FOREST & BIRD

NUMBER 306 • NOVEMBER 2002

Sea Snakes and Turtles • Coastal Sand Dunes
Vanishing Katipo • Spectacular Sea Slugs
Ocean Life in Crisis • The Bird Hunters

THE BEST NEW ZEALAND AND INTERNATIONAL BRAND OUTDOOR CLOTHING AND EQUIPMENT

montrail · EARTH SEA SKY · macpac · GARMONT · ARC'TERYX · icebreaker

WILDCOUNTRY · Fairydown · Marmot · Black Diamond

TRAVEL TRAMPING CAMPING CLIMBING TENTS
PACKS SLEEPING BAGS CLOTHING FOOTWEAR

BIVOUAC outdoor

100% nz owned

committed to adventure

0800 BIVOUAC AUCKLAND NEWMARKET
HAMILTON WELLINGTON CHRISTCHURCH DUNEDIN

free

Subscription to Bivmail

Our 12 page publication filled with stories, gear reviews, outdoor news and competitions.

plus

Be in to win $200 in Bivouac Outdoor vouchers just by subscribing.

Simply email your name and postal address to **bivouac@bivouac.co.nz** with the subject heading *'Bivmail signup F&B'*

or

put your name and address on the back of an envelope and send to: Freepost no. 1888, PO Box 7113, Christchurch, 'Bivmail signup F&B' *(no stamp required)*

The winner of the voucher will be drawn in conjunction with the following edition of Bivmail.

working together we CAN make a DIFFERENCE

Forest and Bird, New Zealand's largest environmental organisation, is involved in a wide range of conservation work. We are a registered charity which works to preserve and protect the indigenous flora and fauna and natural features of New Zealand for the benefit of the public including future generations. Current Forest and Bird membership is 40,000, and the Kiwi Conservation Club, for young people, has an additional membership of 6,000.

Forest and Bird is helping to:

- Protect natural areas including forests, tussocklands, wetlands and rivers.
- Preserve threatened species such as kakapo, kiwi and the yellow-eyed penguin.
- Save dolphins, seals and seabirds by ending damaging fishing practices.
- Promote a safe environment, free from pollution.

What you can do

If you care about New Zealand's environment and want to do something worthwhile to safeguard it for future generations, you can assist Forest and Bird in the following ways:

- Give a donation. Donations over $5 are tax deductible.
- Join as a Forest and Bird member.
- Leave a gift to Forest and Bird in your will.
- Enrol your friends and family with a gift membership in Forest and Bird or the Kiwi Conservation Club.
- Inform others about conservation by expressing concern and encouraging action.
- Assist with volunteer projects in your local area, through your local Forest and Bird branch.

join Forest and Bird

To join today please complete the Donation/Membership form attached to the other part of this form at the back of this magazine, and send to: Forest and Bird, P O Box 631, Wellington together with your payment.

You are reading the official publication of Forest and Bird, available exclusively to Forest and Bird members. If you are not a member you can receive this magazine directly to your home by joining as a Forest and Bird member.

Please send me further information on:

☐ Leaving a bequest to Forest and Bird
☐ Kiwi Conservation Club (KCC) magazine and how to join KCC

Name _____

Address _____

_____

Return to: Forest and Bird, P O Box 631, Wellington. Freephone 0800 200 064
Fax: (04) 385-7373, Email: office@wn.forest-bird.org.nz

Help yourself and Forest and Bird

Forest and Bird is pleased to be associated with two sponsors providing special deals which benefit both Forest and Bird members and the Society. These products are recommended to you as another way you can financially assist the Society whilst gaining a very competitive deal for yourself.

We recommend that you ring the 0800 numbers listed below to obtain obligation-free quotations and information, to judge for yourself whether these opportunities are for you.

Lyn Bates, General Manager

The National Bank of New Zealand Limited

Special Call Account for Forest and Bird members and their immediate family

Support Forest and Bird For every dollar in the Forest and Bird Call Account The National Bank pays Forest and Bird a 0.2%p.a. commission on the average monthly balance of funds held in all Forest and Bird Call Accounts.

Earn a Competitive Rate of Interest The account offers you an interest tier structure that enables members to access a very competitive rate of interest with balances of $5,000 or more.

Enjoy Easy Access Your money can be accessed at any time through The National Bank's touchtone phone banking, Online Banking, nationwide branches, ATMs and EFTPOS.

Interest rates are subject to change. Our disclosure statement is available from our Finance Division, PO Box 540, Wellington. For full details (including terms and conditions) contact any branch of The National Bank of New Zealand Limited.

Visit the Forest and Bird website for more information at www.forest-bird.org.nz

To open your account or to make further enquiries simply

phone The National Bank on 0800 74 84 94

or visit your nearest National Bank branch

Royal & SunAlliance

Exclusive Members Insurance Package

Only available to Forest and Bird members and their immediate family

Ring toll free 0800 505 905

for an obligation free quote

No hassle conversion No forms to fill out. We arrange cancellation of your existing policies on your behalf at no cost to you!

Commission paid to Forest and Bird For every policy issued Forest and Bird receives a commission which continues every year that the policy is current.

Discounted premium rates We can provide comprehensive Home, Contents, Car, Boat and Travel cover for you at competitive rates.

"I saved enough on my insurance to pay for my Forest and Bird membership!"

Linda Conning, Eastern Bay of Plenty Branch

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

NUMBER 306 • NOVEMBER 2002

FOREST & BIRD

Features

14 Sea Snakes and Turtles
Tropical visitors in warmer seas.
By Tony Whitaker

18 Coastal Sand Dunes
Rare plants struggle as sand dunes change.
by Sarah Gibbs

23 Katipo Threatened
Our poisonous spider succumbs to habitat destruction.
by James Griffiths

24 Spectacular Sea Slugs
Colourful creatures part of the variety of sealife.
by Tony and Jenny Enderby

28 Ocean Life in Crisis
Unsustainable fishing is impinging on our waters.
By Barry Weeber

32 Tales of Birds
Bizarre stories of the natural history collectors.
By Brian Gill

Regulars

2 Comment
Helicopter heroes.

3 Mailbag

4 Conservation Briefs
High Country conservation parks; moa and deer; mangeao dying; farm environment awards; Otago Museum; hedgehogs; kiore rats; Tongariro 1080; Kaweka deer.

36 Lodges and Reserves
Matuku Reserve to be expanded.

40 In the Field
The Very Versatile Crab.

42 Branching Out
Quail Island animals; Russell weka; RMA workshops; Limestone Island meeting.

43 Bulletin
Wilding pines; Conservation Authority.

44 Book Notes

48 Index

49 Branches and Lodges Directory

Cover: Colourful but predatory sea slug *Roboastra luteolineata* symbolises the vast range of creatures which rely on healthy seas. (Feature, page 24.)

PHOTOGRAPH: TONY AND JENNY ENDERBY

Forest & Bird is published every February, May, August and November by the Royal Forest and Bird Protection Society of New Zealand Inc. The society's objectives are to preserve and protect the indigenous flora and fauna and natural features and landscapes of New Zealand for their intrinsic worth and for the benefit of all people. Forest and Bird is a member of the World Conservation Union and of Birdlife International.
• Registered at PO Headquarters, Wellington, as a magazine. ISSN 0015-7384

Editor: GORDON ELL
Prepared for publication by
Bush Press Communications Ltd,
PO Box 33-029, Takapuna 1309.

Designer: Daxa Bhana, Microdot
Prepress Production: Microdot
Printing: Business Printing Group

Advertising: Lynette Te Paa,
Print Advertising Ltd,
PO Box 27-194, Wellington.
Ph: (04) 801-6187 Fax: (04) 801-6261
Email: lynette@printad.co.nz

FOREST & BIRD

Royal Forest and Bird Protection Society of New Zealand Inc.

General Manager: Lyn Bates
Conservation Manager: Eric Pyle
Central Office: 172 Taranaki St, Wellington.
Postal address: PO Box 631, Wellington.
Telephone: (04) 385-7374, Fax: (04) 385-7373
Email: office@wn.forest-bird.org.nz
Web site: http://www.forest-bird.org.nz

Field Officers:
Sarah Gibbs, Unit 10, Level 2, Grafton Business Centre, 6-8 Nugent St, Grafton, Auckland.
PO Box 8138, Symonds St, Auckland.
Tel: (09) 303-3079. Fax: (09) 303-3514.
Email: office@ak.forest-bird.org.nz
Ann Graeme, KCC co-ordinator,
53 Princess Rd, Tauranga.
Tel: (07) 576-5593. Fax: (07) 576-5109.
Email: basil@bopis.co.nz
Eugenie Sage, PO Box 2516, Christchurch.
Tel: (03) 366-6317. Fax: (03) 366-0655.
Email: sage@chc.forest-bird.org.nz
Sue Maturin, PO Box 6230, Dunedin.
Tel: (03) 477-9677. Fax: (03) 477-5232.
Email: suem@earthlight.co.nz

Comment

GERRY MCSWEENEY

Giant bristly carrot at 1500 metres in the upper Otira Valley.

Helicopter Heroes

The koru, the unfolding fern frond, symbolises the beginning of new life in natural New Zealand.

In spring, the deciduous tree fuchsia and kowhai burst forth, first with flowers then a mass of new leaves. Our native trees and plants are mostly evergreen but many of these are also transformed in spring.

Manuka, kanuka, red tussock, and many *Dracophyllum* species change from red-brown to green. *Coprosma*, broadleaf, wineberry, and the many *Pseudopanax* species all erupt with new shoots and leaves. A flush of bright green new growth sweeps up the beech-forested mountainsides.

In the alpine zone, a sea of green leaves and later gardens of flowers emerge from underground rhizomes and taproots. Our alpine buttercups (*Ranunculus*) are perhaps the most striking. Each mountain system has its own characteristic, usually showy, species. Taranaki, Tongariro and the North Island axial ranges host *R. nivicola* and *R. insignis*. Haast's buttercup grows on screes from the Kaikoura Ranges south. The giant buttercup *R. lyallii* grows from Kahurangi National Park south to Stewart Island. Godley's and Graham's buttercups cling to our highest central Southern Alps and Buchanan's buttercup occurs from Westland's glacier peaks south to Fiordland.

Present Forest and Bird executive member Alan Mark, in the first edition of his landmark book *New Zealand Alpine Plants*, described the 1973 distribution of *Ranunculus lyallii* — the world's largest buttercup — as follows: 'Introduced game animals have caused its decline so that large plants now tend to be restricted to inaccessible bluffs.'

He described the giant alpine bristly carrot, *Anistome pilifera*, as: 'Almost restricted to rocky sites especially ledges and crevices on rock faces and bluffs. Introduced animals have virtually eliminated it from accessible sites.'

Thirty years later you can walk most of our mountain lands through a sea of tussocks and alpine flowers. In many accessible places, the giant buttercups and bristly carrot now fill whole valley floors and hillsides. This dramatic recovery of native plants extends below the alpine zone to native shrublands, grasslands, and many native forests throughout New Zealand.

It results from a huge reduction in the populations of introduced feral deer, chamois (European antelope) and, in some places, of Himalayan thar (mountain goat).

This conservation success story is a living testament to the courage and hard work of all those involved in commercial game recovery operations largely using helicopters. Recreational hunting is important in developing self-reliance and a love of the outdoors among many young New Zealanders. Sadly it does not sufficiently control feral game populations to allow significant regeneration of palatable native plants.

The commercial game-recovery operators are unconventional. Deer farmers and many landowners often accuse them of 'poaching'. Recreational hunters resent the deer these commercial operators take. Many Government officials seem to resent their perceived freedom. Even trampers can dislike the helicopter noise.

These helicopter operators may not have planted many native trees. They miss out on traditional conservation awards but through their actions, at no cost to the taxpayer, millions of native trees, shrubs and alpine plants are flourishing.

They are the 'helicopter heroes'. They face all the challenges of running small businesses in remote locations. They put their lives on the line every time they fly into the wilds. Many are also involved in aerial possum and goat control, search and rescue and the maintenance of back-country huts and tracks.

In the year to February 28, 2002 they supplied 28,284 feral deer, chamois and thar to seven New Zealand processing plants. Most of their produce was exported.

Their industry is now in jeopardy.

Since April this year most feral game processing has ceased. In the ensuing eight months since then around 20,000 extra deer will be chomping through wild New Zealand. Many will be adult females soon to give birth to fawns. With no effective population control, deer and chamois populations are now increasing exponentially with disastrous consequences for New Zealand's native plants.

The situation arose from a contaminated feral-game meat scare, and a press statement by the Minister of Agriculture threatening a ban on feral-game exports, which put a stop to most feral-game processing. Strong pressure has come on feral-game exports from deer farmers who want to monopolise venison exports. Pressure has also come from the Game and Forest Foundation and from Safari Club International keen to increase animal numbers largely for big-game hunting tourists. Already, under its Thar Control Plan, the Department of Conservation has compromised the unique native biodiversity of the central Southern Alps, north from Aoraki/Mt Cook and Westland/Tai Poutini national parks, to indulge big-game hunters. Since 1983, restrictions on helicopter hunting have caused a dramatic increase in thar numbers there. The Thar Plan expires in 2003 and should be abandoned. Commercial hunting of feral thar should then be reinstated without any artificial restrictions.

Congratulations Chris Carter on your appointment as our new Conservation Minister. Welcome back Jim Sutton to your Agriculture portfolio. Please do everything possible to restart the feral-game industry and save our unique native plants.

GERRY MCSWEENEY
NATIONAL PRESIDENT

Mailbag

Forest & Bird welcomes brief comments or criticisms about items or issues in the magazine. We reserve the right to edit letters for length. The deadline for our February 2003 issue is November 30, 2002.

Ashburton Lakes

As a hutholder at Lake Clearwater, avid photographer, and perpetual student of the area, I would like to congratulate Ann Graeme on her timely article on the beautiful area of the Ashburton Lakes (*Forest & Bird*, August 2002). It is indeed a treasure of the nation. However the threats of proposals to radically alter the area are very real.

Not only is a dam proposed, but also the extraction of waters from other high country tributaries to the Rangitata and Rakaia rivers. Their flow will be channelled to the Ashburton catchment, via a series of connecting canals which will fundamentally alter the flows of other rivers, and carve swathes through a landscape that is recognised as being a significant unmodified area of glacial and preglacial landforms.

The proposed canals slice through the largest high-country wetlands that we have in Canterbury and are acknowledged in the Regional Policy Statement, the Department of Conservation Management Plan, and have Statutory Acknowledgement to Ngai Tahu regarding kaitiakitanga. Thus not only do we have threats to the ecology and sustainability of the very special species within the Ashburton/Hakatere River itself, but a composite of environmental impacts covering a much wider area.

I encourage everyone with a connection to the Ashburton Lakes to remain informed and ready to provide the Ashburton Branch with support as they continue their efforts to provide protection.

DEBS MARTIN, Christchurch

Eradicating Kiore

When Europeans arrived in New Zealand kiore was the only resident rodent. Now only two islands still represent that 'old New Zealand'; Hauturu/Little Barrier is one and kiore have been identified for eradication.

Kiore are predators and research shows two factors have exacerbated their effects on many islands. Firstly, cessation of Maori harvesting for food and secondly increased forest clearance by pakeha; both allowing numbers to explode. Although eradication will protect biodiversity, Ngatiwai who are kaitiaki of the kiore have requested monitored trial harvests in order to protect a rare cultural ecosystem and biodiversity: a win-win solution!

With colleagues, I wrote to the Department of Conservation in 1989 requesting retention of a minority of islands that only ever had kiore, as these represented a unique part of both Pakeha and Maori history — New Zealand when Cook arrived. We requested a plan that identified sites for eradication and sites for retention as kiore-only ecosystems. After 13 years we still await resolution!

Eradication of kiore from Hauturu will eliminate important history and raises other legal and cultural issues. As a conservation scientist, as a fourth generation New Zealander, and as an advisor to Ngatiwai during most meetings with DoC on Hauturu, I am offended that this decision to eradicate has been achieved through polemics and power rather than reasoned debate. A civilised, bicultural nation doesn't act this way.

PROF. JOHN L. CRAIG, University of Auckland.

See Michael Lee's account of the kiore on page 11.

Proposed Conservation Parks in Otago

Doc's Otago Conservation Management Strategy proposes six new conservation parks, including Te Papanui, which all depend on tenure review. Some of the proposed parks could be amalgamated to create a national park centered on the Remarkables near Queenstown, and extending to the Old Man Range and Garvie Mountains.

In Southland the Eyre Mountains, and Lake Mavora also warrant conservation park status. The potential parks include:

GORDON ELL, BUSH FILMS

New conservation parks are planned to protect the natural values of the high-country. Conservation land is being set aside during a process called Land Tenure Review. High-country run holders who usually hold their land on a perpetual lease now have the opportunity to freehold the better pastures. In return, sensitive and valued conservation areas are set aside as Crown reserves. Valley floors tend to remain farmed while higher country is protected.

Rock and Pillar Range conservation park: About an hour's drive inland from Dunedin, the Rock and Pillar Range is the most coastal of Central Otago's schist-block mountains. Along with the neighbouring Lammermoor Range to the south, it has some of the most intact, unmodified snow tussock grassland of any of Otago's block mountains. Over 5000 hectares along the eastern side of the Rock and Pillar Range have already been protected and allocated to DoC, as a result of tenure reviews over seven pastoral leases. The goal is to create a tussock grassland conservation park by securing protection of altitudinal sequences from the valley bottom to the summit, and along the summit of the Rock and Pillars.

Proposed Oteake conservation park: Further inland, and on the boundary between Otago and Canterbury, are the Hawkdun and Ida Ranges. A significant start has been made on creating a park here. Some 10,000 hectares have been protected through tenure reviews, and acquisition of adjoining lands and land already allocated to DoC.

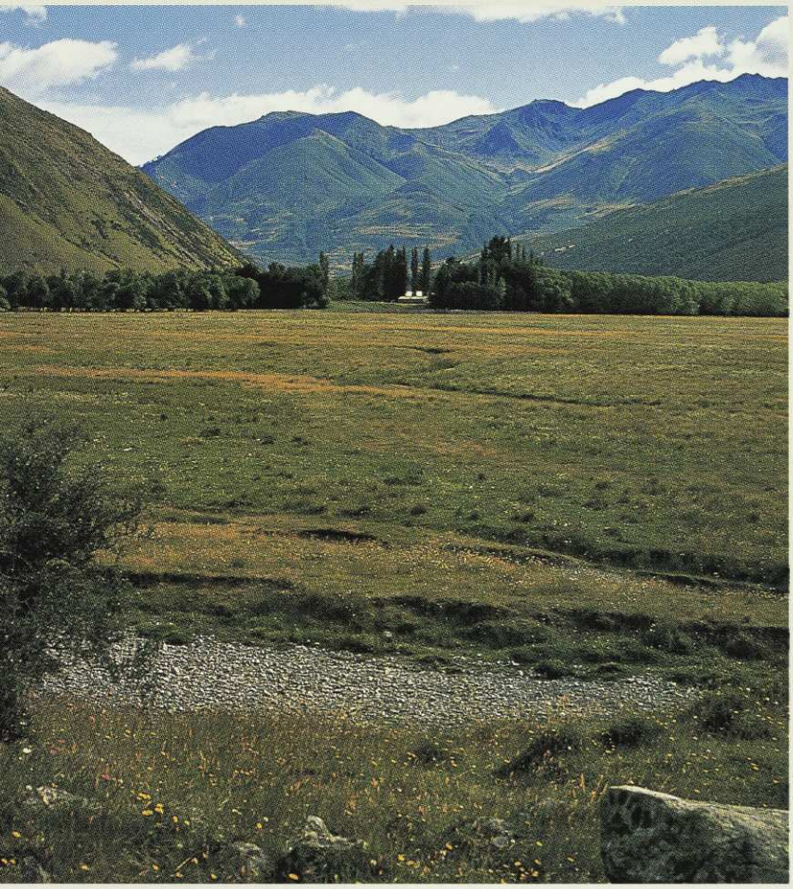
Proposed Kopuwai conservation park: This area comprises the range crests of the Garvie, and Umbrella Mountains, the Old Man, Old Woman, and the Carrick ranges. A substantial start has been made on the proposed Kopuwai conservation park, but there are more than 20 pastoral leases that have yet to be reviewed. So far some 15,000 hectares are protected. This is part of the area that could eventually become part of a national park, combined with The Remarkables.

The Remarkables conservation park: The Remarkables form the jagged view from Queenstown, and are one of New Zealand's scenic icons. Tenure reviews have been completed on four pastoral leases, contributing 7741 hectares towards the proposed park. Some 10,200 hectares are already protected through existing allocations.

Pisa Range conservation park: The Pisa Range is a large block mountain between the Cardrona and Upper Clutha Valleys, forming an imposing backdrop to Cromwell. Tenure review has been proceeding relatively rapidly, and so far some 3591 hectares have been transferred to DoC.

Eyre Mountains: The remote and rugged Eyre Mountains in Northern Southland are partially protected already as conservation land, but this area may eventually be extended through tenure reviews on the western shores of Lake Wakatipu. — **STAFF REPORTS**

Canterbury-Marlborough Parks Proposals



GORDON ELL, BUSH FILMS

There has been little opportunity so far to advance high-country conservation parks in the Canterbury-Marlborough region as by mid-year only one property had had its land tenure reviewed. (More are now in hand). Immediate potential focuses on existing conservation land, as it did with the new Korowai/Torlesse Conservation Park created last year.

Another prospect is the creation of a national park in the Kaikoura Ranges. Forest and Bird is presently launching a campaign to upgrade the status and protection of conservation lands there (see *Forest & Bird* August 2002).

Other places of outstanding interest include:

Waimakariri Basin: Traversed by State Highway 73 between Canterbury and the West Coast and the Christchurch to Greymouth railway, the Waimakariri Basin is probably the place where the greatest number of people come in contact with the typical eastern high-country landscapes. The limestone outcrops and rock tors, and tall and short tussock grasslands, dry beech forest and glacially smoothed landforms are part of one of Canterbury's most distinctive landscapes.

Arrowsmith Range/Ashburton Lakes: Existing conservation land in the headwaters of the Rangitata River (including the Havelock, Clyde and Lawrence Rivers), the Jollie Range and part of the Arrowsmith Range could form the nucleus of a future conservation or national park (see *Forest & Bird* August 2002).

— STAFF REPORTS

The Menu of Moa

Experiments with ostriches and emus show the extinct moa didn't do the damage goats and deer do, says BILL LEE.

The suggestion that deer, cattle, goats and sheep are suitable replacements for the extinct moa is often made in conservation debates about the management of native vegetation. However, experiments using emus and ostriches, by William Bond an ecologist based at the University of Cape Town and myself, have shown that many shrubs and trees have special features to cope with the way the big birds fed which are largely useless for defence against introduced mammals.

The dominance of birds in the pre-human vegetation of New Zealand has long fascinated ecologists interested in plant-animal interactions. In other countries many woody plants have spines and distasteful or toxic leaves to reduce plant feeding by large grazing mammals. In New Zealand these features are relatively rare amongst shrubs and trees.

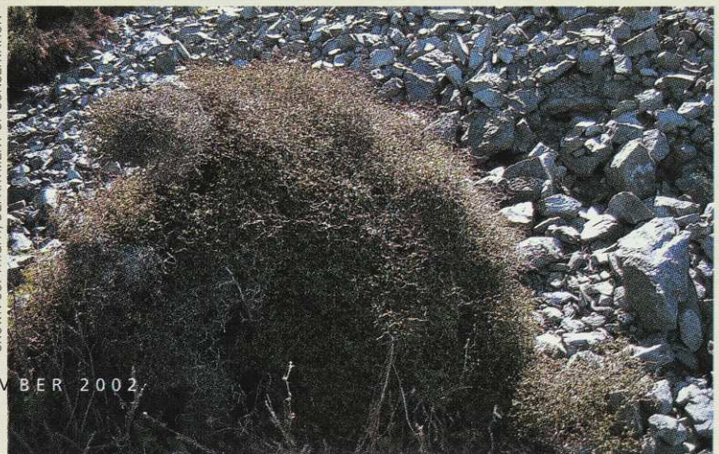
Moa were our biggest plant eaters, and were voracious feeders. A 100-kilogram bird would require approximately 10 kilograms of fresh plant material daily. Subfossil gizzard contents show that the birds ate seeds, fruits, leaves, and shoots of woody plants. Across the landscape they would have had a strong influence on plant composition and form. There are, however, woody growth forms and features that could have developed to defend plants against large browsing birds.

In New Zealand, shrubs and the juvenile phase of several trees commonly have canopy exteriors comprising dense, interlaced branches with small leaves, often hidden in the interior. These are called divaricates, and have been widely cited as an example of a growth form that may have deterred browsing birds. In the 1970s Ian Atkinson and Michael Greenwood pointed out that the divaricate hedge-like structure would have limited moa access to leaves. However, others have argued that similar growth forms occur elsewhere in the world, in the absence of browsing birds, and divaricates often grow in climatically distinctive parts of the landscape. For example, perhaps the growth form helps them to cope with valley-floor frost, or strong wind, and has little to do with animals.

Using experiments with emus and ostriches, we re-examined the interaction between woody plants and large browsing birds. Close relatives of the extinct moa, these birds have only become available in New Zealand in the last decade. We fed shoots off a range of woody species to domesticated birds in Otago. On farms they graze grass but mostly survive on mash pellets. However, younger birds were keen browsers of local native woody plants.

The emus and ostriches have a characteristic feeding technique. They plucked, tugged, and stripped leaves and often stem material from shoots, and easily demolished some shrubs in a few minutes. However, the birds lacked the ability to cut even small stems.

The divaricate form common in New Zealand shrubs and some juvenile trees. The exterior consists of dense interlaced branches.



They were messy eaters, unable to manipulate shoots with their beak. Much of the plant material they pulled off merely fell to the ground. (Plant chemistry was occasionally important, as emus ignored miro and kowhai, while ostriches defoliated both.)

To defend themselves against this type of feeding, plants would need special properties such as small leaves (hard to pluck), narrow strong stems (hard to hold and break), elastic branching patterns, and flexible stems (difficult to gain a purchase). These are the key features that distinguish divaricate juvenile and adult growth forms in trees such as lowland ribbonwood and kowhai. Importantly, these characteristics also distinguish many shrub species, including some of the native brooms. We call these trees and shrubs that can resist browsing by birds 'wire plants' in recognition of their tough, sinuous stems and their uniqueness to New Zealand.

In experiments, we presented the emus and ostriches with shrubs exhibiting a wide range of growth forms. The amount of material eaten by birds was significantly reduced in wire plants. Typical large-leaved shrubs (e.g. *Coprosma lucida*) provided excellent fodder and the birds would have been satisfied after about 8–10 hours feeding. However, wire plants were much more difficult for the birds to handle, and consumption was low. If the birds had only wire plants available, they would have to feed for over 40 hours per day to get their requirements! Clearly this is impossible and they would have been forced to forage on other growth forms.

Sadly, the wire-plant architecture works against browsing birds but is useless against mammals, which readily cut through the thin stems, manipulating long shoots with their lips and tongue, and then swallowing all the plant material. Contrary to what some deerstalkers have suggested, mammals are definitely no substitute for the lost moa. The feeding and rate of plant consumption of mammals are quite different from birds, and vastly more destructive in the New Zealand context. The majority of wire plants need protection from stock and wild mammals to survive. They are over-represented on the threatened plants list, and most favour fertile floodplain soils, which have been widely developed for agriculture.

A very few wire plants are able to cope with mammals, and this accounts for why they remain common. These have spines (for example matagouri) and the ability to form impenetrable hedges. What sets wire plants apart from other woody species in New Zealand, and the woody flora of the world, is their phenomenal stem tensile strength, which makes them difficult to break.

Wire plant are perhaps best recognised by the tugging test — take a shoot of less than three millimetres in diameter, and pull. If it is hard to break then it is probably a wire plant!

— **BILL LEE** *is an ecologist with Landcare Research in Dunedin.*

Mystery of the Dying Native Mangeao

Dead and dying mangeao have become commonplace on bush-covered hillsides throughout the Waikato and Bay of Plenty. Scores of what are normally lush canopy trees are rapidly being reduced to mere skeletons. Unfortunately, this particular tree species lacks the spectacular flowers of the high-profile pohutukawa, and the distinctive personality of the cabbage tree, so it often goes unnoticed.

Since the 1970s, keen Forest and Bird members and others with an interest in forest health have observed, with increasing alarm, the mysterious demise of the native mangeao *Litsea calicaris*. The mangeao is a well-branched tree growing to about 12 metres, occuring as a component of the rainforest from North Cape south to Mokau in Taranaki and the East Cape. Preliminary investigations by Forest Health staff at Forest Research, in Rotorua, turned up no answers, and many unanswered questions.

'Small seedlings were almost always healthy, but understorey saplings had random dieback. Canopy trees ranged from very healthy, through all stages of dieback to death,' according to Forest Research pathologist, Judy Gardner. She says that typical signs of fungi or insect damage were absent, and possums were often mooted as the probable cause.

In an effort to explain these mysterious deaths, Forest Research established plots at Lake Tikitapu and Lake Okataina, near Rotorua. The mangeao were monitored over a two-year period. Canopy and understorey trees were assessed for a list of crown attributes such as shoot dieback, foliage colour and foliage density, and epicormic growth and health. Root systems of healthy and unhealthy saplings were also compared.

Meanwhile, back at the lab, Judy Gardner was on a microscopic lookout for pathogenic organisms.

'At the end of the trial period it was clear that our initial observations and results were correct, in that no fungal or bacterial agent was found. Furthermore, no seasonal pattern was recorded. Dieback occurred randomly throughout the entire two-year period and, likewise, there was no clear spatial pattern of dieback within the crown of trees. There was no evidence that the poor crown health was related to a failure in the root system, and possums were definitely not responsible.'

Some questions have been raised about whether there may be a parallel with the situation in the late 1980s when large numbers of cabbage trees began dying in parts of New Zealand. Many puzzling aspects of this disorder remain unresolved but a pathogenic phytoplasma, a tiny bacteria-like organism, has been found in affected plants. It has been suggested that phytoplasmas may also be implicated in some other decline syndromes of native trees — such as tree ferns and puriri.

Scientists are uncertain what new avenues of investigation to pursue as the research into mangeao decline so far has been inconclusive.

'There is a need for a long-term research programme to look for patterns in decline behaviour,' says Judy Gardner. 'For instance, we may find that decline is associated with weather events such as drought or frost.

'An answer to the mangeao story might provide clues to the causes of decline in other native tree species that have been reported from around the country.'

— **MARGARET RICHARDSON**

LANDCARE RESEARCH

Dying mangeao in mixed forest: the cause has yet to be established.

LANDCARE RESEARCH

Mature mangeao, unspectacular but significant component of native forests in Bay of Plenty-Waikato.

Forest and Bird Support for Farm Environment Awards

A farm environment award initiated in the Waikato is about to become a national competition, and Forest and Bird has a role to play.

The idea of this award began 10 years ago with the Waikato Conservation Board, whose concept originally was a conservation award for those landowners managing their farms in a sensitive manner. It took little time, however, to realize that really it was the whole issue of sustainable land-management that was critical, with conservation being an integral part of that.

The Waikato Regional Council gave support, as sustainable land-management is an important part of their brief. After a couple of years of Environment Waikato doing the administration on behalf of a committee, it became clear that an independent Trust was needed, with Environment Waikato becoming the chief sponsor. That has been the picture ever since. Many other organisations have become sponsors of awards such as 'best dairy farmer' or 'habitat enhancement'.

Over the years, there have been clear trends. One has been for the winners to come from farms which performed in the top group for profit as well as for environmental management. Another has been an emphasis on care of water quality. A third has been the attitudes towards our native species. Rarely do we now see bush with cattle in, and pest control is common.

Christine Henderson, past chair of Southland Forest and Bird, and Geoff Doring, current chair of Wairarapa Forest and Bird had their first experiences this year of being judges in the Farm Environment Awards. For Herman van Rooijen, past chair of South Waikato Forest and Bird, it was his eighth go. They all show enthusiasm for the Awards.

'Being a judge in the Awards was the first time I had done anything like this,' said Geoff Doring. 'I thoroughly enjoyed being involved.' For Christine Henderson, it was the people she met, and going round in a mixed group of people. 'You learn a lot as you go,' she comments. 'I recommend it 100 percent.'

Both felt it was good for Forest and Bird to be involved, bringing into their teams their particular expertise in care of bush and wetlands, and issues such as stream care.

'I was able to discuss new ideas and philosophy with like-minded people,' said Geoff Doring.

Working through the many judging criteria for the first time was a challenge.

'That was where having Herman down to help us was of such value,' said Christine Henderson. 'He has had such a wealth of experience.'

Herman van Rooijen went down to Southland to assist with their judging. As a farmer himself, Herman has been trying to put into practice the concepts he has observed over several years.

'Sustainable management is a whole farm concept,' he believes. 'It is how you fit together all the complexities of economic efficiency, care of soil and soil nutrients, stock health, stream care, shelter and shade, appropriate land use, conservation, biodiversity, pest control, waste and effluent management — even the extent to which there is public use of the land, or the farmer's involvement in the community.'

It has greatly pleased him to see how the ideas being espoused by the Farm Environment Awards are becoming mainstream in the farming community.

Of course great benefits come from having field days on the top farms. They become the role models. However, possibly greater gains come from a group of judges walking around the farms of entrants, and discussing the problems on that farm. One can go back to those farms two or three years later, and note the changes which have occurred, and often the enthusiasm with which they are done.

When it comes to your turn for your region to join in, it is important that there are at least some judges from Forest and Bird. You might even think of your Branch sponsoring a regional award for some aspect of conservation, as Waikato Branch has done.

— **GORDON STEPHENSON**, *a distinguished life member of Forest and Bird, was instrumental in establishing the Farm Environment Awards while chair of the Waikato Conservation Board.*

A finalist in the 2002 Farm Environment Award: stream protection and riparian planting at Parekura.

J. WAEO

Southern Heritage Celebrated in New Gallery

The history and nature of southern New Zealand are featured in an extensive development at Otago Museum. Called 'Southern land, Southern People', the new gallery occupies 1200 square metres on the top floor of a new building.

Combining both human and natural history stories, the gallery seeks to celebrate what is special about the south, and in particular Otago.

The gallery features a series of journeys based on four major themes:

- the geological history of southern New Zealand that led to the distinctive southern landscapes
- the history of life on these ancient surfaces from 500 million years ago to the present, both on land and in the sea
- the story of how both Maori and European have explored and settled this rugged land with its challenging climate, and utilised the natural resources
- and how they have thrived and developed a distinctive southern character that manifests itself in art, photography, poetry, writings and other pursuits such as adventure tourism

With a huge night sky overhead the visitor is introduced to ten icons of Southern New Zealand. Features include a cave with the remains of extinct bird, reptile and mammal species; a display of 32 extinct bird species, including eight moa species, with paintings reconstructing all the species; and an array of marine fossils, mostly on loan from the University of Otago's Geology Department, depicting the history of life in the surrounding seas.

A recently named eight-metre-long plesiosaur is the centrepiece of an exhibit that takes the visitor forward in time on both land and sea, examining the evolution of life. Other highlights include a 30-minute audio-visual, surveyor John Turnbull Thomson's story and his theodolite from the 1850s, and an entrance tunnel to a hard-rock gold mine.

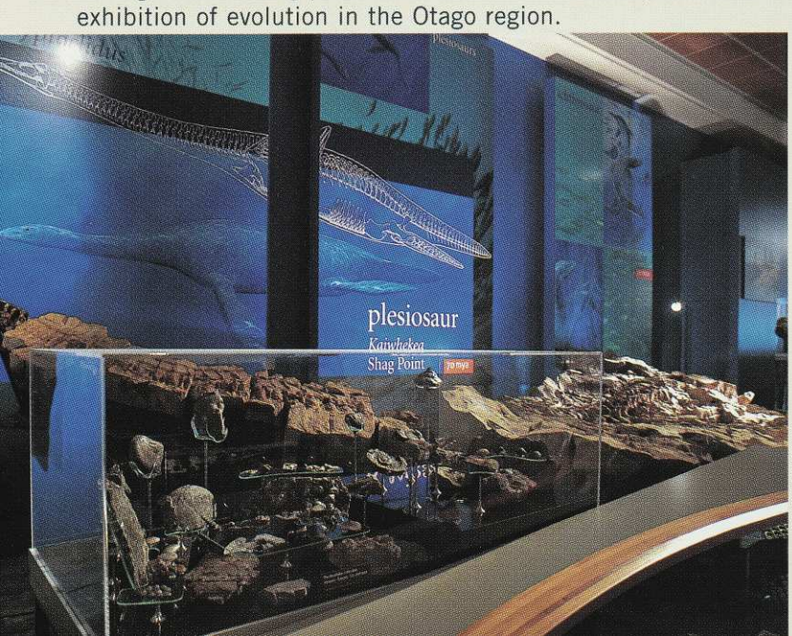
The gallery is encyclopedic in its approach. Graphic panels introduce and summarise the main stories. These alone contain in excess of 25,000 words plus fresh images from amongst the 56 new paintings commissioned for the gallery from a variety of local artists, and hundreds of photographs.

Much new information is included based on the latest research findings. For example, the visitor will be confronted with a three-metre-long model crocodile, and view snakes and crocodiles co-existing in an Everglades-like setting in Central Otago 17 million years ago.

The complex geology of Southern New Zealand is explored through touchable examples of various rocks, a model volcano and graphics exposing the key geological processes at work. — **BRIAN PATRICK** *is the collections & research manager at the Otago Museum and was project manager for the gallery.*

OTAGO MUSEUM

Paintings of the past background the evolution of land and life in southern New Zealand.



OTAGO MUSEUM

An eight-metre-long plesiosaur fossil is the centrepiece for an exhibition of evolution in the Otago region.

Hedgehogs Eating Birds' Eggs, Native Insects and Lizards

I found the hedgehog which changed my mind on a deserted road in Golden Bay. The back half of a native lizard poked out of its mouth, jiggling a bit as it was eaten.

Until then, I'd thought fondly enough of this creature introduced by British settlers, and the largest of the European hedgehogs.

The first hedgehogs were introduced by acclimatisation societies — as early as 1869-70.

'Later on, in the 1890s, settlers brought more out because the place got over-run with slugs and snails — which they'd brought here previously anyway,' says Dr Bob Brockie, who in the 1970s studied the ecology of hedgehogs in New Zealand for his PhD. 'This time they did quite well.

'Soon after their introduction, people used to pick them up and take them to other places. Whole boxes of them were put on trains and guards would drop them off at stations along the way to help spread them all around the country. Hedgehogs spread first in the South Island. Some were taken to the Chatham Islands in 1906, and to the North Island in 1907.'

Long regarded as a benevolent animal which ate garden pests, hedgehogs were spread widely through New Zealand in the 1930s and 1940s. As lately as 1996, somebody released them on Motutapu Island, in the Hauraki Gulf. Research in the 1990s, however, has shown them to be significant pests, eating birds' eggs, native insects and lizards.

Hedgehogs are most abundant in warm lowland areas. Usually the higher and further south you go, the fewer there are. Hedgehogs have made it to most environments, from sand dunes to mountains, with one record of a solitary hedgehog walking across the face of the Tasman Glacier.

'In cold regions they have to hibernate for six months of the year.' says Dr Brockie. 'Around Wellington they hibernate for June, July and August.'

Hedgehogs hibernate in natural holes in the ground, under toetoe clumps, roots of trees, sheets of corrugated iron, in dry corners under buildings, and in rabbit burrows. In the frost-free Far North, few hedgehogs hibernate.

While classified as Insectivores, hedgehogs are now known to eat a much more varied diet. Historically, hedgehogs have been recorded scavenging shrimps washed up on beaches, dead possums and sheep, and even cannibalising on 'hedgehog pizza' road-kills. So it comes as little surprise that hedgehogs have been found to eat a variety of native animals.

Most of the early studies on hedgehog diet were done around cities and farmland. From the early 1990s, a new generation of researchers began to document the impact of hedgehogs on native birds and invertebrates in a variety of ecosystems.

Over five years Dr Mark Sanders and a team of researchers videoed bird nests on the braided riverbeds of the MacKenzie Basin, in South Canterbury. Thousands of film hours revealed hedgehogs venturing out into open riverbeds where they were responsible for 10.5 percent of predation of banded dotterel eggs and 28 percent of the endangered black-fronted tern. The hedgehogs ate the contents and carefully licked out the eggs.

'Analysis of hedgehog guts showed that as well as invertebrates, hedgehogs also take lizards and chicks,' says Dr Sanders.

'In the last 10 years we've really changed our tune on the ecological impact of hedgehogs,' says wildlife researcher, Dr John Dowding. 'What we thought were bumbling curiosities has been radically transformed.'

GORDON ELL, BUSH FILMS

New Zealand's hedgehogs are descended from the largest of the European species. They were introduced and spread by settlers who thought them a benign and useful animal eating garden pests. Recent research show they also eat the eggs of ground-nesting birds, native insects, rare kauri snails and lizards.

North of Auckland, in the sand dunes of Tawharanui, 400 hedgehogs were trapped over two years to protect nests of threatened New Zealand dotterel — but there was no relenting, the hedgehogs just kept coming.

'During predator trapping to protect ground-nesting birds, the hedgehog is far and away the most abundant predator caught,' says Dr Dowding. 'This may have implications for more common birds such as oystercatchers and terns.'

Hedgehogs are enthusiastic reproducers. Most will have three litters each year (or four in the frost-free north) of five or six youngsters. They are known to swim and are capable of climbing a few metres up trees.

Chris Berry studied hedgehog impacts within native forest at Boundary Stream 'mainland island', in Hawkes Bay. Here he found 5.5 hedgehogs per hectare and estimates a nightly hedgehog feed to consist of 150 grams of invertebrates. Overall, this would mean hedgehogs would eat 825 grams of invertebrates per hectare, each night at Boundary Stream. He also discovered that hedgehogs and North Island brown kiwi have a 70-80 percent overlap in preferred foods.

Predators of native kauri snails in Trounson Forest in Northland, have been studied by Natasha Code; she noted hedgehogs preying upon these uncommon snails.

Since 1990 data has emerged to show that hedgehogs eat significant numbers of ground-nesting birds' eggs and a host of native invertebrates such as snails, weta and the larvae of moths.

In towns and on farmland, hedgehogs seem harmless, cute and fascinating, but they are shaping up to be serious predators of native animals in bush and nature reserves.

Back in Golden Bay, I returned next day to where I'd seen that young hedgehog eating a lizard. It was still there — only somewhat flatter.

— DEAN BAIGENT-MERCER

Pacific Rats — Wildlife Pests and Cultural Treasures

The Pacific rat or kiore *Rattus exulans* has become the subject of some controversy in New Zealand. Widespread across the Pacific, it followed human settlement from South East Asia, to Hawaii to Easter Island, to New Zealand. The kiore was one of the two mammals along with the dog (kuri) believed to have been brought to New Zealand by the first Polynesian settlers.

Kiore have become controversial for several reasons. For many years the 'native rat' (looking rather like a big house mouse) was thought to be harmless — particularly in comparison to its larger, more sinister European-introduced cousins — the Norway rat and the ship rat. (The latter, in particular, undoubtedly has had a devastating impact on our birdlife.)

In recent years, however, evidence has come to light indicating the supposedly innocent kiore is a predator of lizards, frogs, large inverterbrates and some birds' eggs. It is also believed to have impacted on tuatara populations, (see *Forest & Bird*, May 2002). On the basis of this evidence, conservation authorities have been targeting the kiore in recent years — progressively exterminating them from island sanctuaries like the Mercury group off the Coromandel Peninsula, from Kapiti off the Wellington west coast and from Tiritiri Matangi off Auckland.

The kiore again burst into the national spotlight four years ago with the sensational report of sub-fossil remains by Dr Richard Holdaway suggesting that the species has been in New Zealand for approximately 2000 years — long before the time that the accepted archaeological record, and Maori traditional genealogy, would suggest was the first arrival date in New Zealand of Polynesian settlers. As if the

The kiore or Pacific rat, brought to New Zealand by Maori ancestors.

implications of that finding were not enough — a deal of cultural politics has begun to swirl around our smallest and certainly most senior resident rodent.

In protein-depleted New Zealand, kiore was an important seasonal food source for Maori. Maori groups have argued that kiore should be seen as one of the resources their ancestors had in mind which the Treaty of Waitangi refers to as 'taonga'. Though obviously no longer a preferred food item for modern Maori, some iwi groups have argued forcefully for the protection of kiore — notably Ngati Wai of Northland's east coast and offshore islands, who claim it as an ancestor.

Behind the kiore debate lies the question of mana and control over New Zealand's natural areas including the conservation estate. Ngati Wai also happen to be the ancestral owners of Hauturu, Little Barrier Island, perhaps the most important nature reserve in the country. Ngati Wai owners were expelled from the island in the 1890s and today their environmental spokesman, Hori Parata, argues against the plans to eradicate the kiore from Hauturu.

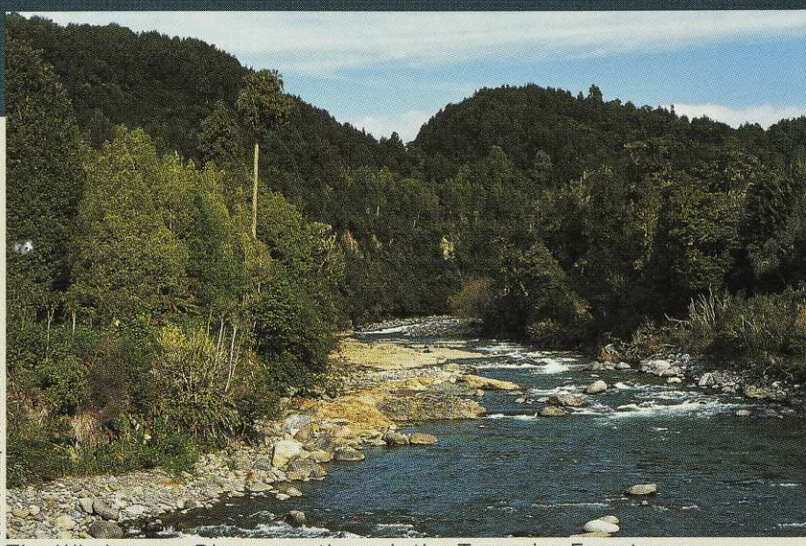
Ngati Wai is supported by scientists like Dr Mere Roberts of Auckland University who sees the debate being fuelled by different cultural perspectives. Biological science students at Auckland University are taught how the Maori revered the kiore as a valuable resource and one of the few mammals to share their isolated world. On the other hand it is suggested that Europeans still have a 'cultural memory' of the horror of the 14th century 'black death' (bubonic plague carried by fleas on invading ship rats) and have a deep-seated, atavistic loathing of all rats.

While this may be so, observations made by members of Captain James Cook's expeditions reveal curious insights on the first-contact relationship between Europeans and Polynesians... and food. In Tahiti (near Mataivai Bay) English sailors enjoyed eating rats, though local Tahitians disliked them and preferred dog. Robert Molyneaux recorded on Friday 26th May 1769: '... in eating rats we quite outdid the indians who abhor them as food.'

This very early reference suggests the attitude of Polynesian peoples towards kiore and their desirability as food was by no means uniform. New Zealand Maori, though closely related to the Tahitians, clearly did not share the Tahitian abhorrence of eating rats. Clearly after the loss of the larger ground birds like the moa, and the retreat of the fur seal from the northern coastline, kiore became a highly valued source of protein.

— **MICHAEL LEE** *is a former Forest and Bird branch chairman, an Auckland regional councillor, and a member of the Nature Heritage Fund.*

Side Effects of Possum Blitz Aids Kiwi



GORDON ELL, BUSH FILMS

The Whakapapa River runs through the Tongariro Forest near Owhango, north of the national park.

The outcome of a 1080 blitz over nearly 20,000 hectares of Tongariro Forest Kiwi Sanctuary last year could herald a significant step in saving threatened kiwi populations.

While possums were the main target, monitoring revealed a near 100 percent kill of rats and stoats. Subsequently the survival rate of juvenile kiwi leapt to more than 50 percent, up from the normal rate in the wild of five percent.

Tongariro Forest, lying north of the national park, is one of five kiwi sanctuaries throughout New Zealand. Resident North Island brown kiwi have been closely monitored by the Department of Conservation since the early 1990s — 32 kiwi in the forest are currently radio-tagged. Hence the impacts of the 1080 operation, made just prior to the hatching season, could be monitored.

For several years DoC has undertaken 'Operation Nest Egg' in the Tongariro sanctuary, taking kiwi eggs from their nests and out of the forest to be hatched and the chicks raised in safe environments. The chicks have been returned to the forest when at a sufficient weight and age to defend themselves against predators.

In 2001, Operation Nest Egg was suspended and the eggs were left in the forest, to test the effectiveness of the poison operation. DoC's biodiversity programme manager at Tongariro, Peter Morton, said leaving the eggs was a calculated risk.

'We assessed the value of the information we would gain by suspending "Nest Egg" as worth the risk of losing chicks.' he says. 'In the absence of pest control, Operation Nest Egg is the only tactic we have to save the lives of kiwi chicks, but it is not the solution. All we're doing is buying time. Long term, it's better to take the predator out of the habitat.'

Peter Morton, who has been working with kiwi in Tongariro Forest for seven years, is 'cautiously optimistic' about the results of the 2001 operation.

'No dead kiwi were found and I am confident there were more chicks surviving in Tongariro Forest after the poison drop. Two days before the drop we had video footage of stoats visiting nests with kiwi and chicks present. After the operation rats and mustelids were at near zero densities, and no rats or stoats were filmed visiting kiwi nests.'

The 1080 drop was mostly

aerial, with a 600-hectare water-catchment area ground treated as a concession to concerned local residents.

Monitoring of kiwi, and rat and mustelid (stoat, ferret and weasel) populations in Tongariro Forest will be continued. Looking at the bigger picture, Peter Morton says issues currently being wrestled with by DoC include whether ongoing 1080 operations can sustain kiwi populations, and if so how many and at what frequency would they be required; or whether ground control, or a combination of aerial 1080 drops and ground control trapping is the answer.

'Undoubtedly we know that we saw no predators in Tongariro Forest for four months, during the kiwi hatching season, and that the kiwi chick survival rate was far above the usual. Also, the amount of fruiting and flowering in the forest now is extremely encouraging.

'I personally believe 1080 is an excellent tool for protecting our native species provided it's used in the right place and used carefully,' he says. 'We don't have anything else to replace it.'

Meanwhile, Operation Nest Egg has been resumed for the 2002 season in Tongariro Forest, with new kiwi reliant on the scientific expertise of temporary human parents for their initial survival. — **KATHY OMBLER**

Recreational Hunters Fail to Control Deer Numbers

The results of a deer-control trial in the Kaweka Ranges of Hawkes Bay show the efforts of recreational deer hunters are insufficient to control deer numbers.

The Kaweka Ranges are a stark reminder of the damage deer can do. Higher altitude beech forests between 1000 and 1500 metres in the Kaweka Forest Park are failing to regenerate. The Department of Conservation considers the situation has reached a critical state across 10 percent of the mountain beech forest. Much of the rest of the forest is in decline.

Sika deer have replaced most of the red deer in the Kaweka Ranges as they can survive even in the degraded environment caused by heavy deer browsing. Sika deer eat seedlings of mountain beech preventing regeneration. Forest is changing to grasslands, unpalatable shrublands and fields of fern.

The Kaweka mountain beech/deer trial had its origins in 1997 when the then Conservation Minister, Hon. Nick Smith, decided that DoC would use aerial culling to control burgeoning deer populations in the Kaweka Ranges. The New Zealand Deerstalkers Association counter-argued that deer-stalkers could control deer over 580 square kilometres of Kaweka Forest Park. Consequently, a trial was set up pitting recreational efforts against aerial control.

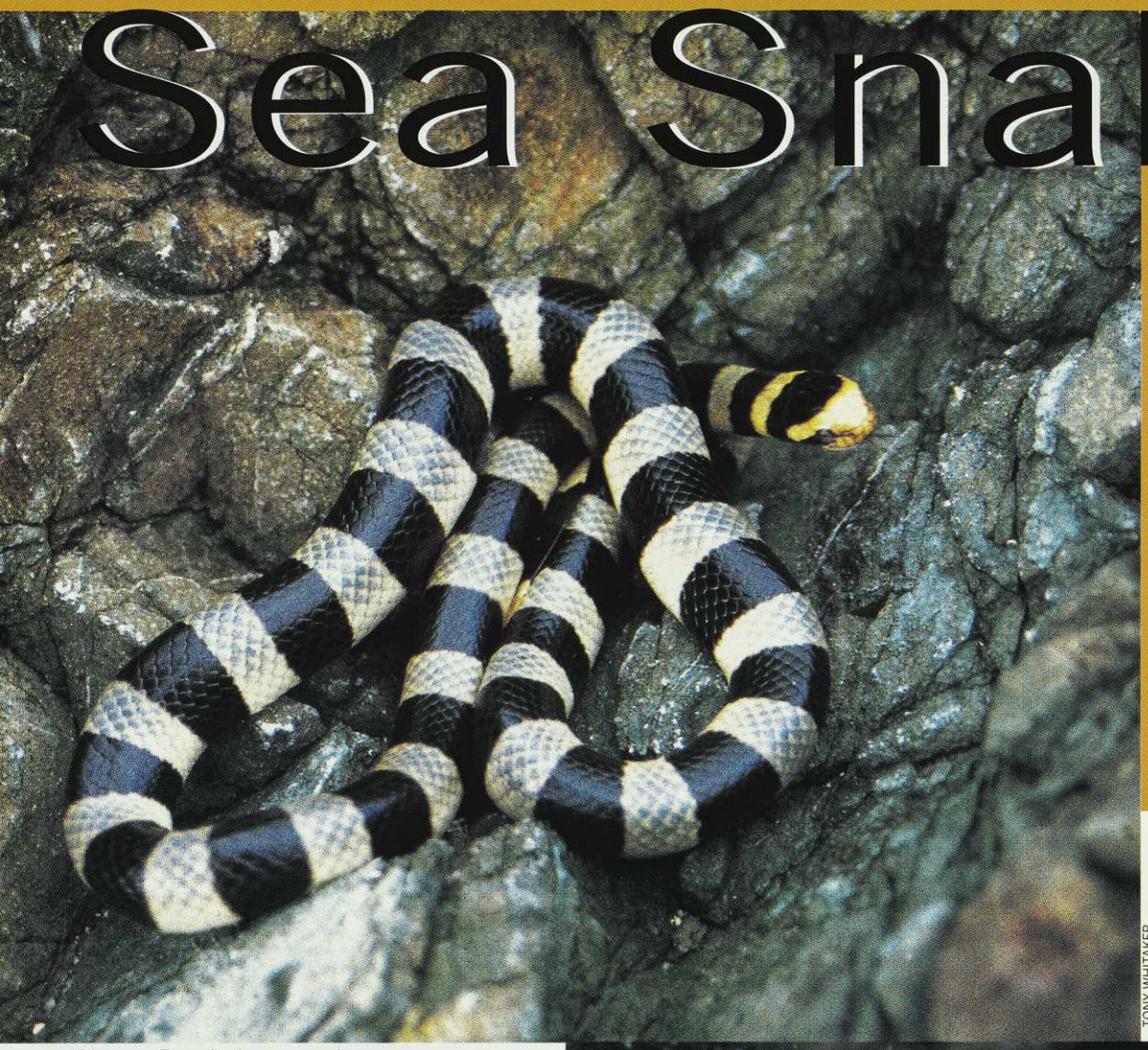
After four years, results are now becoming clear. Recreational hunters have fallen well short of the NZDA's target of 3500 deer a year. Vegetation monitoring shows that deerstalkers' efforts have a minimal effect on regeneration.

In contrast to the negligible effect of recreational control, aerial control is making a difference. DoC's aerial control programme has reduced deer numbers by 61 percent. This has already significantly improved seedling growth rates although only time will tell if it is enough to allow the forests to recover.

— **GEOFF KEEY**, *Forest and Bird biodiversity officer.*

Sea Snakes and

Sea snakes and turtles are actually native animals in New Zealand, writes TONY WHITAKER.



TONY WHITAKER

Aptly named, the yellow-bellied sea snake is easily distinguished from other marine snakes by its black on yellow colouration, flattened head, and large mouth.

Above: Banded sea snake.

PIERRE LABOUTE/IRD

Every year a surprising number of sea snakes and marine turtles — many more than most people realise — turn up on New Zealand's shores. Far from being waifs and strays, their frequency and occurrence show they are a regular part of the New Zealand fauna.

Worldwide there are around 70 species of sea snakes and seven species of marine turtles. Although these are all primarily tropical and subtropical animals, two of the snakes and five of the turtles have distributions extending to New Zealand, where — as native animals — they are fully protected under the Wildlife Act.

The two most frequently occurring species here are truly ocean dwellers — the leathery turtle and yellow-bellied sea snake.

The leathery turtle, a veritable behemoth that can reach 2.8 metres in length and weigh up to 900 kilograms, occurs in all the world's oceans and is the most widely distributed marine reptile. These ancient creatures, unchanged for 100 million years, are unique in lacking the bony plates of other turtles and in having a blood supply that keeps them several degrees warmer than the water. The warm blood allows them to forage to much higher latitudes than other turtles and to dive to over 1000 metres in search of their prey of squid, salps and jellyfish. Leathery turtle records occur all around New Zealand.

In decreasing order of frequency the other turtles seen in New Zealand are the green, loggerhead, hawksbill and olive ridley — all bony-shelled species that reach around 0.8-1 metres in length when fully grown. They can be distinguished from each other on the number, shape and arrangement of the scutes — armour plates which make up the 'shell'.

These are coastal-water species of the tropics and subtropics, and most of the

TONY WHITAKER

The hawksbill turtle is the sole source of tortoiseshell or 'carey'. Despite worldwide bans, the illegal trade in these turtles is a major threat to their survival. Many are killed to provide curios for tourists, as in this roadside stall in northern New Caledonia.

TONY WHITAKER

Turtles in New Zealand Waters

records here are from northern New Zealand.

Yellow-bellied sea snakes are the most widely distributed of the marine snakes, with a range that takes in the tropic and subtropical regions of the Indian and Pacific Oceans. They feed at the ocean surface on small fish, and give birth to their young at sea.

Conversely, the banded sea snake (maximum size 1.4 metres) is the most terrestrial of the marine snakes and is frequently described as amphibious rather than aquatic. The banded sea snake spends a large part of each day ashore, often considerable distances from the sea. Distributed in coastal waters from the eastern Indian Ocean to the China Sea and southwest Pacific, it feeds in shallow water close to shore, primarily on small eels. Their eggs are laid well above high tide line in crevices or beneath stones.

Current Riders

It is no accident that more than three-quarters of all turtle and snake records are in the north of New Zealand — north of the 38°S latitude. And if figures for the two species with widespread records, the cold-adapted leathery turtle and the olive ridley turtle, are removed the proportion is significantly higher (85 percent), with just 4 percent of records occurring south of Cook Strait.

New Zealand straddles the southern arm of the so-called Subtropical Gyre, the massive counter-clockwise flow of water around the South Pacific. From South America, water moves westward to Australia, turns south and strengthens as the East Australian Current; then off New South Wales it turns east as the Tasman Front, passing around Northland to spawn the weak West Auckland Current (extending to Auckland) and the strong East Auckland Current (extending to East Cape). It is these swift-flowing 'rivers' of warm water that most turtles and snakes ride to reach our shores, more than three quarters of all records being where the warm currents touch the coastline.

The sea snakes and turtles reported are unquestionably just a tiny fraction of those that come to New Zealand. But the numbers reported are increasing exponentially. From an average of around 10 records per decade between 1930-1970, the number jumped to 32 in the 1970s, 55 in the 1980s, 90 in the 1990s, and in the period 2000-2001 there have been 18 records.

But do the increasing number of reports actually mean more sea snakes and turtles are coming to New Zealand? There are now vastly more people out and about along on coastlines to find those that do wash ashore, and certainly heightened environmental awareness means a higher proportion of those that are found are reported.

Why might numbers be increasing here when marine turtles are in serious decline, worldwide? The answer may lie in part with global warming. Over the past century the average sea surface temperature around New Zealand has increased by about 0.8°C and if present trends continue this is expected to increase by a further 2°C in the next century. More important than temperature alone is the effect this warming has had, and will have, on ocean currents. As the climate and the sea warm, so the main current systems migrate southward to affect a greater proportion of our coastline.

On top of this, global warming has a

GEOFF ROWLING

With its large size, rubbery skin and seven longitudinal ridges, the leathery turtle looks remarkably like an upturned dinghy as it floats on the ocean surface.

PIERRE LABOUTE/IRD

The enlarged ventral 'fin' enables the yellow-bellied sea snake to swim forwards and backwards with equal ease.

profound effect on the cyclical weather patterns of El Niño-Southern Oscillation and the Interdecadal Pacific Oscillation. These determine short-term wind, current, and temperature changes. In the La Niña phase of the southern oscillation, the western Pacific warms, but conversely a warm phase of the Pacific oscillation leads to increased El Niños. The combined effects mean that some years there are none or few records of marine reptiles while in others — 1985, 1989 and 1996-97 are examples — there are many. The 1989 peak in turtle records coincided with a documented influx of warm water that also brought subtropical fish species to New Zealand.

Most turtle and snake reports are in the early part of the year (January-May), although the seasonal pattern varies between species. This will partly reflect occurrence, but the reporting rate will also be more frequent in summer when more people are at the beach or in their boats. Predictably, relatively few of the turtle and snake encounters are of free-swimming animals at sea — most are of animals washed ashore. Disturbingly, around 40 percent of recent turtle records have been of animals entangled by nets or lines, frequently with fatal consequences.

Species of marine reptiles recorded in New Zealand

Common name	Scientific name	IUCN status	Estimated world population breeding females	NZ records to 2001
Leathery turtle	*Dermochelys coriacea*	Critically endangered	2,300	74
Loggerhead turtle	*Caretta Caretta*	Endangered	60,000+	20
Green turtle	*Chelonia mydas*	Critically endangered	200,000+	46
Hawksbill turtle	*Eretmochelys imbricata*	Critically endangered	8,000+	19
Olive Ridley turtle	*Lepidochelys olivacea*	Critically endangered	800,000+	5
Yellow-bellied sea-snake	*Pelamis platurus*	unlisted	abundant	62
Banded sea-snake	*Laticauda colubrina*	unlisted	abundant	7

What to do if you find a snake or turtle

If you are fortunate enough to find or see a sea snake or turtle you should report it as soon as possible to the nearest Department of Conservation office or on 0800 DOC HOTLINE (0800 36 24 68). Regardless of whether the specimen is alive or dead, all observations are important to help determine the occurrence and status of these creatures in New Zealand.

Make good notes on what you have seen or found, including a description (or photos) of the animal, and details of the site and circumstances. Also check to see if a turtle has a tag in its flipper and note the number.

If the turtle or snake is in the sea and in apparently good health just leave it alone. If it is ashore and still alive, leave it where it is and let trained DoC staff deal with it — though it is important to provide shade. If the animal is dead, either move it well above the high tide line or take it to a safe place for later collection. Remember, all sea snakes and turtles are fully protected and must not be harmed or harassed in any way.

Do not handle live sea snakes — their venom is highly toxic and bites can be fatal. This is no reason to fear sea snakes, however, as they will not attempt to bite unless severely provoked. In the unlikely event someone is bitten, keep the victim calm, still and lying down or partially sitting, apply a pressure bandage to the site of the bite, immobilise the limb with a splint or a sling, and immediately contact the nearest hospital and seek treatment with antivenom. The victim should be given water but no food. DO NOT give alcohol or other stimulants, apply tourniquets, put ice on the bite, try to suck out the poison, or make incisions or excisions.

Despite the relatively high proportion of sea snakes and turtles found alive in New Zealand it is unlikely that any are 'resident' here year-round. With the exception of the leathery turtle, which forages into cool-temperate waters, it seems most likely the other species that arrive are part of a constant flow of animals dispersing from breeding populations. These come from along the Queensland coast or further afield in the region of the Coral Sea, and unwittingly ride here on the Tasman Front. Often the animals arriving here are sub-adult, and there are even records of hatchling loggerhead turtles. With the onset of winter and cooler temperatures it appears most of these animals move on or die — for example a water temperature of 17°C is lethal for a yellow-bellied sea snake — but the predicted rise of 2°C by 2100 may be sufficient that in time some animals could establish here.

If warm currents can bring turtles and sea snakes to our shores with relative frequency,

'So Excellent a Fishe'

In 1620 the Bermuda Assembly approved the first documented legislation for the conservation of marine turtles. Concerned that indiscriminate slaughter was leading to '...decay of the breed of so excellent a fishe ... the danger of an utter distroyinge and losse of them...' an Act was passed that prohibited killing turtles with a carapace length less than 45 centimetres. Sadly, nearly four centuries later the plight of marine turtles is more critical than ever despite worldwide legislation for their protection.

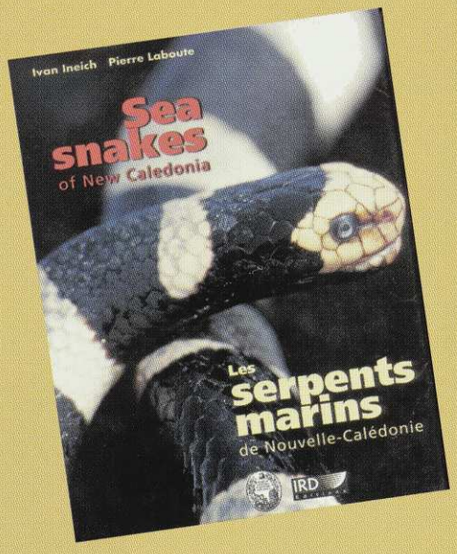
All marine turtles are listed as endangered on the IUCN Red List (see Table), all are given the highest protection under the Convention Against Trade in Endangered Species (CITES, Appendix 1). Most countries have their own laws to protect turtles or their nesting sites.

Nonetheless, conservation successes are few and the number of turtles continues to plummet in the face of massive over-exploitation of adults and eggs, destruction of nesting sites, predation of eggs by introduced species, accidental death as a by-catch of the fishing industry, and pollution.

Particularly poignant is the number of leathery turtles — the rarest and most endangered of them all — that choke to death on plastic bags, mistaking floating debris for their favourite food, jellyfish.

Because no marine reptiles breed or are even resident in the New Zealand region the most significant contribution we can make to turtle conservation is to support the international initiatives to protect breeding sites, address the problems of fisheries by-catch, and eliminate the illegal trade in turtle products. Then we might just have the satisfaction of seeing more of these wonderful creatures in our coastal waters.

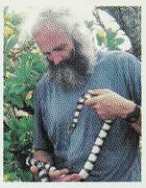
Information on Sea Snakes



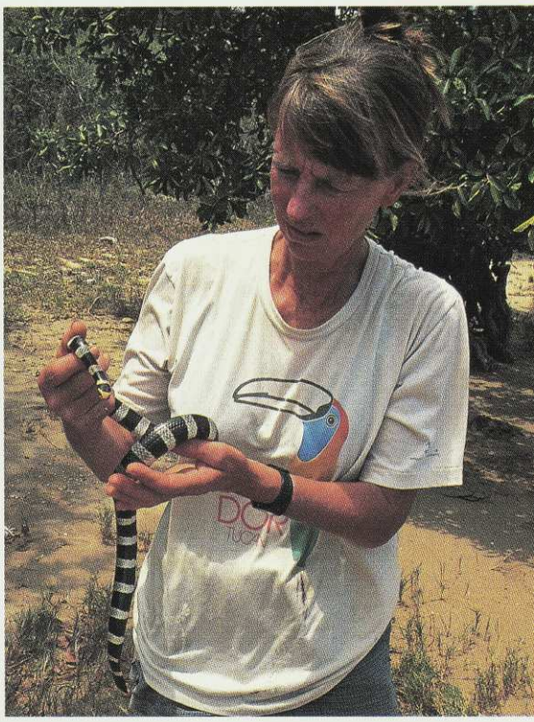
The latest information about banded and yellow-bellied sea snakes is not easy to come by beyond the scientific journals. A new book* on the sea snakes of New Caledonia — where both species are common — provides fascinating detail on their lives and ecology, (and of the other 12 New Caledonian species). There are in-depth chapters on the origins and biology of sea snakes in general, and the risks and treatment of snake bite. Lavishly illustrated, Pierre Laboute's stunning underwater colour photographs reveal these animals as they are rarely seen.

*[Ivan Ineich and Pierre Laboute, 2002. *'Sea snakes of New Caledonia — Les serpents marins de Nouvelle-Calédonie'*. IRD Éditions (Collection Faune et Flore Tropicales 39), Paris. 303 pp. HB, 28 x 21 cm, full colour, bi-lingual; approx. NZ$100]

what about that other great marine reptile, the salt-water crocodile? In 1970 a crocodile was seen only 480 kilometres off North Cape happily paddling this way in the warm waters of the Tasman Front. More recently (1993) one made it to Lifou, New Caledonia. In the recent past, when crocodiles were far more numerous, they relatively frequently travelled eastward as far as Fiji, Kiribati and possibly Samoa. Combine their past abundance with high mobility, then re-examine the monster reptile stories of Maori and early Europeans: there is compelling evidence that the taniwha of Maori folklore was not mythical at all, but based on the infrequent occurrence of saltwater crocodiles in the harbours and estuaries of northern New Zealand.

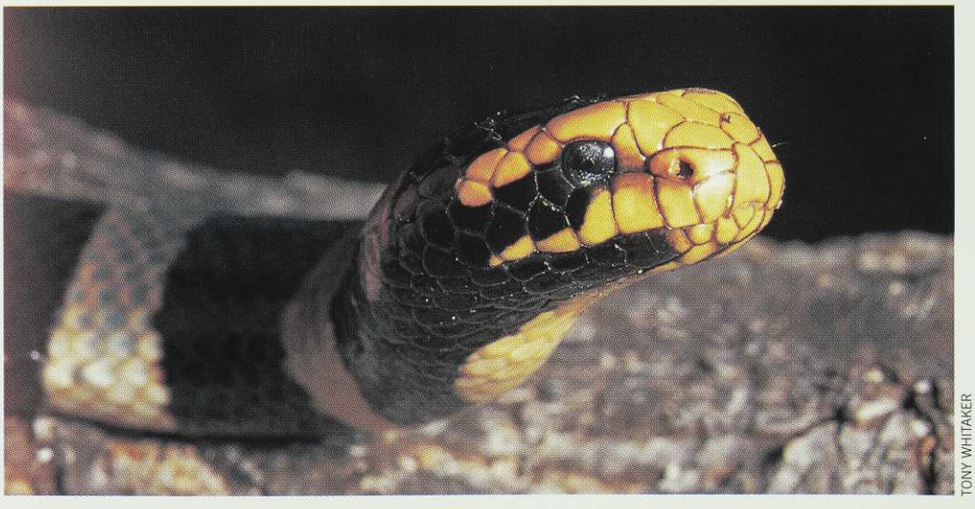


— **TONY WHITAKER** *is an independent scientist specialising in reptiles, particularly lizards and marine reptiles. He is based in rural Tasman.*



The highly venomous banded sea-snake rarely reaches New Zealand because it is a semi-terrestrial species that seldom forages far from shore.

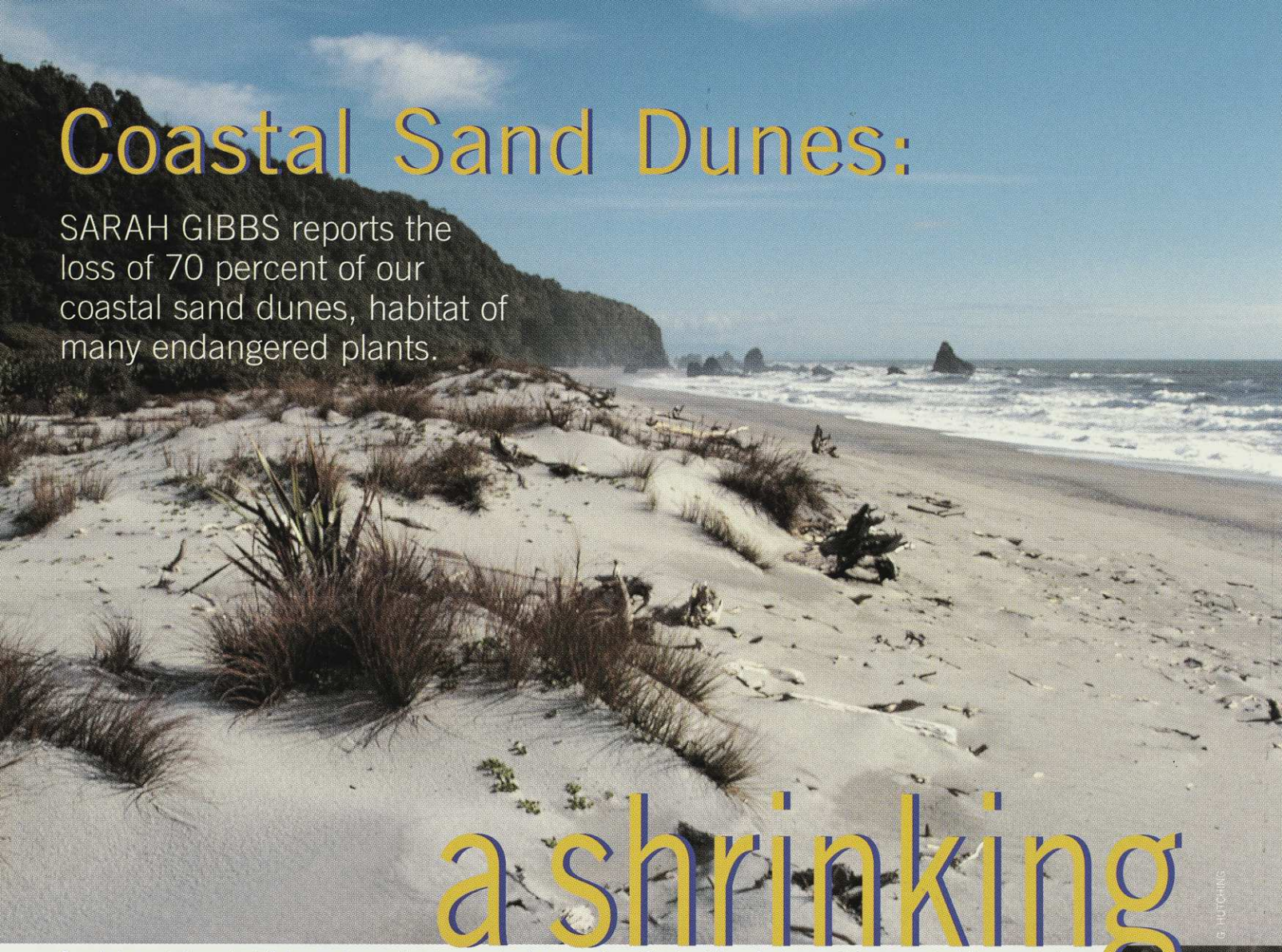
The banded sea snake is 'the most terrestrial of marine snakes and is frequently described as amphibious, rather than aquatic.'



TONY WHITAKER

Coastal Sand Dunes: a shrinking

SARAH GIBBS reports the loss of 70 percent of our coastal sand dunes, habitat of many endangered plants.



Coastal sand dune habitats are becoming increasingly rare. New Zealand has lost over 70 percent of its coastal sand dunes in the last 80 years. Few of the remaining areas are in anything resembling a natural state. Remaining sand dune areas are often still under threat from development, weeds and human disturbance.

Coastal sand dunes create iconic New Zealand landscapes but they are becoming increasingly rare. Sand dunes are home to more of New Zealand's endangered plant species than most other habitats.

The perpetually changing nature of these areas, and the resulting variety of habitats, is a key reasons for this. The other is that many dune species have highly specialised habitat requirements.

As new dunes form along the shore, the dunes behind them are colonised by plants. In the process of colonising areas, each species contributes slightly to modifying the dunes into a new habitat type. Thus each new coloniser stabilises the dunes enough for some new species to establish and,eventually, replace them.

Many of our native sand dune plants are so well adapted to changing conditions that they can only colonise newly exposed areas. It is vital that we conserve the remaining areas of coastal sand dune habitats as dynamic systems if we are to retain this part of our natural and cultural heritage.

In the last 80 years alone, we have lost a massive 70 percent of our coastal sand dune ecosystems. Now, most of the remaining dunes bear little resemblance

SARAH GIBBS

Botanist Colin Ogle (left) leads a trip through coastal dune country near Wanganui at the November 2001 Forest and Bird Council meeting. With him is Rotorua branch chair Chris Ecroyd, himself a professional botanist.

BILL FAIRWEATHER

The critically endangered sand gentian, *Sebaea ovata*, is now only found in two sites within New Zealand. It only survives in habitat within newly-formed dune hollows behind frontal dunes. In the Wanganui area special scrapes behind the dune have been established so this plant may survive.

BILL FAIRWEATHER

A native sun orchid, (*Thelymitra* sp.) in the sandhills at Whitiau Scientific Reserve near Wanganui.

to their original native condition. Most of them are biologically impoverished and barren, compared with their original state.

Dune modification began in many areas when coastal dune forests were burned off during Maori settlement. Clearance of coastal dune forests accelerated with European settlement.

The establishment of European farming techniques, which saw the introduction of livestock to coastal dunes, had huge impacts on ecosystems. Trampling and grazing of native sand-binding grasses led to widespread and serious erosion in the late 1800s and early 1900s. With their natural vegetative cover destroyed, sand dunes frequently migrated inland.

The threat of shifting sand to established farmland led to further modification of coastal dunes — sand dune areas were 'stabilised' with lupins, pines, marram and other exotic species.

Since the 1950s, coastal subdivision and development has had the most significant impact. Many large dune systems have been almost completely covered with housing. Even frontal sand dunes have been bulldozed to allow for better coastal views.

The replacement of native dune vegetation by exotic weeds, many escaped from gardens, has further modified sand dune ecosystems and reduced their native biodiversity.

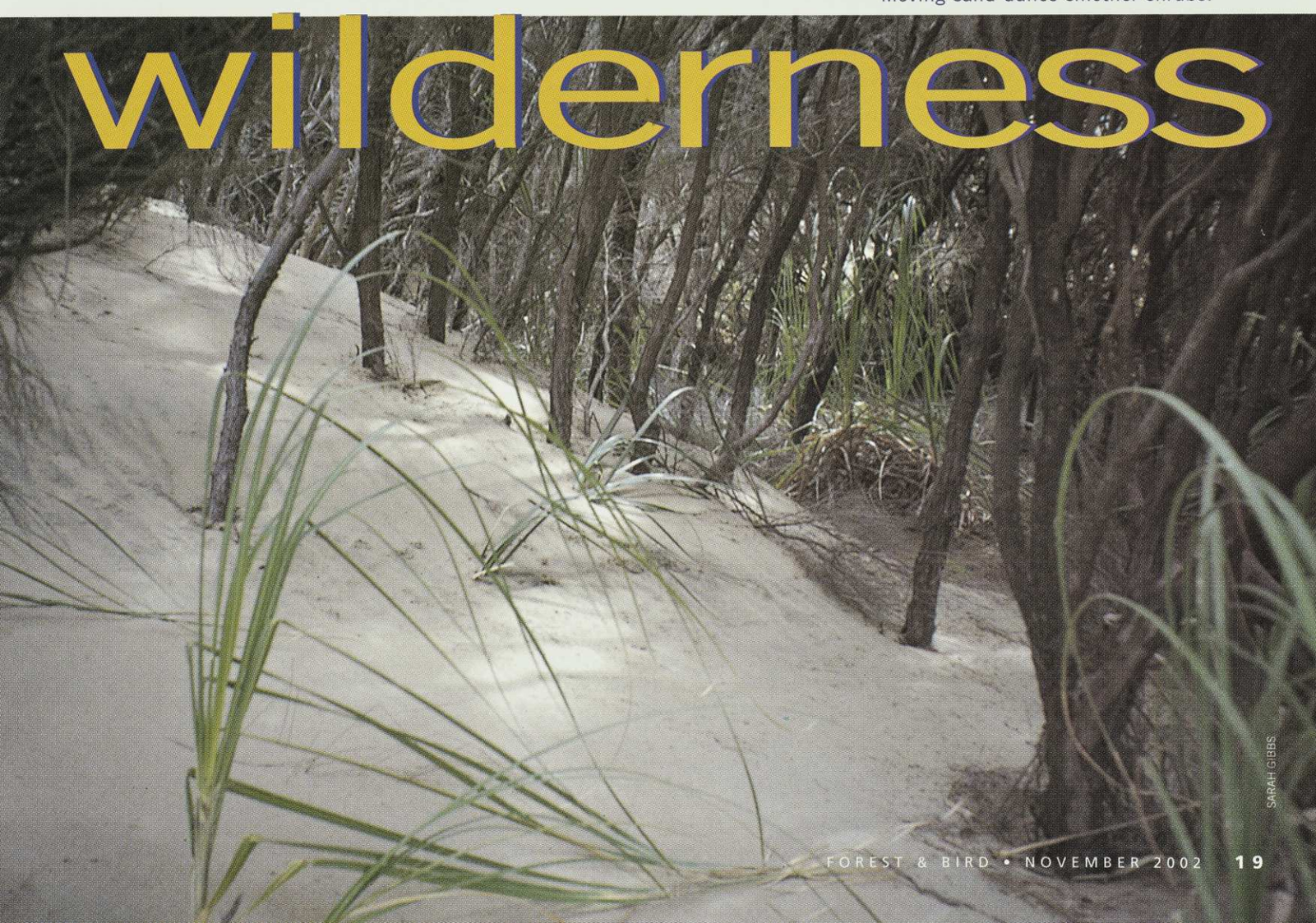
Tighter land use regulations and a growing recognition of issues such as the spread of garden weeds has led in recent years to a reduction in these threats. At the same time, however, an increasingly mobile population has meant that human recreational activities have become a significant and growing threat to the remaining dunes. On many east coast beaches, the density of foot traffic alone has destabilised and, in severe cases, destroyed frontal dunes. On the west coast, the rapidly growing number of people wanting to drive off-road vehicles through this coastal country is the single biggest threat to dunes and dune-living species — plants, insects and birds.

Unmodified coastal dunes are now considered to be as rare, and possibly more threatened, than wetland ecosystems. Their survival, and that of the species that live within them, is dependent on our actions.

— **SARAH GIBBS** *is Forest and Bird's northern conservation officer.*

Moving sand dunes smother shrubs.

wilderness



SARAH GIBBS

New Zealand's coastal sand dunes today: the good, the bad and the ugly

AUCKLAND REGIONAL COUNCIL

Installing a boardwalk to protect sand dunes at Medlands Beach, at Great Barrier Island.

AUCKLAND REGIONAL COUNCIL

A Coast Care group replanting the beach at Karioitahi on the Auckland west coast.

The Good: Sand dune restoration by community groups

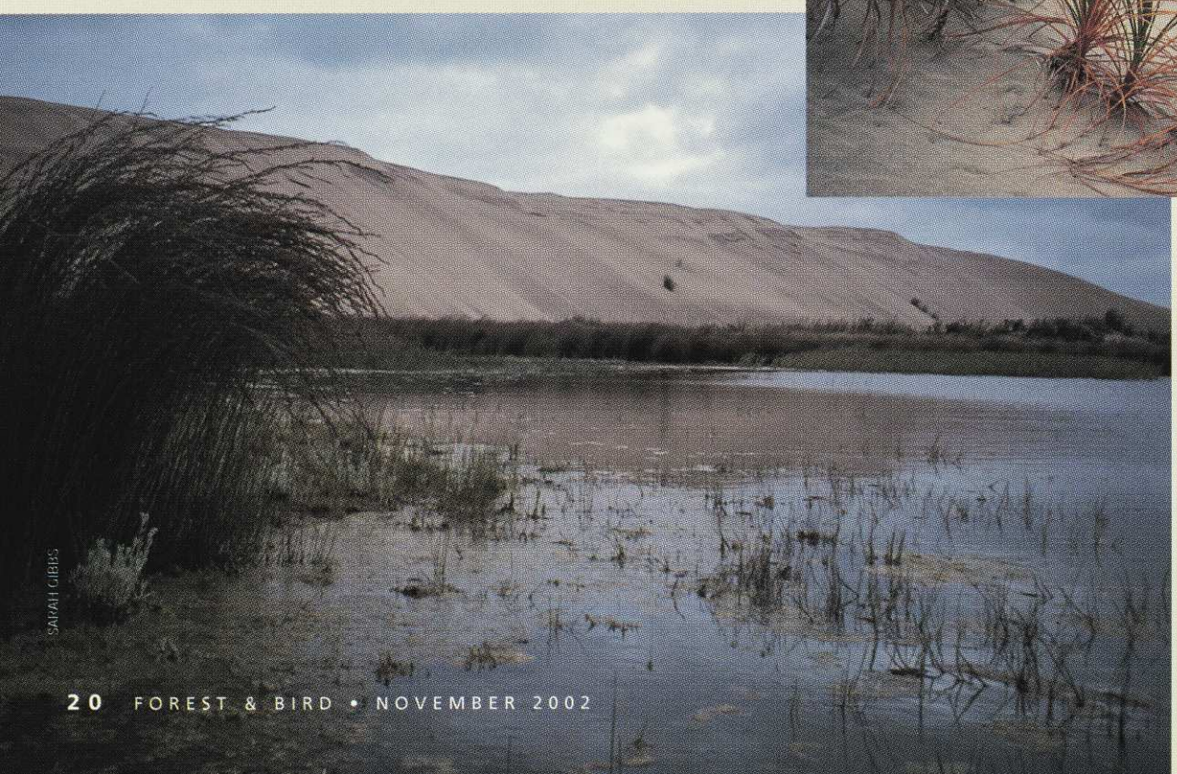
Increasing numbers of community groups have started up around the country to restore coastal dune areas. Common activities undertaken are re-establishing foredune areas by planting native dune grasses such as pingao and spinafex, building 'board walks' to prevent further damage to dunes by foot traffic, educating others about the importance of dunes, and restoring back dunes by planting coastal trees and shrubs.

The value of restoring dunes often extends beyond merely preventing erosion of the land behind the dunes. It helps ensure the survival of endangered species. The native pingao grass, for example, is classified as being 'conservation dependent' for its survival — meaning it will only recover into its natural range in areas where it is aided by restoration.

The Good: 'We have the technology'

When Harley Spence started working with community groups wanting to restore coastal dunes in the Waikato Region, he quickly realised that there was often not enough information available to enable successful restoration projects. It was not even known how to propagate native dune species. Restoration groups were often being told to plant introduced marram because it was too hard to deal with pingao, spinifex and other native species. In response, Harley Spence helped found the Coastal Dune Vegetation Network. This group has facilitated over a decade of research and user-friendly publications into topics including restoration using native species, dune morphology, management of rear dunes, setting up Coast Care groups and monitoring of restoration programmes. Publications can be obtained by writing to The CDVN Secretary, Forest Research, Private Bag 3020, Rotorua or by phoning (07) 347-5899.

SARAH GIBBS



SARAH GIBBS

Above: Endangered pingao grass creates its own habitat by colonising areas of new dunes as they move seaward, partially stabilising them. This in turn helps to create a new frontal dune area, and habitat for a new set of dune species.

At left: Pond retained by Big Dune at Papakanui, South Kaipara Head, Auckland west coast.

The Bad: Sand dune developments still being proposed

With all that is known about building on coastal sand dunes, one could be forgiven for assuming that it was no longer common practice in New Zealand. After all, societies have cautioned against building on sand since Biblical times and probably before. Unfortunately, this doesn't seem to stop developers buying up coastal areas with the intention of subdividing and developing them.

One current example is Ngunguru Spit, just south of Tutukaka in the Whangarei district. The area has been described as 'one large archaeological site' and is an important habitat for a number of native species. Previous applications to develop Ngunguru have been turned down due to the area's high ecological and cultural values and high natural-hazard rating. Despite this, the owner has recently reapplied to Northland Regional Council and Whangarei District Council to develop Ngunguru.

T. FITZGIBBON

The Bad: Hoons on dunes

Fuelled by a surge of cheap imports, driving off-road vehicles as a recreational hobby has become increasingly popular in recent years. Unfortunately, drivers are not always aware of the impacts they have on previously inaccessible areas.

Heavier traffic results in dune blowouts, makes restoration efforts difficult, and prevents regeneration or survival of most native dune species. Increasing numbers of people in what were previously inaccessible areas also mean an increased fire risk and more people taking pets into these areas. In areas where beach-nesting birds are present, the highly camouflaged eggs and chicks can be crushed by vehicles whose drivers do not see them in the sand. Increasing numbers of people on vehicle-accessible beaches also results in lower survival rates of both eggs and chicks, as parent birds will not return to their nests when humans are in the vicinity.

A recent review of the impacts of vehicles on coastal dunes and beaches by the Department of Conservation concluded that species living in coastal sand dunes or the backshore of sandy beaches have a 'nil carrying capacity with respect to vehicle use'.

SARAH GIBBS

Recreational bikers take a break next to a black-backed gull colony within a frontal dune hollow. They appeared oblivious

SARAH GIBBS

to nests on the ground within metres of their parked bikes and to parent birds flying overhead.

The Ugly: Alien invaders

Exotic weed species shortcut the stabilisation process that occurs with native plants, thereby displacing native plants that rely on habitat created by intermediate stages in the stabilisation process. Scientists rate weed invasion as one of the most serious threats to sand dune areas, with pampas grass being one of the biggest problems.

Katipo threatened by changes to coastal sand dunes

The katipo spider has long aroused a sense of unease amongst New Zealand's beach users. Early Maori who named the spider 'night stinger' were loath to sleep in dunes at night and even now, tales of the dreaded katipo arouse anxiety amongst driftwood collectors or those contemplating a frolic in the dunes. Today, however, the likelihood of being bitten by katipo is becoming increasingly remote, as this icon of our coastal dune systems is rapidly disappearing.

L. katipo (adult female on marram grass).

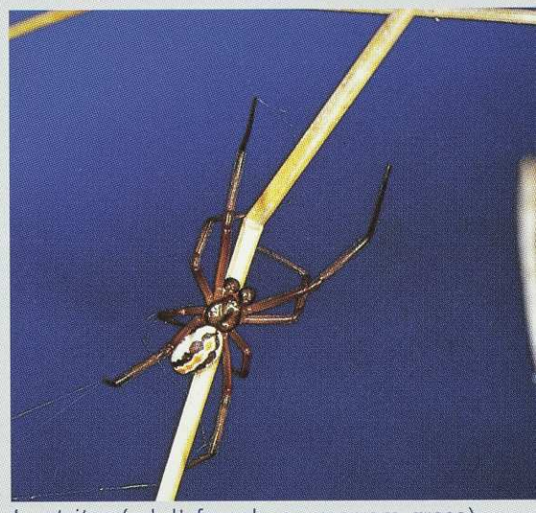
Katipo belong to a worldwide genus *Latrodectus* which also includes the Australian red back (*L. hasselti*) and black widow spider (*L. mactans*). There are two recognised species of katipo; *Latrodectus katipo* and *L. atritus*. Both are peculiar to New Zealand and can be distinguished by the coloration of adult females. Adult female *L. katipo* are primarily velvet black with the exception of a bright red dorsal stripe and a distinctive red, hourglass-shaped marking on the underside of the abdomen. The body is about the size of a pea. In contrast, adult female *L. atritus*, although almost identical in colouration and size, lack the red dorsal stripe, and the red hourglass on the underside of their abdomen is less distinct. Compared to their female counterparts, mature male *L. katipo* and *L. atritus* are diminutive in size (one sixth the size of adult females) and are not so easily distinguished. Males of both species are predominantly white with a series of red-orange diamonds running along the dorsal region of the abdomen. These are bordered on either side by irregular black lines.

L. katipo (adult male on marram grass).

L. katipo and *L. atritus* have distinct distributions. *L. katipo* inhabits dune systems from New Plymouth and East Cape in the middle of the North Island as far south as Karamea and Dunedin in the South Island. *L. atritus* inhabits dune systems from New Plymouth and East Cape to Cape Reinga. Some overlap in distribution currently occurs around East Cape and New Plymouth.

Both species commonly establish webs in low-growing dune plants or driftwood. Webs are almost always constructed over open sand. Spiders inhabiting dune grasses, for example, construct webs in open spaces between grass tufts, whereas those inhabiting prostrate shrubs build webs on the underside of the plants overhanging open sand. Katipo are rarely found in dune regions where dense marram or other exotic plants such as kikuyu or buffalo grass cover the ground.

Research into the distribution and habitat preferences of katipo indicates that patches of open sand are necessary for katipo to build their webs, and that aggressive introduced plants that swathe dune systems in dense cover create an environment unsuited to web construction. Furthermore, katipo are rarely recorded from habitats other than dune systems, which implies that dunes modified by agriculture, forestry or urban development also fail to provide suitable katipo habitat.



L. atritus (adult female on marram grass).

These findings indicate that the introduction of aggressive exotic plants to New Zealand's coastal sand dunes, in combination with dune modification resulting from agriculture, forestry or urban development may have led to the reduction and fragmentation of katipo habitat. Ultimately, these factors are likely to be responsible for the decline in katipo numbers and may threaten the long-term survival of these species.

Unless steps are taken to conserve our coastal dune systems, the katipo is likely to become no more than an 'urban' legend. Conservation of coastal dunes will not only safeguard the future of our coastal icon, the katipo, but will also protect a rich flora and fauna that is as unique to New Zealand as our forests and birds.

— **DR JAMES GRIFFITHS** *is a conservation scientist from Canterbury.*

South African Invader

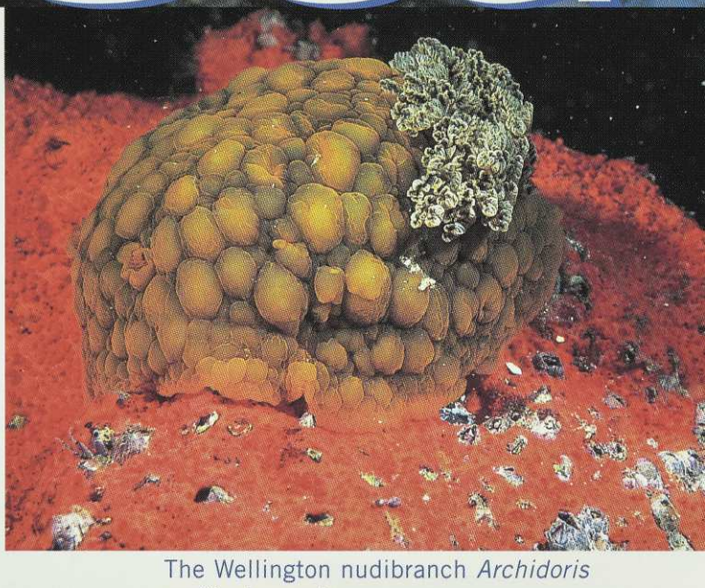
In some dune systems, katipo may also be threatened by *Steatoda capensis*, a South African spider. It is shiny black and may have a dash of red, orange or yellow on it abdomen, thus its popular name 'false katipo'.

S. capensis produces more offspring than katipo and can breed throughout the year, (Katipo only breed in late spring and early summer.) Furthermore, *S. capensis* is not confined to coastal dunes but is commonly found under wood, debris and other objects, large distances from the coast. Because of these factors, *S. capensis*, is able to colonise driftwood and flotsam more quickly than katipo, following disturbances such as large storms, and under certain conditions may displace katipo from driftwood habitat in dune systems.

A Spectacle of Sea

TONY AND JENNY ENDERBY photograph the diverse creatures they call 'Butterflies of the Sea'.

Colourful Verco's nudibranchs, *Tambja verconis*, are usually found on bryozoans.



The Wellington nudibranch *Archidoris wellingtonensis*.

Between the orange sea squirts which cling to the reef wall, our dive lights reveal a green-and-yellow striped sea slug. Closer inspection identifies it as the ultimate nudibranch carnivore, *Roboastra luteolineata*, this one more than 10 centimetres long. It crawls rapidly, obviously hunting for prey but for the moment is unsuccessful.

The description 'sea slug' doesn't seem right for such a beautiful animal (see cover). The scientific name, Nudibranch seems far more appropriate. Yet these colourful creatures, found in many forms throughout New Zealand waters, are actually the marine equivalents of the garden slug — albeit often frilled and multi-coloured.

We find other sea slugs as we swim along the walls of the reef. As the marine growths change to the blue-green of the *Bugula* bryozoan, we find several blue-and-yellow Verco's nudibranchs, *Tambja verconis*, feeding on it. Their spiralled, yellow egg masses are coiled nearby. A similar shaped, smaller green nudibranch and close relative, *T. affinis*, also feeds on the *Bugula*. Both species were oblivious to the danger from the approaching *Roboastra* their potential cannibal.

We were diving in Maroro Bay at the Poor Knights Islands Marine Reserve, one of the best places to see these animals. The *Tambja* species, arguably New Zealand's most colourful nudibranchs, are migrants from warmer waters, carried down by the East Auckland Current. The egg masses show they are breeding locally and could be around for another season or two.

On the rails of the sunken ship *Rainbow Warrior* white tree-like hydroids protrude from the rails and hull. These *Solanderia* hydroids are home to the pink and white *Jason mirabilis* nudibranchs and their matching pink rosettes of eggs. The Jasons feed on the stinging polyps of the hydroids, storing them in the white cerata on their backs, using the stinging cells for their own protection. They are found right around the coast of New Zealand.

Slugs

To find nudibranchs you don't need to travel offshore — many species can be found in the intertidal and subtidal areas. Although sea slugs are quite common, few New Zealanders know of the existence of these colourful animals, sometimes called 'butterflies of the sea.'

They are part of the phylum mollusca, falling into the opisthobranch family, relatives of gastropods like whelks and limpets, but without the external shell. Opisthobranchs include sea hares and pleurobranchs, but the most colourful and patterned are the nudibranchs.

They range from tiny creatures only millimetres long to the huge knobbly Wellington nudibranch, *Archidoris*

Top left: Clown nudibranchs, *Ceratosoma amoena*, are New Zealand's most commonly seen species.

Middle left: The apricot nudibranch, *Tritonia incerta*, varies from bright pink to apricot.

Below: *Jason mirabilis* nudibranch.

wellingtonensis, that grows to 20 centimetres long. Some species like the *Tambjas* can be prolific one year and then seem to vanish completely for several years.

The nudibranch we most often see in rock pools, or while snorkelling, is the clown nudibranch *Ceratosoma amoena* which grows to around eight centimetres. They are spectacular animals with orange spots against a white body with magenta gills and rhinophores. While diving in the channel at Mathesons Bay, near Leigh north of Auckland, we often find dozens on a single dive. This area has yielded over 30 species of opisthobranchs, feeding among the masses of sponges, sea squirts and other encrusting life.

In deeper water, where the ecklonia kelp gives way to sponge gardens, the large apricot nudibranch, *Tritonia incerta*, grazes on a soft coral popularly known as dead man's fingers. Fifty years ago A. W. B. Powell, Auckland War Memorial Museum conchologist, found the apricot nudibranchs in large numbers in rock pools on Auckland's west coast, yet we have never found them in water shallower than 10 metres.

Not all the opisthobranchs could be classed as attractive. Sea hares are the largest in the group, growing to over 30 centimetres long. Their heads are dominated by two large oral tentacles below their rhinophores that look like ears. Unlike nudibranchs, sea hares have a vestige of a shell covered by the mantle on their back, which protects their gills.

Their coloration makes them difficult to find amongst the weed that they feed on. The large, dark-brown, patterned *Aplysia dactylomela* feeds amongst the brown and red weed. Two similar species are *A. keraudreni* and *A. juliana*. Another smaller sea hare, *A. parvula* is either golden brown or a dull red, matching the colour of the seaweeds they are grazing on. Other species include the very large *A. extraordinaria*, a migrant from tropical waters around the offshore islands, while a very knobbly relative, *Dolabrifera dolabrifera*, is more common on the mainland coast. Sea hare eggs resemble a curling purple spaghetti-like mass entwined amongst the weed. Sometimes it turns up in the seawrack left at the top of the tide.

Some years, the hairy sea hare, *Bursatella leachii*, washes ashore in huge numbers. Its slimy appearance has often been wrongly confused with pollution, yet these proliferations are a totally natural event.

Black-tailed sea hares, *Aplysia dactylomela*, are the largest of the coastal sea hares.

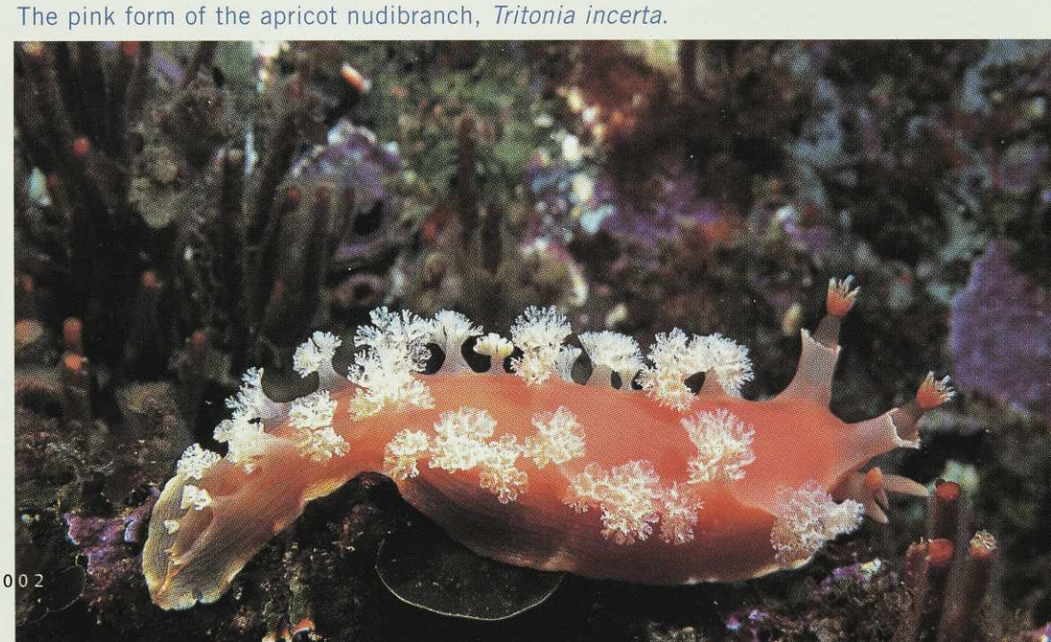
Jason mirabilis nudibranch is found right around New Zealand.

The hairy sea hare can reach more than 15 centimetres long, and have patches of brilliant blue dots between the hairy growths that protrude from its body. Like all sea hares, it can emit a purple dye as a deterrent to predators when disturbed.

Gem nudibranchs, *Dendrodoris denisoni*, are often found in similar habitats. They are smaller with blue spots and none of the hairy growths. They feed on the bright orange compound ascidian *Pseudodistoma novaezelandiae*.

Many opisthobranchs are nocturnal, spending the day hidden under rocks and

The pink form of the apricot nudibranch, *Tritonia incerta*.



Common among the seaweeds are the little sea hares, *Aplysia parvula*.

boulders and emerging at night to feed. One of the least known opisthobranchs, the side-gilled slugs or pleurobranchs, are found here. The most common are *Berthilinia maculata*, a brown and white species about four centimetres long, and *Berthilinia citrina*, a bright orange animal about the same size. Sharing the habitat and the specific name of the latter is *Dendrodoris citrina* a bright orange or yellow nudibranch. When viewed together the external gills of the nudibranch show the difference in the two species.

In Otago Harbour, amongst the prolific sea squirts and sponge life, we found the largest specimens we have ever seen of the gold-lined nudibranch, *Chromodoris aureomarginata*. They were almost twice their usual 50-millimetre size and common on both the Otakou Wall and the Aramoana Mole shipwrecks. We also came across several large Wellington nudibranchs, easily identified by their brown warty bodies. Like the gold-lined nudibranchs these are found right around the New Zealand coast. Large black slugs grazing nearby looked like another opisthobranch species but were the gastropod *Scutus antipodes*. Their white external shells clearly displayed the difference between them and the shell-less or internal-shelled opisthobranchs.

While opisthobranchs are not subjected to collecting pressures their habitats often suffer from run-off and dredging which can have an effect on nudibranch numbers. The reasons for marine reserves are still often talked of in terms of protection for fish species rather than all the animals that make up marine communities. Nudibranchs, sea hares and the other opisthobranchs are just some of those other animals whose habitats would be protected by a representative network of marine reserves. — **TONY AND JENNY ENDERBY** *are photo journalists who live at Leigh on the Rodney coast of the Hauraki Gulf.*

Below: *Tambja verconis* nudibranch and eggs amongst *Bugula* bryozoans.

The morose nudibranch, *Tambja morosa*, grazes on bryozoans.

New Zealand has responsibility for the fourth largest Exclusive Economic Zone in the world. Its oceans cover an area 14 times its land area, some 1.2 million square nautical miles. New Zealand could be described as a wet continent with a few islands protruding out of the surrounding sea.

Fishing is by far the most pervasive and widespread impact on the surrounding seas. Every year over 600,000 tonnes of fish are extracted from our oceans. Besides the target fish, hundreds of other species are accidentally caught.

Many aspects of commercial fishing in New Zealand waters are unsustainable, according to Forest and Bird researcher BARRY WEEBER.

Ocean Life

Every year this fishing catches about 10,000 albatross and petrels, around 1000 fur seals, 80 or so New Zealand sea lions and several dozen Hector's dolphin, some of these animals on the brink of extinction.

More than 80 percent of our biodiversity is thought to live in our surrounding seas. Every week new marine species unknown to science are trawled up and the potential threat of marine extinctions is a growing concern as areas of sea floor are scraped clean.

Seals and hake accidentally killed during trawling for hoki on the West Coast fishing grounds.

Part of an estimated 70-tonnes catch of hoki taken by a trawler off Greymouth.

New Zealand has had an expanding domestic fishery over the last 20 years. We have pioneered fishing deeper (below 300 metres), over a larger area and for longer than any other country. This has resulted, for example, in the demise of many orange roughy populations with one being reduced to only three percent of what it was 20 years ago.

Other species have not fared much better — in the Otago and Southland area rock lobster has been overfished down to five percent of its original population, and in the Hauraki Gulf off Auckland the schnapper population is under 20 percent of its original size.

It is not only target fish species that are at risk from fishing. As a trawler drags a net

Forest and Bird's Marine Reserves Campaign

Forest and Bird's campaign for marine reserves extends to the issues surrounding conservation in the oceans. The impact of fisheries in the southern oceans is of particular concern — both in terms of long-term sustainability, and for their impact on populations of other animals, including birds and seals.

Marine reserves are needed in critical breeding waters surrounding southern islands, such as the Auckland Islands group.

Forest and Bird supports fishing industry initiatives to introduce better fishing practices which won't destroy seals and birds.

Bottom-trawling for hoki also scoops up other fish, known as 'by-catch'. This haul from the Hokitika Canyon also includes ling, rat tails, javelin fish and spiny dogfish.

Every year, ocean fishing catches about 10,000 albatrosses and petrels.

across the ocean floor it operates like a grader, destroying a range of species that occur on the sea floor including corals, bryozoans, sponges and other marine animals. In places like Spirits Bay and Tom Bowling Bay off the Far North, in Foveaux Strait south of Invercargill and on the ocean seamounts, whole communities have been modified by trawling and dredging.(See Seamounts in *Forest & Bird*, May 2000, Spirits Bay, November 1999.) It may take decades, if not centuries, for them to recover.

The size of the nets and the concentration of effort is huge. Nets used in mid-water fisheries, such of those for squid, southern blue whiting and some hoki fisheries, can be up to 400 metres wide and 80 metres high. At this size the Auckland Sky Tower would fit sideways through the opening in the net.

There has been some progress toward protecting the ocean environment in past three years. In 2001, 19 seamounts were protected representing 2.5 percent of the Exclusive Economic Zone. But this restraint on fishing does not prevent the Minister-in-charge of Crown Minerals granting exploration rights to the same area and potentially causing greater damage than fishing.

On the conservation side, the Wildlife Act and Marine Mammals Protection Act are supposed to enable the protection of marine mammals, seabirds and other protected wildlife. The qualifying fact is, however, that both pieces of legislation are subservient to the Fisheries Act. The Minister of Fisheries is put in the driving seat when it comes to protecting marine species of birds and animals. If the Minister does not act then the Minister of Conservation has no powers to force action.

At the same time, the Ministry of Fisheries has in recent years, under different ministers, worked on giving control of fisheries management to the fishing industry. The latest mechanism has been fisheries plans in the 1996 Fisheries Act which the Ministry is not proposing to write. Rather, they are setting up procedures which will transfer greater control to the fishing industry by getting them to write and implement the plans. An added concern is that a fisheries plan can also bind the Minister of Conservation but that minister does not have to be consulted.

The proposal is akin to allowing the mining industry to write conservation plans that control mining on conservation land,

Arrow squid are another catch from the Auckland Islands Shelf.

or the farming industry to write regional water plans. Forest and Bird believes it is essential for the Government to retain control and administration of fisheries management, research, planning and enforcement.

It has been clear for many years that the current system of oceans management is dysfunctional, unsustainable, and overdue for change. In 2000 the Government embarked on a number of processes to improve management of fisheries and improve marine management, but progress has been excruciatingly slow.

The Oceans Policy process started with a hiss and a roar but has got bogged down in vision statements and policy management of the review process. The decision to transfer administration of the review to the Ministry for the Environment will hopefully see progress in the next six months.

At the same time as the Oceans Policy process has foundered, the Minister of Fisheries and Oceans, Hon. Pete Hodgson, has also been pushing the fisheries ministry to develop an environmental management strategy.

In 2001 Forest and Bird and ECO jointly undertook consultation on the proposals for the Ministry of Fisheries' environmental management strategy. This work was funded by a Green Party initiative in the 2001 budget.

The key issues identified were:

- limited opportunities for public participation in fisheries management;
- gaps in information, monitoring and research capacity;
- lack of precaution and environmental assessment in decision-making;
- lack of spatial and ecosystem-based management;
- dominance of private property rights over other interests and the environment;
- lack of recognition of non-extractive use values — the Ministry of Fisheries considers it doesn't have to consider such conservation values.

Similar views were expressed when the Auditor-General and the Parliamentary Commissioner for the Environment reported their reviews of fisheries and marine management in 1999. The Auditor-General's report on the performance of the Ministry of Fisheries concluded:

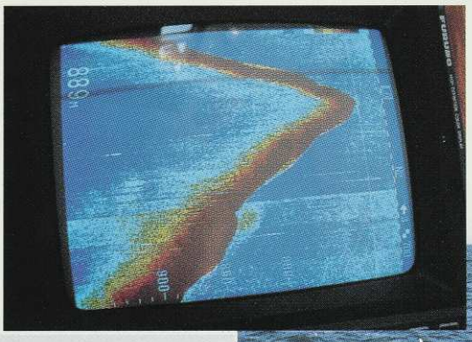
'the Ministry has been slow to commit resources to the environmental principles of the 1996 [Fisheries] Act, given that it has been aware of those principles and their implications for some time.'

The report also found:

'...the Ministry manages most fish stocks without being sure if this management is sustainable...[it] is not able to make informed recommendations to the Minister on issues such as the effects of fishing on the marine environment and the inter-relationships of fish species.'

The Parliamentary Commissioner for the Environment's 1999 report on the management of the marine environment also criticised the absence of public processes. His report concluded:

'...there is little evidence yet to suggest that [the quota management system] is delivering sustainable management of fish stocks or the marine ecosystems they inhabit.... The dominance of the private



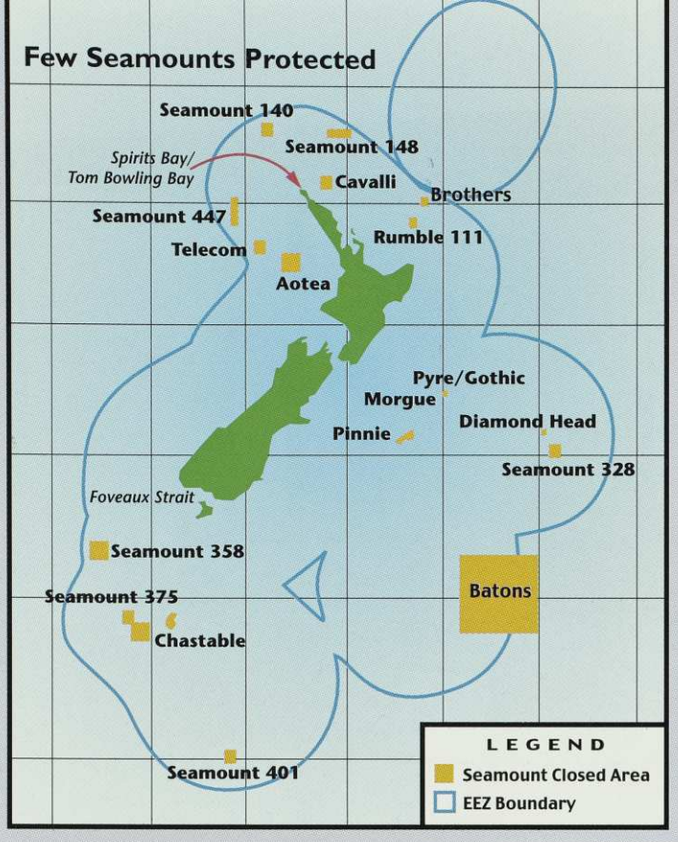
A coloured fish-finder picks up a spawning aggregation of orange roughy over a seamount. Topside, seabirds raft next to the waiting fishing vessel.

Changes Necessary

A key part of any change must be to significantly increase the amount of research funding to assess impacts of fishing and other activity on the aquatic environment.

Any regime must also promote the development of a system of re-presentative marine reserves to help avoid, or mitigate, the effects of fishing and protect biodiversity. Most marine scientists have accepted the use of marine reserves as a legitimate fisheries management tool.

International scientific advice generally agrees that 20 percent of any marine environment needs to be protected if fisheries are to be sustainable.



Protected Seamounts

Nineteen marine protected areas (shown) have been created recently, within New Zealand's Exclusive Economic Zone. These areas protect the environment of underwater mountains — seamounts — where marine life proliferates. There are 500 seamounts in New Zealand waters (and 500 'sea hills'), comprising one fortieth of the EEZ (see *Forest & Bird*, May 2000). Some have already been destroyed by trawling practices which strip the seabed.

Prior to 1978, New Zealand's responsibility only extended out to 12 nautical miles offshore. Following the United Nations Law of the Sea negotiations, New Zealand passed the Territorial Sea and Exclusive Economic Zone Act which extended responsibility to 200 nautical miles offshore.

Part of a 'bag burst' spilling approximately 180 tonnes of southern blue whiting in the vicinity of subantarctic Campbell Island. The broken off cod end and dead fish can be seen floating on the surface.

property rights approach has, to differing extents, excluded the values and priorities of tangata whenua, recreational users, local residents groups and other concerned groups from policy and decision-making processes.'

Three years later there has been little progress. Reliable population and yield estimates are available for less than 15 percent of the commercial fisheries managed under the quota management system.

The lack of research data available to inform environmental decision-making is a key concern of the environmental community. There is a widespread view amongst these groups that fisheries research has focused largely on a small number of commercially important fish species with little funding available for projects to assess the impacts of fishing on the marine environment.

Despite international obligations, management processes have tended to respond to fishing impacts only after damage to the environment has been done. Examples can be found in the decline of Hector's dolphin, the northern scallop fisheries, and stocks of orange roughy, gemfish, rock lobster and paua.

New Zealand can and should do better. It is clear we need a system of oceans management that is integrated, has clear goals and objectives and is open to public submissions and public scrutiny.

We urgently need an environmental management strategy for fisheries, designed to reduce the impacts of fishing on the seas, and to eliminate the impact on seabirds and marine mammals. Meanwhile, a precautionary approach should be widely applied.

A catch of orange roughy caught from a seamount. Populations have been drastically reduced in the past 20 years.

— **BARRY WEEBER** *is Forest and Bird's senior conservation officer for marine issues.*

Tales

BRIAN GILL finds bird specimens in museums tell stories of pioneer discoveries.

The old Bird Hall that occupied a gallery towards the front of the Auckland War Memorial Museum, from 1929-1969. Every bird in the cabinets carried its own story about its collection. The albatrosses were later incorporated into a diorama.

Auckland Museum began collecting birds in the 1850s. Now, a century and a half later, its bird collection of 12,000 specimens tells a fascinating story through the lives of the collectors and the lengths they went to obtain birds. It is a story of remote places, and the tenacity of the people who collected birds, prepared them and packed them for carriage home. The museum's 2500 foreign birds tell an exotic story of danger and hardship in the tropics and in the American 'Wild West'.

For the last 50 years, birds have come to the museum by salvage from those that have died naturally. For the first 100 years, however, birds were mostly killed deliberately for the museum

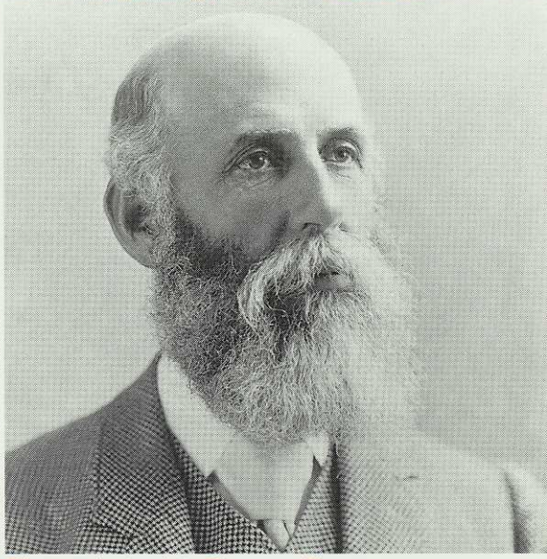
Viewed with horror by today's nature-lovers, this collecting must be weighed against the on-going value of the specimens for scholarly research and public display. In Auckland Museum's current 'Origins' gallery, a mounted South Island saddleback still performs its educational role about 120 years after Andreas Reischek shot and prepared it.

The number of bird specimens needs context. A few thousand collected in a hundred years is negligible beside the estimated two million birds *per day* killed around the world by domestic cats and motor vehicles. While others battle to save our species in the wild, museums struggle to preserve representative samples of our birds as a resource for future educational displays and research.

New Zealand birds

Auckland Museum's oldest surviving New Zealand stuffed birds were bought around 1856 from the collector and taxidermist Mr I. St John of Nelson. St John must have been one of the few taxidermists in the young colony, and his birds were desperately needed by the new museum, which at that stage occupied two rooms in a farm cottage on a site that is now part of the Auckland University city campus. From initial consignments of more than 40 birds, five or six have survived to the present.

In New Zealand of the 1850s, even putting a name to birds was a problem. One of St John's birds was listed as a 'Mud Sucker,' presumably some sort of wader. In 1856 the honorary curator complained to St John '... will you be kind enough next time to put the names on the stands. A Black & White Bird with Red Bill I received this time I had one from you before so do not send up another ...'. The red-billed bird was presumably an oystercatcher.



AUCKLAND WAR MEMORIAL MUSEUM

Pioneer botanist, Thomas Cheeseman, arranged many bird 'exchanges' while Curator, 1875 — 1905.

While St John was in Nelson in the winter of 1856 he was among the first in New Zealand to see Australian silvereyes. The specimen he sent to Auckland Museum, sadly now lost, was later cited in

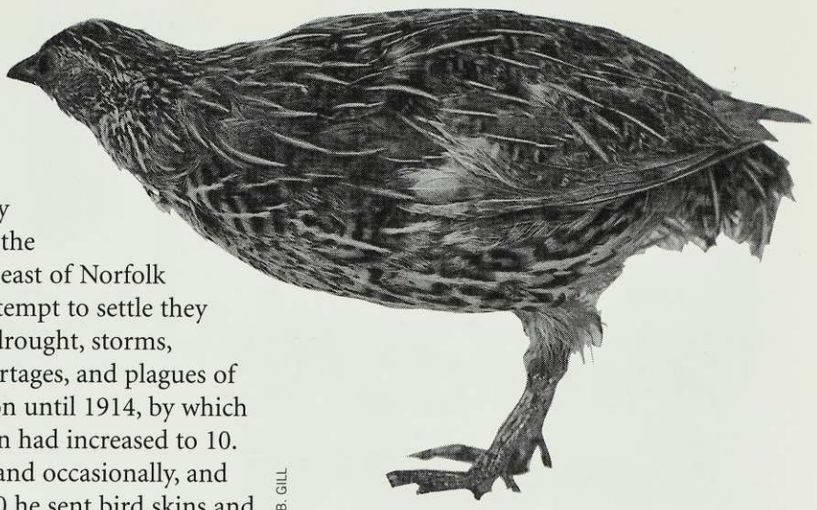
E.G. TURBOTT

# of Birds

the writings of Sir Walter Buller. Today the self-introduced silvereye is one of our commonest garden birds.

In 1878, Thomas Bell, with his wife Frederica and young children, had themselves put ashore on the uninhabited and unclaimed Sunday (Raoul) Island in the Kermadec group, east of Norfolk Island. In their attempt to settle they faced loneliness, drought, storms, robbery, food shortages, and plagues of rats. They clung on until 1914, by which time their children had increased to 10. Bell visited Auckland occasionally, and from 1888 to 1890 he sent bird skins and eggs to Auckland Museum. Roy Bell, one of the children born on the island, sold 103 bird skins from the Kermadec Islands to the museum in 1911, and later lived on Norfolk Island from where he provided further specimens.

J.C. McLean (1871-1918) managed the family's large sheep station in inland Poverty Bay. Between farm work he found time for nature photography and natural history observations. McLean joined Herbert Guthrie-Smith, a fellow run-holder, on ornithological expeditions. The latter described his friend's imperturbable temper. On a trip to Stewart Island in 1911, waist deep in water chilled with melted hail, and with a rising river to swim, McLean was still able to confirm a pair of kokako in the flooded scrub. Guthrie-Smith noted: 'I acknowledge he beat me there. If I had seen a Moa I should have let it pass ....'. Tragically, McLean drowned attempting to cross a flooded river near his home. His important collection of birds' eggs was presented to Auckland Museum in the 1930s.



B. GILL

One of the museum's oldest birds, a New Zealand quail, prepared by I. St John around 1856. The bird is now extinct.

Another important New Zealand egg-collector was Major Geoffrey Buddle (1887-1951), who built a large collection between the 1900s and the 1940s, obtaining many rare items during travels to out-of-the-way places. Because the eggs were carefully numbered and documented they are now an asset to the Auckland Museum reference collection. Like McLean, Buddle was a pioneering New Zealand nature photographer as well as a collector.

Antarctic birds

In the summer of 1929-30, and again the following summer, Robert Falla (1901-1979) served as assistant zoologist on Sir Douglas Mawson's British, Australian and New Zealand Antarctic Research (B.A.N.Z.A.R.) Expedition, with responsibility for bird studies. He had been honorary ornithologist at Auckland Museum, and this position was made permanent after Falla's Antarctic work. Falla brought to the museum the large collection of B.A.N.Z.A.R. birds, which were obtained under difficult conditions, and which, because of their precise documentation,

B. GILL

Study skins of moreporks, and colourful Australian parrots, from the reference collection of the Auckland War Memorial Museum.

AUCKLAND WAR MEMORIAL MUSEUM, C8689

The museum's preparator, Louis Griffin, in a basement workroom, 1909. The museum then occupied a building in Princes Street.

are important scientifically. The B.A.N.Z.A.R. Expedition used the ship Discovery that had served one of Robert Falcon Scott's expeditions 30 years before. Besides zoological studies, the expedition surveyed a section of the Antarctic coast and conducted the formalities to proclaim the Australian Antarctic Territory.

On Kerguelen Island, Falla took a chick from a sheathbill's nest and placed it in a cardboard box. The parent sheathbills, birds related to gulls, followed him on foot, and while Falla was investigating a petrel burrow they dragged the box away and the chick escaped. But the chick was needed for the collection and Falla retrieved it, science prevailing over sentiment. Through his lectures, radio talks and popular writing, Sir Robert Falla became perhaps New Zealand's best-known ornithologist.

Pacific birds

Nineteenth-century missionaries in faraway places often found diversion in natural history. The Wesleyan missionary the Rev. George Brown worked in Samoa and the Bismarck Archipelago, east of New Guinea. Auckland Museum purchased 100 of his bird skins in 1876. A similar collection was bought in 1879 from Andrew Goldie, a 39-year-old Scotsman living in New Guinea. Goldie discovered gold on the Goldie River near Port Moresby in 1878, which led to a small gold rush. He owned Port Moresby's first general store. Many of his birds may have been collected by an assistant called Carl Hunstein, an albino German, who in 1888 was drowned by a tidal wave while collecting on the west coast of New Britain.

G.C. Munro, author of the book *Birds of Hawaii* (1944), had family links to New Zealand. A collection of his Hawaiian birds, the oldest of them from the 1880s, was presented to Auckland Museum. Among them is a specimen of the Kauai O'o (*Moho braccatus*), a species of honeyeater recently declared extinct. Munro collected it on the island of Kauai in January 1893. The loss of this species is tragic, but thanks to Munro's effort in skinning, preserving, transporting and storing the bird, an additional museum specimen exists for posterity. This species succumbed to habitat clearance and the all-pervasive and unrelenting pressure from introduced mammalian predators, not to the actions of bird collectors.

The wealthy philanthropist Mr H.P. Whitney was persuaded by a Trustee of the American Museum of Natural History in New York to fund a lengthy collecting expedition by boat through the South Pacific. The Whitney South Sea Expedition ran from 1920 to 1932, concentrating on birds. When the party called at Western Samoa in 1923 and 1924, the New Zealand Government, the colonial power at the time, made the collecting permit conditional on the presentation of named examples of Samoan birds. New Zealand officials lodged 47 such birds at Auckland Museum, all beautifully prepared and fully labelled by Rollo Beck, the chief collector.

A.T. Pycroft (1875-1971) was an enthusiastic amateur naturalist who wrote a nature column for the *Auckland*

Star from 1927 to 1936. In 1932, while staying on the island of Malaita in the Solomon Islands, he made a collection of birds that now contributes to Auckland Museum's important Pacific Islands collection.

As a young man, Pycroft had the distinction of having eaten a huia. Skilled in taxidermy, he had been sent a huia for mounting. After skinning it he handed its body to his landlady and had her cook it.

While sorting Pacific birds my eye was drawn to skins from the Solomon Islands that were exquisitely prepared. All were collected by J.E. Green, who had been on active service with the U.S. Army on Guadalcanal during World War Two. He had been a preparator at a Californian museum, and so, amid the horrors of the jungle war, he had collected and prepared birds as a path to sanity. During rest and recreation in Auckland he presented his birds to Auckland Museum.

A young sailor in the Royal New Zealand Navy also collected birds while on war-time service in the Solomons and gave them to Auckland Museum. Peter Bull went on to a long career as an ecologist in the Department of Scientific and Industrial Research.

North American birds

Between about 1875 and 1905, Auckland Museum's Curator, Thomas Cheeseman, arranged major exchanges of bird specimens with museums and collectors around the world. Of special interest were exchanges with the Smithsonian Institution, Washington D.C. The hundreds of bird skins received were fully labelled. Many were collected in the 'Wild West' during a time of Federal Government exploration, often by army personnel at frontier outposts. Many labels carry the names of lengthy expeditions, such as the 'U.S. Northern Boundary Survey 1874' and 'Explorations and Surveys West of the 100th Meridian'. Ornithological collecting in the pristine wilderness was often an antidote to loneliness and boredom.

Of the Smithsonian collectors represented among the Auckland Museum birds are several well-known ornithologists of the day, like Elliott Coues (a U.S. Army surgeon) and Henry Henshaw. These two once raced each other, and found that each could prepare a sparrow skin in under two minutes.

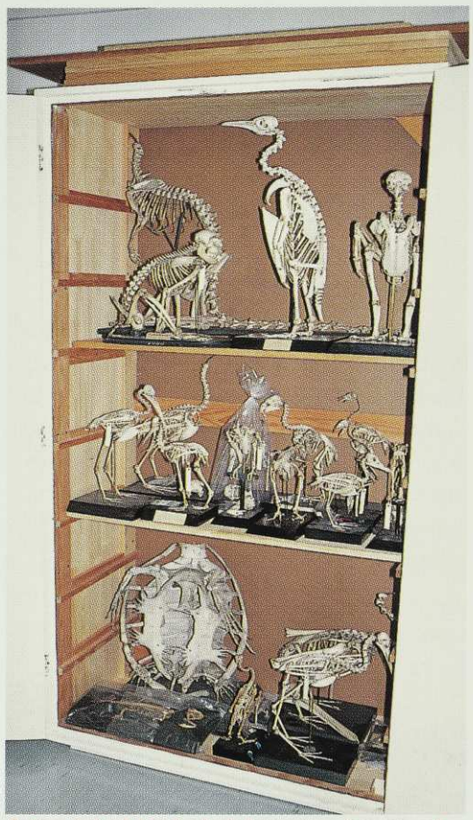
With frivolity there also came danger. Robert Shufeldt (a scholar who published on the osteology of the kea) drowned in the Ohio River near his home, and Charles McKay drowned in Alaska. In the Dakotas in 1864, Sergeant John Feilner galloped ahead of his column in his eagerness to collect, and while dismounted at a stream was surprised by Sioux warriors and killed. Edward Nelson endured climatic hardship in western Alaska, alleviated somewhat whenever he paid Eskimo women to sleep in his wet clothes so the garments would be dry by morning!

Theodore (Teddy) Roosevelt (1858-1919), who inspired the teddy bear, was a hunter, collector and conservationist. He gave his bird specimens to the Smithsonian, which is how nine of them came to Auckland Museum. As Governor of New York he closed down factories that used bird feathers in the fashion trade. During his presidential term (1901-9) he achieved more for wildlife protection than any previous president, creating numerous national parks and reserves.

Today museums receive a steady stream of birds, mostly those that have crashed into windows or been found dead by the roadside, and we always record the collector. There are regular collectors who understand the importance of bird collections and take trouble to save and label specimens for us. So the collecting goes on, and one day these birds too may tell a story to future generations through the names of their collectors.

AUCKLAND WAR MEMORIAL MUSEUM

Display of brown kiwis completed for the former Princes Street building around 1916.



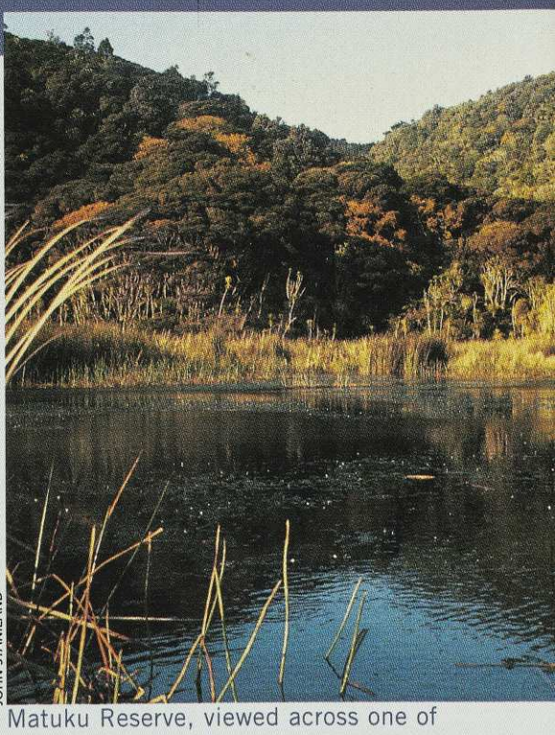
B. GILL

Articulated bird skeletons in storage at Auckland War Memorial Museum.

— **BRIAN GILL** *is Curator of Birds at Auckland War Memorial Museum. He has written several books including* New Zealand's Extinct Birds *(Random Century, 1991) and* New Zealand's Unique Birds *(Reed, 1999).*

Rhythm of the wetland

SARAH GIBBS visits Forest and Bird's Matuku Reserve, now part of a restoration programme in the ranges west of Auckland.



JOHN STANILAND

Matuku Reserve, viewed across one of the expansive ponds created by a huge flood in the slow-moving Waitakere River.

Partially protected by the forested hills of Matuku Reserve, the Te Henga wetland is the largest relatively unmodified freshwater wetland in the Auckland region. In summer, it is awash with brilliant green raupo with silver rippling across open blue-green ponds. In autumn the green becomes progressively tinged with a rich russet red as the raupo succumbs to winter frosts.

Around 20 hectares of this wetland lies within the Matuku Reserve and can be accessed by a boardwalk. In spring, the metallic duet of fernbird pairs can be heard, while the resounding boom of matuku, the bittern, punctuates the constant whisper of rustling raupo. The vegetated areas are also interesting for, although they look like solid islands and peninsulas, many are in fact floating pontoons of vegetation more than a metre and a half thick.

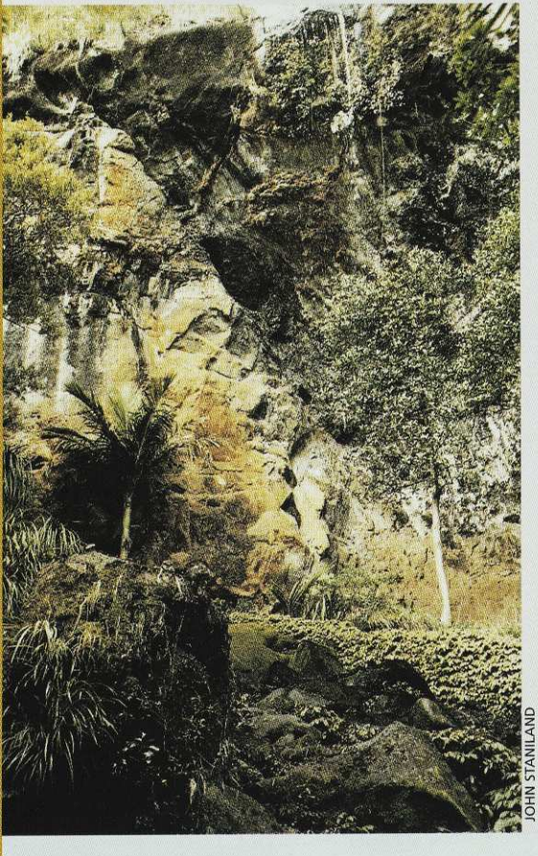
When Forest and Bird first acquired Matuku, the wetland was covered in an almost continuous mat of this floating vegetation and there were no large areas of open water. This all changed on July 1, 1979, when heavy rain coincided with a spring tide at Bethells Beach, downstream, and a full Waitakere reservoir, upstream. With the water table already high and drainage impeded by the high tide, the valley flooded dramatically. For about a day, only the tops of the cabbage trees could be seen above the water and Matuku's volunteer ranger, John Staniland, says it was the one and only time he has ever seen fernbird in the forest area.

The flood rolled up huge carpets of floating vegetation and swept them into the sea, creating large open ponds within the wetland. Within 24 hours the floodwaters had receded, but the ponds have remained, resulting in a mosaic of habitats that attracts a wide range of water birds.

Rising above the wetland, nearly to the ridgeline of Jonkers Road, Matuku Reserve protects round 80 hectares of northern coastal forest as well. Embracing the steep slope of the widest valley in the Waitakere Ranges, Matuku is the Society's second-largest reserve. More than 300 species of plants have been recorded, along with 45 bird species (five of them threatened), six species of native fish, one native lizard and numerous insect species.

A platform near the top of the reserve offers expansive views over the forest, wetland and out to coastal headlands. There is also a spectacular cliff view down a waterfall valley to lush lowland forest, including a grove of around 200 nikau. A

Northern coastal forest clothes the hillside of Matuku Reserve, west of Auckland.



JOHN STANILAND

Flaxes and cabbage trees border the wetland area. A boardwalk gives access to the wetland.

JOHN STANILAND

track system offers a choice of walks from one to three hours. These include a 60-metre boardwalk through the wetland and the experience of walking behind a waterfall. Those visiting the reserve on a branch field trip are also able to climb many metres up a ladder to a tree platform high in a puriri tree, where the Entomological Society and Landcare Research carried out a sampling programme for arboreal insects.

The acquisition of Matuku by Forest and Bird is unique in that it was acquired in four sections, and each section was acquired at different times and in a different way.

The first block of the Matuku Reserve was purchased in 1979, after an area of forest adjacent to the regionally significant Te Henga Wetland was put on the market and a number of prospective buyers were considering using the area for grazing. Forest and Bird's National Executive and Council gave half the money required for the purchase of the initial block, on the proviso that Auckland branches raise the balance. A three-year fund-raising programme was initiated, but the money was raised within three months.

When an adjacent 20-hectare block became available in 1985, Waitakere branch fundraised for half the purchase price — with renowned Auckland botanist Lucy Moore being one of those who made a donation. The QEII National Trust provided the other half on the condition that the entire block be covenanted.

The 16-hectare third block was acquired through a land swap in 1990. Forest and Bird exchanged a two-hectare block on the other side of the road for 16 hectares of forest that was adjacent to the existing reserve and ran down to the wetland.

The next 20-hectare block was purchased by the Society in 1994, with the Nature Heritage Fund providing half the purchase price.

With the current acquisition of 20 hectares (see box, over), Matuku Reserve now protects 120 hectares.

When Forest and Bird purchased Matuku, damage from a herd of around 50 goats had resulted in a thin understorey of unpalatable species. Possums were taking a toll of the canopy. Larger insects were scarce and birdsong, as in other parts of the Waitakere Ranges, was faint.

An adjacent farmer was approached about

Creepy Crawlies

Ground weta

Insects, the often unnoticed force that brings life to forests, are booming. Weta, and in particular ground weta, are an indicator of successful rat control within Matuku. There are virtually no ground weta in comparable areas of the Waitakere Ranges where there is no rat control. In contrast, monitoring has shown plentiful numbers of ground weta within Matuku Reserve.

Voices of the Dawn Chorus

North Island tomtit

It is now rare to visit Matuku without seeing significantly more birds than in other parts of the ranges. Flocks of up to 21 of the threatened New Zealand pigeon have been sighted within the reserve. In the absence of rats, fantail numbers have exploded and family groups of up to 11 have been recorded. When the kowhai are flowering, the tui song can be deafening.

Tomtit have begun to return to Matuku. Tomtit, a close relative of the New Zealand robin, are rare between Whangarei and the southern Waikato. Although present in low numbers in the Waitakere Ranges, prior to rat control there had been only one sighting of a male bird within the reserve. Since rat control began, increasing numbers of tomtit have been seen in the reserve and are now thought to be breeding there.

the goats. He offered to assist by fencing the herd out of the reserve and onto his farmland. Within around seven years parts of the understorey that could be seen through easily became so dense that it was not possible to push through much of it, and for many years it seemed that it would remain like this.

Over the last five years, however, the understorey has been opening up again — but this time for the right reasons. These species have now matured sufficiently that it is possible to see through the forest again. Improved forest health is also reflected in a much wider range of understorey species.

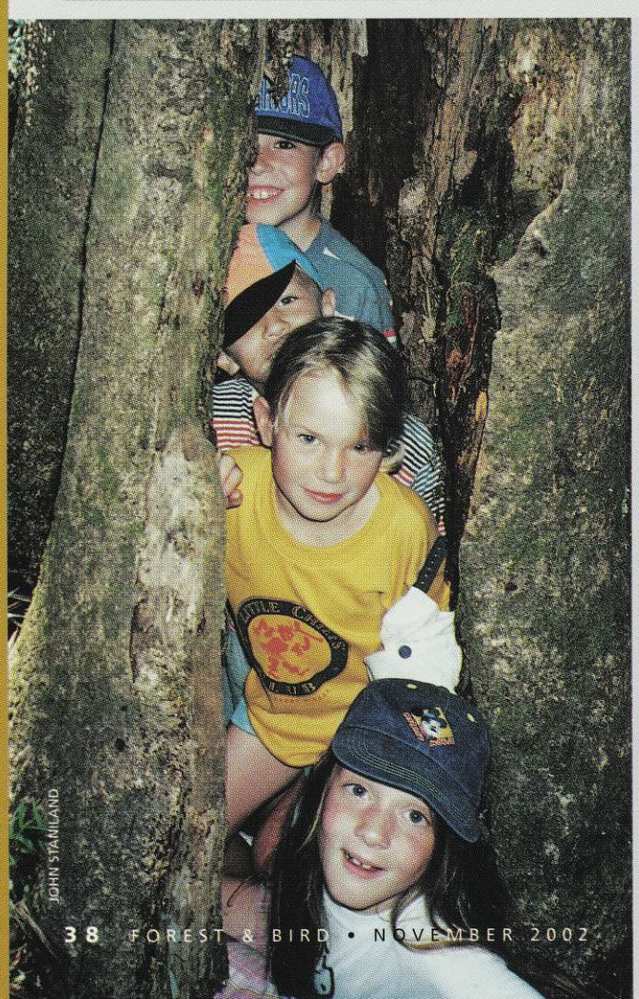
Restoration at Matuku also includes control of possums and rats. Bait stations have been placed at 100-metre intervals along lines 150 metres apart. Branch volunteers keep these stocked with talon provided by Auckland Regional Council, which has resulted in very low rat and possum numbers. Possum numbers are kept low also due to low reinvasion thanks to 'Operation Forest Save' — a successful possum control programme the Auckland Regional Council runs throughout the entire Waitakere Ranges. Recently pest control has been expanded to include stoats and other mustelids, which are trapped in kill traps.

The result has been an increase in life within the forest. Invertebrate numbers have bounced back particularly quickly, and bird species are now following suit.

— **SARAH GIBBS** *is the northern field officer for Forest and Bird. Matuku Reserve may only be accessed from Snow's Lane off Jonkers Road.*

The wetland area includes large areas of floating vegetation. Resident birds include bittern and fernbird.

Waitakere Forest and Bird is extending the Matuku Reserve with the purchase of nearly 20 hectares upstream of the present blocks. It comprises forested hillside falling to the Waitakere River. Purchase has been assisted by the Government's Nature Heritage Fund which granted $140,000 but Waitakere Forest and Bird has to raise a further $25,000.



JOHN STAMILAND

Cabbage trees grow best on alluvial soils, such as the ones found on the border of Matuku forest and the Te Henga wetland. Here Kiwi Conservation Club members sqeeze inside one of the large hollow cabbage trees on the reserve.

Beyond Matuku: A Glimpse into the Future?

Taxpayer-funded 'mainland islands' run by the Department of Conservation and various regional councils have already proven that the large-scale predator control needed to achieve mainland restoration is possible. Matuku Reserve is one of many projects that shows community groups can use the ideas developed in the pioneering mainland islands of the 1990s to run their own projects.

At 120 hectares, Matuku is considered too small to safely re-introduce some of the species that have become locally extinct in the Waitakere Ranges. However, it could be a stepping stone to creating somewhere this could happen. A small group of dedicated volunteers have been working on plans for a larger 'mainland island' -style restoration project near Matuku. 'The Ark in the Park' group, inspired by Forest and Bird, would like to see around 1700 hectares of the Waitakere Ranges protected through community-conducted predator control, with the area being expanded as volunteer help becomes available. If successful, their dream would allow species such as robins, whitehead, bellbirds, kokako, kakariki and even kiwi to be successfully returned to the Waitakere Ranges.

Part of the Matuku Reserve

A Living Legacy

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

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

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

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

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

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

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

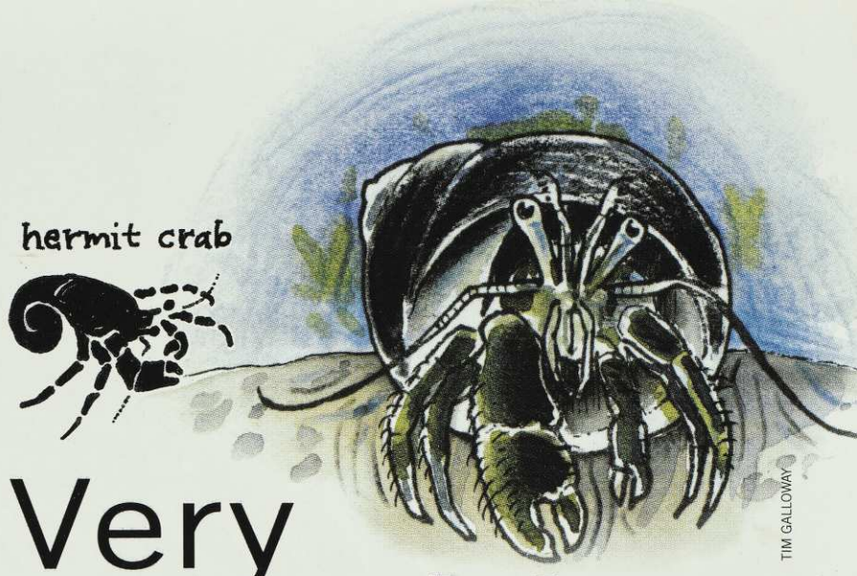
You too can leave a living legacy by remembering Forest and Bird in your will

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

To receive a bequest pack contact:

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

FOREST & BIRD



TIM GALLOWAY

The Very Versatile

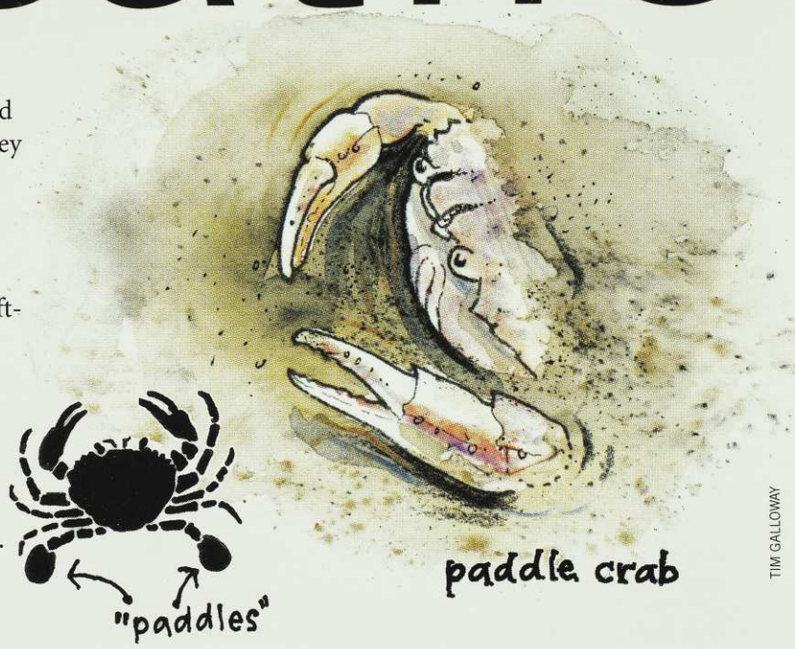
A crab is like a walking Swiss army knife! It is made up of segments, each fitted with appendages for different uses. The variety of shapes and specialities allows crabs to carry out every function they need — walking, swimming, fighting, communicating, reproducing, eating, and breathing.

Take the common mud crab. Its colour matches the mudflats where it lives, and it eats mud, extracting the nourishing bacteria and diatoms.

TIM GALLOWAY

The largest of the mud crab's appendages are its pincers, extra large in male crabs for intimidating rivals. Pincers are used by both sexes for scooping up tiny spoonfuls of surface mud and passing them to the jaws. They work like knives and forks, sorting and sieving from the mud the microscopic food, putting it into the crab's mouth and discarding the left-over mud as neat little balls.

Using its four pairs of walking legs, the mud crab scurries in and out of its burrow, ever alert to escape the beaks of the swooping kingfisher or stabbing heron. And underneath the female crab's tail, each segment carries a pair of forked appendages to which she attaches her eggs. She will carry them there until they hatch into tiny larval crabs.

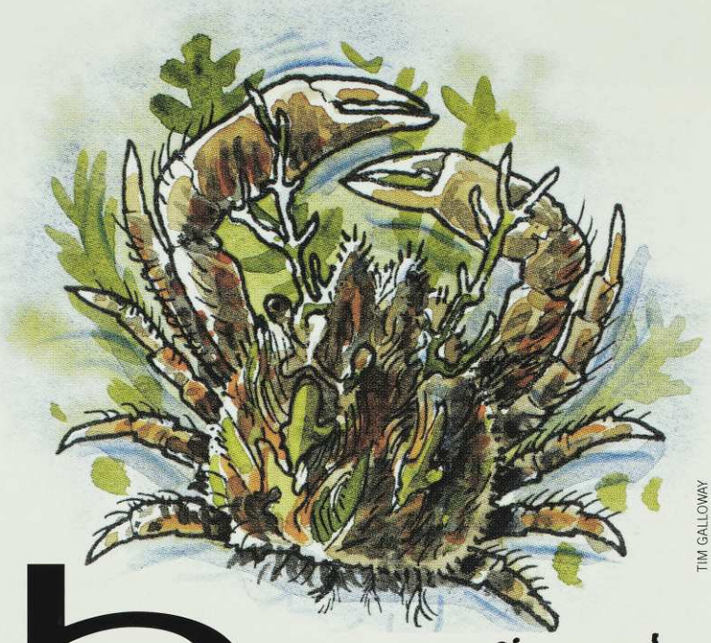


TIM GALLOWAY

The paddle crab, on sandier shores, leads a different life. Its back legs don't end in claws but are flattened into large paddles for swimming. When it is not swimming, the crab lies in ambush on the sea bottom, its paddle legs digging and shuffling the sand over itself until only the stalked eyes poke up like periscopes. When a small fish cruises by, the crab springs out, its sword-like pincers scything through the water to slash or impale the fish. Then, using its pincers like hands, it tears the fish into bite-sized pieces to put into its mouth. The pincers are so strong that they can even prise open pipi and tuatua — and painfully nip an unwary toe!

Squatting inside an empty snail shell, the hermit crab is cautious. Stalked eyes pick up any movement so you need to sit quite still beside a rock pool to see what looks like an empty seashell jerk into life. When, its feelers pick up the water-borne smell of a crushed limpet, the crab casts caution to the wind. It scuttles towards the food as fast as it can tow its shell. With so many hermit crabs in a pool, it's 'first in, best fed'. It's an orgy as each crab jostles to rip off a chunk of flesh with its big pincer. Then the crab cuts up the chunk with its smaller pincer, shreds and minces it with its jaws and stuffs the food into its mouth.

Crab



TIM GALLOWAY

Living in a shell house has imposed some modifications on the hermit crab's design. Its body is twisted to match the spiral of the shell, and it has special tail appendages to hang on to the inside. Then, when the crab retreats within its shell, its large pincer folds neatly over to barricade the entrance.

six-legged half-crabs, also known as porcelain crabs (The 'true' crabs have eight walking or swimming legs.) Half crabs are common and widespread because they are so hardy; the tough, carapace helping them survive the dangers of shifting stones and wave-lashed rocks. Our native half crab *Petrolisthes elongatus*

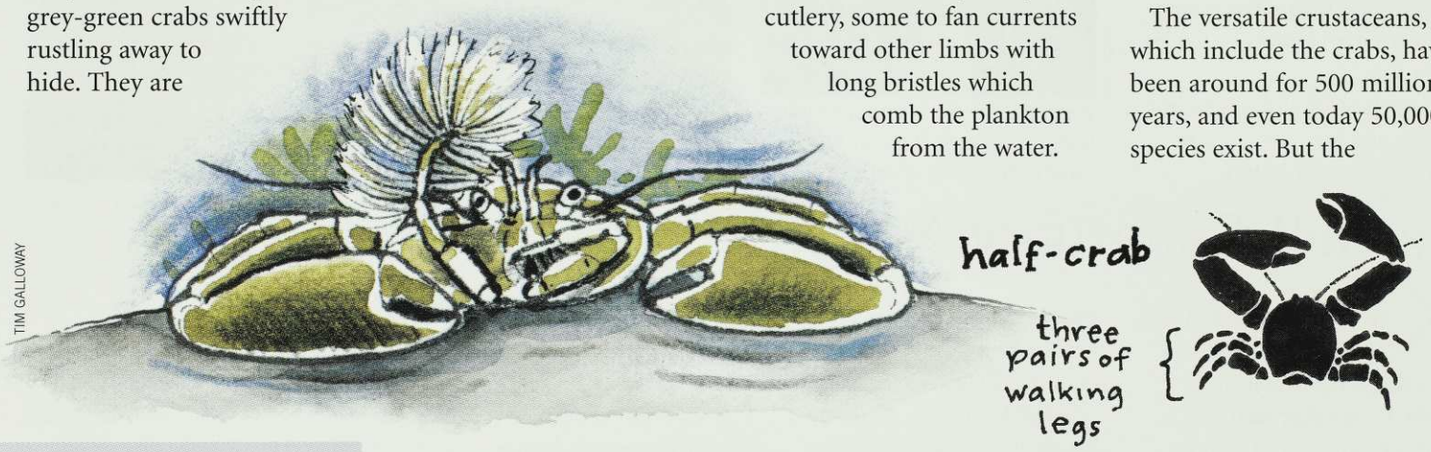
transplants the old garden to the new site. So adapted is the crab to matching its environment that, if its surroundings change, it redecorates its carapace to match.

The versatile crustaceans, which include the crabs, have been around for 500 million years, and even today 50,000 species exist. But the

Turn over a rock on any harbour shore and the chances are you will find lacquered grey-green crabs swiftly rustling away to hide. They are

has recently appeared across the Tasman, perhaps carried

army knife of appendages. Their small feeding limbs are modified into very fancy cutlery, some to fan currents toward other limbs with long bristles which comb the plankton from the water.



TIM GALLOWAY

The crustacean appendage is biramous, meaning it has two sections. Both may be similar, as in the twin stalks of the first antenna of a crayfish, but some-times one serves one purpose while the other serves a different one. For example, the crab's walking leg is the visible branch of one appendage. Its other section has a very different purpose, how-ever, being a feathery gill, almost invisible under the carapace.

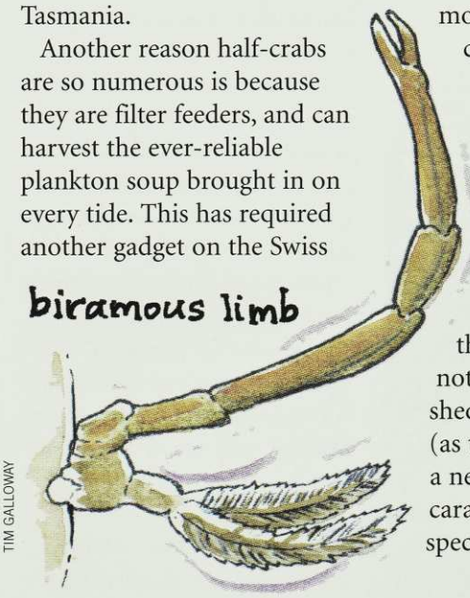
as larvae in a ship's ballast water, to establish itself around the coast of Tasmania.

Another reason half-crabs are so numerous is because they are filter feeders, and can harvest the ever-reliable plankton soup brought in on every tide. This has required another gadget on the Swiss

The next appendages scrape the plankton off the combs and put it in the half crab's mouth. It sounds complicated, but it works.

Most appealing of all are the decorator or camouflage crabs, which plant seaweeds and sponges on their backs and hide by not hiding. When they shed their outer skeletons (as they grow), most plant a new garden on the new carapace. One thrifty species, however, actually

crustacean design has its limitations. An exoskeleton protects you but you have to take it off to grow. Then the naked, vulnerable crab must hide and hope that no predator finds it before its new armour has had time to harden. And the opportunistic hermit crab must not only shed its skeleton from time to time, it also has to find a bigger, vacant shell house as it grows bigger.



TIM GALLOWAY

ANN GRAEME
is the national co-ordinator of Forest and Bird's Kiwi Conservation Club.

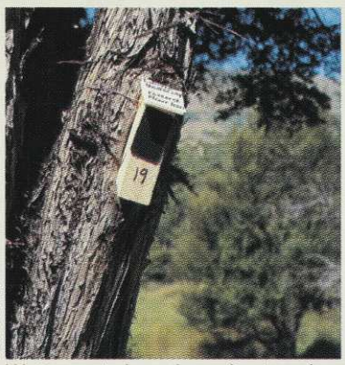
Restoring the Forgotten Fauna of Quail Island/Otamahua

Quail Island in Lyttelton Harbour will again be home to some of Banks Peninsula's unique animals if plans to restore the island succeed. The Quail Island Restoration Trust, on which Forest and Bird is represented, aims to restore one third of the island to native vegetation in partnership with the Department of Conservation and Rapaki Runanga. They have established more than 25,000 trees to date.

Part of the restoration plan is to reintroduce birds, reptiles and invertebrates to the island. A checklist of invertebrate species on Quail Island has been produced to determine what fauna is absent, in comparison with invertebrates from similar habitats in Banks Peninsula.

Many large flightless ground beetles and tree weta became extinct on Quail Island, probably due to vegetation loss and predation by rats, mice and hedgehogs. These flightless invertebrates are unable to recolonise Quail Island and so need assistance to re-establish.

The lack of mature native trees and logs on the forest floor has led Mike Bowie, an entomologist at Lincoln University, to develop techniques to reintroduce and sample their well being. Weta motels (below) are untreated hollow wooden blocks simulating cavities found in mature trees; and wooden discs (right) simulate fallen logs found in mature native forests. These refuges are used by weta, ground beetles, spiders, snails, slugs, flatworms, and even skinks.



MIKE BOWIE

Weta motel on kanuka trunk used to create habitat for cavity-dwelling invertebrates.

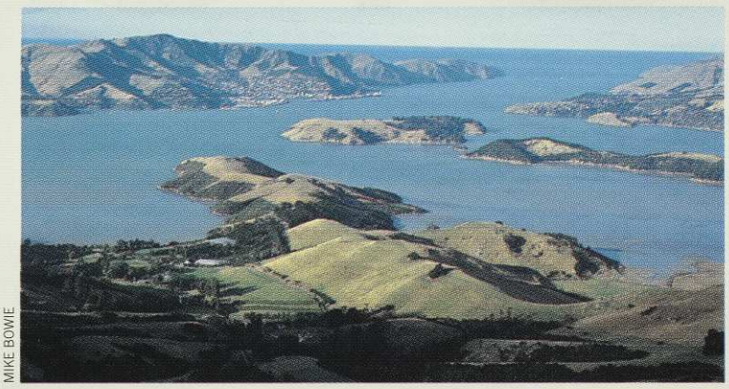
Before any species can be introduced to the island the remaining rats and mice must be eradicated. Once the island is clear of rodents, native insects can be reintroduced to the island to fulfil the aim of restoring its biodiversity.

— **MIKE BOWIE**

MIKE BOWIE

Wooden discs used to simulate log habitat for invertebrates.

View of Lyttelton Harbour with Quail Island in the middle and Lyttelton in the background.



MIKE BOWIE

Russell Sanctuary Now Includes Weka

Kiwi and weka are calling again in the valleys of the Russell Peninsula while brown teal paddle in the harbour. This Bay of Islands community is in the process of creating a sanctuary over 2500 hectares of the peninsula. A predator fence has been built across the isthmus which, combined with heavy densities of traps beside the road and beach, helps minimise the infiltration of predators from the rest of the mainland..

The predator control project is the brainchild of Laurence Gordon, (noted for his success in restoring kokako at Rangitoto Station). Over the past 18 months he has successfully exterminated the vast majority of possums, rats, stoats, feral cats and goats inside the fenced part of the peninsula.

The Russell Kiwi Landcare group was formed to take advantage of Laurence's conservation work and recently applied for the return of North Island weka to the peninsula.

Forest and Bird was delighted to be asked to supply North Island weka for release. This bird is a threatened species, and young weka are bred for release by a few dedicated Forest and Bird members.

We arranged for 17 young weka to be sent to a holding aviary on the peninsula and, in August, they scampered free. Eleven of these birds were captive-reared and six were captured from Pakatoa Island, a weka population we established from captive-reared birds six years ago.

The Russell Peninsula offers a grand opportunity for the weka to establish a thriving population and delight local people and visitors to Russell alike. These birds are joining other endangered birds on the peninsula including breeding populations of at least 100 kiwi, as well as New Zealand dotterel and brown teal.

The Landcare group isn't stopping at weka. They are now applying to bring back another bird, the North Island robin, and hope in the future to have whitehead, kakariki parakeets and other rare birds gracing the peninsula again.

— **ANN GRAEME**, *weka recovery project.*

The North Island weka: Forest and Bird's weka recovery project supplied 17 birds for the Russell Peninsula.

Forest and Bird's RMA Workshops

Forest and Bird has been running a series of full-day workshops on the Resource Management Act, with funding from the Ministry for the Environment. The workshops were launched in Wellington and held in 14 centres from Whangarei to Invercargill.

The purpose of the Resource Management Act is to promote the sustainable management of the environment. It protects the elements of the environment and diminishing natural areas that provide habitat for New Zealand's native species. The Resource Management Act sets up processes to give the community a chance to comment on activities that may have significant environmental impacts. These public processes ensure that decisions are fair, balanced and sustainable.

The RMA workshops, and the free 70-page booklet given to all participants, explained the process for environmental decision-making under the RMA and gave people the skills and confidence to participate through persuasive, focused submissions.

Kate Mitcalfe, the Society's Resource Management lawyer, led the workshops, with assistance from Emma Williams, the workshop coordinator, regional field officers and Forest and Bird members. Guest speakers included representatives from regional and district councils, the Department of Conservation and local environment centres.

The RMA workshops attracted groups of up to 55, with a diverse range of participants including Federated Farmers, New Zealand Salmon Anglers, iwi, residents and ratepayer organisations, Property Rights NZ and many more. The feedback from participants was very positive; one participant commented: 'I've attended several workshops on RMA matters and this rates the best. Council speakers brought their own local but complementary experience.'

Forest and Bird also welcomes a number of new members as a result of the RMA workshops.

— **KATE MITCALFE,** *resource management lawyer, Forest and Bird.*

Branch Groups Visit Limestone Island

Northern branch hosted the September northern regional meeting, attended by Forest and Bird members from the Bombay Hills to the Far North. Among field trips was a visit to Limestone Island in the Whangarei Harbour.

Northern branch has been involved in restoring Limestone Island since the first plantings took place almost 10 years ago. Historically, the island was an important Maori pa site and later the site of limestone mining and a fertiliser plant. The island is now managed as a 'kiwi nursery'. Kiwi chicks are taken to the island to live until they are large enough to defend themselves against stoats and then released back into mainland 'kiwi zones', such as the one at nearby Whangarei Heads. — **SARAH GIBBS,** *northern field officer, Forest and Bird.*

Right: Limestone Island's ranger, Colin Bishop, transports Forest and Bird members from the island. Forest and Bird's northern field officer, Sarah Gibbs, at left.

Left:Forest and Bird members (from left, Neil Sutherland, Sheryl Corbett, Chris Bindon, Jan Butcher and Claire Stevens) standing in the Molly Stevens memorial kowhai grove, with Whangarei Heads 'kiwi zone' in the distance. The grove was planted in memory of a former Northern branch Forest and Bird member.

Plucking Pines

Waikato Branch welcomes fit members and friends to its annual camp (22-23 February 2003) to help remove wilding pines, *Pinus contorta*, from Ruapehu. Free accommodation is available in Ohakune ski lodges, and petrol costs are met. Please book early with Philip Hart: on email at prhart@waikato.ac.nz or 129 Cambridge Road, Hamilton, or 07 856 7992.

New NZCA

Two well-known Forest and Bird members have been appointed as members of the New Zealand Conservation Authority which advises the Minister and Department of Conservation on policy.

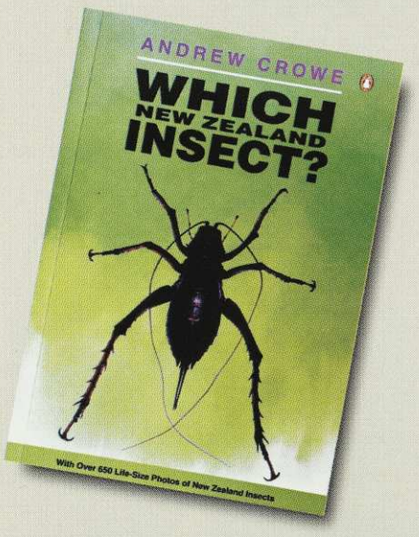
Professor Alan Mark of Dunedin, a member of the national executive and distinguished life member, has been appointed as the statutory nominee of the Royal Forest and Bird Protection Society. A botanist, he has been closely involved in the affairs of the Otago Conservation Board for the past 10 years, spending some time as chairman. He had previously been Forest and Bird's nominee on the National Parks Authority which was blended into the NZCA when it was established in 1990.

Linda Conning of Te Teko was a member of the Forest and Bird executive 1997-2001, and has been apppointed to the Authority as a nominee of the Minister of Conservation. She is an environmental consultant and horticulturalist. Formerly involved with the Far North branch of which she was chair in the mid 1990s, Linda Conning now lives in the Eastern Bay of Plenty where she has been a Forest and Bird committee member and branch councillor.

Which New Zealand Insect?

By Andrew Crowe, 128pp, limpbound, Penguin Books, Auckland 2002, RRP $39.95.

Andrew Crowe has gradually cornered the market in illustrated field guides which are easy to interpret, and full of useful information. Having done the trees, the birds, and the seashells (and insects life-sized), he's returned with a handbook which includes 650 photographs and a substantial amount of straightforward text. Both native and introduced insects are included, with details of their behaviour and distribution.

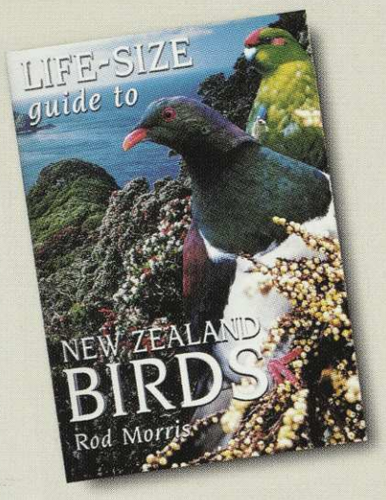


The book is intended as a field guide for adults and children. Again, it features life-sized photographs with magnifications noted on tiny creatures such as sandflies. There are three times as many species recorded here than in his previous *Life-Size Guide to Insects,* yet the format is small enough to be handy in the field. The text provides a mass of complementary information, from Maori names to biosecurity breaches, and often the kind and amount of food taken.

This should be a basic book in any collection of nature guides, for its sheer usefulness and comprehensive nature.

Life-size guide to New Zealand Birds

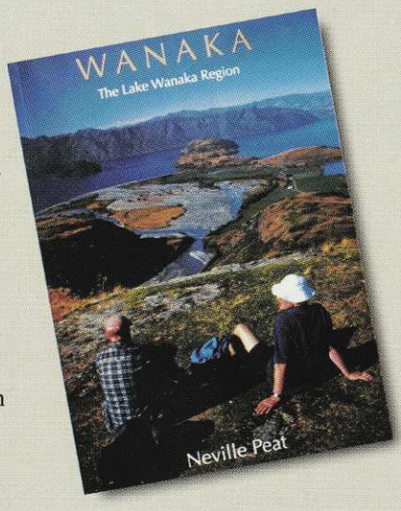
By Rod Morris, 32pp, limpbound, Random House N.Z. Ltd. Auckland 2002, RRP $19.95.



A curious one this, for many of the birds are bigger than an A4 page. Consequently many of them appear as arresting portraits only, their bodies out of frame. The book focuses on a few representative habitats into which the birds have been inserted by computer manipulation. Each colour spread has a following monochrome key which includes notes on the birds. Rod Morris is a superb photographer and the close-up details are striking.

Wanaka, The Lake Wanaka Region

By Neville Peat, 64pp, limpbound, University of Otago Press, Dunedin 2002, RRP $19.95.



Neville Peat has already written similar volumes about *Stewart Island* and *The Catlins* in this excellent series of local guides/souvenirs. In full colour, they introduce the land, its geology, nature, and human history, for the thinking traveller. This volume, too, outlines the physical setting of high-country lakes and mountains. There is a chapter on walking and another on nature. The bright presentation and the gorgeous landscapes are an invitation to visit.

Outdoors in New Zealand

By Colin Moore, 175pp, limpbound, New Holland, Auckland 2002, RRP $24.95.

Colin Moore's 'Outdoors' column in the old-style *New Zealand Herald* was one of the few acknowledgments that

newspaper gave of a life beyond the Bombay Hills. Now the newspaper has changed and Colin Moore has moved on, but here is a collection of his columns from the 1990s. It records an adventurous middle-age; walking in civilised and wild places, fishing and sailing, canoeing, and several attempts on Aoraki/Mount Cook. The pieces are as slender as a newspaper column but Colin Moore is still good company.

Sea Kayaker's Guide to New Zealand's Upper North Island

By Vincent Maire, 176pp, limpbound, New Holland, Auckland 2001, RRP$29.95.

Paddling your own canoe is an increasingly popular way of entering the natural world, and a much more sympathetic way of enjoying the outdoors than the petrol-powered options. This book covers the coast (islands, and tidal rivers and estuaries too) from about Auckland, the Hauraki Gulf and Coromandel to the Far North. There's not much detail and only indicative maps of coastlines and places to locate the text. Appropriate marine charts and maps are listed, however, along with marine radio channels. Notes on land access, camping grounds, and safety considerations are useful, for those contemplating a course about these bountiful and fascinating coasts.

Pukaha, songs from the forest

Compiled by the National Wildlife Centre Trust, Mt Bruce (Pukaha). Forest & Bird doesn't usually notice compact disks but this one comes with a conservation purpose, supporting work at Mt Bruce. Compiled largely from recordings made over many years by Les McPherson, the disk successfully recreates a dawn chorus of birdsong, followed by daytime bird calls and the sounds of night in the forest. Local Maori, Rangitaane O Wairarapa, contribute a greeting and songs. The birdsong tracks have been carefully engineered to remove the twin-recording curses of wind 'pops' and persistent insects; at times more than 32 tracks are melded into one. The disk comes with a 48-page booklet naming and illustrating the birds.

2002 *index*

By issue then page number.
Key: Bn = Bulletin
BO = Branching Out
CB = Conservation Briefs
Cm = Comment
IF = In the Field
WW = World Watch

AUTHORS

AIREY, Yvonne, Bushy Park, CB Feb 10
BAIGENT-MERCER, Dean, Hedgehogs, CB Nov 10
BARNETT, Craig, Why Birds Sing, Feb 18
BROWN, Derek, Hunting Rats in the Falklands, WW May 12
COLLINS, Meg, Kaka Beak Recovery, CB Feb 7
DENYER, Karen, Looking After Forest Patches, May 28
EARLY, Nick, The Challenge of Tourism, May 35
ELL, Gordon: Celebrating Rakiura, May 14; Native Birds in Town, May 24; Protecting the High Country, Aug 22; The Other Wild West Coast (Auckland), Feb 12; The Places in Between (Restoring the Dawn Chorus), May 22; Wilderness Areas, Paparoa, Adams, CB May 4; uncredited Conservation Briefs and Book Notes
ENDERBY, Jenny and Tony, Looking for More Marine Reserves, Feb 24; Spectacular Sea Slugs, Nov 24
GIBBS, SARAH: Coastal Sand Dunes, Nov 18; Matuku Reserve (West Auckland), Nov 36
GILL, Brian, Tales of Birds, Nov 32
GRAEME, Ann, Hidden World of the Ashburton Lakes, Aug 28; March of the Mangroves, Aug 18; Saving Our Streams, Feb 28; Strange Story of Tree Ferns, IF May 38; Conservationists of the Future (KCC) May 32; The Very Versatile Crab, IF Nov 4; Weka at Russell, BO Nov 42
GRAEME, Basil, Who Wants Wallabies? Feb 32
GRIFFITHS, James, Katipo Threatened , Nov 23
HANSFORD, Dave: Killer Fungus Attacks Frogs, CB Feb 6; New Underwater Species, CB Aug 8; Recordings Lure Seabirds to Mana, CB May 8; Rare Plants in Wairarapa, CB Aug 9
HARDING, Mike, Kaikoura Ranges Park proposal, Aug 32
JONES, Philippa, Tuatara Boom After Rat Eradication, CB May 10
KEEY, Geoff, Kaweka deer control, Nov 13; Society Support for 1080, CB Aug 4
KNUTSON, Carol, 'I Love Marine Reserves' campaign, BO May 40
LEE, Bill, Moa and Deer Diets, CB Nov 6
LEE, Michael (Mike), Pacific Rats, pests and treasures, CB Nov 11
LUSK, Pete and Garrick Martin, Proposal for Sister parks Across Gondwana, CB May 5
LUSK, Pete, Logging Ends in Westland, BO May 42
LYONS, Keith: Community Restoration in Christchurch; Illegal deer Releases, CB May 6; Stoats, CB Feb 4
MADDISON, Peter, Life in Earth, ITF, Feb 36;
MANKELOW, Sarah, Bats in South Canterbury, CB May 11
MARTIN, Garrick and Pete Lusk, Proposal for Sister parks cross Gondwana, CB May 5;
MATURIN, Sue and Eugenie Sage, Tenure Review, Aug 25; park proposals, Nov 4
McSWEENEY, Dr Gerry: Comment, Helicopter Heroes, Nov 2; High Endeavours, Cm Aug 2; Saving Our Seas, Restoring Our Forests, Cm Feb 2; Wild lands Under Pressure, Com May 2
NOVIS, Phil, Ancient Algae, IF Aug 38
OMBLER, Kathy: National Waste Strategy/Zero Waste, Aug 6; Triple-bottom-line reporting, CB Aug 7; Tongariro Forest & 1080, CB Nov 12
PATTERSON, Geoff, New Zealand's Unnamed Lizards, May 16
PEAT, Neville, Yellow-eyed Penguin, Feb 20
RICHARDSON Margaret, Mangeao dying, CB Nov 7
ROBINSON, Sian: Argentine Ants, CB Feb 8; Dangerous Insect and Spider Invasions, CB Feb 9; Restoration in Wellington, Upper Hutt, Eastbourne, Aug 36
SAGE, Eugenie and Sue Maturin, Tenure Review, Aug 25; park proposals, Nov 4
SALMON, Bruce, Plants That Kill to Survive, Aug 14
STEPHENSON, Gordon, Farm environment awards, CB Nov 8;
WEEBER, Barry: Marine Reserves banners, CB Aug 40; Ocean Life Crisis, Nov 28
WELLS, Gudrun, Trees Among the Tussocks, Aug 24;
WHITAKER, TONY, Sea Snakes and Turtles, Nov 14
WHITE, Peter, Forest Remnants Significant in Waikato region, May 48; Society Reserves in South Auckland, Aug 48; Tai Haruru Lodge, Aug 48; Waiheke Island, Feb 43

SUBJECTS

Adams wilderness area, CB May 4; Addington bush, May 23; Algae, IF Aug 38; Archey's frog, CB Feb 6; Argentine ants, CB Feb 8; Ashburton Lakes, Aug 28; Auckland Museum, CB Aug 10, Collections, Nov 32; Auckland West Coast, Feb 12
Bats in South Canterbury, CB May 11, Bexley wetland, May 22; Biosecurity, insects, spiders, CB Feb 9; Birds, Museum specimens, Nov 32; Bushy Park robins, CB May 42, Bushy Park education, CB Feb 10; Birdsong, Feb 18
Carnivorous plants, Aug 14; Celebrating Rakiura, May 14; Challenge of Tourism, May 35; Conservation Trust, CB Aug 12; Chytrid fungus, CB Feb 6; Commercial fishing, 'Ocean Life Crisis', Nov 28; Conservation Authority members, Bn Nov 43; Conservation parks, CB Nov 4; Crabs, IF Nov 41
Deer control: Illegal releases, CB May 6, Kaweka, Nov 13, Tongariro/1080, CB Nov 12. Diets and Moa, CB Nov 6; Distinguished life member, Aug 42;
Environment awards, (farm) CB Nov 8
Falklands, rat eradication, WW May 12; Farm environment awards, CB Nov 8; Fish, Freshwater, Feb 29; Fishing, 'Ocean Life Crisis', Nov 28; Forest Remnants in Waikato Region, May 48; Frogs, CB Feb 6;
Genetic engineering, BO Feb 40, ITF Feb 36; Gondwana parks, CB May 5
Hedgehogs, CB Nov 10; Hutchins, Les DCNZM, CB Aug 5
I Love Marine Reserves campaign, BO May 40; Illegal deer releases, CB May 6; Islands: Limestone BO Nov 43, Mana CB May 8, Quail BO Nov 42, Somes/Matiu, BO May 42
Kaikoura Ranges Park proposal, Aug 32; Kaka beak, CB Feb 7; Katipo threatened Nov 23; Kaweka deer control, Nov 13; Kiore (Pacific Rats), CB Nov 11;
Land Tenure Review, Aug 25; Lee, Hon Sandra, Aug 42; Lizards, New Zealand's unnamed species, May 16; Logging Ends in Westland, BO May 42
Mana, CB May 8; Mangaeo dying, Nov 7; Mangroves, Aug 18; Marine reserves: banners, CB Aug 40; campaign, BO May 40; looking for more, Feb 24; policy, Cm Feb 2002; 'I Love' campaign BO May 40; Matuku Reserve (West Auckland), Nov 36; Moa and Deer Diets, CB Nov 6; Mt Bruce restoration, CB Aug 11
National Executive declared 2002-03, Aug 42; changes, Bn Feb 42; National Parks, Rakiura, May 14; National Waste Strategy/Zero Waste, Aug 6; Native Birds in Town, May 24; New Underwater Species, CB Aug 8; Nudibranchs, Nov 24; NZCA members, BO Nov 43
Ocean Life Crisis, Nov 28; Ornithological Society alliance, Bn May 46; signed Bn Aug 42.
Pacific Rats, pests and treasures, CB Nov 11; Paparoa wilderness area, CB May 4; Penguin, yellow-eyed, Feb 20; Pests: stoats CB Feb 4; wallabies, Feb 32; (see also deer); Pet-free subdivisions, CB Feb 5; Places in Between (Restoring the Dawn Chorus) May 22; Plants That Kill to Survive, Aug 14; Proposed conservation parks, (South Island high country) CB Nov 4; Protecting the High Country, Aug 22
Quail Island, BO Nov 42; Queen's Honours, CB Aug 5; CB May 11
Rainwater, Feb 48; Rakiura National Park, May 14; Rare Plants in Wairarapa, CB Aug 9; Rats, CB Nov 11; Rat Eradication and Tuatara, CB May 10; in the Falklands, WW May 12; Recordings Lure Seabirds to Mana, CB May 8;
Reserves: Bushy Park, CB Feb 10; Firth, May 48; Matuku (West Auckland), Nov 36; Morgan, May 48; Ngaheretuku, Aug 48; Olive Davis, Aug 48; Somes/Matiu, BO May 42; Te Rere, CB May 41; Walter Scott, May 48;
Restoration: Mt Bruce, CB Aug 11; Christchurch, Bexley wetland, Addington bush, May 23; Wellington, Upper Hutt, Eastbourne, Aug 36; of Forest Patches, May 28; Wakefield Bush, CB May 41; Restoring the Dawn Chorus, May 22; RMA workshops, BO Nov 42; Robin, Bushy Park CB May 42;
Saving Streams, Feb 28; Sea Slugs (Nudibranchs) Nov 24; Sea Snakes and Turtles, Nov 14; Soil life forms, ITF Feb 36; Somes/Matiu replanting, CB May 42; Support for 1080, CB Aug 4
Tai Haruru Lodge, Aug 48; Tales of Birds (Museum collectors), Nov 32; Tenure Review, Aug 25; The Other Wild West Coast, Feb 12; Tongariro Forest & 1080, CB Nov 12; Tourism, challenges, May 35; Tree Ferns, IF MAY 39; Trees Among the Tussocks, Aug 24; Triple-bottom-line reporting, CB Aug 7; Tuatara Boom, CB May 10; Tui Time website, CB Aug 10; Turtles, Nov 14;
Underwater, new species, CB Aug 8; Unnamed Lizards, May 16; Unsustainable fishing, Nov 28
Waiheke Island, Feb 43; Waste Strategy, Aug BCB 6; Who Wants Wallabies? Feb 32; Wanganui Council meeting, BO 39 Watson, J.S., grants, Feb 42, Bn May 46; Weka at Russell, BO Nov 42;
Westland Logging Ends, BO May 42; Why Birds Sing, Feb 18; Wilderness areas, CB May 4; Wilding pines, Bn Nov 43;
Yellow-eyed Penguin, Feb 20
Zero Waste, CB Aug 6

join *Forest and Bird*

working together we CAN make a difference

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.

Kiwi Conservation Club

a special club for children

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.

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

Membership and/or donation form

Name (Mr/Mrs/Ms) ______

Address ______

______ Telephone ______

Email ______

This is a ☐ new membership
☐ 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 *(prices include GST and are annual except Life)*

☐ single	☐ family	☐ non-profit group	$52
☐ senior citizen	☐ senior family		$39
☐ student/schools $35	☐ libraries		$52
☐ business $120	☐ life *(single only)*		$780
☐ overseas NZ$95	☐ corporate		$395 ☐ donor member $250

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

☐ single	$12	☐ family (no. of children ______)	$20
☐ mini set (4 magazines)	$22	☐ class set (30 magazines)	$55
☐ overseas	NZ$22		

DONATION *(Donations over $5 are tax deductible)* $______

☐ Enclosed cheque to Forest and Bird

or charge my ☐ Visa ☐ Mastercard ☐ Amex ☐ Diners

Expiry date ______ Cardholders signature ______

Mail FREEPOST No. 669, Forest and Bird, PO Box 631, Wellington.
Phone (04) 385-7374 or freephone 0800 200 064 with credit card details.
Fax (04) 385-7373 with credit card details. **Internet** www.forestandbird.org.nz

2002

Membership and/or donation form

Name (Mr/Mrs/Ms) ______

Address ______

______ Telephone ______

Email ______

This is a ☐ new membership
☐ 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 *(prices include GST and are annual except Life)*

☐ single	☐ family	☐ non-profit group	$52
☐ senior citizen	☐ senior family		$39
☐ student/schools $35	☐ libraries		$52
☐ business $120	☐ life *(single only)*		$780
☐ overseas NZ$95	☐ corporate		$395 ☐ donor member $250

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

☐ single	$12	☐ family (no. of children ______)	$20
☐ mini set (4 magazines)	$22	☐ class set (30 magazines)	$55
☐ overseas	NZ$22		

DONATION *(Donations over $5 are tax deductible)* $______

☐ Enclosed cheque to Forest and Bird

or charge my ☐ Visa ☐ Mastercard ☐ Amex ☐ Diners

Expiry date ______ Cardholders signature ______

Mail FREEPOST No. 669, Forest and Bird, PO Box 631, Wellington.
Phone (04) 385-7374 or freephone 0800 200 064 with credit card details.
Fax (04) 385-7373 with credit card details. **Internet** www.forestandbird.org.nz

2002

Membership and/or donation form

Name (Mr/Mrs/Ms) ______

Address ______

______ Telephone ______

Email ______

This is a ☐ new membership
☐ 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 *(prices include GST and are annual except Life)*

☐ single	☐ family	☐ non-profit group	$52
☐ senior citizen	☐ senior family		$39
☐ student/schools $35	☐ libraries		$52
☐ business $120	☐ life *(single only)*		$780
☐ overseas NZ$95	☐ corporate		$395 ☐ donor member $250

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

☐ single	$12	☐ family (no. of children ______)	$20
☐ mini set (4 magazines)	$22	☐ class set (30 magazines)	$55
☐ overseas	NZ$22		

DONATION *(Donations over $5 are tax deductible)* $______

☐ Enclosed cheque to Forest and Bird

or charge my ☐ Visa ☐ Mastercard ☐ Amex ☐ Diners

Expiry date ______ Cardholders signature ______

Mail FREEPOST No. 669, Forest and Bird, PO Box 631, Wellington.
Phone (04) 385-7374 or freephone 0800 200 064 with credit card details.
Fax (04) 385-7373 with credit card details. **Internet** www.forestandbird.org.nz

2002

Membership and/or donation form

Name (Mr/Mrs/Ms) ______

Address ______

______ Telephone ______

Email ______

This is a ☐ new membership
☐ 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 *(prices include GST and are annual except Life)*

☐ single	☐ family	☐ non-profit group	$52
☐ senior citizen	☐ senior family		$39
☐ student/schools $35	☐ libraries		$52
☐ business $120	☐ life *(single only)*		$780
☐ overseas NZ$95	☐ corporate		$395 ☐ donor member $250

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

☐ single	$12	☐ family (no. of children ______)	$20
☐ mini set (4 magazines)	$22	☐ class set (30 magazines)	$55
☐ overseas	NZ$22		

DONATION *(Donations over $5 are tax deductible)* $______

☐ Enclosed cheque to Forest and Bird

or charge my ☐ Visa ☐ Mastercard ☐ Amex ☐ Diners

Expiry date ______ Cardholders signature ______

Mail FREEPOST No. 669, Forest and Bird, PO Box 631, Wellington.
Phone (04) 385-7374 or freephone 0800 200 064 with credit card details.
Fax (04) 385-7373 with credit card details. **Internet** www.forestandbird.org.nz

2002

We invite new and existing members to pay membership and donations by direct debit

Every year we process in excess of 25,000 cheques. As you can imagine, this is a time consuming and labour intensive process. You can greatly assist the work that we do by making your membership payments and donations by Direct Debit.

Pay your membership/donations by direct debit

If you are an exisiting member this authority will operate from the next date your membership becomes due for renewal

Name (Mr/Mrs/Ms) _____

Address _____

_____

Phone (work) _____ (home) _____

Email _____

We may need to contact you if problems are encountered setting this up.

This is a ☐ new membership
☐ 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.

Gift from (Mr/Mrs/Ms) _____

Address _____

_____

Forest and Bird membership category *(prices include GST and are annual except Life)*

☐ single ☐ family ☐ non-profit group			$52
☐ senior citizen ☐ senior family			$39
☐ student/schools	$35	☐ libraries	$52
☐ business	$120	☐ life (*single only*)	$780
☐ overseas	NZ$95	☐ corporate	$395
☐ donor member	$250		

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

☐ single	$12	☐ family (no. of children _____)	$20
☐ mini set (4 magazines)	$22	☐ class set (30 magazines)	$55
☐ overseas	NZ$22		

Please debit my bank account on a continuous basis as selected below:

☐ 28th each month (may only be used where donation is included with subscription)
☐ 5 instalments, on the last day of January, February, March, April and May in any year.
☐ 6 monthly on 28 January and 28 July
☐ annually on 15 January

If you join part way through the year, a partial payment by direct debit maybe required.
Should the membership fee be increased Forest and Bird are authorised to automatically increase this amount.

For the relevant portion of the following:

$	Current annual subscription
$	Gift subscription for: member number _____ member name _____
$	Donation as outlined below (list annual amount here)
$	Total annual amount

I wish to make a regular donation to Forest and Bird of $ _____ per annum.

☐ To be deducted from my bank account together with my subscription as outlined above **or:**
☐ To be deducted on the day closest to the 15 January every year.

Please make my annual donation: $ _____

Complete the bank authority form overleaf and post together with your completed direct debit form to: Forest and Bird, Freepost no. 669, P O Box 631, Wellington

BANK AUTHORITY FORM

Direct Debit

BANK INSTRUCTIONS

NAME:
(of Bank Account)

AUTHORITY TO ACCEPT DIRECT DEBITS
(Not to operate as an assignment or agreement)

AUTHORISATION CODE
0 6 1 0 3 5 3

Bank account from which payments to be made:

BANK	BRANCH	ACCOUNT NUMBER	SUFFIX

(Please attach an encoded deposit slip to ensure your number is loaded correctly)

To: The Bank Manager

BANK:

BRANCH:

TOWN/CITY

I/We authorise you until further notice, to debit my/our account with all amounts which ROYAL FOREST AND BIRD PROTECTION SOCIETY OF NEW ZEALAND INC. (hereinafter referred to as the Initiator) the registered Initiator of the above Authorisation Code, may initiate by Direct Debit.
I/We acknowledge and accept that the bank accepts this authority only upon the conditions listed below.

Information to appear on my/our bank statement:

PAYER PARTICULARS:	PAYER CODE:	PAYER REFERENCE:
F O R E S T & B I R D	S U B S C R I P T I O N	T H A N K Y O U

YOUR SIGNATURE(S) DATE / /

Approved	For Bank Use only			BANK STAMP
1035	Original - Retain at Branch			
02 1999	Date Received:	Recorded by:	Checked by:	

CONDITIONS OF THIS AUTHORITY

The Initiator

(a) Has agreed to give written advance notice of the net amount of each direct debit and the due date of debiting at least four business days before the date when the direct debit will be initiated. The advance notice will include the following message:-
The amount of $..... will be direct debited to your bank account on (initiating date).

(b) May, upon the relationship which gave rise to this Authority being terminated, give notice to the Bank that no further Direct Debits are to be initiated under the Authority. Upon receipt of such notice the Bank may terminate this Authority as to future payments by notice in writing to me/us.

The Customer may:-

(a) At any time, terminate this Authority as to future payments by giving written notice of termination to the Bank and to the Initiator.

(b) Stop payment of any direct debit to be initiated under this authority by the Initiator by giving written notice to the Bank prior to the direct debit being paid by the Bank.

The Customer acknowledges that:-

(a) This authority will remain in full force and effect in respect of all direct debits made from my/our account in good faith notwithstanding my/our death, bankruptcy or other revocation of this authority until actual notice of such event is received by the Bank.

(b) In any event this authority is subject to any arrangement now or hereafter existing between me/us and the Bank in relation to my/our account.

(c) Any dispute as to the correctness or validity of an amount debited to my/our account shall not be the concern of the Bank except in so far as the direct debit has not been paid in accordance with this authority. Any other disputes lie between me/us and the Initiator.

(d) Where the bank has used reasonable care and skill in acting in accordance with this authority, the Bank accepts no responsibility or liability in respect of:-
- the accuracy of information about Direct Debits on bank statements.
- Any variations between notices given by the Initiator and the amounts of Direct Debits

(e) The Bank is not responsible for, or under any liability in respect of the Initiator's failure to give written notice correctly nor for the non-receipt or late receipt of notice by me/us for any reason whatsoever. In any such situation the dispute lies between me/us and the Initiator.

The Bank may:-

(a) In its absolute discretion conclusively determine the order of priority of payment by it of any monies pursuant to this or any other authority, cheque or draft properly executed by me/us and given to or drawn on the Bank.

(b) At any time terminate this authority as to future payments by notice in writing to me/us.

(c) Charge its current fees for this service in force from time-to-time.

lodge *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, contact: John Dawn, Doves Bay Road, RD1, Kerikeri, Tel: (09) 407-8658, fax: (09) 407-1401.

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 Myriam Schreuder, PO Box 91, Piha, Waitakere City. Tel: (09) 812-8541.

Waiheke Island Cottage
Located next to our 49ha Wildlife Reserve,10 minutes walk to Onetangi Beach, general stores etc. Sleeps up to 8 in two bedrooms. Lounge, well-equipped kitchen, separate toilet, bathroom, shower, laundry. Pillows, blankets provided. No pets. Ferries 35 minutes from Auckland. Enquiries with stamped addressed envelope to: Robin Griffiths, 45 Kennedy Rd, Surfdale, Waiheke Island, Tel: (09) 372-2849.

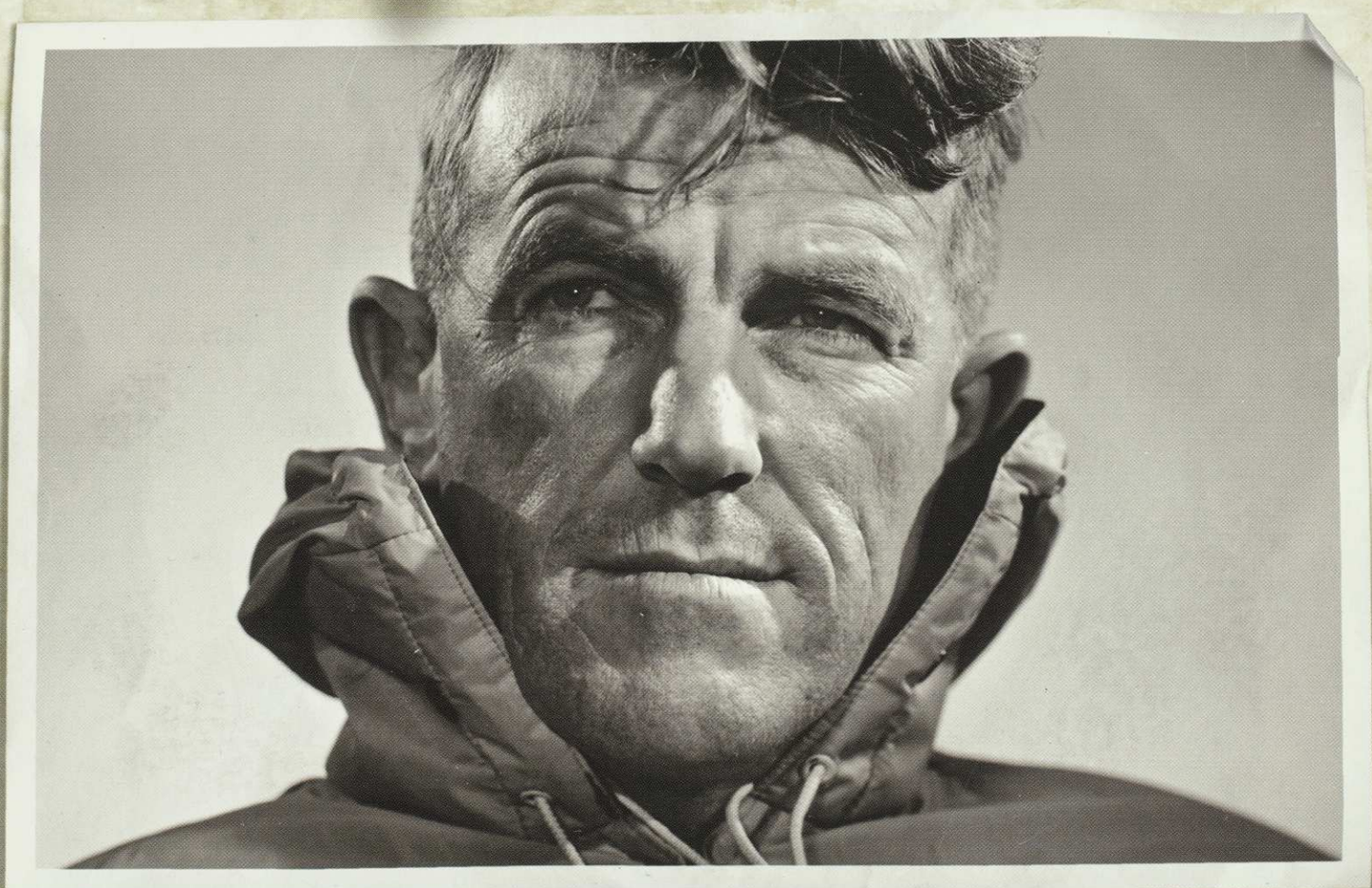
Ruapehu Lodge, Tongariro National Park
Situated 600 metres from Whakapapa Village, at the foot of Mount Ruapehu, this lodge is available for members and their friends. It may also be hired out to other compatible groups by special arrangement. It is an ideal base for tramping, skiing, botanising or visiting 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, 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.
Tel: (03) 415-8024, fax (03) 415-8244.
Email: dianan@clear.net.nz

CRUSHING COLD.
OXYGEN STARVATION.
CONSTANT DANGER.
BEE-KEEPING PREPARES YOU
FOR ANYTHING.



FOLLOW THE TRIUMPHS AND ACHIEVEMENTS OF THE GREATEST LIVING NEW ZEALANDER, IN A NEW EXHIBITION THAT CHARTS HIS EXTRAORDINARY LIFE. "SIR EDMUND HILLARY: EVEREST AND BEYOND" OCTOBER 25, 2002 - FEBRUARY 28, 2003.

AUCKLAND MUSEUM Te Papa Whakahiku CELEBRATING 150 YEARS OF COLLECTING

SIR EDMUND HILLARY EVEREST AND BEYOND | NATIONAL GEOGRAPHIC | SKY TELEVISION | NATIONAL GEOGRAPHIC CHANNEL | MUSEUM CIRCLE | AUCKLAND CITY

Auckland Museum, Auckland Domain, Parnell. Open daily from 10am until 5pm except Christmas Day. Admission charges apply. Infoline: 09 306 7067. www.akmuseum.org.nz

MEARES TAINE AKM 0191