a buffer zone around the Raukumara Forest Park (111,000 hectares) which runs down the spine of East Cape. Alongside the new covenant lies another 14,000 hectares, south of Te Kaha, (the Iwiroa and Maungaroa 3B blocks) which came under the protection of a Nga Whenua Rahui covenant in December 1997.

At $500,000, the agreement to covenant Mangaroa/Ohotu is one of the largest signed between a Maori trust and Nga Whenua Rahui, since it was established in 1991.

— *Source: Nga Whenua Rahui.*

NGA WHENUA RAHUI

Regenerating forest along the Motu River, East Cape, now protected by a covenant under Nga Whenua Rahui. The covenant protects 8503 hectares of the Mangaroa block in the hinterland southeast of Te Kaha. The forest lies between the Motu and Waikakariki rivers, forming part of a buffer zone to Raukumara Forest Park. At higher altitudes, the forests consist of umodified hard beech, tawa, rewarewa, tawari, kamahi, with some rimu. Silver beech dominates the highest points.

200 native plants at risk

More than 200 native plants face possible extinction, according to the Department of Conservation. A report on threatened native plants estimates some 10 percent of native 'vascular plants' are at risk of extinction and sets priorities for saving them.

Entitled *Conservation Requirements of New Zealand's Nationally Threatened Vascular Plants*, the report lists actions needed to restore populations of 223 of New Zealand's most threatened plants — some 10 percent of species. Among them are 42 trees and shrubs, 45 herbs, and three lianes and vines. Also threatened are six native grasses, five sedges and four orchids along with five ferns and fern allies.

Each threatened species is listed with its general location, form, habitat, and the threats it faces. Often these threats are from grazing by introduced pests, or invasive weeds, but other factors can be as varied as fungal diseases, loss of habitat, and 'numbers too low for breeding'.

Management requirements to improve the chances for 104 of the more threatened plants, suggest that weed control, advocacy and animal control are required, for a total of round 60 plants. Half the species also need legal land protection. 'Translocation' will help 44 species; cultivation and propagation will improve the chances for 39 species; population enhancement for 29; and habitat enhancement for 26.

The report summarises conservation work on each species undertaken to date, and suggests priority sites for survey, monitoring requirements, desirable research and management. Often the plants are also illustrated to aid recognition by field workers. For the scientifically concerned, there are selected references to publications about the species.

The Nelson/Marlborough region has the highest number of 'high priority' threatened plants, some 22, followed by Canterbury (11) and Otago (11).

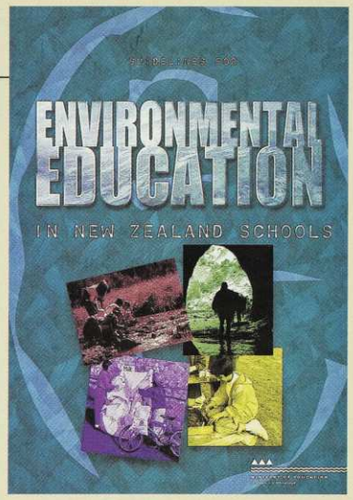
New Zealand has lost at least 11 plant species since humans arrived in New Zealand. Many more are under threat of extinction, according to the report. which 'only covers the tip of the iceberg' of threatened plants.

The report states another 10 percent of New Zealand's 2400 native plants are under some form of threat. Another 20 percent have yet to be fully 'described' — or scientifically classified — and 'some of these will definitely be under threat'. The report 'doesn't even touch on "non-vascular" plants like mosses, fungi and lichens, or marine flora, which also face threats.'

PENNY HURLSTONE, DEPARTMENT OF CONSERVATION

A restoration programme on Moutohora (Whale Island) off Whakatane is specially aimed at restoring populations of New Zealand's threatened plants. Moutohora has been pest free since 1987, and 400 plants from nine threatened coastal species were transplanted onto the island this spring. The species transferred were sand tussock, sea spurge, sand pimelea, native cucumber, New Zealand cress, tawapou, parapara, and pingao. Further threatened plants will be translocated to the island in future years. The restoration of Moutohora involves several community groups, Ngati Awa, and the Department of Conservation.

New guidelines for environmental education



Schoolteachers now have a new document to help them with 'environmental education'. The *Guidelines* published by the Ministry of Education complement the existing curriculum requirements for *Learning to Care for Our Environment*.

Published as *Guidelines for Environmental Education in New Zealand Schools*, the policy attempts to show how the environment is a theme in all seven learning areas that make up the New Zealand curriculum. Thus the environment appears as a theme in areas as diverse as science, art, and language, technology, social studies, mathematics and health.

The definition of the environment is a broad one, including nature and the built environment, along with people and their values.

The idea of the *Guidelines* is to show teachers how to identify opportunities in the curriculum to introduce environmental education. School boards will determine the extent to which environmental education is incoporated in the curriculum, however.

Education is seen as a key factor in achieving the environmental vision arising from the Environment 2010 Strategy, the governmental response to international agreements on 'sustainability'. The idea is to guide primary and secondary schoolchildren towards playing their part in ensuring 'a sustainable future'.

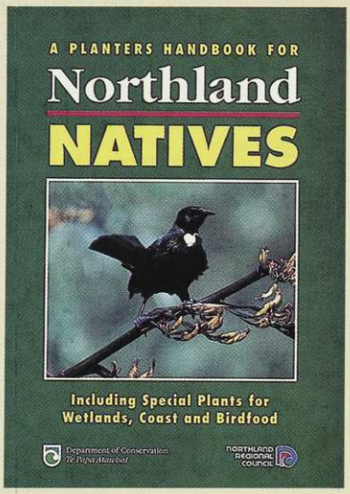
The aims of environmental education are five-fold, to help students develop:

- awareness and sensitvity to the environment and related issues;
- knowledge and understanding of the environment and the impact of people on it;
- attitude and values that reflect feelings of concern for the environment;
- skills in identifying and solving environmental prolems;
- A sense of responsibility demonstrated through participation and action in environmental matters.

The guidelines aim to communicate four key concepts: the interdependence of life; sustainability; biodiversity; and personal and social responsibilities for actions.

Both Forest and Bird and the Kiwi Conservation Clubs are listed as 'active in the environmental area and may provide either advice or resources to support environmental education programmes'.

Native plants for northern gardens



Lists of native plants which should flourish in any of the warmer northern parts of New Zealand are published in a 20-page booklet published jointly by the Northern Regional Council and the Department of Conservation, Whangarei. The booklet encourages gardeners and landowners to use native species to provide natural habitat, particularly for birds.

Its charts recommend easily available native trees and shrubs for various situations, including harsh coastal environments, windy, dry, shaded, and wet places. Ferns, sedges and ground covers are also listed along with the trees.

Height and growth rates are summarized; also the risk of possum damage. Two calendars suggest plantings to ensure year-round food for native pigeon, tui and silvereye.

While published in Whangarei, the booklet lists plants and trees which grow generally in the region from Auckland and coastal Bay of Plenty northward. It follows a previous joint publication *Environmental Weeds: Delightful but Destructive* which is a useful colour guide to the 'garden escapes' and weeds which threaten the natural environment of Northland. Both are excellent examples of local environmental advocacy which have applications beyond the confines of Northland.

A Planter's Handbook for Northland Natives is available free from the joint publishers, Northland Regional Council, Private Bag 9021, Whangarei, or the Department of Conservation, PO Box 842, Whangarei.

Saving city wastes and making money

In Timaru residents have been asked to choose whether to bury 40,000 tonnes of 'rubbish' annually, or recycle it. Present methods of disposal would fill its comparatively new Redruth site within 24 years and cost $29 million. The alternative 'waste strategy' would divert up to 98 percent of 'rubbish'.

The strategy would include composting vegetation and kitchen wastes, presently 46 percent of the waste stream. By using worms in the composting process — 'vermicomposting' — a compost concentrate is produced. It is claimed this product could increase production of grapes by 50 percent, lucerne by 90 percent and broad beans by 400 percent. If this proves to be so, the product could be worth over a million dollars a year and create ancillary jobs and businesses.

According to its council promoters, Timaru residents could play their part by using two rubbish bins to help simplify rubbish sorting. One bin takes organic garden and kitchen wastes; the second bin is divided into a recyclable side and a non-recyclable side.

Spoil, clay and rubble presently comprise 10 percent of waste which could be used instead for filling construction sites.

A materials-listing service, The Trading Post, will watch out for people's requirements for reusable items, while a shop called The Last Post will sell assorted second-hand items. An education centre to introduce these ideas is suggested, with a spin-off opportunity to encourage debate and improvements in water use, sewage disposal, drainage, rivers and marine health.

So far surveys have shown that 88-89 percent of the community supports the concept of re-using rubbish. Now council staff are costing the proposal in detail, and identifying the commercial markets for products such as the wormcast compost. Ratepayers will then have hard figures from which to choose their favoured option, to take effect sometime in the next three to five years.

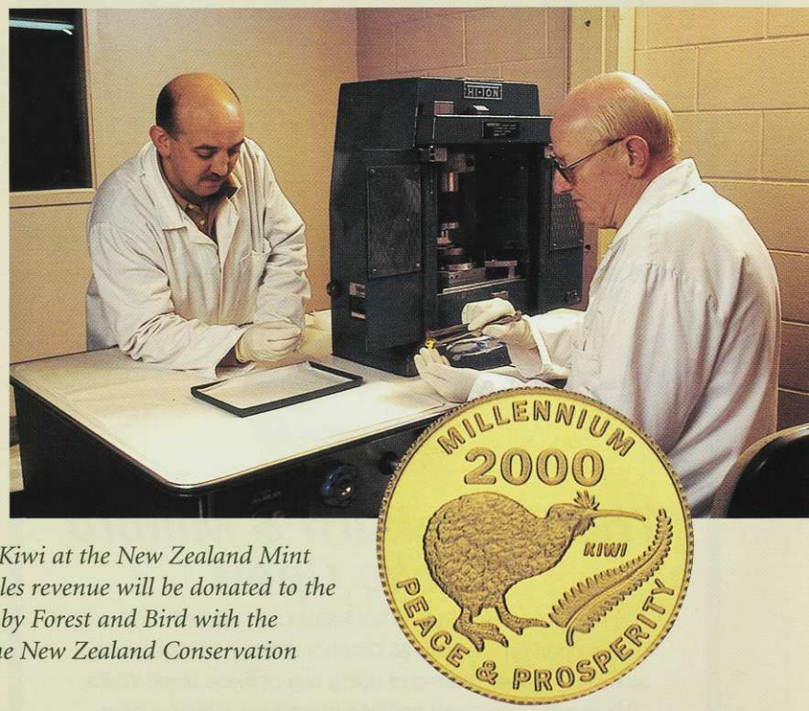
— *Source: Brian Gallagher, Timaru District Council.*

More help for threatened species

More funds for the Threatened Species Trust have been offered by an Auckland company which makes gold coins. The funds will come from a proportion of each sale of a quarter-ounce gold 'coin' marking the new millennium.

The coins have no face value — only the Crown can mint New Zealand money — but are part of an international trade in gold 'commemorative coins'. The coins each feature a kiwi and are part of a series begun in 1989 known as the New Zealand Gold Kiwi.

The Threatened Species Trust was initiated by the Royal Forest and Bird Protection Society, with the Department of Conservation and the New Zealand Conservation Authority, to handle private donations towards restoring populations of threatened species. Its high-profile recovery programmes include kakapo (sponsored by Comalco) and the kiwi (sponsored by the BNZ), both of which have their own programme trusts. The new initiative comes from New Zealand Mint Ltd and will benefit general funds for threatened species work.



Minting the new Millennium Gold Kiwi at the New Zealand Mint Ltd in Auckland. A proportion of sales revenue will be donated to the Threatened Species Trust organised by Forest and Bird with the Department of Conservation and the New Zealand Conservation Authority.

Foretastes of forest futures

West Coast conservationists recently confirmed that what happens on the ground can be very different from what Timberlands West Coast claims is involved in 'sustainable' logging.

An area of forest in the Hokitika Gorge has already been laid waste, according to members of Forest and Bird, the Buller Conservation Group and Native Forest Action who visited there. The area at Doctor's Creek was dense, rich, rimu forest before it was logged four years ago.

Almost all the trees in an area of two or three hectares were felled but only the best part of the best trees was helicoptered out. Dozens of logs and sections of logs were left to rot. Where a log was eight metres long by one metre in diameter, a three-metre section was 'cut to waste' to make a smaller load for a helicopter. Above the first limb, a log six metres long by half-a-metre in diameter was left to rot.

Another tree was felled two metres above the ground leaving enough timber in the stump to make half-a-dozen dining tables.

After a complaint about the waste, Timberlands sent a logging gang back into the forest. Instead of removing the already fallen four-year-old logs they cut a whole lot more, many in the riparian strip. These too were airlifted out.

Local landowners report similar waste in the Grey Valley, near Kumara, and at Mt Stormy, Karamea.

The important thing about the Hokitika and Grey Valley areas is that they fall within the Timberlands West Coast 'sustainable management' zone. According to the company's publicity, only one tree per hectare per year is to be removed. The company claims its logging is to the highest international standards, and that larger streams are protected by leaving a riparian strip of trees. The recent photographs from Doctor's Creek indicate that Timberlands West Coast breaks its own rules.

Timberlands West Coast says it has perfected its 'sustainable management' techniques on rimu and is now applying these to beech. Our photographs show what they are actually doing: they are carrying on the same way as loggers of 30 and 40 years ago. The only difference is they now remove the logs by helicopter.

— *Pete Lusk*

A pictorial feature on West Coast forests at risk appears on page 24.

PETER RUSSELL

PETER RUSSELL

Westport Forest and Bird member, Peter Lusk on the stump of a rimu tree beside a five-metre wide tributary of Doctor's Creek near Hokitika. According to the conservation group which investigated damage to the forest, 'this highlights Timberlands' disregard for its own streamside management protocols'. Under these protocols no logging is supposed to occur within 10 metres of major streams.

Making best use of rat poison

A review of the use of the poison bait brodifacoum on conservation land is being conducted by the Department of Conservation. The poison is virtually the only weapon the department has in its battle against burgeoning populations of rats, and officials want to ensure it is used properly and wisely.

In DoC's island eradication programmes, the pesticide brodifacoum is considered a valued and cost-effective ally. (See An Eradication of Rats, page 36.) According to a senior technical officer of the department, Keith Broome, no other pesticide is as effective in island situations.

'As well as ridding islands of rats, brodifacoum can also be useful for mopping up bait-shy possum populations where the pest has learned not to eat other poisons,' he says.

Brodifacoum, marketed as Talon and Pestoff, is a 'second-generation' anti-coagulant which is currently available without licence in New Zealand. (It is sold in supermarkets.) The poison is also used by farmers, forestry companies, community conservation groups and regional councils.

'Correctly applied, animals poisoned with brodifacoum do not get symptoms until after they have a lethal dose. This means rats don't become bait-shy and it allows us to get the 100 percent kill that is so critical on islands,' Keith Broome says. However, he explains, this helpful property of brodifacoum can potentially cause problems because the poison can be transferred to scavengers or predators of the rat or possum. 'Generally this transfer results in low levels of poison causing no apparent harm, but if used repeatedly small doses could build up.'

While DoC is keen to retain the use of brodifacoum for island situations, where 'one-off' poison operations do not constitute the same risk as that of repeated use on the mainland, it wishes to improve its use of brodifacoum generally, with better safety procedures.

'The department is currently researching alternatives and ways to better manage the "when, how and why" of pest control using brodifacoum,' Keith Broome says. 'A review team is looking at current use of the pesticide and developing practical solutions while maintaining a high level of protection.

'The department is also initiating a programme to better inform people about its pest control operations. These procedures build on the best of what is already happening in some areas and set nationwide standards for pesticide use on public conservation land.'

— *Kathy Ombler.*

Mangaweka boulders protected

Curious boulders on a Rangitikei property near Mangaweka have been protected under an arrangement between the landowners, the Department of Conservation, and the Forest Heritage Fund. The 'concretions', akin to landforms such as the Moeraki Boulders, are hidden in a forest remnant of less than two hectares. The owners, Kevin and Janice Robb, receive 200-300 visits a year from people seeking permission to see the huge boulders.

The concretions were formed in thick beds of mudstone, with limestone layers growing round a nucleus such as a fossil shell. When the surrounding mudstone eroded away, the harder boulders were left behind.

— *Source: Jo Priestley, DoC.*

JO PRIESTLEY, DEPARTMENT OF CONSERVATION

Farmers Kevin and Janice Robb perch on one of the curiously shaped boulders on their farm near Mangaweka in the upper Rangitikei district. The round 'concretions' are hidden in a forest remnant, and are now officially protected.

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Lizards in the Garden

New Zealand gardens host a variety of lizards and TONY WHITAKER tells how to attract them.

Green Gecko

TONY WHITAKER

Common Gecko

TONY WHITAKER

The geckos on these two pages may occur in New Zealand gardens. Geckos are baggy-skinned lizards. The smooth-skinned lizards of the garden, known as skinks, are shown overleaf.

For most suburbanites the first evidence there are lizards in the neighbourhood is when the family puss coughs up a pile of mutilated corpses on to the shag-pile. After cleaning up the mess the curious will wonder where they came from because, for most people, lizards are the unseen inhabitants at the bottom of the garden.

Yet, with more than 70 recognized species, New Zealand has one of the highest diversities of lizards of any temperate area on earth. There are 37 geckos (baggy-skinned lizards) and 35 skinks (smooth-skinned species) occupying various habitats from the shore to more than 2,000 metres up the mountains. It is hardly surprising, then, that at least some have been able to adapt to life in urban environments.

Not for us, however, are those translucent house geckos boldly running upside-down across the ceiling as in the tropics, or gathering in noisy groups around the lights at night. Instead, our lizards are rather secretive and timid creatures, more comfortable well out of sight, in dense vegetation, beneath leaf litter or hiding in the dark recesses of our houses. Nevertheless, in total, 12 species of gecko and at least seven species of skink have been reported from suburban environments (see box opposite) though some of these are rare in such places.

The lizard species inhabiting suburban environments vary in different parts of the country, but most are skinks.

Throughout the North Island, the secretive *Cyclodina* species can be found, largely nocturnal and occupying overgrown, damper sites. Their presence is usually detected when debris or dense vegetation is cleared.

In the southern North Island and the

Pacific Gecko

TONY WHITAKER

South Island are the day-active *Oligosoma* species that prefer drier, sunny sites. These may be glimpsed as they scurry for cover when disturbed.

Common geckos (species of the *Hoplodactylus maculatus* complex) sometimes occur in sheds or older houses, forming populations that live for many generations in the roof or beneath the floor. These nocturnal animals are seldom seen but tell-tale signs of their presence are their droppings — small white lumps of uric acid, or the papery, white pieces of skin shed several times each year.

In outer suburbs, gardens bordering native bush or scrub may be home to tree-dwelling green geckos (*Naultinus* species) and forest geckos *Hoplodactylus granulatus*, but their superb camouflage means they will rarely be seen.

To encourage lizards in the garden it is important to know their needs. To observe them requires patience and an understanding of their behaviour.

The essential things in a lizard's life are secure cover and food. Day-active skinks also require sheltered basking sites. Highly ordered and tidy suburban gardens are no place for lizards as these conditions are not met. However, if you have an overgrown garden, or 'wild' places on your property, there are things you can easily do to encourage lizards to establish themselves or to enhance the populations that might be present.

All lizards require a place to hide when inactive, and to protect them from predators and extreme weather. Cold, heat and dehydration are critical factors in their survival. Lizards also need cover to shelter them from predators while they search for food. The kinds of places lizards use for retreats, and when foraging, vary between species, however.

Natural retreats include cracks in the ground or banks, places beneath logs or rocks, dense vegetation (e.g. the bases of flax plants), crevices in trees, or under bark. Materials for artificial retreats for lizards are limited only by your imagination — consider using planks, corrugated iron, bricks, or concrete. Remember, it is not the material but the size of the sheltering object that is significant. The protective object should exceed 20 centimetres square and its distance from the ground should be no more than 5-8 millimetres). Lizards like to squeeze themselves into a tight space just wider than their body thickness to feel contact with both their back and belly. Anything too far from the

What to look for, and where

The lizard species inhabiting suburban gardens vary widely throughout the country. The lists below are just a guide to what to expect in different places. Remember anything can turn up, especially in rural gardens, as happened recently when a Coromandel resident found a striped gecko *Hoplodactylus stephensi* in his bedroom — the first North Island record for this exceedingly rare and endangered species!

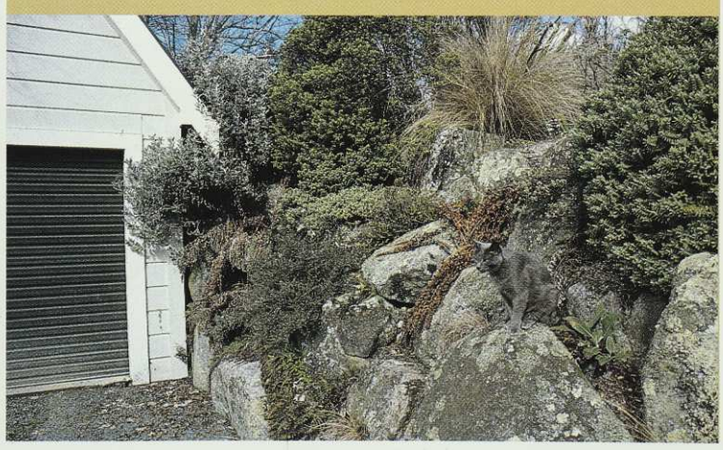
In Auckland: Though copper skinks *Cyclodina aenea* and ornate skinks *C. ornata* are widespread in the city, their secretive and largely nocturnal habits mean they are not often seen. Day-active rainbow skinks *Lampropholis delicata*, introduced from Australia, are much more conspicuous inhabitants. In outer suburbs (e.g. North Shore, Henderson, Titirangi), gardens adjacent to native forest or scrub remnants may also have green geckos *Naultinus elegans*, forest geckos *Hoplodactylus granulatus* and Pacific geckos *H. pacificus*.

Wellington: Copper skinks are prevalent but ornate skinks are very localised and rarely seen. The most widespread lizards in the city are the daytime common skinks *O. nigriplantare polychroma* and brown skinks *Oligosoma zelandicum*. Common geckos *Hoplodactylus maculatus* are relatively abundant in coastal suburbs (e.g Island Bay, Miramar). In hill suburbs (e.g. Karori, Eastbourne, Hutt Valley), gullies with native forest or scrub are occupied by forest geckos and green geckos.

Christchurch: The only lizard within the city is the common skink. In suburbs along the Port Hills and at Lyttleton there are also Canterbury geckos (an undescribed species related to *Hoplodactylus maculatus*). Jewelled geckos *Naultinus gemmeus* occur in remnants of native forest or scrub.

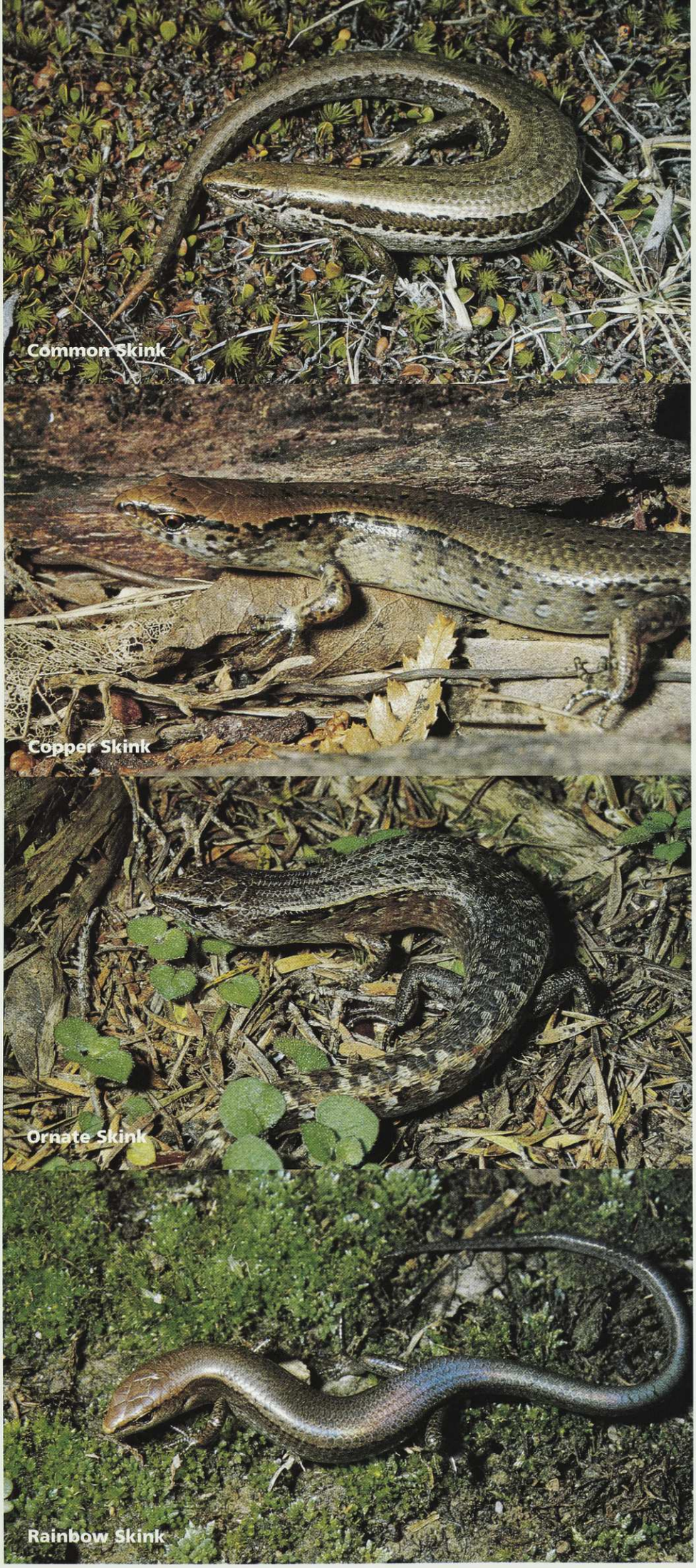
Dunedin: The southern city fares least well for suburban lizard populations. Only common skinks live in urban areas but in outer hill suburbs, and in the small communities along the Otago Peninsula, jewelled geckos occur in native scrub and forest remnants, sometimes in exceptional abundance.

Other places, and surprises: Less commonly reported from city and town gardens are moko skink *Oligosoma moco* (North Shore), spotted skink *O. lineoocellatum* (Kaikoura, Christchurch), McCann's skink *O. maccanni* (Alexandra), Marlborough green gecko *Naultinus manukanus* (Picton), Nelson green gecko *Naultinus. stellatus* (Nelson), and two as yet undescribed species related to *Hoplodactylus maculatus* (Wellington, Kaikoura and Alexandra).



TONY WHITAKER

The suburban rock-garden (at right) has many features of benefit to geckos and day-active skinks. Lots of loosely placed rocks provide secure crevices for retreats and good basking surfaces. Dense plant growth provides safe cover for foraging. Closely branched Coprosma *species produce edible fruit. Shrubs reaching to the roofline to allow geckos access to the roof void. The only problem is the cat but it would be challenged to catch lizards in such good cover.*



TONY WHITAKER

Smooth-skinned lizards are known as skinks. Here is a range from New Zealand gardens.

ground or firmly embedded in soil is unsuitable.

Lizards, especially skinks, are territorial so it is important to provide enough habitat and enough retreats for a population to establish. Each lizard requires several square metres of space. As each lizard will also use different retreats at different times, sheltering objects should be well scattered through the whole area.

If artificial cover is placed in thick vegetation, or amongst ground-cover plants, it also provides a surface where diurnal skinks can bask. Basking sites must be in the sun for several hours each day. A material like stone that absorbs and retains heat is ideal, and the surface should be orientated to face directly to the sun. Several different basking sites may be needed so lizards can follow the sun during the day.

Skinks seek food within the protective cover of dense vegetation: to venture on open surfaces like paths or lawns is far too risky. Even well-weeded flower beds are too bare. To provide suitable foraging areas, allow parts of your garden to become completely overgrown. Whether with ground-cover plants, weeds or rank grass is immaterial, but the greater the variety the more

10 ways to encourage lizards in the garden

- Get rid of the cat and dissuade other cats from visiting the garden.
- Encourage thick plant growth on banks, in borders and along hedgerows.
- Mulch heavily and encourage a build-up of deep leaf litter.
- Place logs, planks or bits of corrugated iron where plants can grow around or over them.
- Make rockeries with many loosely placed stones (not firmly embedded in soil) or create stone heaps.
- Use dense ground-cover plants.
- Leave numerous cracks when building stone or block walls.
- Plant berry or nectar producing species, especially native divaricating shrubs.
- Allow vines on buildings to reach the roof so geckos can easily get in and out.
- Minimise or eliminate pest spraying so that insect populations increase.
- Don't keep a cat.

likely there will be a diverse invertebrate fauna as lizard food.

All lizards are primarily insectivorous and eat any invertebrates they can overpower, including beetles, flies and caterpillars. Spiders are a special favourite, but lizards are not fond of slaters. Nocturnal geckos love moths. Any gardening practice that promotes a proliferation of invertebrate life — such as reducing or eliminating pest spraying, and using deep mulches and ground-cover plants — ultimately benefits lizards. In summer day-active skinks and geckos eat lots of sweet juicy berries and soft fruits like kawakawa *Macropiper excelsum*. Good natives to plant are divaricating Coprosma species, pohuehue vines (*Muehlenbeckia*) and porcupine bush (*Melicytus alpina* or *M. crassifolius*). These plants bear fruits within densely tangled branches that help protect foraging lizards from predators and are easy to climb. Geckos are also particularly fond of nectar so flax, pohutukawa or other species producing copious nectar should be planted.

Many introduced birds and mammals kill lizards but easily the most serious —especially for urban lizards — are cats. Cats have been found with over 30 lizards in their stomachs, representing just 4-6 hours hunting. If you really want to encourage lizards in your garden you should not keep a cat and should discourage other cats from visiting your property. Failing that, be sure to provide plenty of secure cover where lizards can forage and hide.

Cyclodina skinks prefer to hunt at night and require humid conditions. They favour foraging in sites with dense moist, ground cover and deep leaf-litter, preferably beneath shrubs or trees. To encourage these species, mulch heavily or promote the accumulation of leaf-litter. Also plant vigorous ground-cover species. Planks, logs or rocks are the best material for retreats as they retain moisture.

Conversely, *Oligosoma* skinks prefer drier, more open habitats away from the cover of trees. The best sites for them are sunny banks with dense ground cover of rank grass or low herbaceous species. Heat-retaining surfaces are favoured for basking sites, and pieces of corrugated iron are good for artificial retreats because heat readily transfers through them.

Common and Pacific geckos like dark, dry retreats during the day; at night they forage on trees, banks or buildings. Retreats can be in buildings — often in the roof between the building paper and roofing iron to take advantage of warmth from the sun. They also like stacks of corrugated iron or planks, squeezing into narrow gaps to be secure from predators. In more natural situations these geckos hide in dry crevices in trees, banks or walls. Old pohutukawa trees provide excellent shelter with their deeply furrowed bark. Another favoured retreat site is the 'skirt' of dead leaves on cabbage trees.

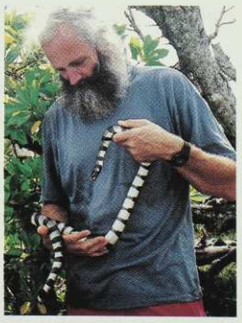
To encourage green and forest geckos into your garden do not 'clean', thin or open up native bush and scrub. These geckos need the protection offered by dense foliage, tangled branches and dense ground cover such as stick litter and ferns. It will even help these strictly forest-dwelling geckos if you promote thick tangles of vines such as pohuehue (*Muehlenbeckia australis* or *M. complexa*).

Never introduce lizards to your garden. All New Zealand lizards are fully protected and it is against the law to capture them or move them to another place. Furthermore, bringing a lizard from another place — say, the skink your children see at the beach — would probably be moving it to a completely unsuitable habitat. If your garden is a suitable habitat for lizards they will probably be there already, and all they will require to thrive and multiply is that the habitat is improved. If you enhance the habitat lizards will populate your property from elsewhere in the neighbourhood anyway.

Remember — a clean and tidy garden is not a good place for lizards. If you fancy harbouring lizards, get rid of the cat, let the plants run wild, scatter around some artificial cover, and before long you will probably be rewarded with a glimpse of a skink. Sit quietly and you will be able to watch these fascinating little creatures go about their daily lives.

Taranaki's special town dweller

The rarest lizard to regularly occur in urban habitats is the goldstripe gecko *Hoplodactylus chrysosireticus*. These small geckos (total length about 14 centimetres) are known only in the area from Taranaki to Mana Island, near Wellington. The Department of Conservation rightly regards them as threatened (Category C priority), but Taranaki residents might well wonder why — goldstripe geckos occur in New Plymouth and several smaller towns such as Waitara, Stratford and Opunake. In natural habitats or gardens, the goldstripe gecko seems to prefer flax, though the lizards are equally at home on species with similarly dense foliage — cabbage trees, toitoi, or cultivated plants such as agaves, yuccas, or red-hot pokers. The geckos hide by day amongst the leaf bases and forage at night to the tips of the leaves and flower spikes. Occasionally they can be seen by day sunning themselves close to cover. In secure and protective habitat goldstripe geckos have been able to adapt to urban life and attain locally high population densities close to the heart of a major provincial city.



TONY WHITAKER is a herpetologist and consulting ecologist based in Motueka. The krait, or sea snake, is from Vanuatu, but specimens wash up on New Zealand shores occasionally.

After the Fire

Restoring Forest and Bird's penguin reserve at Te Rere in Southland. STORY AND PICTURES BY **FERGUS SUTHERLAND**

FERGUS SUTHERLAND

The rugged coast of Forest and Bird's Te Rere penguin reserve in the extreme southeast of the South Island. The shelter of a rock platform and the Te Rere stream provides landing access for the yellow-eyed penguin which breed among the coastal vegetation.

Forest and Bird's yellow-eyed penguin reserve at Te Rere, in Southland, is gradually recovering from the devastating fire which swept this isolated coastal area four years ago. More than two-thirds of the 100 or so birds were burnt alive as fire swept through the coastal forest, and enthusiasts who originally worked to secure the reserve have had to replant it again.

Over a period of 20 years, through fluctuating fortunes, Forest and Bird has invested considerable funds, volunteer time, and much physical effort into the 70-hectare reserve.

Te Rere is near to the southernmost point of the South Island, an ideal location for penguins to access a rich, oceanic feeding area. This is an extremely rugged and wave-battered coastline, much of it cliffed and inaccessible, but at Te Rere itself a small sheltered inlet, and a sloping rock shelf on a narrow lee shore, provide two landing places for penguins. Here the birds are able to surf in on the ocean swells sweeping the coast and then, as they gain a foothold on the slippery rocks, scramble to the safety of the bush. Te Rere has no doubt provided a haven to thousands of generations of these long-lived birds.

Unique among penguins, the yellow-eyed prefers to live and breed in the cool shelter of forest. Here, individuals live to more than 20 years, consistently raising an annual brood of two chicks with their long-term partners. The long, arduous work of chick raising occupies the warmer months from October to March and is shared equally by both parents.

Until the 1970s, the penguins at Te Rere had a relatively secure home in forest which swept right down to the seashore. They could also gain easy access to forest further inland, by swimming up the small, gently flowing Te Rere Stream. They had plenty of habitat to spread into. Pairs of birds found private nesting sites beside enveloping tree fern, under twisting rata and among the roots of giant rimu trees. The penguins throve in this environment and the local people tell of them 'being everywhere'.

The remote security of the penguins was shattered, however, in the late 1970s when a new owner of the land started clearing the forest for farmland. About this time, members of the Southland Branch of Forest and Bird became aware of the situation, and an urgent effort to save some of the penguins' habitat was initiated. Fortunately for the penguins at Te Rere, support for saving them came from several sources. The farmer allowed an area on the coast to be fenced off for them, and the Wildlife Service provided fence materials. Penguin researcher John Darby provided information and support, and Forest and Bird members provided co-ordination and physical effort to erect the fence and start replanting.

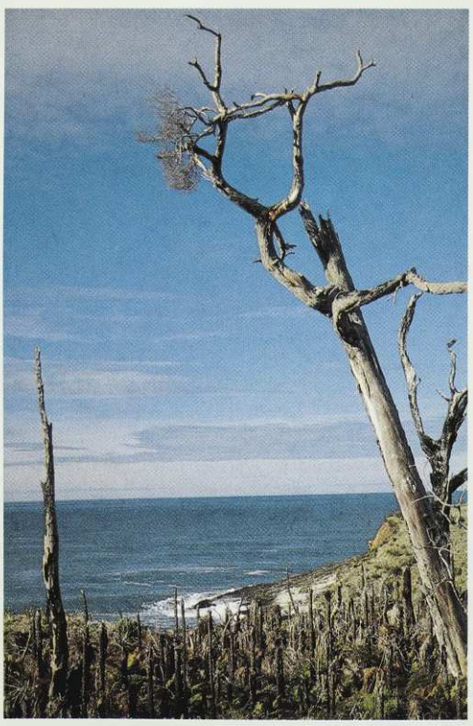
Within a few months the fence was up and the future of the birds looked secure; but all was not well. Rapid forest-clearing outside the fence brought a greater risk of fire. Possums, deer and hares ravaged new plantings. Stoats were common. Most significantly, closer examination of the area revealed that the new fence only protected

about half the penguins in the colony. To secure the colony, a larger area was needed and longer-term security of land tenure guaranteed.

It was at this stage that the project became a national one for Forest and Bird. The colony was recognised as one of the most significant on the mainland, (a Cousteau team filmed here) and in 1987 the Society found the money for a land purchase on the basis that Southland Branch could raise funds for fencing. Fortunately, there was a new owner of the land who was willing to sell in order to help the penguins. The purchase agreement was made in 1988 and the Te Rere Penguin Reserve established. From that time many organisations and individuals contributed to the effort by the Southand Branch to fence the larger area and start the huge task of replanting the forest habitat.

Other hazards remained however. Browsing animals continued to set back regrowth, and in February 1995 fire devastated the reserve. Starting in smouldering stumps several kilometres away, the flames were fanned by exceptionally strong winds and swept through half-cleared forest and into the penguins' home. The vegetation was explosively dry as a result of a two-month drought and more than two-thirds of the 100 adult penguins at Te Rere were killed outright. There were fledgling chicks still on shore and these, and more adults, suffered and died over the next few days despite rescue efforts by Department of Conservation. The birds were particularly vulnerable because some were ashore moulting while others were still feeding their chicks. With a total world population of yellow-eyed penguins of about 3500, the losses caused by the fire were extremely serious. To the people of Southland who had invested so much time and effort in Te Rere, the destruction by the fire was a devastating blow.

Fire devastated the Te Rere Penguin Reserve in February 1995. More than two-thirds of the 100 adult penguins at Te Rere were killed outright. More died over the next few days despite rescue efforts.



FERGUS SUTHERLAND

ROD MORRIS, DEPARTMENT OF CONSERVATION

Yellow-eyed penguin, also known as hoiho, with chick. Individuals live to more than 20 years, consistently raising an annual brood of two chicks with their long-term partners.

Recovery since the 1995 fire has been slow and penguin numbers are still only in the thirties. The fire disrupted normal nest sites and penguins that survived often had to find new long-term mates. This led to low breeding success for Te Rere birds and, in addition, the 1998-99 season was not very good for most yellow-eyed penguin colonies on the mainland. It is thought this was because of a downturn in the food supply.

Recovery of the land habitat has progressed more favourably. A detailed plan now guides management. A caretaker employed by the Society visits the colony each month to observe the penguins, and maintain possum, stoat and hare control. Firebreaks and an emergency water supply pond have been constructed. Thousands of flaxes have been planted in exposed places and a variety of native shrubs in more sheltered locations. The planting has been done by volunteers of the Southland Branch of Forest and Bird assisted by many others. John Darby and the caretaker have maintained watch on the birds, while the adjacent landowner developed a firebreak.

Southland Forest and Bird is optimistic that Te Rere will be re-established as a major mainland penguin colony. As one of the principal aims of management at the reserve is to keep it as natural as possible, access is generally restricted. However, the Southland branch invites visitors take part in one of the regular working bees.

FERGUS SUTHERLAND

Blasting away

The use of explosives to get heavy flax plants out of the ground is a technique used before by Southland farmers. As an alternative to the hard labour of digging with a spade, or the expense of getting a big digging machine in to a remote place, the use of explosive has much to recommend it.

Working with explosives requires someone with the necessary skills and qualifications to ensure safety. A 75-millimetre-diameter hole is bored under the flax bush with a mechanical fence-hole borer then, depending on the softness of the ground, two to four 'plugs' of explosive are put in place. The resultant blast lifts the flax out of the ground and loosens it, making it relatively easy to split a big flax into up to 20 plantable 'fans'. The fans need to be cut with a machete to make them easier to handle, and to ensure the stability of the plant when in the ground.

FERGUS SUTHERLAND

— FERGUS SUTHERLAND is part-time caretaker at Te Rere, and an eco-tourism operator. He has served on Forest and Bird's national executive.

Summer Holiday

Birds which nest at Christmas-time are often victims of unwitting holidaymakers, reports GORDON ELL.

PHOTOGRAPHS BY GEOFF MOON

Victims

New Zealand dotterel

GEOFF MOON

Rare and endangered New Zealand birds are among the victims of the traditional New Zealand love for the seaside. The birds nest about the tideline just when most New Zealanders flock to the beach around Christmas.

Consequently, populations of birds such as the New Zealand dotterel and the variable oystercatcher — classified respectively as 'threatened' and 'rare' — are diminishing with each successive summer. Some of this population collapse is due to the depredations of wild animals — hedgehogs are the worst predators, along with black-backed gulls, feral cats, stoats and ferrets.

Summertime holidaymakers disturb nesting birds and their young. At left, a nesting colony of white-fronted terns still has young to feed at Christmas. Numbers of the 'threatened' New Zealand dotterel (top) and 'rare' variable oystercatcher (below) are heavily affected by human disturbance.

Increasingly, however, it is the pressure of people on beaches which is destroying nesting areas and habitat. Burgeoning settlement of coastal areas has brought increased beach traffic to many parts of our coast, particularly in the north where the mainland population of New Zealand dotterel lives.

The variable oystercatcher, (usually black, in contrast with its pied cousin), occurs more widely around New Zealand but nests in almost exactly the same weeks when New Zealanders traditionally take their annual holiday. Careless feet, pet dogs, and vehicles on the beach, all take a toll of nests. Like the New Zealand or red-breasted dotterel, variable oystercatchers nest in a scoop of sand just above the high tideline, where most human traffic is concentrated. Fiercely territorial, each pair generally holds its own stretch of beach, often a small bay.

Anyone with a keen eye or a pair of binoculars can soon locate the nesting site of these birds by watching their behaviour. They may feign injury to lead intruders away. Nests are not obvious, however, to the unthinking passerby, particularly if driving a 4WD or quad-bike along the beach to a favoured fishing site. Even the careful footsteps of the curious observer may mark a way across the sand for some predator. The chicks of both species of bird can run about the beach, like balls of animated fluff, from shortly after hatching but at holiday time they are very vulnerable.

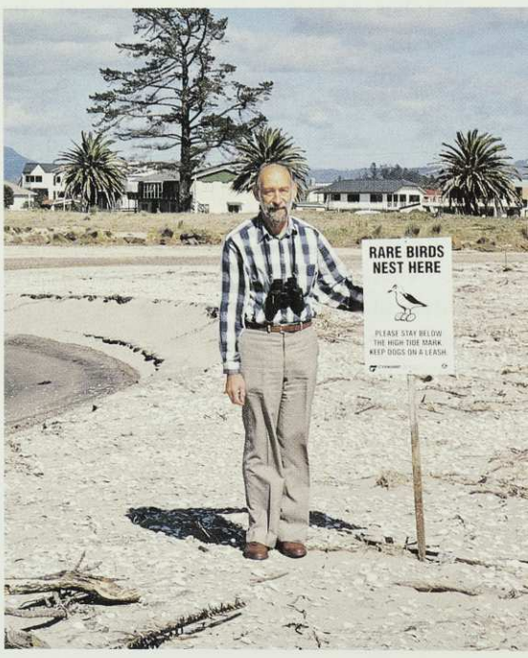
For a decade or more, volunteers and people hired on work schemes have devoted time to protecting some of the most threatened breeding grounds at Christmas.

Forest and Bird signs at Buffalo Beach near Whitianga on the Coromandel Peninsula warn off people from a dotterel nesting site. Volunteers, like Dr Bruce Mackereth, protect such beach sites at many places in the north.

MEG GRAEME

Variable oystercatcher

GEOFF MOON



GEOFF MOON

Caspian terns and chicks

The direct result where this has happened is more breeding success, but such costly guardianship is limited to a handful of places.

At Opoutere on the eastern Coromandel, a sandspit is a productive breeding ground both for dotterel and variable oystercatcher. In 1990 Waikato Forest and Bird fenced above the tideline and funded a student to guard the spit, stopping vehicles from using it as an illegal road, and asking holiday-makers not to take their dogs there for exercise. Chicks then suffered because they could not use the low tide area where people walked. Now the fence guards the body of the narrow spit and its inner shore as well. With some 15 breeding pairs within a comparatively small area, the Opoutere project has now been adopted by the Department of Conservation as one of its own special sites, with predator control extending through the pine forests at the base of the spit.

More often, however, it is local Forest and Bird people who put up signs and ribbon fences to protect smaller nesting sites.

'The signs go up at the beginning of October and stay in place through the breeding season,' says Ann Graeme, national coordinator of the Kiwi Conservation Clubs. She lives in Tauranga and has been active in dotterel conservation work in the region. 'Forest and Bird branches, such as Eastern Bay of Plenty, Te Puke, Upper Coromandel and Thames-Hauraki, are active all along their coasts protecting these "little sites" — perhaps a nest or two — while DoC increasingly has adopted the most productive places as part of its Dotterel Recovery Programme,' she says.

'Prior to the Christmas holidays the system works well, with local Forest and Bird folk persuading other locals to keep out of nesting areas and to control their dogs,' Ann Graeme says. 'The birds need to breed early and successfully, however, or their second brood would run into the Christmas break. Unfortunately, when the holidaying hordes arrive at the beach, local care for the birds tends to be swamped by the visitors.'

For more than 10 years, Forest and Bird members have been trying to protect a breeding area with up to a dozen New Zealand dotterel at Omaha on the Rodney coast. The job has been made harder by a growing subdivision with expensive homes encroaching along the sandspit where the birds breed. Predators, and cats and dogs from the adjacent village, raided the nests. Now fences surround the nesting areas along the last remaining dunes and predator control is carried out with the cooperation of residents. The chicks which fledged in 1997 were the first to reach that stage in eight years.

Futher up the coast, the giant dunes of Mangawhai South Head are easily approached across the river from a popular seaside resort. For decades one of the last known populations of fairy tern in New Zealand bred on the beachfront of this once remote spot. In 1984 the national population fell as low as three pairs. Dogs accompanying 'boaties' from across the river chased the Mangawhai birds from their nests. A similar fate befell a nesting colony of Caspian tern which in New Zealand now has 'rare bird' status.

The Wildlife Service, followed by the Department of Conservation, moved to protect the nesting sites with a fence and resident guardians. Fairy tern also breed on sandspits at Waipu and South Kaipara Head but the New Zealand sub-species of the fairy tern is 'critically endangered' with a total population recently fallen again, to an estimated 21 birds.

Two pairs of fairy tern have recently bred on a sand island off Papakanui Spit at South Kaipara Head, on the west coast north of Auckland. During the 1980s, motor vehicles on the sandspit were one of the factors blamed for chasing away many nesting birds, including a colony of some 350 Caspian terns. Gwenda Pulham who watches the site with other members of the Ornithological Society recalls that in the summer of 1992-93 there were no successful nests of any birds on the huge sandspit because of vehicle traffic.

In the past three years, however, the sea has broken through the sandspit protecting a large area as an island, and many birds have returned. This natural protection from people has been strengthened during the breeding season by the Department of Conservation with fences on the spit, wardens, and predator control. For the first time in years, a fairy tern chick fledged in the summer of 1997-98.

DoC has its hands full in the north during summer and students are hired to protect some eight sites regarded as 'breeding hotspots' for the

P.F. PENNY

Vehicle tracks demonstrate the reason why no birds bred successfully on the huge Papakanui Sandspit at South Kaipara Head in 1992-93. Now, with fencing, wardens and pest control, the area has partly recovered. At the end of last summer, 30 New Zealand dotterel were seen roosting on the spit at high tide and there were 10 nesting territories on an adjacent sand island. Among other birds recorded, an Ornithological Society team counted two fairy terns, five pairs of variable oystercatcher, 30 banded dotterel, and a colony of 2200 white-fronted terns with 900 chicks. Note the nest of a banded dotterel between the vehicle tracks, bottom left.

New Zealand dotterel. Each conservancy generally has a couple of major 'hotspots' where predator control and protection are carried out by employees. On Matakana Island last summer they protected 26 pairs of New Zealand dotterel and more than 28 chicks fledged. Responsibility for protecting the 'little sites' elsewhere — one or two pairs — still falls on local enthusiasts such as Forest and Bird members.

Even common coastal birds may suffer from disturbance with the influx of holidaymakers in summer. While using other habitat as well, the white-fronted tern and all three species of New Zealand's gulls often nest on the ground, on sandspits and beaches. Loose dogs, riders, pedestrians and motorised traffic in summer can disturb their nesting colonies. Vulnerable young birds are still being fed by their parents at that time.

Using beaches as roads has had an increasing impact on bird populations in the Auckland region. (It is still possible to make the 50-kilometre run up Muriwai Beach to the South Kaipara Head because the strand is a legal road.) The same use of beaches as highways can be observed, however, in many places around the coast in the nesting season. There is not only the impact of the now ubiquitous 4WD wagon or utility taken on the beach for an off-road adventure. There are also burgeoning numbers of farm bikes, 'quads', and all-terrain vehicles, often used illegally on beaches to get access to fishing spots.

Unless our countryside is to be bound up in a mass of rules — no dogs, no powerboats, no vehicles, for example — the only practical way through this unfortunate holiday traffic jam will be better public understanding and sympathy for the birds. This is where the advocacy of Forest and Bird volunteers, guarding the nesting areas, is making a difference.

People who understand the reasons for rules are far more likely to view them sympathetically, than those who feel they are being harassed in their pursuit of happiness.

Unfortunately, neither rules nor reasoning works with summer hoons. So there is a continuing need for law enforcement too.

Ultimately only a growing appreciation of our tenuous and threatened wilderness can change people's attitudes, encouraging them to respect the needs of wildlife at midsummer, and to share our shores.

GORDON ELL is the author of Seashore Birds of New Zealand, *with pictures by GEOFF MOON who illustrated this article.*

GEOFF MOON

New Zealand dotterel chicks and egg

Shore-nesting birds most at risk at Christmas are the New Zealand dotterel (above), officially classified as a 'threatened species', and the 'critically endangered' fairy tern (at right) of which only an estimated 22 birds survive.

GEOFF MOON

Fairy tern and nest

On Lakeshores Too

The situation at the beach is often repeated on inland lakeshores, where a sudden influx of visitors and their pets can disturb shy birds nesting in the reed beds. The careless use of motorboats is understood to be a major factor in the decline in numbers of Australasian crested grebe, regarded as a 'threatened native' bird, on South Island lakes. The growing numbers of jet-skis amplifies the problem.

The large grebes (like their smaller threatened cousins, New Zealand dabchick) nest at water level on a platform of reeds or weed. They are sensitive to noise disturbance, as water skiers and others power past their nesting and feeding areas. Alarmed, a nesting grebe may leave its nest without covering its eggs with protective weed, leaving them exposed to extremes of weather. The wash of speeding boats may even swamp them. Family dogs enjoying a romp on the lakeshore may chase or scare off nesting birds. Disoriented pet cats may disappear from the holiday camp and go wild, living off birds and lizards along the lakeshore.

Again it is the unfortunate conjunction of the nesting season with the annual waterside holiday which puts extra, unwonted pressure on the breeding birds. In places, boating restrictions have been put in place to protect the breeding grebes, but these come late in the noticeable decline in wild populations. Places which 10 years ago had a few of these grebes, now have none.

Mature beech trees, like these are to be felled and helicoptered from the West Coast forests under Timberlands' management plans. Old beech trees are vital habitat for perching plants (such as native mistletoe), as roost sites for native bats, and as foraging and nesting sites for birds such as kaka and parakeets. Scientific research has shown that wildlife makes much more use of beech trees above 70 centimetres in diameter, for nesting and foraging, than it does smaller trees. Large old trees have more potential nesting holes than small trees because holes form when branches break off at the trunk and timber rots with the ageing tree. Timberlands plans to leave only the very biggest trees — red beech with a diameter of more than 110 centimetres and silver beech over 90 centimetres — taking those in the critical 70-centimetres-plus range.

Forests 'To Go'

Logging by Timberlands West Coast is changing these forests forever.

ROB BROWN

At risk from the Timberlands beech plan are the red and silver beech forests on the east bank of the Maruia valley, near Springs Junction. More than 90 percent of the 13,000 hectares of Maruia are pristine, old-growth forest which the Department of Conservation has described as having 'outstanding wildlife habitat values'. These forests are home to several species threatened with extinction, such as kaka, blue duck, parakeets, falcon and several native fish species. Overall, the Department of Conservation has identified that 92 percent of the 132,000 hectares of native forest which Timberlands controls has 'high' or 'medium' conservation values deserving protection.

New Zealand enters the twenty-first century with a logging scheme more suited to the nineteenth.

Centuries-old native trees are being felled, on the West Coast of the South Island, by a Government-owned company which pays only a peppercorn royalty for the timber it logs.

This portfolio of pictures, by conservationists active on the West Coast, shows some of what is being lost as Timberlands moves in, logging rimu and beech.

Along with the community of independent research scientists, and Government advisory bodies, Forest and Bird has opposed the felling of beech and rimu trees in this region on economic and scientific grounds.

The science of the 'sustainable beech management' scheme has been convincingly challenged by the Academy of the Royal Society of New Zealand, a body made up of the nation's most-eminent scientists; and by Landcare Research, the Government's own scientific research company.

In business terms, the profitability of Timberlands West Coast is also questionable. The company benefits from extraordinarily low royalties paid per tree; also the Government's reluctance to make it pay a dividend. As a State-owned corporation, or as a prospect for sale, Timberlands is an anomaly in free-market terms.

The oddity of Timberlands West Coast arises in part from the West Coast Forest Accord, signed in 1986, which provided for a transition from native forest logging to an industry based largely on plantation forests. Forest and Bird was among the interested parties which signed the agreement. At that time, approximately half the exploitable lowland forest from the Buller to Okarito in South Westland was protected as conservation lands. The other lowland native forests were subsequently allocated to Timberlands.

Since the Accord was signed over a million cubic metres of native logs have been felled by Timberlands as part of its 'transition' to felling exotic plantations. Adequate plantation pines are available but, because of the high value of rimu, Timberlands has postponed the changeover to pine in the Buller. Elsewhere, with just a few exceptions, the

For every tree logged and taken to the sawmill, another two trees are felled and left to rot on the forest floor. This process is part of an 'improvement felling' regime to cull 'defective stems' to improve future timber prospects. Claims by Timberlands that the beech scheme involves logging 'an average of one tree per hectare per year' is seen by Forest and Bird as 'a cynical public relations slogan'. In the Maruia forests, 51 trees are felled per hectare of which 35 are 'felled to waste' and left to rot.

EUGENIE SAGE

ROB BROWN

STEVE PHIPPS

ROB BROWN

Heavy rimu logging is occurring in the Charleston forests close to Paparoa National Park as part of the Buller rimu 'overcut'. Logging is stripping away the dense mantle of forest which formerly enhanced many scenes like this. The magnificent natural architecture of the Buller karst country includes natural limestone bridges, towering bluffs, huge arches and overhangs, along with complex cave systems and underground rivers and streams.

STEVE PHIPPS

Far left: During Conservation Week, activists highlighted Timberlands' 'trial logging' in the Maruia valley beech forests. The public receives little or nothing in return for the destruction or degradation of thousands of hectares of beech and rimu forests which were standing when moa still roamed the land. In the 1998-99 financial year the Crown received only $186,974 in royalty payments from Timberlands West Coast, and $294,000 in tax. Timberlands has only paid a dividend once in its nine-year existence.

Sales of beech and rimu logs gave the company $10 million in revenue in 1998-99, allowing it to spend generously on the controversial public relations campaign documented in Secrets and Lies *by Nicky Hager and Bob Burton (see Book Reviews, this issue).*

Left: Forests damaged by past logging in the Nile Valley of Charleston Forest. Bleached spars in the middle foreground have been left as rimu was heavily logged.

Only a narrow strip of forest around South Westland's Okarito Lagoon is protected from logging. Timberlands is experimenting with sustainable' logging in the terrace rimu forests of North Okarito, an area which deserves to be added to Westland National Park.

STEVE PHIPPS

EUGENIE SAGE

Extensive new roading is proposed as part of the 'beech scheme' and is already part of 'sustainable' rimu logging. New roads, such as this one in the terrace rimu forest of North Okarito, provide significant corridors for the invasion of pests, and weeds such as gorse, broom, blackberry and buddleia.

STEVE PHIPPS

This site was cleared in Charleston Forest during logging for rimu. This felling is part of what is called 'the Buller overcut', an expression applied to the heavy logging of rimu, intended as a temporary measure while the West Coast industry converted to exotic pine trees.

EUGENIE SAGE

The aftermath of heavy rimu logging in the Awakiri Valley, near Paparoa National Park. Every saleable rimu tree has been felled and removed by helicopter, except for a few trees left on the river's edge. Helicopters give logging crews access to areas previously uneconomic to log because of the high cost of roads.

West Coast timber industry is now based on exotic trees.

It is timely now, to revisit the future of the 130,000 hectares of native forests held by Timberlands.

New Zealand has changed immeasurably, in business and social terms since 1986, except it seems in the vicinity of these forests. Publicly-owned native forests are now protected throughout New Zealand, excepting these Accord forests and the Longwood and Rowallan forests in Southland.

Nature tourism based on the native forests has boomed since then, as an alternative to logging, moving the economy of South Westland from the era of exploitation to a more sustainable future. To the north, Paparoa National Park has been a huge success and boost for local business.

The High Court has also ruled that the Government is under no obligation to proceed with any beech-logging scheme.

Forest and Bird is proud to stand alongside the community of distinguished scientists who are calling for a stop to the logging, and with fellow conservationists on the West Coast and elsewhere, as we champion the protection of these great rainforests and their dependent native plants and wildlife. The time has come for the publicly owned native forests held by Timberlands to be recognised for their international conservation significance and included in the West Coast's famous network of national parks and reserves. — *Gordon Ell and Eugenie Sage.*

ANDY DENNIS

'Eco-tourism' offers an economic alternative to native forest logging, according to conservationists, who point to the tourist industry which sprang up in the Haast region when logging stopped there.

'Protecting West Coast forests is the only ethically responsible decision that could be taken on this issue, given that New Zealand has lost over 85 percent of the lowland forests that existed here prior to human settlement and that many of the 1000 species of indigenous plants and animals threatened with extinction depend on lowland forest habitats for their survival. It also secures one of our most important places of sanctuary from the stresses of modern life. As technology takes over more and more of our lives, the need to safeguard areas of wilderness for "re-creation" (that is, solitude, escape, adventure, contact with wild nature) will become increasingly urgent.' — *Dr Andy Dennis, writer and photographer.*

Back from the Brink

New Zealand scientists have helped rescue the Rarotongan flycatcher from extinction, writes HUGH ROBERTSON

Once among the 10 rarest birds in the world, the Rarotongan flycatcher or kakerori has been brought back from the brink of extinction.

When rescue work began in 1989 there were only 29 birds left and extinction was predicted by 1998. However, thanks to one of the most successful bird-conservation programmes ever undertaken, numbers have instead rebounded and the kakerori is no longer regarded as 'critically endangered.'

The special feature of the recovery programme, led by New Zealand scientists, is that all the management has taken place within the natural habitat of the species.

The kakerori *Pomarea dimidiata*, is a small forest bird found only on the island of Rarotonga in the Cook Islands. Distantly related to the fantail in New Zealand, it more closely resembles a whitehead or yellowhead in its shape, size and feeding behaviour. For the first two years of life, kakerori are bright orange, then in their third year they become mottled-orange and grey, and from the fourth year onwards they have a dark-grey back and paler-grey underparts.

They are one of the *Pomarea* flycatchers found throughout eastern Polynesia, and all five species are threatened with extinction. In 1989, the kakerori and the Tahiti flycatcher were among the 10 rarest bird species in the world.

Missionaries wrote that kakerori were abundant on Rarotonga until at least the mid-1800s; but the arrival of ship rats spelt doom for them in the same way as they did for many forest birds in New Zealand. Like our species, these birds of oceanic islands evolved in the absence of mammalian predators. While they coped with invasions by the relatively benign Pacific rat or kiore, the introduction of ship rats was too much. A few birds were collected for museums around the turn of the century but, for most of the 1900s, it was thought that the kakerori had gone the way of no return, like the huia, piopio and bush wren in New Zealand.

Then, in 1973, a small pocket of birds was re-discovered in the rugged foothills of Rarotonga. In 1984, New Zealand scientists Rod Hay and Gerald McCormack made a rapid census. They found 24 birds, and colour-banded eight of them (see *Forest & Bird*, August 1984). A thorough census by Rod Hay and myself in September 1987 revealed 38 birds, including five of the colour-banded birds. Observations over the next two breeding seasons showed that an alarming 80 percent of nests failed to produce young. This was mainly because of predation by ship rats, though at least one adult kakerori was killed by a feral cat.

By 1989, there were 29 birds left, including just 13 females — mathematical modelling predicted there was a 50 percent chance they would be extinct by 1998 unless something was done urgently. Ed Saul joined the rescue team in 1989 and, working closely with the fledgling Cook Islands Conservation Service, we started a 'research-by-management' programme. We began experimentally poisoning rats over an increasingly large part of the 155-hectare range of the birds. Poison bait stations (in 40cm sections of Novacoil drainpipe) were laid out along ridges surrounding the valleys occupied by kakerori, and on twisting tracks mainly following the contours within the valleys, where most nests are found.

Since then a variety of poison baits has been used, but the preferred choice is Talon 50WB (waxy block) baits, because rats like them and they persist reasonably well in the hot humid environment. From late September to December baits are replenished or replaced weekly by a small team of (increasingly fit!) conservation workers and volunteers led by Ed Saul.

The aim is to knock down rat numbers by the time the first kakerori nests appear in mid-October, and then maintain low numbers of rats through until December when the breeding season is starting to tail off. Feral cats are incidentally killed by eating poisoned rats, or sometimes by eating baits hooked out from the bait stations. Wherever possible, nests are given extra protection from rats by nailing a band of aluminium around the trunk of the nest tree and any nearby trees with interlacing branches.

The intitial success of the rat poisoning programme is assessed by recording the decline of bait-take as the weeks pass and by the amount of nesting success. The ultimate test is the the number of yearlings alive and the total population size during the annual census in the following August.

This roll-call of birds is possible because about two-thirds of the birds have now been mist-netted and marked with a unique combination of coloured plastic leg-bands. The unbanded birds are either highly faithful to their territories or can be distinguished by their particular plumage type.

The population of kakerori has grown from the 29 birds of 1989 to a minimum of 180 birds in 1999. This growth has been made possible by a combination of nesting success (increasing from 20 percent to 67 percent), and the increasing rate of survival of the adult birds (up from 76 percent to an amazing 93 percent). This gives a mean life-expectancy now of 13 years.

The kakerori changes colour as it matures. For their first two years of life they are bright orange. In their third year, birds become mottled orange and grey. From the fourth year they have a dark-grey back and paler-grey underside (see page 31).

ROD HAY

The habitat of the Rarotongan flycatcher, the kakerori, which occupies only four valleys in the Takitumu Conservation Area of Rarotonga, Cook Islands. Rediscovered on 1973, bird populations have been boosted from 29 birds in 1989 to 180 birds, with guidance from New Zealand.

H.A. ROBERTSON

H.A. ROBERTSON

Hugh Robertson (left) of the Department of Conservation in Wellington spends 10 percent of his time giving scientific advice to the Kakerori Recovery Programme. Ed Saul (right), is the leader of the conservation workers and volunteers on Rarotonga. He has been the principal technical adviser to the project since the 1980s.

Kakerori are among the longest-lived wild birds for their size. Three of the eight birds colour-banded as adults in 1984 were still alive in August 1999 at a minimum age of 18 years, 10 months. Five others are known to be at least 16 years old. Almost unbelievably, 18 of the 29 birds alive in 1989 were still alive a decade later. In this way, kakerori have a similar life history to many long-lived New Zealand birds such as kiwi, kakapo and kokako. Their life expectancy is quite different from the short-lived perching birds of the Northern Hemisphere which are lucky to live much more than five years.

Since 1996, the management of the Kakerori Recovery Programme has passed from the Environment Service (formerly the Cook Islands Conservation Service) to the three families who own the forest occupied by the kakerori. Known as the Takitumu Conservation Area the project is part of the South Pacific Biodiversity Conservation Programme run by the South Pacific Regional Environment Programme. Under this programme, customary landowners conserve the biodiversity in a defined area and at the same time develop a sustainable economic use of the area. In this case sustainable use is through ecotourism. Anna Tiraa, a stalwart of the rat-poisoning campaigns and nest monitoring, was instrumental in getting this project off the ground; Ed Saul has remained the backbone of the recovery programme and has been the principal technical adviser to the project.

The 155 hectares of Takitumu host all five species of native land-bird found on Rarotonga. Here, too, are found most of the sea-birds (tropicbirds, terns and noddies) of Rarotonga. There are numerous lizards (which have benefited greatly from the rat- and cat-control programme), a large colony of fruit bats (flying fox or moakirikiri), and a wide variety of native plants. These plants include several rare and unusual orchids and mistletoes.

Tracks have been constructed through one of the four valleys occupied by kakerori to allow tourists of varying levels of fitness to be catered for, and an interpretation centre is close to completion. During the kakerori breeding season some side valleys are closed off, but visitors are permitted to see certain kakerori nests from a distance. Year round, all visitors are assured of seeing and hearing kakerori (and lots more) during their half-day guided tour for $35 per person — contact the Takitumu Conservation Area Project at PO Box 3036, Rarotonga; phone (00682) 29906, or email: kakerori@tca.co.ck

The Kakerori Recovery Programme has been extremely successful and is now promoted as a model for other conservation work in the region. In this particular case, the threat was straightforward — just two species of introduced predator, the ship rat and feral cat. The answer to the problems they posed was also simple — poisoning ship rats also led to secondary poisoning of feral cats.

These two predators are also the main threats to many other endangered birds in the South Pacific. The technologies developed in New Zealand, and during the Kakerori Recovery Programme, are now being used elsewhere in the region to try to conserve other birds, especially the critically endangered cousin of the kakerori, the Tahiti flycatcher *Pomarea nigra*.

Although the kakerori population on Rarotonga has recovered spectacularly, it remains at risk from threats such as cyclones, new bird diseases, and new predators (such as snakes) that could accidentally get to Rarotonga. An overnight storm in late July 1998 apparently killed about half of the yearlings from the preceding season, and provides a warn-

ing about the potential impact of a severe cyclone. Conservation efforts are now being directed toward determining the feasibility of shifting some kakerori to another island, in the southern Cook Islands, which is free of ship rats: this is simply an insurance policy, so that Rarotonga can be re-stocked if disaster strikes there.

Meanwhile, through this programme, the kakerori has gone from an obscure forest bird unknown to most Rarotongans, to an emblem of the island which many Rarotongans are proud of. A local rugby team has even adopted the name Kakerori — surely the ultimate measure of advocacy success! Further, the establishment of a successful eco-tourism business by the land-owning families also shows that conservation and economic development can work hand in hand.

HUGH ROBERTSON is a scientist with the Department of Conservation in Wellington where he is head of the Kiwi Recovery Programme. Some 10 percent of his time is devoted to giving scientific advice to the Kakerori Recovery Programme, with travel costs paid by the Ornithological Society of New Zealand, the Pacific Development and Conservation Trust, and the South Pacific Regional Environment Programme.

The mature kakerori has a dark-grey back and paler-grey underparts, in contrast with its juvenile forms.

GERALD M'CORMACH

Insects at Risk

GEORGE GIBBS argues that too many protected predators are changing the nature of our offshore sanctuaries.

ENT OF CONSERVATION

Tuatara eat other native species. If their numbers increase too greatly on an island sanctuary, they can upset the natural balance with other protected species on which they prey. Several insect species are threatened on Stephens Island in Cook Strait where there are more than 50,000 tuatara.

The offshore island sanctuaries set aside to protect our threatened wildlife may be the scene of New Zealand's next extinctions. Burgeoning numbers of predators, both native and introduced, may be causing the accelerated extinction of their prey, including several rare insects and other invertebrates.

On the tuatara islands of Cook Strait, growing numbers of this prehistoric reptile are changing the very nature of their environment. On Little Barrier, the introduced kiore, or Pacific rat, and the saddleback, have brought the 'world's largest insect' — the wetapunga — to the brink of extinction. If we are not to lose an increasing number of our insect species, thought needs to be given to the number of their predators.

It is ironic that while conservation of New Zealand's native animals and plants is progressing in leaps and bounds, with each successful island transfer or pest eradication, the threats to our native insects, spiders and other small creatures can be increased. Much of our invertebrate diversity has never been 'described' in the scientific sense. Some creatures, such as the Cromwell chafer beetle, have only tiny localized areas of distribution. In such cases, extinction of a species can occur without anyone noticing, but the changes in our offshore nature reserves are closely observed. Scientific records over the years indicate that invertebrate numbers can be affected by burgeoning populations of predatory animals. Several rarities, including the giant weta, are in danger of extinction unless we adjust the pressure on them.

New Zealand has a long list of extinctions. For birds, the list is almost a world record; nothing short of calamitous. Less is known about the loss of invertebrate animals. While birds leave bones, animals which do not have a bony skeleton leave few traces.

It is almost impossible to list the invertebrates that have recently become extinct. Nevertheless, we should attempt it. With the emphasis of conservation moving from individual species to whole communities, we should be devoting far more effort to this 'silent majority' of small invertebrate animals.

To set goals for New Zealand conservation, scientists strive for the 'pre-human' state. The first 'unnatural' extinctions in New Zealand are associated with the introduction of kiore, the Pacific rat, which Richard Holdaway has suggested might have occurred as long ago as 2000 years. Although this small rodent had little impact on the larger birds, there is clear evidence that it had a devastating effect on some of the larger terrestrial invertebrates, and on reptiles, amphibians and small flightless wrens. The impact of kiore can still be seen today by comparing the fauna of islands where kiore are present against those without. The scarcity of larger invertebrates and reptiles on kiore-infested islands is immediately apparent.

There are several recent cases where an insect or a snail has disappeared from a limited and well-studied area. And a disturbing feature is emerging: invertebrates are becoming extinct within our nature reserves! Believe it or not, sanctuaries which receive heavy doses of 'conservation management' are the places where species are being lost.

One reason for this is that sanctuaries are chosen for their unique or rare examples of animals and plants. Another is that we tend to know more about the biology of nature reserves than the country at large. The irony is that they are selected for the express purpose of saving species from extinction.

Small areas, such as islands, can only maintain limited populations of a limited number of species. Sometimes, when a disturbance occurs, the balance will be destroyed allowing certain species to increase in numbers at the expense of others which may go extinct.

Probably the best-known example of

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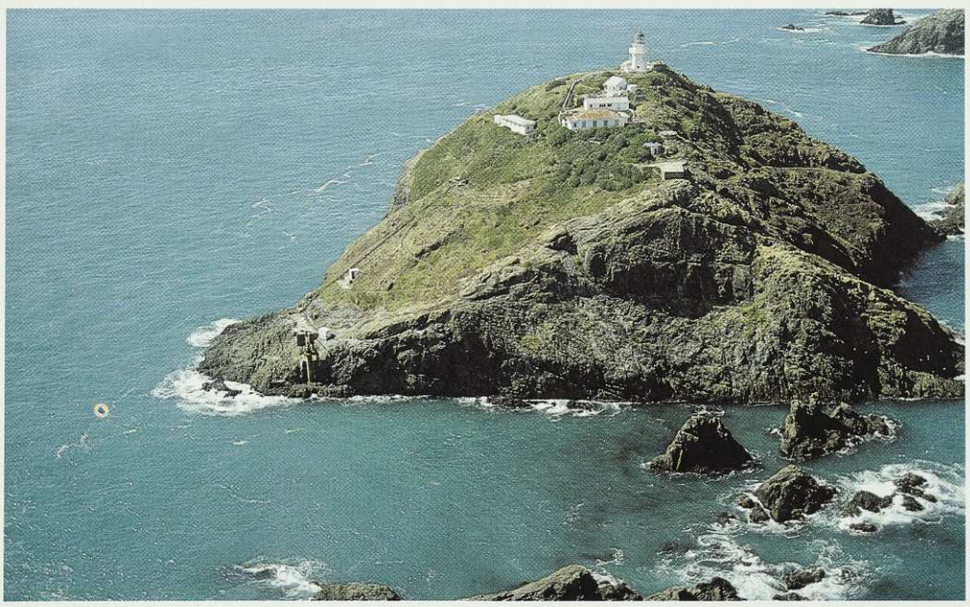
Extreme closeup of a Little Barrier giant weta, or wetapunga threatened with extinction.



GEORGE GIBBS

When visiting the North Brother Island in Cook Strait during 1959, the author saw very few tuatara, while the Cook Strait click beetle was relatively common. Returning in 1993 he could catch 50 tuatara in a night and the click beetle had vanished — a presumed 'local extinction' due to the increase in predatory tuatara.

such disturbance, from New Zealand, occurred on Big South Cape Island in 1962-63 when ship rats got ashore, leading to the total annihilation of a wren, a snipe, and a bat, and the local extinction of two other birds and a weevil. That example is well known because it involves vertebrate species. Our preoccupation with vertebrates, however, can lead to disaster for insects.

Takapourewa (Stephens Island) in Cook Strait is still one of our prime wildlife sanctuaries despite extensive modification when a lighthouse was constructed in 1892-94. The forest was cleared for farm animals and cats were introduced. Extinction of no less than 14 land bird species followed including the Stephens Island wren, South Island kokako and South Island thrush. At least one reptile and a large carnivorous paryphantid snail were not immune to the impact.

When the cats were finally eradicated in 1925, all had not been lost. The survival of a number of reptiles, including tuatara, the world's rarest frog (Hamilton's frog), and some notable insects, gave the island the status of a Wildlife Sanctuary in 1966. The island's trump card was tuatara which burgeoned to reach an estimated 50,000 animals as a result of the increased area of open sunny slopes where eggs can incubate more successfully than in forest. This extent of increase in a top predator species confined to the limited area of an island was bound to have serious repercussions on its prey species.

Sure enough, when we examine the fate of the previously rich fauna of forest invertebrates we find they have suffered badly. The giant carnivorous land snail *Powelliphanta hochstetteri obscura*, was last seen alive on the island in 1905. A Stephens Island endemic, the large carabid beetle *Mecodema punctellum*, was last seen in 1931. Another similar carabid beetle *Mecodema costellum*, described as being 'very abundant under logs and stones' by the early naturalist G.V. Hudson in 1934, is now extremely scarce. The list goes on,

ROD MORRIS, DEPARTMENT OF CONSERVATION

When populations of native predators get out of balance with their prey, other native species may become threatened. The author, George Gibbs, argues management of refuge islands may have to include managing the number of tuatara so other species on which they feed can also survive.

and includes the Cook Strait giant weta and the Stephens Island endemic ngaio weevil, which are still present but in low numbers.

The situation is complex because not only have tuatara numbers escalated to an estimated 1500-2000 per hectare in the bush areas but, over the same time period, the forest logs and deep moist litter required by some of these invertebrate species have all but disappeared. The combination of forest loss followed by increased predation has upset the delicate balance of this island community

I believe the list of extinctions of large-bodied invertebrates on Stephens Island will continue to grow unless conservation management faces up to the issues. Re-

This giant weta, or wetapunga, once occurred on the mainland of Northland but is now restricted to Little Barrier Island. Its body is about the size of a mouse and some say it is the world's heaviest insect.

C.R. VEITCH, DEPARTMENT OF CONSERVATION

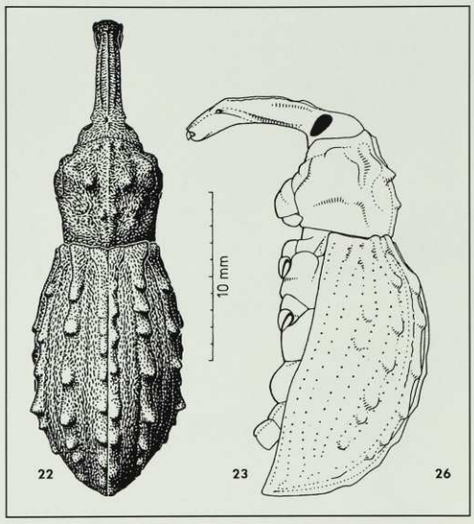
establishment of forest habitat is a long-term goal but it will not happen fast enough to stop more extinctions. To give these ailing creatures a fighting chance, tuatara numbers should be reduced. Why not adopt a management policy that considers the optimal tuatara carrying capacity of Takapourewa with regard to the other elements of the fauna and relocate some, as is done in Africa with elephants?

A similar thing is happening on another rat-free island in the narrows of Cook Strait. North Brother Island is a tiny island with low, windswept shrub cover on its upper slopes, crowned with a lighthouse and accompanying buildings. From my first visit in 1957, I recall the abundance of the nocturnal Duvaucel's gecko, the scarcity of tuatara and the large numbers of beetles sheltering under rocks. I returned in 1993 on a census survey of tuatara. Over 400 tuatara were counted (160 per hectare) but one of the beetle species (the Cook Strait click beetle) seen on the previous trip could not be found and has since been 'presumed extinct' so far as this island is concerned. Why should this happen in an 'undisturbed nature reserve'? I can only conclude that the increase in exposed soil areas, resulting from human lighthouse activities over a century, has boosted tuatara numbers to the point where they are exterminating their food species, in this case one of New Zealand's listed 'endangered' invertebrate species.

Hauturu (Little Barrier Island) in the Hauraki Gulf is undoubtedly New Zealand's foremost nature reserve. Here, on a much larger and more complex island, the impacts of single events are less likely to have such far-reaching results. Yet it is the pending risk of extinction of New Zealand's most significant invertebrate that stimulates me to write this article.

The wetapunga *Deinacrida heteracantha* is often claimed to be the world's heaviest insect. Whether correct or not, it is certainly the moa of our insect world. Although its sole population occurs in our top wildlife sanctuary, it could be doomed to extinction in the very near future.

In the days of Sir Walter Buller, wetapunga were found all over the Northland peninsula, on Waiheke, Great Barrier and Little Barrier Islands. Buller witnessed its extinction on the mainland North Island prior to 1900, attributing it to the invasion of Norway rat. When first studied on Hauturu by Aola Richards in 1958-61, it was widespread around the bunkhouse area at a time when the island was infested with both kiore and cats.



An extinct giant weevil believed common in New Zealand's rimu forests prior to the introduction of the kiore or Pacific rat. Its 'sub-fossil' was turned up by bulldozers when the pumice landscape west of Lake Taupo was being prepared for planting in exotic forest. Generally fossil insects are hard to find because they have no bones. This insect was found in the remains of a rimu forest buried by the Taupo eruption, along with examples of several other well-preserved insects. The giant rimu weevil is about 23 mm long, and has never been collected alive. It is 'clearly another example of invertebrate extinction' according to the author.

Since then the cats have been exterminated and a number of visits have been made by entomologists with the express purpose of finding and studying this remarkable insect. It is clear from reports that wetapunga numbers have been steadily declining to the point where it is now very difficult to find one, let alone any number of them for a population study. In 1994 and 1995, we could not find sufficient adult weta in the two-week search periods to do the work properly.

Two animal species that we did see frequently were kiore at night and saddleback by day. Both are known to be expert weta predators and together could well be the reason for decreasing wetapunga numbers. In the days of Aola Richards's study, the cats kept the rats in check and saddleback had not been re-introduced. Today it appears that wetapunga cannot sustain the two-pronged attack.

Either predator by itself might be tolerable. The commonly-held notion that 'saddleback are native and therefore wetapunga must be adapted to their predation' might no longer apply in the presence of kiore. How long can this declining weta population persist? I had been assured by the Department of Conservation that an eradication programme for kiore was planned and should take place in the spring of 1999.

If successful, we might see wetapunga plucked from the brink of extinction. The latest, and most devastating news, however, is that the planned kiore eradication did not go ahead this year due to some cultural differences of opinion about the value of kiore which are regarded as a taonga (or treasure) by the tangata whenua, Ngati Wai.

There are two lessons here for New Zealand conservation. The first is that our overwhelming focus on vertebrates, especially birds and tuatara, is not only taking resources away from other organisms and communities but is actually threatening the invertebrates. The second is the myth that only the aliens are 'bad guys' — that all native fauna and flora evolved in harmony and therefore can live together without threatening one another. However, following ecological disturbance on the confined space of an island, a native predator — even a tuatara — can wreak just as much havoc amongst native prey species as a rat or a stoat, if there are too many of them.

The Department of Conservation must address these issues or face the ironic situation of having further extinctions on managed conservation areas. Imagine the shame of conservation-conscious New Zealanders should they learn that wetapunga, the world's heaviest insect, has become extinct on our top island sanctuary because we could not make a critical management decision and get rid of the rats.

As a major plank of the much heralded *'Biodiversity Strategy — Our Chance to Turn the Tide'* we need to develop a conservation philosophy which recognizes that in some (exceptional) cases there can be too many of even our beloved vertebrates for the good of the greater ecological community. In the case of Little Barrier/Hauturu, the cultural issues which threaten native biodiversity must also be resolved or we risk still more extinctions.

GEORGE GIBBS is an entomologist, and Associate Professor of Zoology at Victoria University of Wellington. He is author of New Zealand Butterflies, The Monarch Butterfly *and* New Zealand Weta.

The author of this article, George Gibbs believes the native saddleback and the introduced kiore, or Pacific rat, are killing off the giant weta in its last refuge on Little Barrier Island. He believes rats must be exterminated as soon as possible if the giant weta is to survive.

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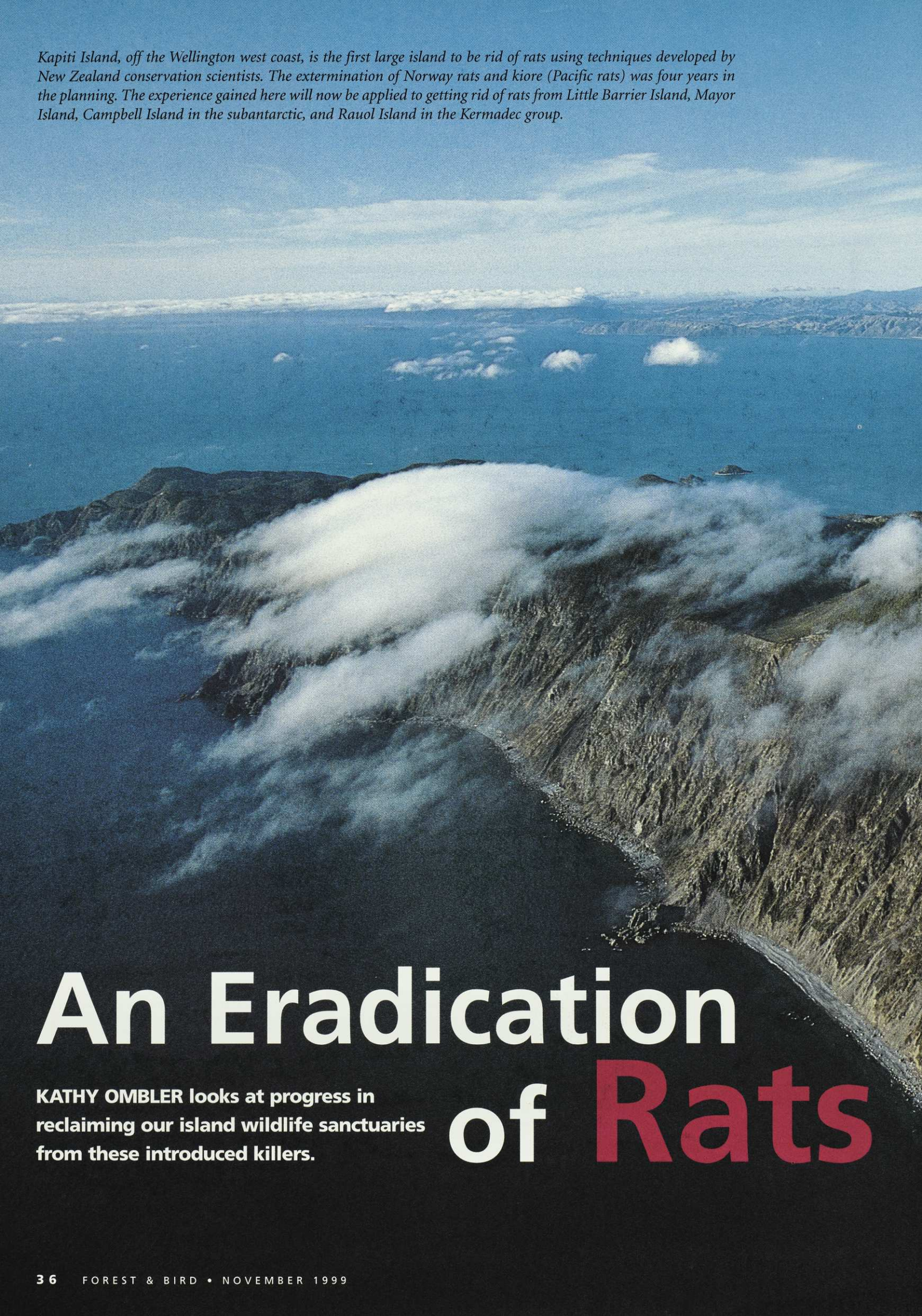
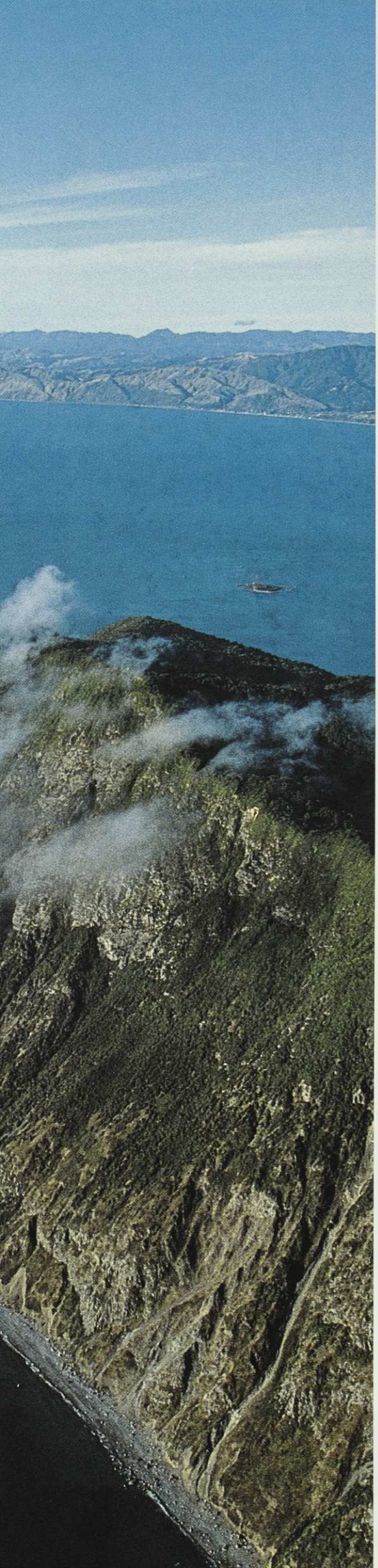


Kapiti Island, off the Wellington west coast, is the first large island to be rid of rats using techniques developed by New Zealand conservation scientists. The extermination of Norway rats and kiore (Pacific rats) was four years in the planning. The experience gained here will now be applied to getting rid of rats from Little Barrier Island, Mayor Island, Campbell Island in the subantarctic, and Rauol Island in the Kermadec group.

An Eradication of Rats

KATHY OMBLER looks at progress in reclaiming our island wildlife sanctuaries from these introduced killers.



ROB SUISED

The Pied Piper of Hamelin really is just a fairy tale compared with the real life achievements of conservation staff and scientists who are ridding New Zealand's offshore islands of rats. These introduced animals are the enemies of birds, lizards, insects and plants, and their removal has resulted in a spectacular recovery in natural values on some of our most precious reserves.

To date rats have been eradicated from 54 of our offshore islands, ranging from small rock stacks to the rugged 1965 hectares of Kapiti Island. Presently, Kapiti ranks as the largest rat eradication success in New Zealand and already the reserve is showing dramatic recovery signs.

Stitchbird numbers have rocketed (to a 78 percent survival rate for young birds, compared with 33 percent previously). Saddleback numbers have increased from nine pairs to 20, where previously they were declining. Anecdotal evidence reports an increase in lizards and invertebrates on Kapiti. A partly completed vegetation study has already noted increased numbers of native seedlings, many growing in some areas for the first time on record. Breeding seasons must surely improve for the bush parrot, kaka, considering that pre-poison monitoring showed half of their nests were preyed on by rats.

Like other rodent-free, offshore islands, Kapiti plays a key role in safeguarding populations of New Zealand's threatened wildlife. Several threatened species are already on the island. The way is now clear to transfer more.

During the 1990s, expertise for the eradiction of rats has developed so much that the Department of Conservation is now planning to eradicate rats from several major islands, including Little Barrier in the Hauraki Gulf, Tuahua or Mayor Island in the Bay of Islands, Raoul Island in the Kermadec group, and Campbell Island in the subantarctic.

The story of rat eradications combines developing technical expertise with personal determination. Patience and extended sojourns in cold, wet and rugged environments have all played a part. Key examples of the developing techniques can be traced in the increasingly difficult challenges met.

Rugged Breaksea Island (170 hectares) lies on the Fiordland coast. Norway rats were exterminated there in 1988. Rowley Taylor of the then Department of Scientific and Industrial Research led this operation, the first on such a major-sized island. The method used was a 'rolling front' of bait stations placed 40-50 metres apart. The island was cleared in sections with the 'rolling front' advancing progressively along the length of the entire island.

Rats are a major predator of native birds and other animals. Their raids on nests, eggs and chicks have been blamed for the critical state of many bird populations. New Zealand has three species of rats, all introduced: the black or ship rat; the Norwegian or brown rat; and the kiore or Polynesian/Pacific rat.
The black rat (pictured) is an adept tree climber, where it robs nests.

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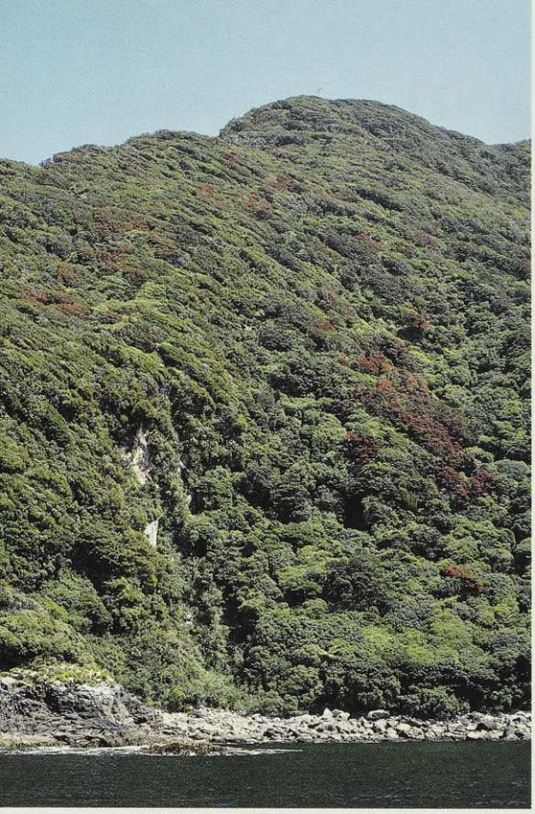


GORDON ELL, BUSH FILMS

Breaksea Island off the Fiordland coast was the site of the first successful attempt to get rid of introduced rats from an offshore island. In the 1980s, scientists developed a system which involved laying a 'rolling front' of poison bait stations, advancing in sections along the length of the island. Further tests on Ulva Island (in Paterson Inlet, Stewart Island) led to further techniques which enabled larger islands to be tackled.

Volunteers cut tracks and baited stations. After the eradication, South Island saddleback, yellowhead and a rare weevil were released on Breaksea. Also the Fiordland skink, self-reintroduced from a nearby rock stack, has become quite abundant.

Until 1997, Norway rats infested Ulva Island (250 hectares) which lies in the Paterson Inlet of Stewart Island. These rats were exterminated, again by laying a 'rolling front' of bait stations. Ulva was divided into three sections, but the workload was doubled when one section had to be re-poisoned.

The Ulva eradication was regarded as a trial run for Kapiti, and confirmed the unsuitability of the labour-intensive, 'rolling-front' method for larger islands. On Kapiti, for example, up to 12 'sections' would have been needed and the operation would have taken more than a year, encompassing a rat-breeding season. Another problem on Ulva was that weka took baits and ate poisoned rat carcasses. Because of this weka were taken off Kapiti during the poisoning.

Ulva was always considered difficult because it is so close to Stewart Island. There is easy boat access and, depending on tides, it is believed to be possible for rats to swim from Stewart Island. Two rats have since been sighted (one on Ulva, one swimming just offshore). Both were caught and killed by DoC staff

Efforts to eradicate the Pacific rat or kiore from the Mokohinau group, northwest of Great Barrier Island, began in 1991. Kiore eradication was begun on five islands, ranging from one to 56 hectares, by aerial spreading of poison bait. This, and subsequent aerial poisoning in 1994 on three of the Mercury group east of the Coromandel Peninsula, confirmed the success of aerial operations. Rodent-free status of the entire Mokohinau group was confirmed in May this year with the completed eradication of 18-hectare Fanal (Motukino) Island. The threatened Mokohinau skink and tuatara are now likely to be reintroduced.

Four years of feasibility trials, and consultation with three iwi (including landowners of the northern end of the island), were undertaken prior to ridding Kapiti of Norway rat and kiore. Work began with aerial poisoning in 1996. Two drops of poison bait were made to ensure total coverage.

Pre-poison trials established that the Kapiti population of kiwi, kakapo, kaka, stitchbird, saddleback and kokako would not be vulnerable. However, during the poisoning, takahe, brown teal and some weka were held in pens on the island and more weka were transferred to the mainland. A new population of North Island robins was deliberately established on nearby Mana Island. After extensive post-poison monitoring, Kapiti was declared rat free in January 1999.

Poisoning to eradicate kiore from Whenua Hou/Codfish Island (1560 hectares), was carried out in 1998 and the island is now undergoing 'post-poison' monitoring. Two aerial drops were made, as well as intensive ground poisoning in the habitat areas of fernbirds and kakapo. Kakapo and 25 fernbirds (of a unique subspecies) were taken off during the poisoning, and 250 short-tailed bats were held in aviaries on the island. After the eradication, kakapo were returned and Campbell Island teal released. Fernbirds are likely to be returned from nearby Putauhina Island when they have bred up to a self-sustaining population.

Throughout the history of rat eradication on islands, volunteers, including ornithologists and Forest and Bird members, have worked alongside specialist staff. In the Hauraki Gulf, Forest and Bird member Mike Lee personally completed the eradication of rats from Rotoroa Island (90 hectares) and nearby rockstacks as part of a university study (*Forest & Bird*, August 1999).

On many islands, DoC and local iwi have developed good liaison in getting rid of rats. In Southland, the local Oraka Aparima rununga of Putauhina approached DoC to eradicate rats from their island and supported the relocation of fernbirds there while neighbouring Whenua Hou was poisoned.

In the Marlborough Sounds, DoC is currently planning a 'joint eradication' of rats from the Rangitoto group of islands, involving local Maori and Victoria

Quarantine concerns

So far 54 of New Zealand's offshore islands are now rat free. But will they stay that way? The conservation director of Forest and Bird, Kevin Smith, has concerns about DoC's procedures to safeguard these islands from re-invasion.

'In my view, few of the rat-free islands have adequate quarantine procedures,' he says. 'Where procedures such as bag inspections are in place, they are not consistently adhered to. Quarantine standards are highly variable.

'It is a privilege to visit these offshore islands. They are ecological treasures. To keep them that way all visitors need to follow strict biosecurity procedures to prevent accidental rodent re-introduction and to stop the dispersal of weeds.'

Another issue concerning Kevin Smith is that mice invasion of islands is more likely once rats have been eradicated. 'Mice are harder to eradicate than rats and are known to readily hitchhike around with humans. This reinforces the need for stringent rodent quarantine,' he says.

A senior technical officer for DoC, Pam Cromarty, acknowledges there is no single set of 'standard operating procedures' regarding quarantine arrangements.

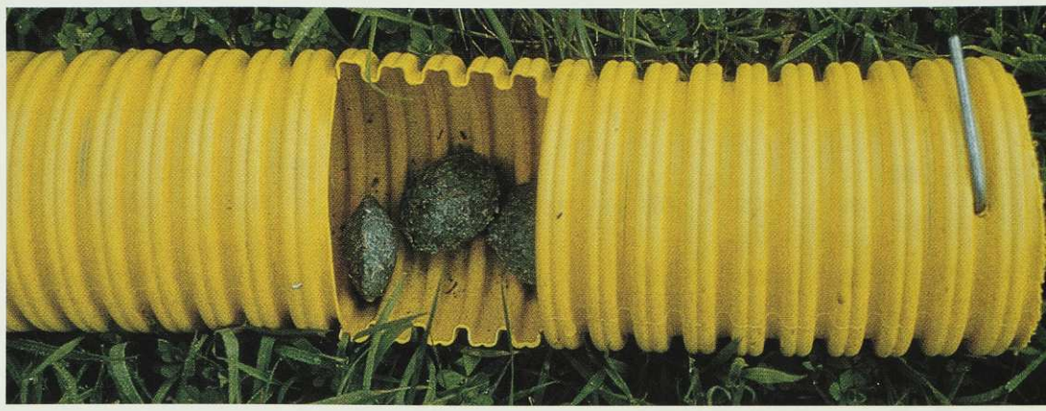
'While each conservancy is acutely aware of the importance of rodent-free islands, it is probable that more formal procedures, reflecting national "best practice", and taking into account the differing legal status of the various islands, will be developed,' she says.

University of Wellington. The idea is to relocate tuatara there.

Campbell Island (11,216 hectares) in the Subantarctic World Heritage Area, is one of four major island priorities now listed in DoC's strategic planning for rat eradication — the problem species here is the Norway rat. Bait trials have been carried out recently, and an operational plan is being prepared with funds to be sought depending on the trial results. Because of the huge distance involved and the island's wet climate, the logistics of this operation will be difficult and the cost huge. It was originally thought the presence of cats on Campbell Island would complicate the eradication, but a recent search has detected no sign of them.

Also high on the priority list is Hauturu, Little Barrier Island (3000 hectares), which is infested with kiore. Some aspects of planning are underway and negotiations with iwi are progressing with a view to making this a millennium project. (See 'Insects at Risk', page 32 this issue.)

Eradication of Norway rats and kiore, from Mayor Island/Tuahua (1277 hectares) off the Bay of Plenty coast, is proposed to take place within the next two to three years. Local iwi support the eradication.



DEPARTMENT OF CONSERVATION

Some trials have already been undertaken to eradicate Norway rats and kiore from Raoul Island (3000 hectares) in the Kermadecs. Eradication could be carried out within three years. The remote location of Raoul, some 1100 kilometres northwest of mainland New Zealand, will make this operation particularly expensive.

Because rats and cats are present on both Mayor Island and Raoul, it is hoped the Bay of Plenty eradication will help improve techniques for the larger, more distant Raoul operation.

Expertise with rat eradication in New Zealand has developed so much during the 1990s that other countries now come seeking our technical know-how. In recent years, New Zealand conservation experts have designed operational plans for eradications in Norfolk Island, American Samoa, the French subantarctic islands, Pitcairn, Canada and Hawaii. In some cases, New Zealand experts have been personally involved in projects. Currently under consideration is the possibility of Australian conservation staff joining DoC's proposed Campbell Island eradication, to gain experience for eradications from islands off Western Australian.

— KATHY OMBLER is a Wellington-based freelance writer with an active interest in conservation and recreation.

Brodifacoum baits for rats. Use of the poison is discussed in Conservation Briefs, page 12.

Fascinating Fungi

'A few mushrooms with your bacon?'
'Mmm, yes please!'

Some fungi are delicious; truffles are so highly prized that they can sell for several thousand dollars per kilogram. Other fungi are very poisonous.

Fungi play a part in the production of many things that are good to eat or drink: fresh bread, blue vein and brie cheeses, wine and beer. Some fungi contaminate foods with toxins; some produce powerful antibiotics which can be used to treat bacterial infections. Fungi are intriguing and brightly coloured treasures to be found in the garden, on bush walks, or jaunts to the park.

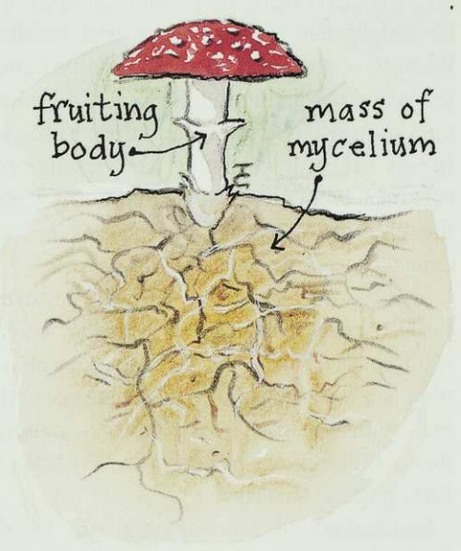
In the past fungi have been classified in the Plant Kingdom but unlike green plants they cannot make their own food by photosynthesis for none of them possess chlorophyll. To live they must have organic food, such as carbohydrates and protein etc., more in the the style of animal nutrition. So now they are classified in a Kingdom all to themselves: the Fungus Kingdom.

Unlike animals, fungi don't move around to find their food. Instead, they grow on or in their food — be it wood, fruit, leaf mould etc. — secreting enzymes which digest the food outside their bodies which is then absorbed and used for growth.

Most fungi grow as microscopically thin strands called hyphae, which repeatedly branch to form a network called a mycelium. The mycelium penetrates all parts of the food that the fungus is using. Fungi which live off dead organic material are called saprophytes, whereas those that live on living organisms are parasites. Some are able to do both. *Armillaria*, (a parasite that attacks a number of plants including kiwifruit vines), will continue to live on the host it has killed.

So what do fungi do when they've used up the food on which they are growing? They have to reach another source and they do this by making spores. Spores are tiny reproductive structures which can remain dormant through long periods of inhospitable conditions, then germinate to produce a new mycelium if they land on a suitable surface. Spores are so small that they are carried far and wide by air currents and are present in every lungful of air we breathe.

To make spores, the mycelium forms a special fruiting body which pushes up into the air. These fruiting bodies are the things we call mushrooms and toadstools. Each one releases millions of spores so there is a good chance that some of them will reach a new food source and start a new mycelium. So when you happen upon a toadstool on a bush walk, remember that it is just the tip of the iceberg and hidden beneath is the fungus network of feeding mycelium.



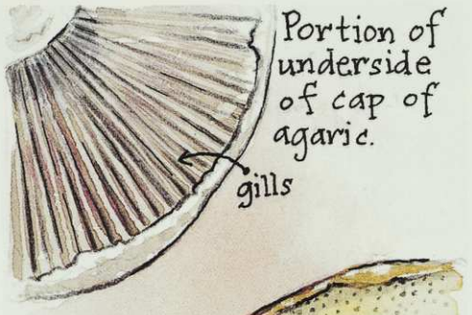
ILLUSTRATIONS BY TIM GALLOWAY

The largest single living organism in the world has been found to be an *Armillaria* mycelium sprawling across 600 hectares in the state of Washington, USA. It has been calculated that the total mass of this individual would be 400 tonnes; bigger than a blue whale!

In all ecosystems, fungi play a vital role as decomposers. They help to recycle dead material into mineral salts in the soil, ready for renewed uptake by plants. Logs of solid wood transformed to crumbling dust testify to this power.

Mycorrhizal fungi are even more intimately involved with plant nutrition. These form a mutually beneficial relationship with plant roots. The fungus partner

helps the plant to take up nutrients from the soil and, in return, the fungus may share some of the carbohydrate made by the plant. This is why we often find toadstools popping up around a tree, as does the fly agaric, *Amanita muscaria*, around pine trees. The mycelium that produces these white-spotted red toadstools has formed a mycorrhizal association with the roots of the pine tree.



There are many ingenious ways in which fruiting bodies launch their spores for dispersal. The most common method is that of the agarics which have gills under an umbrella-shaped cap. Spores produced in the gills fall down and are blown away.

Boletes, like the sticky bun fungus *Boletus granulatus*, have the familiar-shaped cap but, instead of gills, the spores are produced in cylindrical tubes beneath it.

Curiously, the pouch fungi, like the blue tobacco-pouch fungus, *Weraroa viriscens*, never open to release their spores. Instead they may be dispersed by fungi-eating invertebrates or by birds fossicking for insects.

Puff balls, like the velvet earthstar, *Geastrum velutinum*, form a dry mass of spores which puff out from a small central hole at the slightest touch.

The bird's nest fungus, *Crucibulum laevae*, produces miniature cups containing 'eggs', which are little packets of spores. When rain drops 'plop' into the cup, the 'eggs' are splashed out.

A foul stench attracts flies to the basket fungus, *Ileodictyon cibarius*, thought at one time to be 'ghost's droppings' - tutae kehua - and you can understand why. Basket fungus and its close relation the red 'flower' fungus *Aseroe rubra*, produce a sticky, stinking, spore mass on which flies crawl. The flies feed on the spores and carry them away sticking to their bodies.

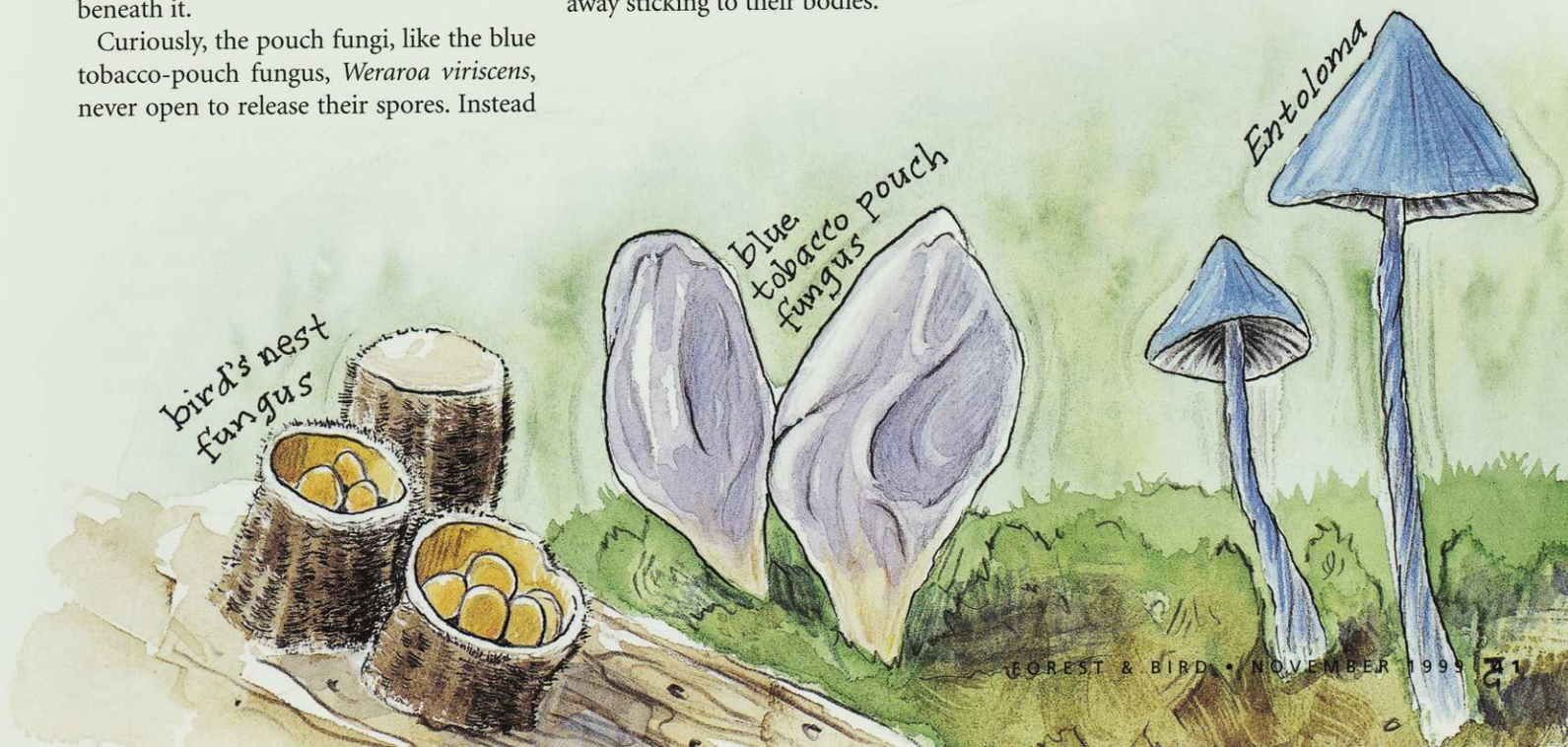
Most macabre are the fungi which infect underground cicada nymphs and porina caterpillars. Having fed on an insect's tissues, and replacing them with fungal mycelium, the fungus sends a fruiting stalk up above ground from which to shed its spores. The insect corpse, packed with fungal mycelium, becomes a 'vegetable cicada' or 'vegetable caterpillar'.

The sheer variety of fungal fruiting bodies is a cause for wonder. Textures range from woody to jelly-like. Sizes range from caps only a couple of millimetres in diameter to bracket fungi that are big and strong enough to sit on. Colours range from the palest creams and mushroom hues to the most vivid such as the bright blue of *Entoloma hochstetteri*. Fungi are mysterious in their sudden appearance, and ephemeral in duration. To me, they are mystical, curious life forms.

It is always disappointing to see toadstools kicked to smithereens at the side of a track. Let's pause to admire them instead. Remember also their essential role in silently driving the cycles of nature.

— *Kate Mulligan.*

KATE MULLIGAN is an organiser of the Kiwi Conservation Club, and current secretary of the Tauranga Forest and Bird committee.



Forest regeneration project in Upper Hutt

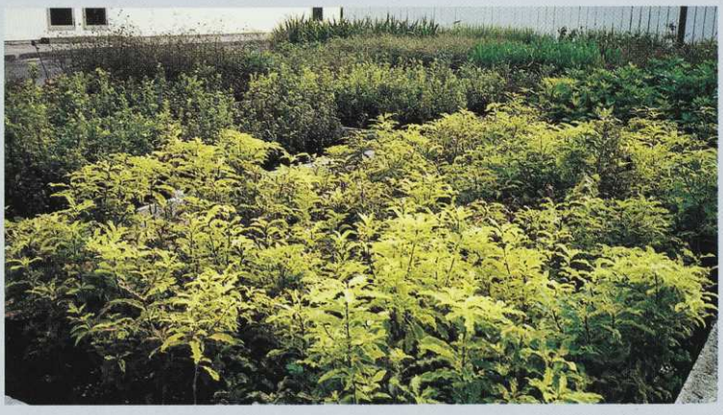
Since 1994 the Upper Hutt branch of Forest and Bird has been involved in a successful joint effort to rejuvenate two surviving areas of native forest in Trentham Memorial Park. Known as Barton's Bush and Domain Bush, these are the only remaining areas of the original lowland forest which once covered the Hutt Valley.

Following a study of the area in 1994, which revealed a negected and weed infested area, a report was prepared and Forest and Bird offered to coordinate several interested groups. Upper Hutt City Council has provided ongoing funding for weed and pest control in the area, and helps pay towards the production of more than 4000 trees and shrubs to be planted back into the forest each season.

These plants are sourced from seedlings and seed collected from the Upper Hutt area. They are collected and grown by an enthusiastic group of Forest and Bird members, and by Upper Hutt College students. The Hutt International Boys' School has more recently joined the scheme.

A shadehouse at Rimutaka Prison is used for raising many of the young plants. Help is given by some of the prisoners, both in potting up young plants and planting them in the bush. A number of other groups also help with the planting out.

The success of this project is evident in the healthy, vigorous growth of the bush and the many favourable comments from local people who visit the park. It has been an excellent exercise in cooperation between very different local groups, and in providing many students with an ongoing practical experience of how regeneration works.



Some of the plants for the restoration of native forest remnants in Upper Hutt are cared for at Rimutuka Prison. A plant production unit organised by Upper Hutt Forest and Bird raises 4000 plants every season.

EROL CARR

Members of Upper Clutha Forest and Bird in the Wilkin Valley of Mount Aspiring National Park. The extended field trip was organized in response to a request for 'more tramping trips' and led by Upper Clutha chair, Bill Hislop, a former chief ranger of the park.

Mount Aspiring Adventure

Requests for field trips involving extended tramping, led Upper Clutha Forest and Bird into the spectacular Wilkin Valley of Mount Aspiring National Park. Bad weather at the departure for the three-day trip resulted in a one-day delay and a reduction in party size from a dozen to five people.

The first day involved a fixed wing flight from Makarora to Jumboland Flat which placed us within one and a half hours walk of the Upper Forks Hut.

Day two was spent walking up the North Branch of the Makarora visiting Lakes Diana, Lucidus and nearby Castalia, then returning to the hut. The third day was taken up with the seven-hour walk down the valley to Kerrin Forks, from where we jet boated out to Makarora.

This trip provided a variety of beech forest walking, open river flats, the adventure of river crossings and subalpine tussock grasslands. There were three beautiful lakes, each one different in its setting, dominated by the main divide peaks of Castor, Pollux, Mercury, Perseus and others named for great mythological characters. We were able to observe the planet Venus and a late moon side-by-side, dipping behind the skyline of Mount Pollux. All this was enhanced by the 'fresh after the storm' clarity of the mountain air.

There was little evidence of possum and deer in the upper valley. The forest edges, grass flats and boggy areas show some improvement since cattle were removed about 1995.

— Bill Hislop, Upper Clutha branch.

Project Crimson grants

Forest and Bird branches have again been busy seeking funding for pohutukawa and rata projects from the Project Crimson Trust. Six of the 55 projects being funded by the Trust this year are led by Forest and Bird people from branches in Auckland, Upper Coromandel, Gisborne, Waihi, Wairarapa and Wellington.

A total of $4150 in grants is spread across the branches. The funds are being put toward weed and pest control, potting mix, plantings, irrigation, and a nursery scheme. All projects involve the protection or regeneration of pohutukawa and rata in the branch area.

Applications for grants from Project Crimson's next funding round will close on April 30, 2000. For more information, 'visit' the Trust' website www.projectcrimson.org.nz or contact its office on 09 4808864, or write to PO Box 34-214 Birkenhead, Auckland.

— Debbie Teale, Project Crimson.

The Collier-Dickson Reserve where South Taranaki branch is undertaking predator control. Protected under a covenant from the Queen Elizabeth II National Trust the property lies on a peninsula protected by the Patea River where it flows through Lake Rotorangi

Restoring the dawn chorus in South Taranaki

Encouragement from the Collier family persuaded South Taranaki Forest and Bird to undertake pest control management in their Collier-Dickson Reserve, bordering the Patea River, at Lake Rotorangi. Because it is a peninsula extending into the lake, the risk of re-infestation should be minimised.

The 390-hectare reserve is protected by covenant under the Queen Elizabeth II National Trust. Unused shearers' quarters were donated and moved to high ground where they were extended to accomodate 15 people. Material and labour was contributed by South Taranaki branch. It is now a comfortable lodge for trapping, education and family weekends.

Long-term care is now in its second year, under the responsibility of Rex Hartley, a recent recipient of a Taranaki Regional Council Environmental Award.

Birdlife is flocking back to the Collier-Dickson Reserve on Lake Rotorangi where South Taranaki Forest and Bird has undertaken extensive pest control. The project included shifting old shearers' quarters, and turning them into a lodge for visitors. Thanks to the protection of 'paternal' trappers, a tomtit has also nested and successfully reared chicks in the eaves of the lodge.

With the regular help of Allan Baikie, Ian Perrett and Noel Barrie, 400 possum carcasses have been tallied, through shooting and trapping, with approximately 300 succumbing to line bait. To begin with one could regularly shoot 50 plus a night; now three or four is a pleasing result.

The consequent return of many different species of birds is obvious. There are presently two pair of resident falcon, bellbird, pigeon, fantail, and grey warbler. Only a year ago one had to strain to hear birds. A brief walk to the lake and a quick count with Bill Messenger noted 133 plant species, 81 different observations of tree, climber and shrub, 30 different ferns and 32 bryophytes. Goats are still a problem.

The control programme continues thanks to grants from Waikato Forest and Bird, the J.S.Watson Trust, Taranaki Savings Bank, and the Lotteries Board.

— Alison Crafar, South Taranaki branch.

GEOFF LLOYD

Forest and Bird members on Great Barrier Island have been influential in establishing a land and beach-care group, called Custodians of the Environment, based on Mulberry Grove School. Early initiatives include beach clean ups, and planting native flora on streamsides and along the coastal esplanade reserve. School staff and children have also helped the Department of Conservation to rescue a small whale which stranded only 30 metres from the school.

Weka reserve on the East Coast

Gisborne Forest and Bird is caring for a colony of weka released on part of the H.B Williams Turihaua estate. Eleven birds, raised by Andy Bassett from the Department of Conservation and Basil Graeme of Tauranga, have found a new home in a coastal reserve set aside by a local environmentalist, Bill Williams. Some birds are wearing tracking devices and are regularly checked. Local Forest and Bird members monitor the 16-hectare reserve on a weekly basis, filling water and supplementary feeding stations. Most of their work, however, involves pest control with many rats, a feral cat and one stoat caught to date.

— Warner Ovenden, Gisbone branch.

Electric fencing surrounds a reserve near Gisborne, where Forest and Bird members are caring for a recently established colony of weka. Their work includes pest control, and providing water and food for the birds.

Southland members win Loder Cup

Forest and Bird members Brian and Chris Rance have been awarded the 1999 Loder Cup for their 'outstanding work in setting up a threatened plant garden and community nursery' on their lifestyle property at Otatara, near Invercargill.

The Loder cup, one of New Zealand's leading conservation awards, honours people and organizations that have made an outstanding contribution to the conservation of New Zealand's native plants.

The Rances are strong conservationists with a passion for New Zealand's native flora and fauna. They have helped save some of Southland's rarest plants by taking seeds and cuttings from isolated plants surviving on private land and growing them in their 'Noah's Ark' garden at Otatara. (See Conservation Briefs, *Forest & Bird*, August 1999.) Some of the plants 'rescued' by the Rances have been planted back into the wild to boost wild populations, while others are being cultivated as a back-up for species under threat in the wild.

'The vision and hard work of Brian and Chris Rance is an inspiration for people throughout New Zealand and shows what can be achieved,' according to the Minister of Conservation, Dr Nick Smith. Recipients of the award in recent years have included the Auckland-based Supporters of Tiritiri Matangi Island to which many Forest and Bird members belong, Mrs Isobel Morgan of Napier Forest and Bird, the Native Forests Restoration Trust, and botanists Dr David Given of Christchurch, and Dr Peter Johnson of Dunedin.

JANINE GRAY, DoC

Forest and Bird members Chris and Brian Rance have won the prestigious Loder Cup for their work in establishing a garden of threatened native plants near Invercargill. Here the cup is presented to them by the Minister of Conservation, Dr Nick Smith (centre).

Bird cards from Upper Coromandel

Upper Coromandel Branch has recently produced some bird cards as a fund raiser. The postcards are based on paintings done during the 1930s by Lily Daff for the New Zealand Native Bird Protection Society, as Forest and Bird was then called.

When Forest and Bird celebrated its fiftieth anniversary, a book of the paintings was published. With consent from Head Office, some of the paintings have now been copied for the cards.

The postcards depict six birds seen on the Coromandel Peninsula — native pigeon, little blue penguin, North Island brown kiwi, shining cuckoo, grey warbler, and New Zealand dotterel (illustrated). They are being sold in packs of six, one of each bird. (See advertisement on page 8 of this issue.)

The Upper Coromandel committee felt a need for suitable cards to use for brief messages, such as thank-you notes and reminders, and the idea grew from there. Funds raised will be used for various conservation projects in the Coromandel area and elsewhere.

— *Tina Morgan*

FOREST & BIRD

Lily Daff's 1930s painting of New Zealand dotterel done for the New Zealand Native Bird Protection Society, as Forest and Bird was then known. Upper Coromandel Forest and Bird has republished it as part of a postcard set to raise funds for conservation.

Website for Kiwi Conservation Club

Embracing both the need for conservation information and modern technology, the Kiwi Conservation Club is now 'online' on the world-wide web at www.kcc.org.nz

Every day Forest and Bird receives requests from children and teachers for information about New Zealand wildlife and wild places, as conservation and the natural environment slowly but surely edge their way into the education curriculum. At the same time, the growth of information technology is moving at a much faster rate as more homes and schools install computers with the capability of accessing the world-wide web.

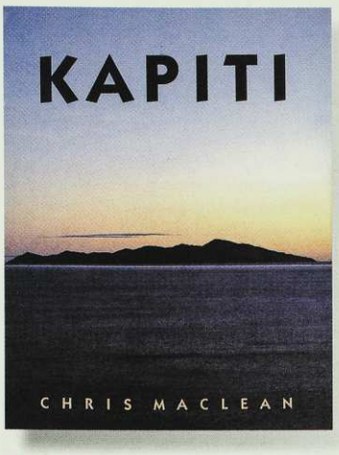
The objective of the KCC website is to offer a fun, informative, educational and 'interactive' introduction to New Zealand wildlife and wild places. The target audience is children of KCC age (5-13 years). The secondary audience is teachers and secondary school students.

The KCC website contains information on a wide spectrum of conservation and environmental topics, including 'how to be green at school', where to find more environmental information, how to write to politicians, information about Forest and Bird and KCC, and Forest and Bird fact sheets. Each of these sheets focusses on a single subject: perhaps a New Zealand species like the weta, or an ecosystem, or an environmental issue such as marine reserves. There is also a special 'password-ed' section for KCC members only where they can find extra puzzles, games and information provided exclusively for them.

It is hoped that by making the most of the technology available, Forest and Bird can reach a wider audience through its KCC website. The idea is to encourage children and their educators to learn more about the natural world and the active part they can play in caring for the planet.

— *Carol Knutson.*

bookreviews



Kapiti

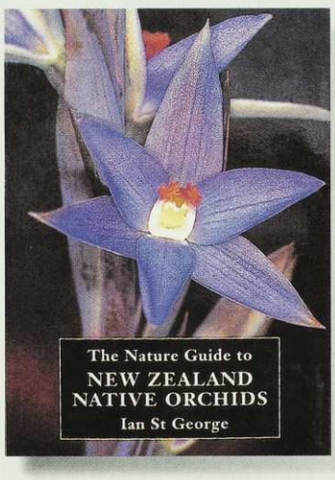
by Chris Maclean, 303pp, Whitcombe Press, 39 Bruce Avenue, Brooklyn, Wellington 2, 1999, RRP$49.95.

Chris McLean devotes nearly fifty pages of this highly detailed book to the work of Forest and Bird's founder, Captain Val Sanderson, and others, in their fight to save this nature reserve from pests and political apathy. Set aside more than 100 years ago, the neglect of Kapiti Island off the Wellington coast was a catalyst in the formation of our Society in 1923. The island's significant place in history is much greater than the conservation successes of more recent years, however.

Chris Maclean traces the story of the island through Maori times, including the years when it was the base of Te Rauparaha in his murderous raids on the South Island. The whaling history is exciting too, and the remains of old shore stations can still be seen in the regenerating forest.

Obviously there is much about conservation and the attempts to remove a succession of pests from the island. Perhaps the most interesting dimension, however, is the evolving relationship between Maori landowners and the Crown, over the management and development of the island. Maclean's detailed historical approach presents a microcosm of the kinds of issues increasingly encountered in the administration of public reserves, and the involvement Maori in their management.

This is a large format book, crammed with pictures of the many personalities who figure in the story of the island, details from old charts, pictures of pioneer settlement, and paintings by fascinated visitors and residents. The result is highly detailed, but fascinating to follow. What could have been a book of purely local interest transcends that genre, and draws a significant picture of changes in New Zealand attitudes to conservation, and of relations between Crown and Maori.



The Nature Guide to New Zealand Native Orchids

by Ian St George, 176pp, Godwit, Auckland 1999, RRP$39.95.

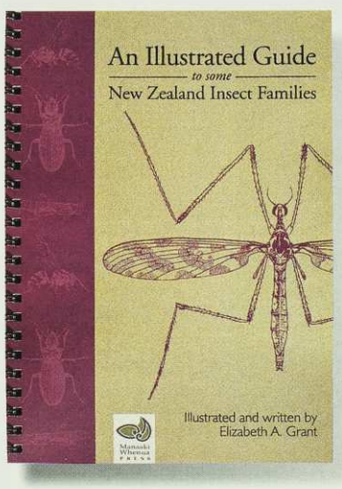
Anyone who enjoyed the *Forest & Bird* article about native orchids in our last issue would like this book. It's full of wonderful pictures illustrating the more than a hundred species of native orchid, plus distribution maps and reader-friendly identification notes. There is an introductory section on early orchid botany and art; also sections on the structure and life cycle of these often tiny plants, and the habitats where they grow. If you have one of the earlier illustrated guides to orchids now is a good time to replace it as the names of several quite well-known species have been changed.

The Hand Guide to the Birds of New Zealand

by Hugh Robertson and Barrie Heather, illustrated by Derek Onley, 168pp, Penguin Books, Auckland, 1999, RRP$29.95.

Here is the front end — the picture pages and captions — from

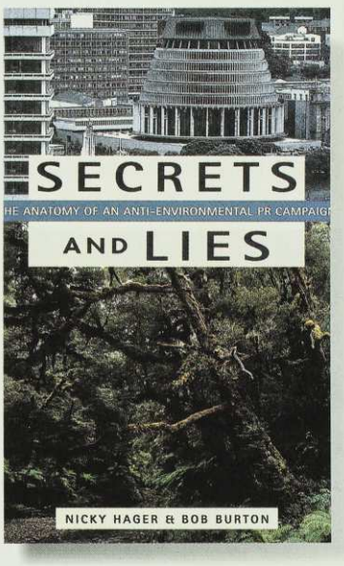
the much heavier *Field Guide to the Birds of New Zealand* published for the Ornithological Society by Viking in 1996. The caption-like text largely refers to the birds' appearance and distribution; the life cycle details, and supporting notes which make up the bulk of the original *Field Guide* don't appear here. It's highly portable, with a good protective cover. If you want a picture guide to sort out features in the field then Derek Onley's illustrations are just as useful in this format.



An Illustrated Guide to Some New Zealand Insect Families

illustrated and written by Elizabeth A. Grant, 196pp, Manaaki Whenua Press, PO Box 40, Lincoln 8152, RRP$32.50.

Originally written to help students, this ring-bound book consists of excellent line-drawings of New Zealand insects and facing-page text to help in their identification. After a few introductory pages, distinguishing the different features of insects, the book relies on comparing specimens with its clear, scientific drawings. The book is not exhaustive — it doesn't distinguish between the common species of little blue butterflies or the admirals, for examples — but it does provide a good start for placing an insect in its appropriate family.



Secrets and Lies

by Nicky Hager and Bob Burton, 286pp, Craig Potton Publishing, PO Box 555, Nelson, 1999 RRP$29.95.

Billed on its front cover as 'the anatomy of an anti-environmental PR campaign', *Secrets and Lies* is a damning account of how Timberlands West Coast tried to create a public climate sympathetic to logging native forests. The story has already created controversy regarding the role of a Government-owned company spending funds to influence political decisions about its future. *Secrets and Lies* is the result of painstaking research, using many 'leaked' documents which reveal the lengths Timberlands West Coast has gone to. The book pulls no punches, names names, and shows how individuals working for conservation are targeted for personal attack. 'Public relations' of this kind has been around governments for decades, but this is probably the first time it has been subjected to investigative journalism of this quality. A brave book: a shabby story.

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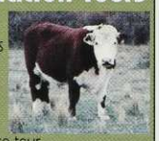

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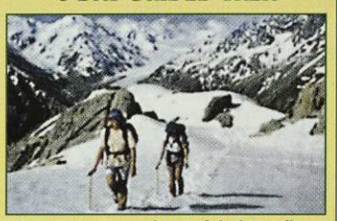

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By issue and page number.
Key: Bn = Bulletin
BO = Branching Out
CB = Conservation Briefs
Cm = Comment
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☐ This is a renewal membership (membership no.) _____

Gift membership

Join a friend by filling in their name above and your name below. Gift membership will be sent with a special gift card in your name. If you would like to be billed for renewal of this gift membership next year please tick here ☐

Gift from: (Mr/Mrs/Ms) _____

Address _____

_____

Forest and Bird membership category *(all prices include GST)*

☐ single	☐ family	☐ non-profit group	$49.00
☐ senior citizen	☐ senior family		$37.00
☐ student/schools	$32.00	☐ libraries	$49.00
☐ business	$100.00	☐ life (single only)	$675
☐ overseas	NZ$70.00		

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		

Donation (Donations over $5 are tax deductible) $_____

☐ Enclosed cheque to Forest & Bird
or charge my ☐ Visa ☐ Mastercard ☐ Amex ☐ Diners

Expiry date _____ Cardholders signature _____

By mail: FREEPOST No. 669, Forest and Bird, PO Box 631, Wellington.
By phone: (04) 385-7374 with credit card details. By fax: (04) 385-7373.
Email enquiries to: office@wn.forest-bird.org.nz

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Donation and/or membership form

Name (Mr/Mrs/Ms) _____

Address _____

_____

Telephone _____

☐ This is a new membership
☐ This is a renewal membership (membership no.) _____

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membership/donation form

Working together we can make a difference

join Forest and Bird

As a member of Forest and Bird you can:

- Gain satisfaction from the knowledge that you are contributing to the conservation and protection of New Zealand's natural heritage.
- Receive the *Forest & Bird* magazine - four full-colour issues a year, delivered to your mailbox.
- Receive regular issues of *Conservation News* containing the latest in environmental news.
- Participate to the level you desire in a large, successful, grassroots conservation group.
- Be informed by your local branch of trips, walks and conservation projects in your area.
- Stay at Forest and Bird's reasonably priced lodges around the country.

Use the attached form to give a donation or join as a member
(Donations over $5 are tax deductible)

It is your support and generosity that enables Forest and Bird to continue working for the environment.

FOREST & BIRD

Kiwi Conservation Club

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.
- A personalised KCC membership certificate containing the Kiwi Conservation Code.
- KCC member's stickers.
- Notification of activities and trips held in most areas by local KCC groups.

Instilling a love of nature is a gift that lasts a lifetime

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: Diana Noonan, Mirren St, Papatowai, Owaka, RD2.

LET ME TELL YOU ABOUT

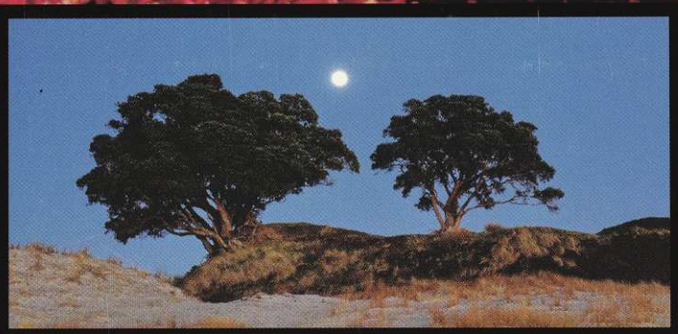
THE *Birds*

AND THE *Bees*

AND THE *Flowers*

AND THE *Trees*

Look out for our photo competition starting November 99. See our website *www.projectcrimson.org.nz* for details or contact the Trust at our address below.



AND THE *Moon up above*

AND *You*

Thousands of volunteers have helped the Project Crimson Trust grow and plant more than 150,000 trees in the last few years.

Join Project Crimson now and help protect pohutukawa and rata, New Zealand's Christmas trees.

PROJECT CRIMSON
Protecting Pohutukawa & Rata

Carter Holt Harvey
in partnership with the Department of Conservation

The Project Crimson Trust, PO Box 34 214, Birkenhead, Auckland
Website: projectcrimson.org.nz