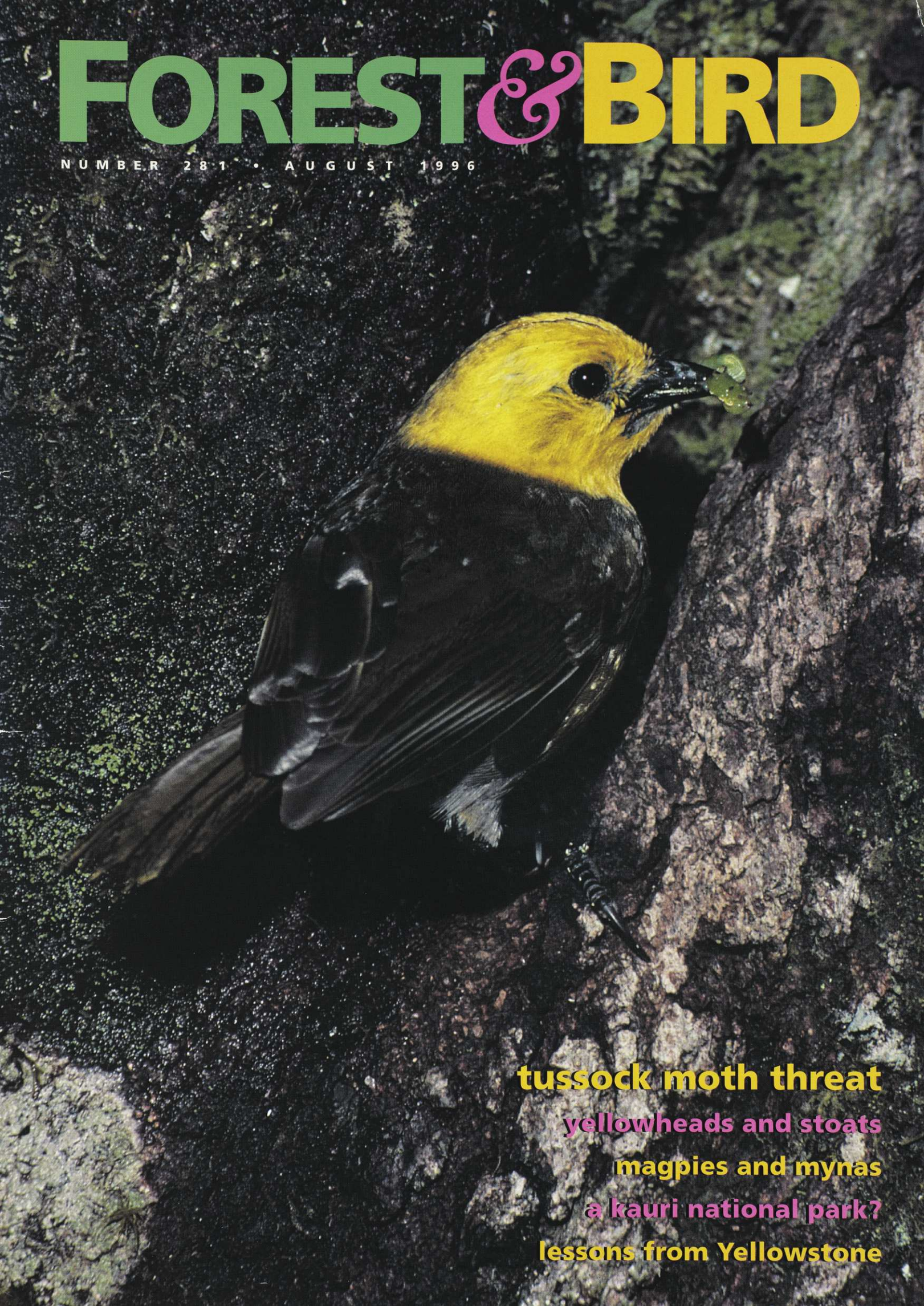
FOREST & BIRD

NUMBER 281 • AUGUST 1996



tussock moth threat

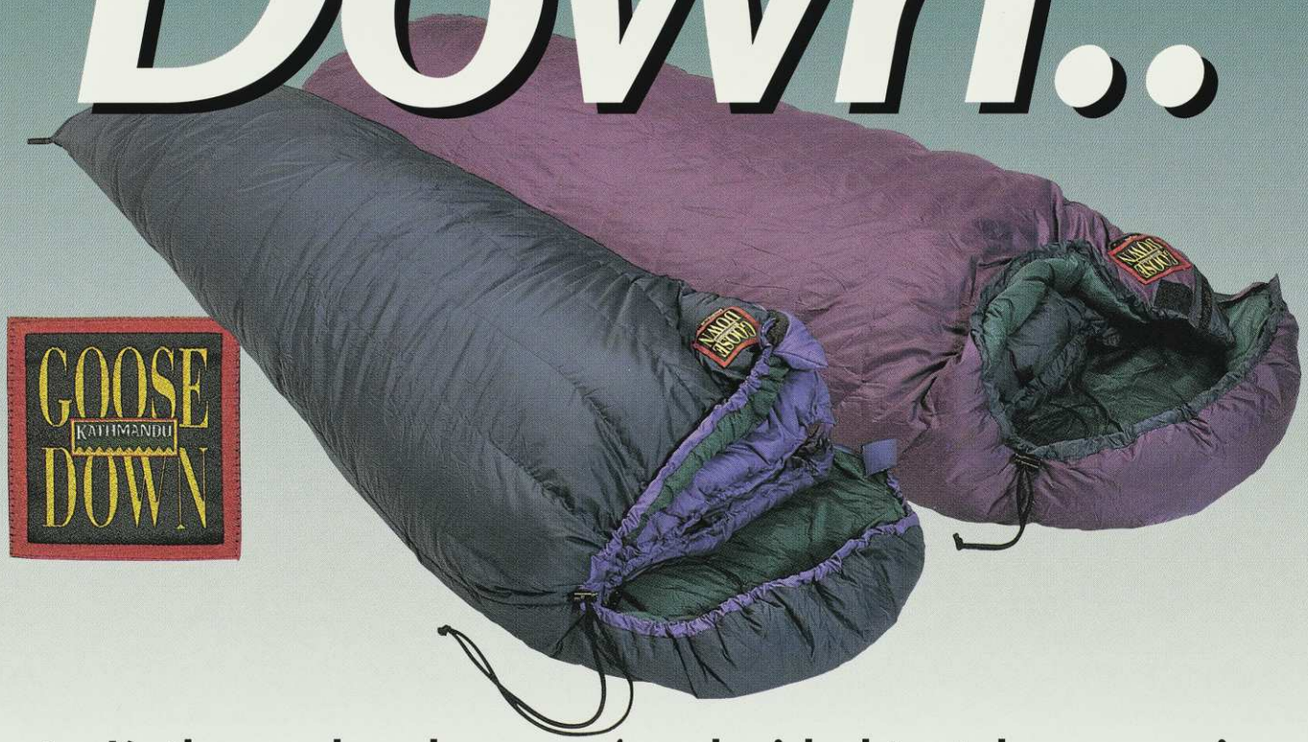
yellowheads and stoats

magpies and mynas

a kauri national park?

lessons from Yellowstone

Get Down..



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FOREST & BIRD

NUMBER 281 • AUGUST 1996

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 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 (IUCN) and BirdLife International (ICBP).

Editor: Ian Close
Design and Production: Wellington Media Collective
Photoprocess: Plateways, Wellington
Printing: Format Publishers, Wellington
Advertising Manager: Jill Wood, Print Advertising, PO Box 27-194, Upper Willis Street, Wellington. Ph: (04) 801-6187

Registered at PO Headquarters Wellington as a magazine.

ISSN 0015-7384

Forest and Bird is a member of the Magazine Publishers Association of New Zealand and the Audit Bureau of Circulations.

Royal Forest and Bird Protection Society of New Zealand

General Manager: Caroline Brooks
Conservation Director: Kevin Smith
Publications Manager: Ian Close
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

Field Officers

Jacqui Barrington, PO Box 106085, Downtown, **Auckland.**
Tel: (09) 303-3079. Fax: (09) 303-3514.
Basil Graeme, 53 Princess Rd, **Tauranga.**
Tel: (07) 576-5593. Fax: (07) 576-5109
Eugenie Sage, PO Box 2516, **Christchurch.**
Tel: (03) 366-6317. Fax: (03) 366-0655.
Sue Maturin, PO Box 6230, **Dunedin.**
Tel: (03) 477-9677. Fax: (03) 477-5232.

Shops

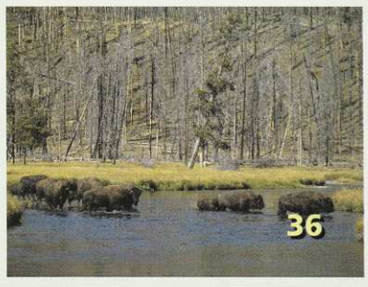
103 Victoria St, Wellington, Tel: 499-2737
Level 2, Emcom House, 75 Queen St, Auckland.

For details of the society's branches see *Branch Directory* on page 53.

FOREST & BIRD

FEATURES

REGULARS



Cover:
Once abundant and conspicuous throughout the South Island, mohua or yellowheads have disappeared from three-quarters of their range. At long last more effective methods of controlling their main predators – stoats – are being developed (see article page 20).

DON HADDEN

The strange case of Colin Boyd

IN RECENT YEARS New Zealanders have started to wake up to the enormity of the ecological damage we have inflicted on this country.

This has led to a shift of values, a recognition of the need to protect what is left of our indigenous animals and habitats. The shift has articulated itself in a number of ways. A Department of Conservation was formed in 1987 with a statutory duty to "advocate the conservation of natural and historic resources". Planning laws that previously favoured development, changed towards sustainable management when the Resource Management Act was passed in 1991. Public relations, the marketing of individual products and even our sense of national identity began to focus on a clean green mantle. "Clean and green" is now on every political agenda and the publicity material of most New Zealand export companies.

Then, like a feudal Black Knight of old, comes Colin Boyd, a Taranaki farmer who took a case against what he termed the "green collar criminals" who wanted to stop him from clearing 150 hectares of forest bordering Egmont National Park.

Boyd bought his property in 1994 with the intention of developing it as a dairy farm. However, there appeared to be an insuperable obstacle to this end: the native vegetation on his block was protected under the New Plymouth District Council's transitional district plan.

The block had been identified as a recommended area for protection in 1986 for its important conservation values. Surveys by DoC scientists since then had only enhanced its importance for nature conservation. The forest contained nationally threatened plants and native fish, and significant areas of maire swamp that elsewhere throughout Taranaki had been extensively drained for farmland. All in all DoC considered it "a rare type of forest ecosystem . . . and one of New Zealand's more important remaining forest areas".

Mr Boyd defiantly began to clear his property – "as long as I have the key to the farm gate," he said, "it will be developed into a dairy farm" – and took his case to the Planning Tribunal. Last April, Judge Treadwell (of fast ferries fame) held that the district council had set in place a protection mechanism that was technically illegal under the now-defunct Town and Country Planning Act. Boyd was free to continue to clear the forest on his property and has said he is determined to do so.

Boyd is no mere struggling dairy farmer set upon by bureaucrats wanting to stop him earning a livelihood. He has made a lot of money over the years building up a successful machinery contracting business. But he appears to belong to an anachronistic breed of people who still call themselves pioneers and who, in the name of progress concentrate on destroying nature itself.

> "If all the major forest companies in New Zealand can voluntarily agree, as they have done, to stop clearing forests for plantations, surely the dairy industry can act in a similarly responsible manner."

His actions typify the now discredited concept that property rights are absolute, with the law not admitting the smallest infringement of them, even when the good of the community as a whole is at stake. He openly calls the forest on his property "shit". He concludes that the forest's destruction and its conversion to grass will be "a monument to what I have done".

I'm sure he's right. It will be a monument, but not the type he thinks.

A monument should have wide public acceptance as representing something of cultural significance or enduring social, artistic or academic value. How does the Boyd dairy farm development stack up?

Is the development significant? No. There are already thousands of dairy farms in Taranaki producing hundreds of millions of litres of milk. Production volumes have largely reached their limits with the land capable of dairy farming beginning to come under stress from the number of animals on the land.

Does the Boyd development enhance New Zealand's reputation in any way? No. The giant Kiwi Dairy Company exports virtually all its production and like other dairy companies relies heavily on "green marketing". Surely it wouldn't want the world market to think it is an industry expanding on the back of the destruction of New Zealand's biodiversity.

Today with over 500 threatened species of plants and animals in this country, Boyd's destructive actions are particularly reprehensible. Most development of this type occurred long before people were fully aware of the ecological consequences and at a time when a fledgling dairy industry was just beginning.

The Boyd case highlights the inadequacies of the transitional arrangements of the Resource Management Act and the need for legally enforceable rules to control undesirable activities. It is five years since that Act came into force, but much of the country's planning regime is still governed by out-of-date schemes and philosophies developed under repealed and discredited legislation. Indigenous biodiversity is being lost as a result.

Land owners, but particularly companies that benefit from the land's production, need to promote the concept of duality of ownership so admirably described by Joseph Sax:

"Property owners must bear affirmative obligations to use their property in the service of a habitable planet. They are all crew members on a common spaceship that is called planet earth. This is the affirmative duty of proprietorship".

The concept is not new. Over a century ago Victor Hugo said, "There are two elements in an edifice, its usefulness and its beauty. Its usefulness belongs to the proprietor, its beauty to the world. Thus for an owner to destroy it is to exceed his rights of ownership".

The concept is well established in other industries such as forestry. If all the major forest companies in New Zealand can voluntarily agree, as they have done, to stop clearing forests for plantations, surely the dairy industry can act in a similarly responsible manner. As it is, the Boyd saga is giving dairying, and farming generally, a bad name.

Keith Chapple

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

mailbag

Strong reading

Firstly your magnificent magazine goes from strength to strength and is always compulsive reading. I read it from cover to cover the day it arrives. The articles are first class and are controversial enough to make all members sit up and take notice.

I am concerned to see yet another "foreign bird" in our midst – the Nankeen heron whose presence only makes it harder for our native birds to find food.

The thought of this heron plundering the nests of other native birds is a very strong reason for ridding the country of it before it becomes too numerous to deal with.

Shirley Bathgate-Hunt
Havelock North

Whirinaki logging

Ian Close (May) isn't the only one who has revisited Whirinaki recently. Ian McDonald, the wonderful photographer, whose pictures grace the pages of *To Save A Forest: Whirinaki* has also revisited the places where he had previously taken photos.

What he found was devastation. This supposedly protected forest has had 360 cubic metres of what DoC calls "dead" trees removed between 1989 and 1995.

This take has been for the making of waka for the 1990 celebrations and for new wharenui. Apparently requests for trees came in from all over the country, but aren't there "dead" totara elsewhere that could be used instead of further decimating the Mangawiri Basin and the Taho Flats of Whirinaki?

It would be good for the kaka too, if those dead totara were left so that the forest can move through its natural ecological cycle.

Those of us who were directly involved in the campaign for the protection of Whirinaki are very disappointed to find that what we thought was protected is still open to extraction.

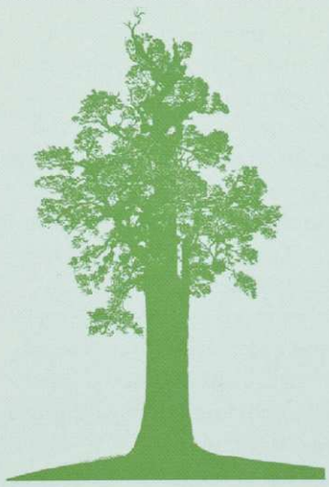
C.F. Stevens
Glenfield, Auckland

In relation to your article on Whirinaki, I visited Block 10 about two years ago. Block 10 used to contain a basin full of the podocarps that fully deserved the accolades given by David Bellamy and others. That basin has been ruined and rather than recovering is still being degraded by people today.

The main road established by the forest service is still open. Old logging roads and tracks off the main road are being used by vehicles. I saw evidence that windfall trees are sawn into sections and taken out, perhaps for firewood.

The total Whirinaki forest was absolutely worth saving but the jewels were the two basins where the underlying geological structures allowed ash to accumulate to a great depth. These basins were where the most dense and best podocarps supported their abundant wildlife. They were the prize, but conservationists did not manage to save them intact. One was the Mangawiri Basin logged and planted with pine. The other was the basin in Block 10, selectively logged.

Second prize is to wait for the basin in Block 10 to recover. In time, it will. But treated the way it is at present, it will never recover.



Conservationists should insist that the roads into this area are blocked so that fallen trees cannot be removed, so that regenerating podocarps are not driven over by vehicles, so that this area with its unique geological structure is allowed to crawl its way back to its former glory.

We missed first prize. Second prize is slipping away.

Russell Bell
Eastbourne

John Sutton, manager of DoC's Murupara Field Centre replies:
DoC is obliged under the Conservation Act to provide for the taking of plants for traditional Maori purposes and has allowed the removal, at a very low level, of windfallen or dead-standing totara from Whirinaki and other North Island conservation areas since 1987. Currently, with the agreement of the local iwi, the removal of totara from Whirinaki has been suspended pending an independent review taking into account ecological, cultural and legal perspectives.

Old logging roads into Block 10 are deliberately not being maintained and are becoming increasingly unpassable for motor vehicles with the passage of time.

Pushing water uphill

An Auckland visitor to our home here in the forests of British Columbia has presented me with a copy of your May issue of *Forest & Bird*, as a house gift.

I am reading it with interest and with admiration for both its professionalism and quality. I am puzzled, however, by an assertion on your *Worldwatch* section, which seems to suggest that in the northern hemisphere water flows uphill. I refer to the account concerning US Interior Secretary Babbitt "opening the gates on the 220-metre-tall Hoover dam on the Colorado River, sending water streaming into the Grand Canyon . . ."

The Hoover Dam holds back the waters of Lake Mead, which is, in turn, the terminus of the Grand Canyon of the Colorado. Water leaving Hoover Dam would not flow up into the Grand Canyon, even under instructions from a US Interior Secretary. Perhaps Mr Babbitt was up at the Glen Canyon Dam when he opened the gates?

Barney Gilmore
Kaslo, British Columbia

Forest & Bird *does not wish to be party to breaking the law of gravity, and is happy to stand corrected. Water from the Glen Canyon dam flooded the Grand Canyon.*

Cat damage

In response to Ken Catt's article "Should Felix Take The Rap" (May), I observed cats moving into a conservation area near our family farm on the Hawke's Bay coast.

In one year I killed 40 cats. The next year or so bellbirds nested around the house and tui raised some young. The 25-hectare reserve has been possum-baited now for nearly two years. The results: huge fruit sources available and a noticeable increase in pigeon, tui and bellbird.

Robert McLean
Masterton

Forest & Bird welcomes comments on items in the journal or on environmental matters generally. Please address letters (maximum of 250 words) to the Editor, Forest and Bird, Box 631, Wellington. We reserve the right to edit letters for length and sense.

CONSERVATION briefs

ROD MORRIS

Soon to be seen no more on Kapiti Island . . . a Norway rat munches miro fruit. Miro and other trees such as hinau and matai will benefit from rodent removal on the island as rats are very partial to their seeds. As well as eating native birds, rats compete heavily with them for food items such as flowers, seeds and seedlings as well as lizards, snails and other invertebrates.

Kapiti rat blitz ▲

BY THE TIME you read this, New Zealand's largest rat eradication should have taken place. At the time of writing in mid-August, DoC staff had closed Kapiti Island to the public and were watching the weather for the best time to drop the 26 tonnes of poisoned bait needed to remove the island's last two mammalian predators – Norway rats and kiore.

Under consideration for four years, the eradication is now considered operationally feasible on the 1,960-hectare island. No other area of this size anywhere in the world has been successfully cleared of rats, and the procedure is complicated by the need to wipe out the two species at the same time.

Weka, since they eat rats, are the only birds likely to be affected by the poison in any numbers. A hundred of the estimated 2,000 weka on Kapiti have been put into four pens on the island where they will be held until the baits have decomposed. Another 140 have been removed to the mainland. It is expected the Kapiti weka population will be back to full strength within five years.

Although the eradication cannot be officially considered successful until the island has been monitored for rats for two or three years, DoC regional conservator Allan Ross expects to see a rapid increase in birdlife in the important wildlife sanctuary following the poison drop.

"Some of our rarest native birds such as saddleback, stitchbird, kaka and brown teal are currently suffering massive predation losses to the rats," said Ross. "Even those birds which can uneasily coexist with rats such as tui, bellbirds and robins, plus a colony of long-tailed bats, will also benefit from the rodent removal."

Once the rats are removed, DoC will need to increase efforts to prevent any accidental introductions. Ecologist and expert on rodent impacts, Dr Ian Atkinson, says that the removal of Norway rats might make the island more susceptible to the invasion of the dreaded ship rat – a better swimmer and more agile climber.

"The occasional ship rat that currently lands on Kapiti may have been killed by the resident Norway rats," Atkinson told the Wellington Conservation Board. Atkinson was particularly worried about the risk of ship-rat invasion from the four slipways that exist on Maori land on the northern end of the island. He also argued that a private commercial lodge proposed on Crown land between the Maori land and the nature reserve would generate a continuous flow of foodstuffs, stores and building material all of which increase the risk of rat introduction.

No decision on the lodge can be made until complicated tenure issues relating to the status of the land are sorted out by the Commissioner of Crown lands.

Gambling money goes to conservation

MORE THAN a dozen projects as diverse as weka captive breeding, the purchase of a Waiheke Island forest block, researching the conservation values of pastoral leases, and environmental education, have been the beneficiaries of funding to Forest and Bird from the Lottery Grants Board over the past year.

Since March 1995, the society and its branches have received over $235,000 from the Environment and Heritage Committee of the board.

One of the major grants was for the eradication of kahili ginger around Whangaroa. Forest and Bird's Far North branch, with the use of the lottery money, DoC assistance and additional Task Force Green funding, has managed to knock back much of the rampant spread of the invasive weed in many sensitive forest locations.

Another grant has helped fund regular transport to Somes Island for the group of Lower Hutt branch members who have been crossing Wellington Harbour once a fortnight for the past 15 years in order to restore the vegetation of the island. When the MAF boat on which they had previously depended was sold after DoC took over management of the island, the group was faced with crippling travel costs before the lottery money came to the rescue.

Lotteries also provided top-up money to enable the Auckland regional office to hire a planner on Task Force Green for 12 months. Selma Dancy filled this position to July, and her replacement for the final three months is Sandra Proctor.

Selma organised planning workshops for branch committee members interested in the resource management process, and kept them abreast of case law in the fields of natural resource management and conservation.

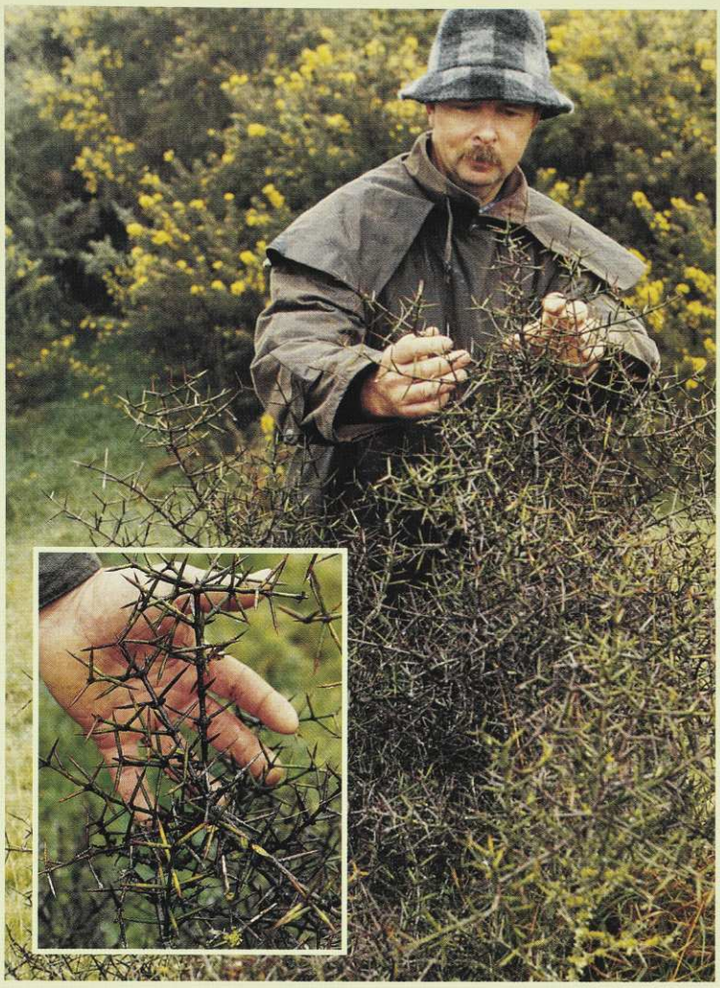
With several other young planners, Selma prepared written and oral submissions for the society on such major projects as the Auckland Regional Plan (Coastal), and the Manukau, Rodney, Waitakere and Auckland City District Plans.

Call for improved environmental reporting

ENVIRONMENTAL reporting by New Zealand companies was poor, claimed KPMG Peat Marwick, the organisers of national awards to promote environmental disclosure, whose winners were announced in August.

"By international standards

BILL KEARNS



Jim McDonald fingers one of the 12 rare matagouri plants discovered on his Bulls farm. These will be protected in a special reserve offered by Mr McDonald. More of the small-leaved shrubs will be grown from cuttings by DoC to augment the small population and to plant out in nearby dune areas.

New Zealand companies are well behind in their environmental policies and disclosure practices," said head of KPMG's Environmental Unit, Ken Tremaine. "Some companies have gone backwards."

The judges were particularly disappointed with local authority reports – a new category in this year's awards. None of the reports received were thought to be of sufficient standard to justify an award. This, despite the statutory obligation of regional, district and city councils to report on their environmental impacts and their responsibility to monitor the state of the environment of the area under their protection.

Watercare Services won the main award, for the second year running. It's report giving a detailed analysis of the organisation's environmental impacts and a comprehensive statement of environmental policies and objectives was considered by the judges to be a model for other organisations to emulate.

Rare matagouri find

A SMALL population of one of the North Island's most depleted native plants – matagouri *(Discaria toumatou)* – has been discovered on a farm near Bulls.

While relatively common in parts of the South Island, particularly in Canterbury, the distinctive tangled, thorny shrub has been almost obliterated from the North Island – reduced to a few fence lines on the Wairarapa plains, a few scattered plants near Waiouru and on some coastal dunes in the east.

DoC botanist Colin Ogle said that the rediscovery of the plant, also known as wild Irishman, was a significant link with the past, as the native shrublands of which it was an important component once flourished on the dunes of the Wanganui, Manawatu and Horowhenua districts but had almost totally disappeared with human settlement. Because of its rarity in the North Island today, few people realise that matagouri used to be widespread.

Old records showed the plant as far north as the Bay of Plenty and Manukau Harbour.

Mr Ogle said that the discovery was important in maintaining the diversity of the species' gene pool. He pointed out that the shrub also provided habitat for lizards and nesting birds which used the thorny habit of the plant as protection from predators.

False claim from Coal Corp

FOREST AND BIRD has forced the withdrawal of a series of high-profile advertisements in the national print media due to their containing false environmental claims.

The series of double-page ads by Coal Corp – now metamorphosed as Solid Energy – stated that "modern coal from Solid Energy was full of surprises. It's clean and economical . . ."

Full of surprises indeed, since no fossil fuel can be described as clean. Coal, in fact is one of the dirtier fuels since it produces per unit of energy more airborne pollutants, particularly sulphur dioxide and nitrogen oxides (important contributors to acid rain) and CO_2 (the main contributor to the Greenhouse Effect) than comparable fuels such as oil and gas.

Forest & Bird editor Ian Close wrote to the Advertising Standards Complaints Board (ASCB) in March arguing that the advertisement breached the ASCB's code for environmental claims. After notification from the chairman of the ASCB that the board had agreed to hear our complaint, Coal Corp decided to withdraw the advertisement.

The backdown by the state-owned corporation – currently engaged in a major expansion of mining activity – follows its canning of an earlier advertisement claiming that coal was "environmentally sensitive". That ad was withdrawn also, after Greenpeace lodged a complaint with the ASCB.

ANN GRAEME

Resort staff of Pakatoa Island acquainted themselves with the island's new residents as weka expert Tony Beauchamp organised the banding and weighing of the birds before their release. Here, John Ramsey, joint owner of the island, holds a weka while Dr Beauchamp looks on.

Golf balls main threat to weka

A HAURAKI GULF resort, Pakatoa Island, is now home to 29 young weka, bred by Forest and Bird members as part of the society's North Island weka project.

Finding an island to establish a new weka population took on considerable urgency last December, when nearly all the weka liberated at Karangahake by Forest and Bird were killed by ferrets. It had become clear that the society's attempt to establish a weka population at this mainland site had been beaten by the problem of introduced predators.

With only about 2,000 North Island weka remaining, and more than half of them vulnerable on the mainland, the status of the subspecies is precarious.

Pakatoa is a beautiful little island with small sandy beaches and rocky headlands, clustered chalets, a rolling golf course interspersed with patches of regenerating forest and, most importantly, no dogs, cats or ferrets.

The release day in early August was a triumph of coordination as members of the weka team from all over the North Island brought their captive-reared birds to meet the boat at Maraetai.

The weka were taken by tractor to the far end of the island, carried to the rough grass on the edge of the dam and released. Most ran like quicksilver into the cover, but a few surveyed their surroundings and strutted across the fairways. The breeders watched them go with mixed feelings of pleasure and regret.

Forest and Bird is grateful to John and Bernice Ramsey, owners of Pakatoa Island, for giving a home to this threatened species, and we trust they, their visitors and the weka will enjoy each other's company. We also thank Auckland DoC and Mike Lee of the Hauraki Islands branch for smoothing the path of the release.

Further weka releases on Pakatoa are unlikely. Since mainland release is not a useful option at present, DoC's Weka Recovery Group is expected to come up with plans for more "backstop" islands to secure more weka populations and sustain the bird should it become extinct on the mainland. These islands will then become the homes of the next generation of Forest and Bird's captive-bred weka.

Ann Graeme

Poor season for taiko

A BREEDING season that was looking like the best on record for New Zealand's most endangered bird, turned out disastrously. Chatham Island taiko, which nest only in bush on the south-west of the main Chatham Island, had produced five or six eggs in January but by March all nests had failed and no chicks were raised.

Once thought extinct, the taiko or magenta petrel, was rediscovered in 1978 when two of the burrow-nesting seabirds were caught by a team led by David Crockett. It was not until 1987, however, that a burrow – the first seen in living memory – was found by a Department of Conservation/Crockett team, and measures could be put in place to protect the birds and their young in the burrows (see *Forest & Bird* May 1994).

Although taiko numbers – thought to be between 45 and 150 – may be slightly higher than several other endangered birds, such as kakapo and fairy tern, the taiko's situation is more precarious because of the combination of naturally slow breeding, the constant threat from a suite of introduced animals, the inaccessibility of their nesting sites for protection work, and the lack of techniques available to transfer them to a predator-free site.

During the last nine breeding seasons, a maximum of three chicks have been successfully raised each year (although none of these chicks has been seen again). So when five or six active nests were found last season, hopes were high for a record production year. But by the end of February four chicks had gone missing and another possible nest was deserted. The remaining chick was killed in March.

Predators were probably the key factor in these losses. DoC

GRAEME TAYLOR

staff believe that weka and/or rats caused at least three of the failures, and it is likely that they were also responsible for some of the others. Unfortunately a lack of close monitoring of the burrows by DoC means we cannot be certain.

What is clear is that DoC needs to strengthen its efforts against the taiko's predators. Virtually no rat control had been carried out around two of the burrows that failed in early February. Despite a major trapping and poisoning programme that has cleared thousands of weka, possums and rats and hundreds of cats from the general nesting area of the taiko, sign of these pests is still regularly found close to nesting burrows.

Forest and Bird wrote to then Conservation Minister Denis Marshall in 1991 concerned that the control programme was not intensive enough and urging it be stepped up. The minister assured the society that DoC would continue to protect nesting birds and chicks from predators.

Fortunately it appears that DoC will intensify its taiko protection efforts next season. In the past, the operation has run on a shoe-string budget but the recent boost to DoC funding has allowed a full-time manager to be employed on the Chathams to specifically coordinate the taiko and the threatened parea (Chatham Island pigeon) conservation programmes. Seasonal workers will again be employed for predator control.

Also coming up next season is a major DoC/Crockett programme using radio transmitters to find further nesting sites. Hopefully some chicks will survive to fledge next year and further nesting sites will have been found where these special but precariously surviving birds can be protected.

Alan Tennyson
Museum of New Zealand

A ten-day old taiko chick photographed in January. A month later the bird was dead, probably killed by a weka – an introduced animal in the context of the Chathams. As well as weka predation, the taiko is threatened at its breeding grounds by feral cattle, sheep, three species of rat, cats, pigs and possums, which between them can trample burrows, destroy the protective bush habitat and eat adults, chicks and eggs.

BARRY DURRAN

A team of German engineers prepares to mount one of seven 20-metre blades onto the first of Wairarapa Electricity's new wind turbines. The 44-metre turbines are half as tall again as ECNZ's experimental wind turbine in Wellington. The site, on private farmland south of Martinborough, has been named Haunui (strong wind).

Renewable energy in the Wairarapa

NEW ZEALAND'S first commercial wind farm is up and running.

Wairarapa Electricity's seven-turbine farm south of Martinborough was formally commissioned in June and is now generating enough power for 1,500 homes, or six percent of the electricity supplier's needs.

The site has good wind regimes averaging 25 kilometres an hour, putting it in the top five percent of potential wind farm sites in the country.

While the commercial viability of the $9-million project is marginal over the short term, over its 20-plus years lifetime it is likely to be very competitive with other forms of generation.

Meanwhile in Palmerston North, another electricity supplier, Central Power, has obtained resource consents for a much larger-scale wind farm in the northern foothills of the Tararua Ranges. The site could hold up to 130 wind turbines generating 65 megawatts – half of Central Power's needs. The company is still examining the financial viability of the $50-million project before deciding to go ahead.

Goldman award for Ballantine

MARINE RESERVE proponent and Forest and Bird member Bill Ballantine was a recipient in April of the prestigious Goldman Environmental Prize.

Six environmental activists were presented with the awards on Earth Day by the San Francisco-based Goldman Environmental Foundation, for their grassroots work in protecting the world around them.

Bill's award was for his work over more than 20 years as a marine biologist promoting the establishment of no-take marine reserves in New Zealand and internationally. Author of the seminal *Marine Reserves in New Zealand*, Bill was also instrumental in the passage of New Zealand's Marine Reserves Act. Today, because of Ballantine's efforts, there are 13 reserves and another 25 under consideration.

The other winners of this year's awards were:

- Edwin Bustillos, for efforts to protect Mexico's Sierra Madre Occidental, a rainforest region home to many endangered species.
- Marina Silva, a close associate of Chico Mendes before his assassination in 1988, who has continued his campaign to end Amazonian deforestation.
- Mahesh Chander, winner of some 40 landmark environmental judgments from India's Supreme Court.
- Amooti Ndyakira, an environmental journalist in Uganda.
- Albena Simeonova, who has worked to raise environmental awareness in eastern Europe, particularly in her native Bulgaria.

As part of their award, each winner received a cheque for US$75,000 from Richard Goldman, president of the Goldman Foundation.

ROD MORRIS

A browsing rusa stag. Rusa are one of eight species of deer successfully introduced into the New Zealand environment. Native to Indonesia, rusa were liberated by mistake in 1907 (they were thought to be sambar deer); they are currently restricted to the Urewera area.

Finger points to deer

A THREE YEAR study into the impacts of deer and possums on a North Island forest has shown that, even at very low densities, deer browsing can shut down the regeneration of many native plants in the sub-canopy.

The study was by Wayne Fraser, Graham Nugent and Peter Sweetapple from Landcare Research in Lincoln. They examined relative densities of possums and deer in the podocarp-hardwood forests of the Waihaha catchment west of Lake Taupo, what the animals ate and from where, and how much of each food species was available.

Both deer and possums ate about 100 plant species but did not really compete for food. One of the surprising results was the relatively small amount of total foliage eaten. Possums took only 3.3 percent of the foliage produced each year in the forest, and deer only 1.1 percent. Yet in both cases this was enough to have long-term effects on forest health.

As deer were targeting seedlings, their impacts were more damaging than possums which mainly eat new growth on mature trees. Few seedlings of deer-preferred species such as broadleaf and lancewood ever reached more than five centimetres in height, showing that the deer were effectively wiping out future generations of their preferred foods in the shrub layer and sub-canopy.

A 1080 aerial drop in 1994 reduced possum numbers in the catchment by 93 percent and deer by 60 percent. The scientists predict that while possum foods will recover, there are still too many deer for their preferred plants to regenerate. The research is continuing.

The growing evidence of continuing deer damage to the integrity of native forests is causing a rethink about pest control within the Department of Conservation. To date the department has rarely targeted deer in its control operations, relying instead on recreational and commercial shooting to manage deer impacts. As this policy is patently ineffective, DoC is now in the process of preparing a new deer management plan which will hopefully look at ways of achieving greater reductions in deer impacts in native forests.

Boaties and island sanctuaries

ENVIRONMENTAL transgressions are common among boat users visiting conservation islands in the Hauraki Gulf. A 1995 survey of boaties reveals that 89 percent broke some kind of regulation, and 59 percent knew they had done so. The survey was done by Auckland University student Craig Jones as part of his MA thesis.

The main infringements were bringing dogs onto islands, damaging vegetation and lighting fires.

An astonishing ten percent of boats had domestic pets on board – mainly dogs and cats – while only five percent had effective rodent control measures.

When asked whether they had considered the possible negative effects of their actions, 77 percent of those surveyed replied they hadn't given it any thought.

Combined with a lack of understanding about the purpose of reserves – 25 percent thought it was solely recreation – these actions and attitudes represent huge potential trouble for offshore island sanctuaries and the endangered creatures that find refuge on them.

Most at risk are shore nesting and/or flightless birds like the New Zealand dotterel, and little blue penguins. Unsupervised dogs put ashore to exercise and "do their business" can create havoc in these fragile island populations in a few moments of mindless fun. Some boat users have even been caught rowing their dogs ashore on Tiritiri Matangi – known for its takahe, kiwi and other endangered birds. Kawau and Ponui also have kiwi, and in addition Kawau has weka. All three of these bird species are flightless and threatened.

Even the populations of flying birds can be badly affected by dog disruptions that interfere with incubation and reduce nesting success.

And the accidental introduction of rats, of course, can threaten whole ecosystems.

Forest and Bird urges yacht clubs around the country to work with DoC in drawing up a code of environmental conduct for boat owners using the gulf and its islands, and then to help publicise and police it.

Pest-free offshore islands are a priceless conservation asset; they deserve our best efforts to ensure they have the protection they need.

Jacqui Barrington

Kaituna River victory

BAY OF PLENTY conservationists and iwi are delighted with a High Court decision that allows the Department of Conservation to divert part of the Kaituna River to restore some of the natural flow to the Maketu estuary in the Bay of Plenty.

Forty years ago the Kaituna River was diverted away from the estuary, straight into the sea. With no river to flush it, the estuary began slowly filling with sand until it was unable to support its former rich populations of sea and shore life (see last issue of *Forest & Bird*, page 8).

A channel with four culverts and gates was completed by DoC last October to restore water to the estuary. But court action by a disaffected land owner led to delays and then to direct action by local residents in February to force open two of the gates.

While the court judgement confirmed DoC's right to restore water to the estuary, the Maketu Action Group has said

that it will continue to work for an even larger flow to be returned.

Update on New Zealand dotterels

PROBLEMS BESET most of our native birds, but few can have as many difficulties to contend with as the New Zealand dotterel. Nesting on sand spits of northern beaches, dotterel nests fail because of disturbance and destruction from dogs, dune buggies and careless people.

Understanding these impacts has led to successful beach warden schemes by DoC and Forest and Bird to protect nesting sites in popular areas during the busy summer period (see *Forest & Bird* November 1992).

But that is not the end of the dotterels' problems. Their nesting places continue to shrink as new subdivisions smother increasing areas of the Coromandel and Northland coastlines, and even protected sites like the Ohope spit in the Bay of Plenty are eroded by high seas. Cats, rats and hedgehogs prey upon eggs and chicks, and recent video surveillance has shown southern black-backed gulls stealing eggs and harassing dotterel families.

On Matakana Island, the largest dotterel breeding site in the Bay of Plenty, gulls, grown fat from the nearby rubbish tip, multiplied and their nesting colonies overran dotterel nest sites. Last winter, in a culling programme, more than 3,000 gulls, about 70 percent of the population, were killed with alphachloralose, a humane narcotic poison. The result? A record number of 17 dotterel chicks peacefully fledged.

In the absence of gulls, dotterel behaviour changed dramatically. Territories were up to three times larger and adults took chicks to the water edge to feed when previously they had been kept close to the cover of the dunes. For the first time, parent birds were observed resting with their eyes closed, when previously they had been constantly awake and flying at gulls passing overhead.

That was the only good news for North Island dotterels last year. The birds nest just above the high tide mark and in November, spring tides combined with storms washed away many nests from Northland to East Cape. Then, just as the birds were re-nesting, another very high tide in December wiped them away again.

As a labour of love, Forest and Bird member Bev Woolley monitored the Coromandel birds, and provided assistance, advice and fencing material to locals minding the dotterel nests on their beaches. However at Opoutere, the major nest site on the Coromandel, high tides and inadequate wardening saw only six chicks banded, the fewest for many years.

Research by Andrea Lord prompted DoC's New Zealand Dotterel Recovery Group to recommend that the dotterel fence on the estuary side of the Opoutere spit be extended to close off public access, so chicks can feed undisturbed. Andrea also recommended that a distance of 80 metres from the nest be roped off to prevent human and canine disturbance.

Behind the beaches at the Auckland Regional Park of Tawharanui, 400 hedgehogs have been killed over the past four years, yet dotterel eggs continue to be taken.

The extent of the dotterel nesting failure at Tawharanui was highlighted by John Dowding who monitored 24 dotterel pairs and reported that only two pairs fledged chicks, a quarter of the eggs being inundated by the high tides and the remainder lost to predators. His video surveillance of nests revealed a raiding cat, a spur-winged plover casually demolishing an egg laid in the plover's territory, and hedgehogs eating the eggs, night by night, as they were laid.

Further south there is encouraging news from Stewart Island. The southern New Zealand dotterel is now recognised as a separate subspecies and is our third rarest bird (after fairy tern and kakapo), and amongst New Zealand's five most endangered birds. Wild cats destroy nests and kill sitting adult birds, resulting in an alarming scarcity of males in the tiny population, because the male birds incubate the eggs at night and tend to fall victim to the cats.

From a low of 65 birds in 1994, the population has risen to 93, the highest since 109 were recorded in 1990. More funds for the southern dotterel have at last been made available to DoC so that this summer the rugged hinterland was comprehensively explored and many of the dotterel's mountain-top breeding sites were recorded. This will allow further cat and rat control to be carried out, as well as on Table Mountain where the indefatigable John Dowding has long struggled to assist this neglected bird.

Ann Graeme

Counting dotterels

FIVE YEARS AGO the first national census of New Zealand dotterel was carried out. Forest and Bird and Ornithological Society members helped DoC to walk the hundreds of kilometres of coastline where the birds are found. The grand total of birds recorded was 1,350. This year the national census will be repeated and will give us a real indication of the fortunes of this endemic bird. Five years of effort have gone into trying to reverse its decline. Has it been successful?

A count will be made of nesting pairs during Labour weekend and another next March, when the birds are in their autumn flocks.

Forest and Bird members from the Waikato, Bay of Plenty, Auckland and Northland will be able to take part in the great count. DoC offices will organise walkers along their coastlines, and may provide training to ensure helpers are practised in recognising the species they may encounter. DoC is asking Forest and Bird branches to get in touch with their local DoC office in September so plans can be made.

The dotterel range is spreading south from East Cape – twenty-two birds, the biggest number ever, were recorded from Lottin Point to Mahia last summer. With this increase in range, Forest and Bird members from Gisborne and Wairoa will be able to take part in the census for the first time.

DICK VEITCH/DOC

New Zealand dotterel with egg on South Kaipara Head. The northern subspecies breeds on beaches around the coast on the northern half of the North Island where it lays eggs in a depression in the sand lined with pieces of grass or shell. The southern subspecies numbers less than a hundred and breeds – mainly on hilltops above the treeline – only on Stewart Island.

C.R. VEITCH/DOC

The bar-tailed godwit is one of a number of waders that breeds in north-east Asia and migrates each year to the southern hemisphere along the East Asial Australasia flyway. In summer they can be found all around the New Zealand coast, concentrated in estuaries and inlets with broad intertidal flats. The ecological integrity of wetlands along their long-distance flightpath is vital to these birds.

Who'd be a bird at Fukuoka? ▲

IN JULY 1994, despite widespread opposition at home and abroad, Auckland's Japanese sister city of Fukuoka began construction of a 400-hectare artificial island in adjoining Hakata Bay.

The massive reclamation is now having a measurable impact on the bay's rich intertidal Wajiro mudflat, with the numbers of migratory waders using this internationally important "crossroads" site on the East Asia/Australasia flyway having declined significantly.

Pre-1993 waterbird populations were estimated at 55,000 to 60,000. After dredging began in 1994, water quality nose-dived and the latest figure for the 330 bird species known to use the area is around only 38,000. The official explanation was "natural factors".

At the most recent international Ramsar wetland meeting, in Brisbane during March, the New Zealand delegation criticised Fukuoka's treatment of such an important waterbird site.

Ironically, a month later, a godwit or kuaka banded in New Zealand was identified at Wajiro, confirming the living link this bird and 14 other species form between Auckland and its sister city.

Contrary to earlier promises that all remaining tidal flats would be preserved intact, Fukuoka City has now unveiled plans to construct a highway along the four kilometres of seawall, cutting through the important remaining patches of tidal flat, including the so-called Eco-Park Zone. The preservation of the zone was one of the promises made to pacify opposition to the original reclamation by Fukuoka's Mayor Kuwahara who stated repeatedly that no further reclamations would occur.

Local environmentalists are stunned by the scale and insensitivity of these proposed developments, and the deliberate misleading of the public at home and abroad. The only hope, they say, is more international pressure to shame Fukuoka into some semblance of environmental responsibility.

The heat will definitely be on when Mayor Kuwahara and 250 citizens of Fukuoka visit Auckland in October to celebrate the tenth anniversary of the sister city relationship.

Jacqui Barrington

Damning report on Australia's environment

WHILE THEY CAN be thankful for clean water, and relatively low levels of urban air pollutants, sulphur dioxide and acid rain, Australians have no cause to be complacent about the country's environment, according a recently released government-commissioned report, *State of the Environment 1996.*

The 600-page document is the first comprehensive and independent report card on how Australians are treating their environment. Compiled over 30 months, it brings together input from more than 100 scientists, headed by an advisory council of representatives from industry, the national research agency CSIRO, universities, indigenous groups and the environmental movement.

The results make disturbing reading:

- In the two centuries since European settlement, more mammals (18) have become extinct in Australia than in any other country; over the same period, Australia has lost about 75 percent of its rainforests and about 40 percent of its total forest cover.
- Land is being cleared at a rate of about 6,600 square kilometres a year (most of it in Queensland).
- With the land clearance has come massive soil erosion, an annual toll of 14 billion tonnes – or about 19 percent of all the soil lost globally. Some areas of rangeland are so badly degraded they may never recover; others will only recover if exotic grazers are removed.

One point made in the report is that land clearance, agricultural modification and other human activity are altering native habitats so extensively that many indigenous species are moving well beyond their natural ranges and turning into pests. These species outside their range, states the report, "may pose as serious a threat to biodiversity as exotic species".

One cockatoo for example, the galah – once confined to river systems – has now spread throughout the country due to the greater abundance of water from farm dams and animal troughs, and is competing for nesting sites and destroying the eggs of another native parrot, Carnaby's cockatoo. The latter has disappeared from a third of its range in the last 25 years.

American import threatens Spanish wetlands

IN THE Guadalquivir delta, in southern Spain, an internationally important area of wetlands is under foreign invasion.

In 1974, the voracious and highly fertile Louisiana red crayfish was introduced to the region, and has spread rapidly across most of the 77,000-hectare Doñana National Park and beyond. As a consequence, the diversity of the aquatic life of the wetlands has diminished.

According to Dr Andy Green of the Doñana Biological Station in Seville, "the freshwater marshes have shifted from being a complex ecosystem full of diverse plants and invertebrates to one dominated by crayfish and phytoplankton, with no submerged higher plants."

The voracious crayfish have decimated the underwater vegetation. "Almost all the energy flowing through the ecosystem now goes through the crayfish," says Green. This

means that birds that do not feed on the crayfish have to compete for declining food resources. Several snails in the area have been wiped out, partly through crayfish predation, and also because they compete with the crayfish for food.

Another hazard to local wildlife is trapping. Fishers are using adapted eel nets in the shallow water of the delta to trap the crayfish and, while this has had little or no effect on the crayfish population, it poses a serious threat to ducks and rails including the globally threatened marbled teal.

Formerly the marbled teal's main breeding ground, the national park once held thousands of breeding pairs. Last year, for the first time, they failed to breed. However, hopes for the teal have been raised by recent rains, which have filled the crayfish-free brackish marshes, and provided safer breeding areas.

The crayfish, though, remains firmly entrenched, and is now widespread in Spain and Portugal.

Source: BBC Wildlife

Standing up for a native rodent

THE PRAIRIE DOG or native ground squirrel of the US Great Plains has become the focal point of a clash between old and new values in the American West.

Traditionally regarded as vermin that ruin grazing land and decimate crops, the 30-centimetre rodents (a number of species of the genus *Cynomys*) have been the target of eradication campaigns by government agencies and property owners during most of the last 100 years.

But today, conservationists point out that prairie dog colonies are critical to the survival of more than 100 species, including rare burrowing owls, swift foxes, mountain plovers, golden eagles and endangered black-footed ferrets. "The prairie dog is to the prairie what krill is to the ocean," says Jasper Carlton, of the Biodiversity Legal Foundation in Boulder, Colorado. "We are wiping out a major ecosystem."

The eradication programmes coupled with plague outbreaks have taken a toll. Once spread over 40 million hectares, prairie dogs today are concentrated in pockets on less than a million hectares of short-grass prairie, from western Texas to eastern Montana, and across to the Dakotas.

Many cattle ranchers regard prairie dogs as an expensive pest that munches grazing land down to scrub and digs holes that can cripple horses. Farmers claim dirt mounds around the burrowing holes trip up their farm equipment, and the animals supposedly wreak havoc on crops of corn, sunflower and alfalfa. With their network of underground tunnels, prairie dogs also cause subsidence problems under highways.

In Wyoming, landowners are free to shoot, poison or fire-bomb prairie dogs at will, notes Bob Luce, a biologist with the Wyoming Game and Fish Department. "You can do whatever you want to do to them, whenever you want to do it."

Some farmers invite gun enthusiasts onto their land to shoot the prairie dogs. The sport is becoming so popular that enterprising ranchers can charge shooters for the privilege. Rural towns promote prairie dog "derbies" – day-long shooting competitions – to boost tourism and attract revenue.

Ecologists say much of the bias against prairie dogs reflects a lack of understanding. "People in the West are still waging a war on the West – they want to subdue nature," says Luce. "They don't realise that there's a whole ecosystem complex built around prairie dog habitat."

Missing cranes return

IN A PREVIOUS *World watch* article (*Forest & Bird* August 1994) we reported the disappearance of the tiny western flock of Siberian cranes from their traditional wintering ground in India's Keoladeo National Park in Bharatpur.

This year, however, after two winters' absence, excited scientists reported that four birds had made it to the park. Numbers of the cranes, one of the world's most endangered migratory birds, had been declining steadily at Bharatpur, and they were thought to have succumbed to poaching along their migratory flightpath which takes them from Siberia over Pakistan and Afghanistan. From 200 birds in 1960, numbers plummeted to zero in 1994 and 1995.

The return provides a glimmer of optimism for the continued survival of the western flock. Only one other population of the crane exists, an eastern flock of about 3,000 breeding in eastern Siberia and wintering in China. However, these birds too are under threat – from fishing and hydroelectric projects on the Yangtze River.

DAVID R. AUSTEN/BRUCE COLEMAN LTD

The giant Ok Tedi gold and copper mine. Slurry from the mine has caused severe contamination of Papua New Guinea's largest river system; the first 70 kilometres of the Ok Tedi River below the mine is biologically dead.

Mining company pays up in PNG

WIDESPREAD environmental damage arising from mining operations at the Ok Tedi gold and copper mine in Papua New Guinea, has resulted in a massive legal payout by the giant Australian miner, BHP.

In 1984, dams erected to hold the 60 million tonnes of slurry that the mine produces every year were burst by unusually strong rains and seismic activity. Since then, the slurry, which is heavily contaminated with copper and cadmium, has flowed directly into the Ok Tedi and Fly Rivers, which empty into the Gulf of Papua. The slurry has killed wildlife and the sedimentation has made many of the surrounding waterways too shallow to navigate, thus destroying the way of life of the local inhabitants.

The villagers hired a firm of Australian lawyers to sue BHP, which manages the Ok Tedi mine and has a majority shareholding.

In an out-of-court settlement in June, BHP agreed to pay some A$550 million toward the costs of resettlement for ten villages, compensation for 30,000 landowners, and cleaning up the pollution. The company is investigating cleanup options and will submit its preferred option to the government and landowners later this year.

Many environmentalists feel that the river system has been irretrievably damaged by the mining, and that the settlement, while a victory for local landowners, is unlikely to do much for the local environment. "The mine has been operating for 12 years with no waste management plan in place," says Helen Rosenbaum of the Australian Conservation Foundation. "Implementing one now won't save the river system".

Hopefully, however, the size of the settlement will discourage transnational resource companies from considering only the minimal environmental standards that exist in developing nations.

Reports on campaigns and projects by Forest and Bird branches and field officers

Stopping the native firewood clearout

THE DUNEDIN branch has been campaigning this past winter to encourage the city's firewood users to buy only non-native firewoods. Reduced demand for native wood will hopefully lead to a reduction in the cutting and clearance of native forest.

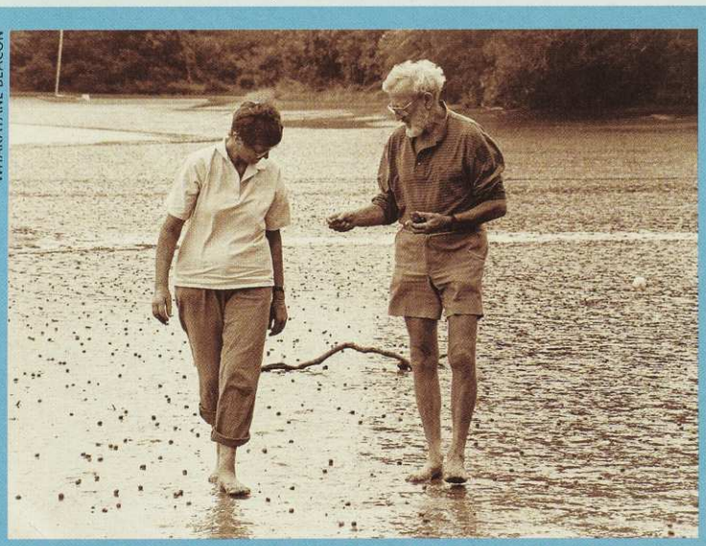
Raising local awareness of the natural values of manuka and kanuka is a major objective. Manuka and kanuka are often labelled "scrub", a term that belies the important role both species play in maintaining biodiversity.

Manuka and kanuka forests in Otago provide habitat for native passerines including brown creeper, rifleman and tomtit. An isolated population of South Island robin inhabits kanuka forest in the Silverstream catchment behind Dunedin, and fernbirds and falcons both use areas of low manuka close to the city. The jewelled gecko is also found in manuka around Dunedin, often in association with *Ileostylus* mistletoe.

The branch has been running advertisements in newspaper firewood columns (which carry ads for native firewoods from as far afield as the Catlins and the West Coast) to promote non-native firewoods, and to provide the message that manuka and kanuka are wildlife habitat.

KEN MASON

Members of the Dunedin branch flock to the city centre to distribute manuka honey lollies and pamphlets explaining the importance of kanuka and manuka forests as native wildlife habitat. Information was also given out on the wide range of exotic firewoods available.



WHAKATANE BEACON

Helen and Adrian Harrison, of Eastern Bay of Plenty branch, explore their nearby mudflat in Ohiwa Harbour in readiness for a public walk to mark this year's Seaweek. The event, organised by the branch, was well attended with 70 people enjoying the window opened into this fascinating but little-appreciated habitat. Walk leader and Forest and Bird staffer Ann Graeme enthused about the gargantuan appetites of titiko (mud snails) which eat twice their body weight in mud every hour, and consequently have a continuous and artistic faecal trail. She also explained the life story of baby eels, titiko sex (it's easy when you're a hermaphrodite), and how to tell boy crabs from girl crabs. The walk provided an opportunity to inform – and incense – the public about a local scheme to create a canal network and housing marina that will dredge much of the mudflats.

Restoring Limestone Island

RESTORATION OF Limestone (Matakohe) Island – a 40-hectare reserve in Whangarei Harbour and an open sanctuary in the manner of Tiritiri Matangi – has been an important commitment for Forest and Bird's Northern branch.

Branch identities Tony McCluggage and Jack Craw are two of many members active in the Friends of Matakohe Limestone Island. The branch has also donated over $15,000 for fencing and trees since 1989.

To date the Friends have planted over 30,000 native trees and shrubs, fenced off ten hectares of historic pa and Maori agricultural sites for grazing, killed hectares of weeds, built tracks and boardwalks, and eradicated possums and cats.

Restoration work took a major leap forward earlier this year when a self-contained cabin was barged across the harbour to the island and David Wright took up residence as full-time ranger. David's duties include fire and vandalism control, track maintenance, weed management, plantings and guiding visitors.

Other plans include the eradication of rats and mice this year, and the introduction of saddleback, kaka, several species of skink and possibly a rare weta species. Later releases might include kiwi, weka, robin and other birds.

As well as a pest-free refuge for threatened species, the island will be an educational resource for schools and the local community. Increased numbers of visitors to Limestone Island will hopefully take some of the pressure off the ecologically similar and even more valuable Hen and Chicken and Poor Knights Islands.

Learning about Wellington's seashore life

HUNDREDS OF children and their families joined Wellington Kiwi Conservation Club during Seaweek earlier this year to learn about the capital's rocky south coast.

Over two weekends at Victoria University's Island Bay Marine Laboratory, about 1,200 young eager marine enthusiasts were drawn to various "touch tanks" and aquaria that line the laboratory, and had personal encounters with starfish, a host

HENRICUS PETERS

Man with a shark hat: marine biologist Dr Victor Anderlini from the Island Bay Marine Laboratory shows children some of the natural riches of Wellington's south coast.

SOUTHLAND TIMES

Mangu Kaha president Peter Warren (right) surveys some of the broom and gorse clearance done by gang members in the proposed wetland reserve at Riverton.

of seahorses, well-camouflaged flounder and even an octopus. Other activities included screen-printing, face-painting, making sea creatures and a special colouring competition.

Groups were also guided across the road to the shore and given a talk by marine biologist Dr Victor Anderlini about the wonderful tidal zone and seashore life on the coast – one of the most biologically diverse stretches of coastline around New Zealand and soon to be the site of a formal marine reserve proposal.

KCC coordinator Sally Bowman was greatly encouraged by the success of the activities, as was the marine laboratory which has agreed to open its doors regularly one weekend each month.

Stamp of approval

FOREST AND BIRD'S Auckland office took its message to some of the city's postal consumers in June.

To coincide with the release of a new issue of native wildlife stamps, the Post Shop at the North Shore Mail Centre provided space for a Forest and Bird promotional display and decorated the shop with a wildlife theme. During the four weeks of the display, the Post Shop ran a competition for an environmental gift pack.

As a result of the display, Forest and Bird has received an upturn in membership inquiries from the North Shore area, plus the donations received from competition entrants.

Forest and Bird teams up with gang

SOUTHLAND BRANCH is working with a local Maori gang to develop a wetland reserve at Riverton.

Members of the Mangu Kaha gang have helped with weed clearance in the six-hectare reserve. Gang president Peter Warren said his members supported efforts to conserve the area, and the work would help some of the younger members develop work skills. Forest and Bird has contributed a grant towards the wetland work which is being coordinated by the Riverton Estuary Care Society.

Apart from Mangu Kaha and Forest and Bird, other groups involved in the project are the Department of Conservation, Southland Regional Council, Fish and Game, and the local ornithological society.

The wetland development should improve native fish habitat and encourage birds such as marsh crakes and fernbirds, which are relatively rare in the area, to breed there. Long-term plans included boardwalks and signs.

Conservation in the South Waikato

FOREST AND BIRD'S South Waikato branch is celebrating its tenth birthday this year.

Branch secretary Anne Groos says that as one of the society's smaller branches, South Waikato concentrates on revegetation projects, speaker evenings and weekend camps. It has developed a native plant nursery which contributes thousands of trees to replanting projects every year as well as providing the main source of branch funds.

A continuing programme has been the restoration work with native plantings at Jim Barratt Reserve and Harihari beach on the west coast.

The branch is also an active member of consultative committees set up to look at minimising the environmental impacts of major local resource users applying for new resource permits. These include Carter Holt Harvey's giant Kinleith pulp and paper mill and the Lichfield cheese factory.

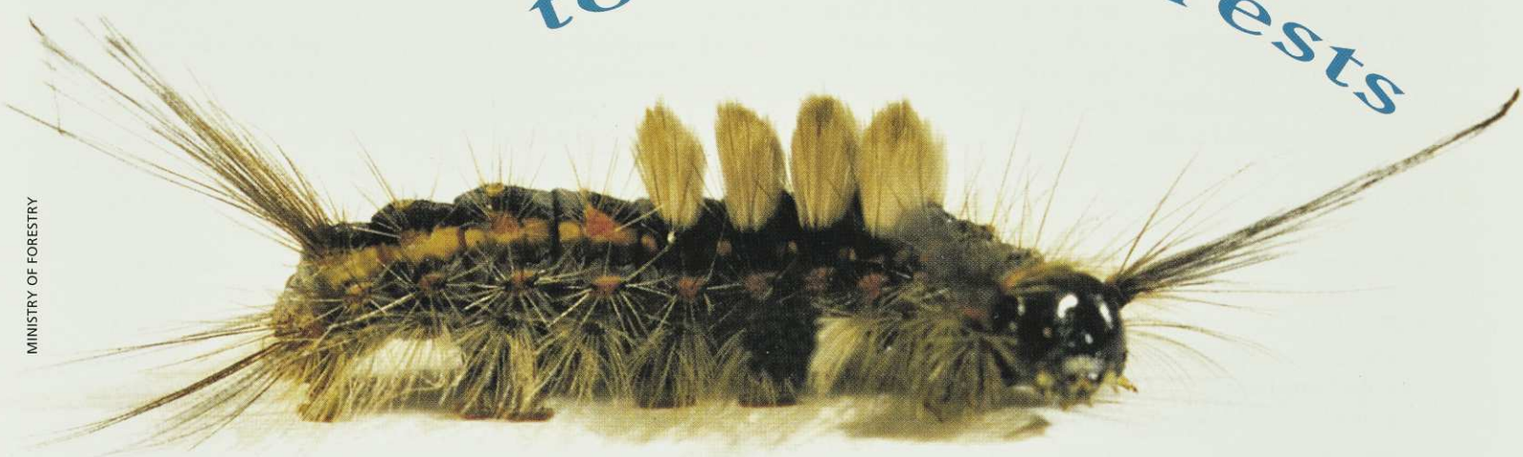
Northern field officer Jacqui Barrington was guest speaker at a well-attended anniversary dinner held by the branch in Putaruru in early August.

CHRIS BARBER

Part of the Forest and Bird display at the North Shore Mail Centre, and two of the new stamps.

Sometime in the next month or so, one of the most expensive tracts of this country's real estate will be sprayed in an aerial eradication attempt without precedent in New Zealand. GERARD HUTCHING explains why conservationists should be worried about the recent arrival of the white-spotted tussock moth.

Soft, furry and a danger to native forests



MINISTRY OF FORESTRY

Fully grown caterpillar of the white-spotted tussock moth with its distinctive "tussock-like" hairs. Young caterpillars are blacker, less brightly coloured and less hairy.

AT STAKE IN Auckland's proposed spray eradication is not only the future of roses, plums, peaches and apples of the city's Kohimarama and Mission Bay suburbs, but also native and plantation forests in the remainder of New Zealand.

The target of the airborne exterminators is the white-spotted tussock moth *(Orgyia thyellina)*, so called because during its fully grown caterpillar stage the striking animal sports four distinctive patches of hairs resembling tussock on its back. In a light moment one wag from the body responsible for the eradication campaign, the Ministry of Forestry (MoF), christened the moth "orgy" – a reference not only to its Latin name but also its voracious appetite. Birch, oak, maple, willow, Douglas fir and some eucalypts are other species known to be on its menu.

MoF would prefer that the moth could be eradicated other than by blanket aerial spraying, but with no natural predators in New Zealand it will otherwise spread unchecked. Like the closely related, and even more threatening, Asian gypsy moth, the tussock moth also hails from Asia – specifically Japan, Korea, Taiwan, China and the Russian Far East. Being native to that region, it appears to be in balance with its environment; occasionally it goes through population peaks when, in certain areas, it becomes a pest until the normal checks and balances in the way of parasites and predators reassert themselves.

Just how the moth arrived in New Zealand is unknown. Possibilities include egg clusters attached to a second-hand Japanese car import, via a ship, in a container or with personal effects.

Less is known about the ecology of the tussock moth than the gypsy moth, but sufficient to ring alarm bells among New Zealand authorities. Besides the fact that the moth can go through three generations in a season, and one female can be responsible for several million moths in that time, laboratory trials have also shown that the caterpillar behaves like a possum – that is, it eats out a favoured food first then moves on to less fancied plants.

Forest Research Institute entomologist John Bain found that caterpillars had different diets according to age. The younger preferred blackberry but as they grew older they moved on to pine and other trees.

In Auckland gardens it has been recorded feeding on plum, peach, cherry, roses, willows, kakabeak, grapefruit, *Acer negundo*, apple, birch, oak, wisteria, geranium, coral pea and possibly also on bottlebrush and titoki.

While the caterpillar has been found

feeding mainly on horticultural and other exotic trees, that is not a measure of its potential risk to native forests, but more the nature of the urban area it has been liberated in.

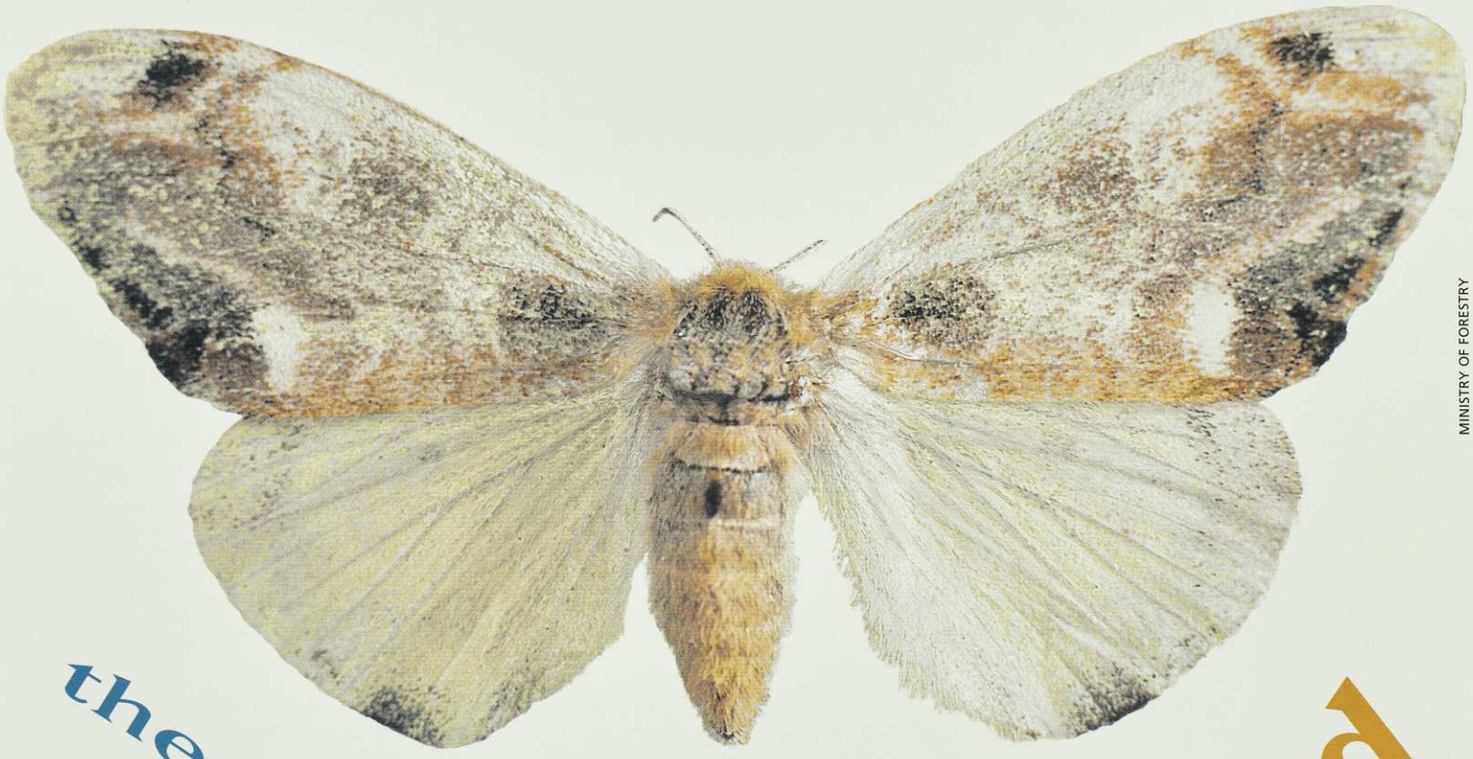
Feeding trials at the Forest Research Institute have shown the caterpillars will feed on red and silver beech trees, and all expectations are that given the breadth of the animal's food range in inner Auckland and its ready adaptation over a short time to New Zealand conditions, it would happily adapt to a wide range of native trees such as kamahi, kohekohe and pukatea throughout the country. Overseas research shows the caterpillar likes to feed on broadleaf hardwoods similar to those that make up the major component of New Zealand forests.

If eradication is unsuccessful, and without any natural predators or parasites in New Zealand to keep the moth and its caterpillars in check, the damage to the conservation estate could be of possum-like proportions as the pest inexorably spreads throughout the country.

MOF'S GENERAL manager of operations, John Handiside, is under no illusions about the difficulty of the task of eradicating the moth.

"There's been nothing attempted like this in New Zealand before, in fact no-one has tried to eradicate the tussock moth anywhere in the world, but by god we're going to do it if we can," says Handiside.

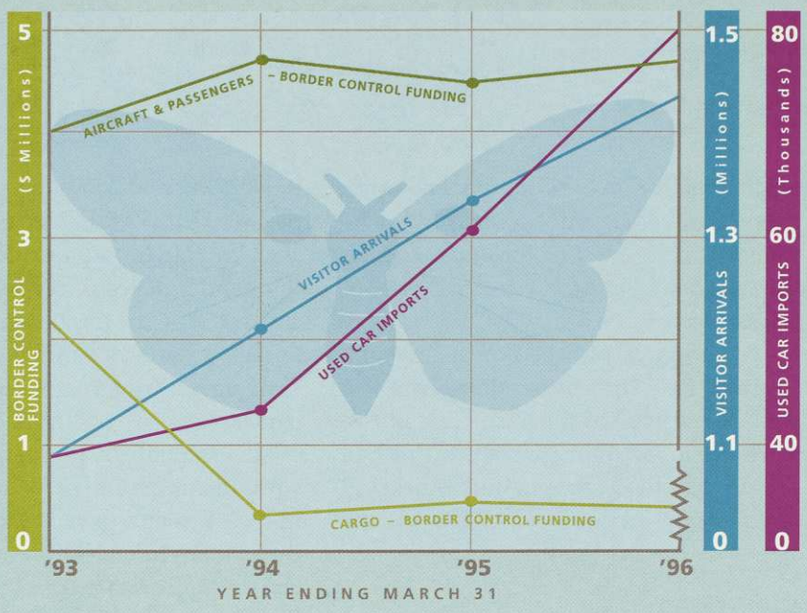
Authorities first heard about the existence of the moth in New Zealand on 17 April this year. However it is believed to have been in Auckland at least since spring 1995. As soon as MoF went public over the issue, a local doctor came forward to say he had taken a photo of a caterpillar the previous November but had not informed anyone. It is thought to be the first time the



MINISTRY OF FORESTRY

the tale of the white-spotted tussock moth

At the border



High stakes poker: while visitor arrivals and imports to New Zealand have increased in the last few years expenditure on border control has declined.

AS BARRIERS TO trade around the world decrease and the international movement of goods and people gathers pace, the risk of unwanted biological introductions increases dramatically. For those countries, such as New Zealand, with isolated, highly endemic, and only recently modified island biotas, it is potential disaster.

The routes of entry for exotic pests have increased and become more unpredictable, and at the same time the pests' "travelling conditions", through refrigerated air transport and containerisation, have become more favourable.

On top of this, global warming with its likely temperature increases and changes in rainfall patterns and wind movements will make New Zealand a favourable environment for organisms which might not otherwise have arrived or survived here.

The ramifications of more liberalised trade are profound. Trade considerations are placing pressure on quarantine authorities around the world to take greater risks, both technically and philosophically, in relation to the entry of diseases and pests. Even to restrict the movement of commodities on legitimate quarantine grounds will often not be without cost to a country's trade reputation.

The risks are not only to native flora and fauna, but to agriculture, amenity vegetation and forestry.

Forest and Bird conservation director Kevin Smith points to the example of the tussock moth introduction as just one of a number of instances where animals have been introduced – accidentally or intentionally – because border controls have been too lax.

"Recently we have seen a Japanese butterfly appear in a Dunedin used-car importer's yard, a live snake was found in a used car on the Wellington wharf and now the tussock moth in Auckland. With more open trade and increased travel we are going to see more of these incidents unless we are more vigilant," Mr Smith says.

MoF's John Handiside worries that the Asian gypsy moth and other potential American pests could hitch a ride to New Zealand in second-hand logging machinery, most of which is imported from the United States where the moth is a huge pest.

"The biggest problem by far is the importation of this equipment where something is taken out of a forest, not cleaned, then brought into the country. We've now introduced a rule forcing people to dismantle a piece of machinery so that all the internal bits can be examined," says Handiside.

In Australia recently, border control staff detected a fungal disease that entered the country on second-hand machinery.

Smith says the second-hand car trade also needs to be closely examined. New Zealand imports over 6,000 used cars every month. As tussock moths prefer to lay their eggs in sheltered places, a small cluster could easily be concealed under a car's mudguard or flap.

"We're seeing a big increase in car imports but not an increase in the Ministry of Agriculture's ability to control. A lot of the checking and cleaning is done in New Zealand – the onus needs to be put on the exporters to send us clean cars. Instead New Zealand accepts all the biological risk from the trade," says Smith.

There has been a great increase in imports of plant material for pasture improvement and horticulture, as well as living plant material such as cut flowers and propagative or seed stock. These provide an obvious route of introductions for alien organisms.

In Australia, poinsettia cuttings imported for the Christmas trade have recently introduced into the country a whitefly capable of crop damage worth hundreds of millions of dollars. The cuttings were supposedly fumigated, but probably, under pressure from the importers (fumigants reduce shelf life), at too low a dose. Australia is currently conducting a review of its quarantine arrangements.

On the issue of intentional imports, Smith believes that MAF is too permissive in what it allows into this country. He considers the ministry is more concerned at pleasing its counterparts overseas than with the increased risks to the New Zealand economy or to our native plants and animals that this attitude entails.

"Take the proposed importation of flash-fry red turkey meat. The poultry industry sees this as a big threat to New Zealand's avifauna and the domestic industry because it could bring in Newcastle's disease and other serious avian diseases," he said.

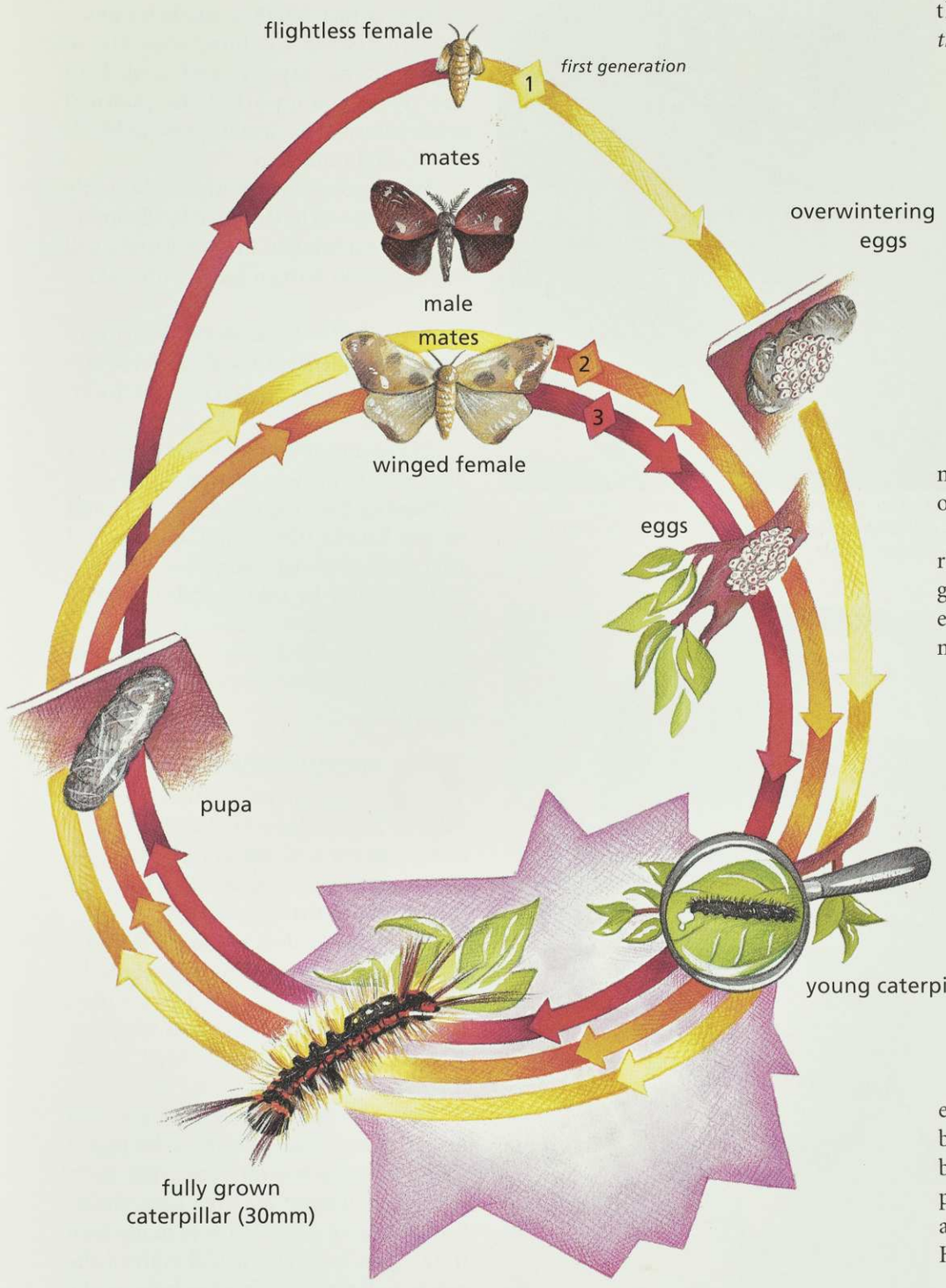
"MAF has released a draft import standard that would permit the import of this meat along with any viral freeloaders. Conservationists will be grateful to the poultry industry if its impressive technical submission and lobbying succeeds in stopping the imports."

Smith regards it as absurd that two agencies – MoF and MAF – each dealing with exotic pest irruptions in the same city at the same time (tussock moth and fruitfly) are separate. He would prefer to see an amalgamation of skills related to border control.

Understaffing at MAF Quarantine is a common complaint, brought into sharp focus by the fruitfly scare earlier this year. At the Auckland waterfront there are four fewer staff than necessary, while at Napier and Tauranga staff have had difficulty in taking leave.

An Audit Office report in 1994 recommended a beefing up of MAF's border protection procedures by using sniffer dogs and organic X-ray machines but government money wasn't forthcoming. Spending on border control has fallen at the same time as visitor numbers have increased. In 1990 the government budgeted $15.2 million for border protection; by 1996 that had dropped to $14.5 million. In the meantime overseas tourist numbers leapt by 50 percent.

Life cycle of the white-spotted tussock moth



The moth can pass through up to three generations a year. The first two generations produce winged female moths. The female mates with a male and lays between 50 and 300 eggs in a cluster about the size of a five-cent coin. These hatch within a few weeks. Both female and male adults die within a couple of days of the eggs being laid.
The last generation of females is flightless. After mating with a male moth the flightless female lays her eggs directly onto the pupal case or chrysalis from which she emerged. These overwintering eggs are laid in autumn and don't hatch till spring.

tussock moth has been introduced to any country outside its natural range.

By April 1996 the moth had managed to munch its way around seven square kilometres of Auckland's leafiest suburbs, spreading not only as an adult by flying but also as a caterpillar by being blown on silken threads (known as ballooning). MoF is concerned too that egg masses – a hundred or more clustered together the size of a five-cent coin or smaller – may have been transported out of the infected area as garden waste.

That, however, is a worst case scenario. Assuming the moth has been contained within the seven-square kilometre area, MoF has drawn up an action plan to spray 40 square kilometres (30,000 households) of Auckland's eastern suburbs with the organic spray Foray 48B, containing the active ingredient Btk *(Bacillus thuringiensis* variety *kurstaki)*.

A naturally occurring bacteria found in the soil, Btk becomes active only in a caterpillar's uniquely alkaline gut, posing no danger to plants, animals or insects other than moths and butterflies. All North American studies show no human health problems associated with the spray.

As soon as the eggs that scientists are keeping a close eye on show signs of hatching (probably September or October), either helicopters or fixed wing aircraft will swing into action, covering the area by night in a fine mist three to four times over the course of several weeks.

Assisting New Zealand's efforts to get rid of the tussock moth is the experience gained from localised North American eradication operations on the Asian gypsy moth. First accidentally released from a laboratory in 1869 in the north-east of the USA, the Asian gypsy moth has never been completely eradicated from North America. In parts of the west coast where orcharding is important to the economy, aerial spraying has eradicated discrete populations of the moth but in the north-east it has been controlled only.

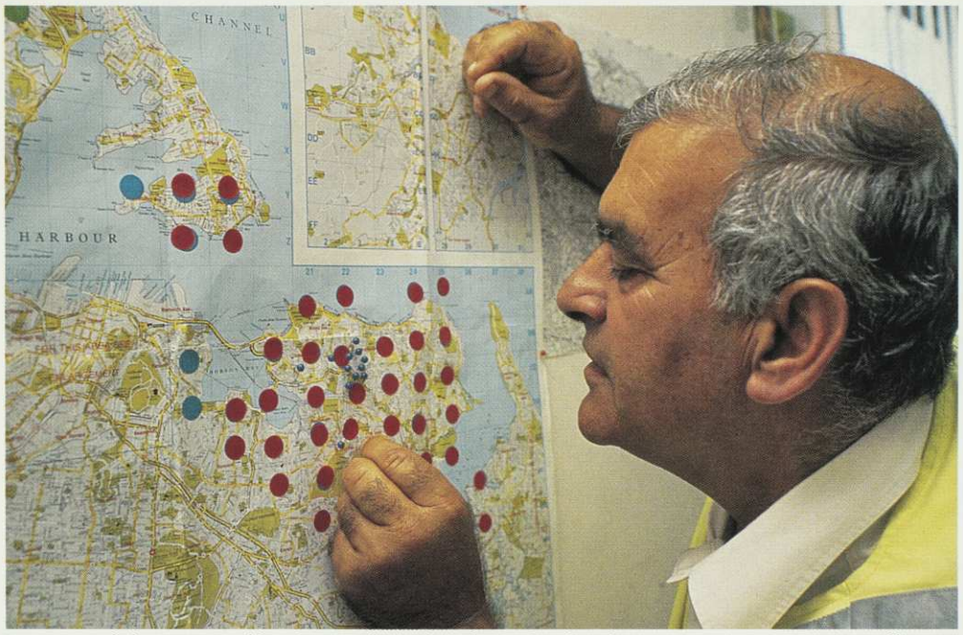
"They've done so much work and we've been able to learn from that. We've discovered that sometimes spraying hasn't worked because they haven't put a large enough application on, or perhaps because they haven't had a large enough buffer area around the critical zone, or possibly it's rained after they've sprayed and they haven't sprayed again," says Handiside.

Residents of Canadian cities such as Vancouver (19,000 hectares sprayed), Victoria (116 ha), Hope (90 ha), Richmond (430 ha) and United States cities such as Portland (3,000 ha) have all learned to live with low-flying aircraft showering their homes and gardens with Btk.

John Handiside says he understands some people's fears of spraying but believes the alternative – yet another pest attacking native forests and damaging a $2.6-billion export timber trade – is worse to contemplate than the disruption caused to some Aucklanders.

"None of us wants to be sprayed and none of us want to be woken in the middle of the night. Some of the people in the area are very opposed to what we

MINISTRY OF FORESTRY



As news of the east Auckland tussock moth infestation breaks, MoF senior protection officer Chris Scott marks new sightings on the map. Although only discovered in April, the moth is believed to have been in Auckland since at least spring last year.

MINISTRY OF FORESTRY

MoF senior forest health officer Dave Bartram finds white-spotted tussock moth caterpillars in Auckland's Kohimarama in April. While the caterpillars have been discovered mostly on exotic species, native broadleaf trees are very much at risk as well.

are trying to do and would prefer the moth to be here along with the consequences of that, but the number is minuscule compared to those who are in support," he says. Forest and Bird has strongly supported the planned eradication and has lent its name to MoF's local poster campaign.

While non-target moth and butterfly populations will be damaged by the spraying, MoF expects that the populations will be restored to normal levels within three years.

In 1993 Handiside visited Vancouver a year after the largest-scale aerial spraying operation ever carried out in an urban area.

"The Vancouver authorities were very pleased with the way the operation went. Technology has progressed since then and we can benefit from newer, quicker and safer ways of doing things. For example, we'll probably be using much less spray than the Vancouver operation – only about half a bucket to cover an area slightly larger than a rugby field," says Handiside.

DEPENDING ON who you talk to, the estimates of success of the $5.5-million eradication operation range from 80 percent likelihood to it's already too late and the moth will have spread outside the targeted area.

If eradication does not work, there are a variety of other controls that could be tried, including chemical insecticides, biological control agents, mass trapping, mating disruption and sterile insect techniques.

While, in the US, scientists have tried in vain to introduce parasites as biological control agents to control Asian gypsy moth, no biological agent has even been identified overseas to control tussock moth. Even if an agent is found, it will control the moth, not eradicate it. One hope is the knowledge that at least four natural parasites of tussock moth have been recorded, with more likely to be discovered.

Male tussock moths could be attracted to traps with a pheromone or chemical attractant. Problems associated with this method are that it will not wipe out the moth, and the pheromone may attract non-target species. As yet, a specific tussock moth pheromone has not been isolated, but sample lures are being trialed.

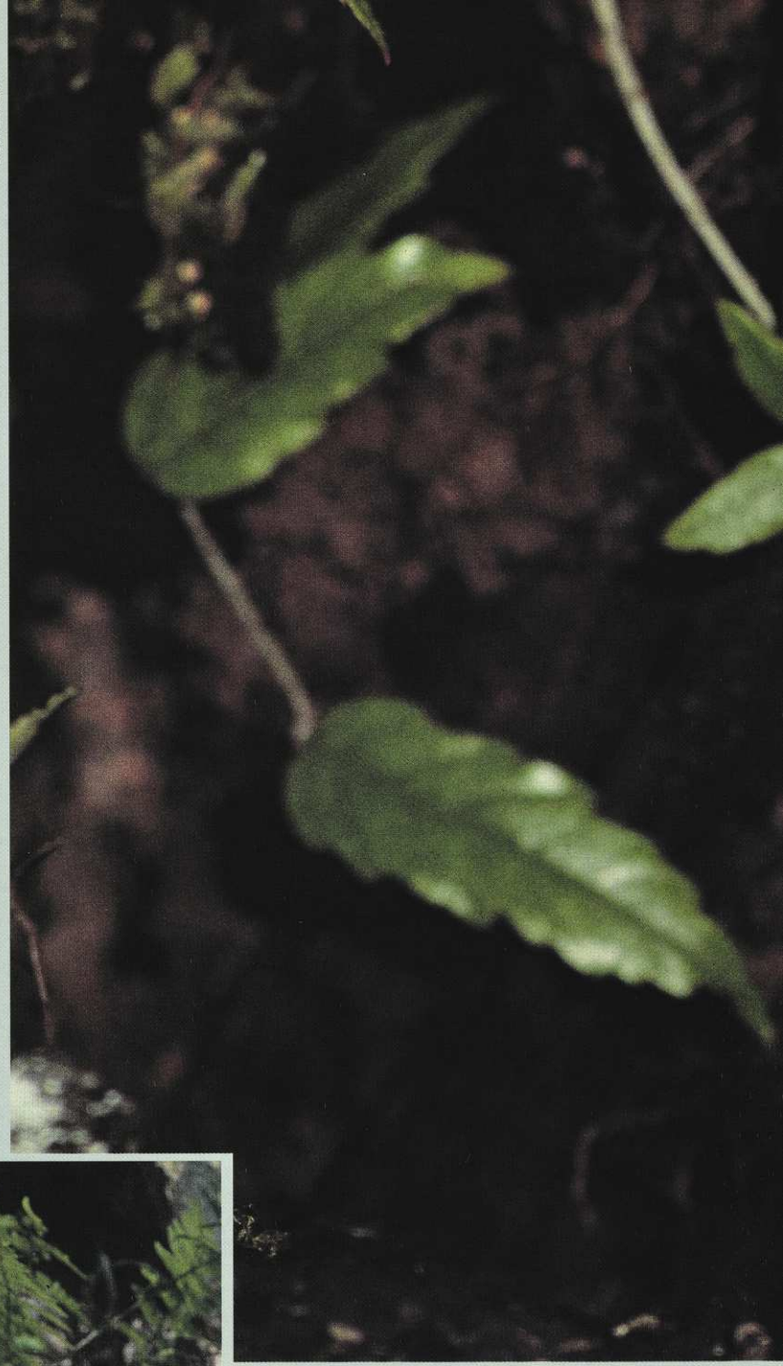
In North America, pheromones have been successfully used to lure male gypsy moths away from females during the mating season. Pheromone flakes or beads are dropped by aircraft, confusing the males and preventing them finding the females.

The chances of a further hi-tech option – moth sterilisation – working are even more remote. Using this technique, scientists hand-rear large numbers of females, sterilising them before releasing them. They then mate, producing sterile eggs. In small field trials the technique has been shown to work, but it is doubtful if it would succeed on a wide scale.

Based on the moth's spread so far, scientists estimate that in ten years it could cover 400 square kilometres – provided humans do not unwittingly lend it a helping hand by carrying eggs with garden debris. But that is the big risk. Despite MoF's request to residents not to move uncovered garden waste out of the area, there have been reports of at least six uncovered trailers with garden waste on them seen in one day in the affected zone. Should spraying not eradicate the moth, more draconian measures will be needed to stop residents from such practices – a small price to pay to stop the pest from spreading.

Until the tussock moths eggs begin to stir with the arrival of warmer weather, Ministry of Forestry staff are working overtime to inform residents of their plans. For the moment it is a waiting game, until John Handiside's "weird looking beast" unsuspectingly ventures out into an Auckland spring to meet its unexpected fate . . .

GERARD HUTCHING *is a freelance journalist based in Wellington and a former editor of* Forest & Bird.



DON GEDDES

Recent studies of mohua, or yellowhead, provide the first detailed evidence of the magnitude of stoat impacts on the long-term viability of a threatened endemic bird.

ROD MORRIS

COLIN O'DONNELL looks at this research and describes developments in the battle to control stoats in New Zealand forests as better control techniques become available.

TACKLING STOATS

Mohua

Mohua, or yellowhead, are closely related to the brown creeper (also endemic to the South Island and Stewart Island) and the whitehead (only found in the North Island). Since the arrival of Europeans, the mohua has disappeared from extensive areas of relatively unmodified forests, and, unlike its two cousins, is continuing to decline.

HIGH IN A HOLE in a red beech tree, a clutch of three hungry blue-grey mohua nestlings jostle for position awaiting the arrival of a parent with a juicy caterpillar or beetle. They hear a scratching noise outside the nest, but instead of their mother or father the sound is that of a stoat – the most efficient killer in the forest – that has heard the chicks from some distance away. Within a few seconds the nestlings are all dead.

Millions of years of mohua evolution in ancient New Zealand have left the species with no defence strategies to counter exotic predatory mammals.

Since mammalian predators were introduced to this country, many bird species have become extinct or reduced to small populations on predator-free islands. Kiore arrived with early Polynesians, and a further three rodent species were introduced by Europeans after 1770. Three mustelid carnivores – stoats, weasels and ferrets – were released in the 1880s in an unsuccessful attempt to control rabbits. Domestic cats also became wild and spread throughout the country.

Early naturalists and ornithologists frequently commented on the devastating

Using poisoned hen eggs for stoat control

THE USE OF poisoned hen eggs is a new concept in stoat control. Poisoned eggs placed in specially designed bait stations killed more than 85 percent of the stoats attracted to the bait stations in three trials carried out by Landcare Research and the Department of Conservation in 1994 and 1995.

Until recently, the department used hen eggs only as non-toxic baits to attract stoats to Fenn traps set in tunnels. Because both traps and tunnels are bulky and heavy to carry in the field, DoC contracted Landcare Research to develop a toxic bait for stoat control. Initially, I tested a variety of potential long-life baits, such as those used for controlling rats, cats, pigs and possums, but captive stoats wouldn't eat them. I then decided to test poisoned hen eggs as bait.

In 1994, I set up a trial in Craigieburn Valley near Arthur's Pass, using hen eggs injected with 1080. This quick-acting poison is used for possum and rabbit control, and kills stoats within a few hours. Bait stations were designed with entrances large enough to allow stoats to enter but too small to allow them to remove the poisoned eggs. This forced stoats to eat the eggs inside the bait stations and prevented them leaving uneaten eggs available to non-target species outside the bait stations.

Video recordings showed stoats, possums and kea approaching the bait stations, but only stoats were able to enter and eat the eggs. The numbers of stoats eating eggs were reduced by about 86 percent within three weeks of the poisoned eggs being placed in the bait stations.

Because the use of 1080 is restricted, I tested the anticoagulant diphacinone the following year. Diphacinone is currently not used for pest control in New Zealand, but a similar anticoagulant, brodifacoum, is widely used under the trade name Talon for control of rats, mice and possums. Two trials were carried out with DoC's Stephen Phillipson and Graeme Loh – one in the Hawdon Valley near Arthur's Pass and the other in the Caples Valley west of Lake Wakatipu. Stoat numbers were reduced by 87 percent in the Hawdon and 85 percent in the Caples within two to three weeks of baiting with diphacinone-poisoned eggs.

Last summer, DoC used 1080 and diphacinone in research-by-management trials in the Hurunui, Hawdon, Landsborough, Dart and Catlins areas for the protection of mohua. Final results are not yet available, but the number of eggs eaten by stoats declined in all trials. In some trials, rats and mice also ate the poisoned eggs. The latter result is a potential advantage of the technique, because if both stoat and rodent populations are reduced at the same time this avoids the problem of one predator replacing another.

Radio-tagged stoats have proved essential for checking the effectiveness of the trials. Stoats are caught in live traps and a miniature radio transmitter attached to each animal before release. Each stoat transmits its own distinct signal so their movements and fate within the poison area can be monitored. When animals die they can be found quickly and autopsied to determine their cause of death.

While monitoring stoats this summer, DoC scientists Peter Dilks and Elaine Murphy found that the dose of poison that killed stoats during pen trials did not always kill wild stoats. They suspected something was amiss when radio-tracked stoats living in the poison grid did not die when large numbers of poisoned eggs were being eaten. One animal showed no effect after

ERIC SPURR

Hen eggs eaten by stoats inside bait stations.

A bait station with entrance restricted to allow entry by stoats but not by other species such as harriers, kea, and weka. The entrance is also small enough to prevent stoats removing eggs from the bait stations.

effects of these mammalian arrivals on native forest birds, though most examples of predation were anecdotal. We now know that avian prey has been identified by researchers as a major part of the diets of stoats and weasels in New Zealand, and several detailed studies have found that a large proportion of forest bird nests can be preyed upon by these animals as well as by rats.

One study, by Phil Moors, found that eight native bird species at Kowhai Bush, Kaikoura, lost 70 percent of their nests to predators – with stoats and weasels responsible for more than three-quarters of these. Doug Flack recorded a similar result for South Island robins in the same area: 55 percent of nests were preyed upon, with mustelids destroying 44 percent and rodents nine percent. Predation rates varied markedly between years, as did densities of mustelids.

However, neither study determined whether this high level of predation

eating an egg that had been injected with 1080 a week earlier, another became ill but quickly recovered after eating a freshly injected egg. Further trials with higher doses of 1080 found that all stoats died within a few hours of eating poisoned eggs.

A disadvantage of diphacinone and other anticoagulants is that stoats do not die until seven to ten days after eating a lethal dose. During this time they may continue to prey on birds. Consequently, I am now testing an alternative toxin, cholecalciferol, that is quicker-acting than the anticoagulants and doesn't have the use restrictions of 1080.

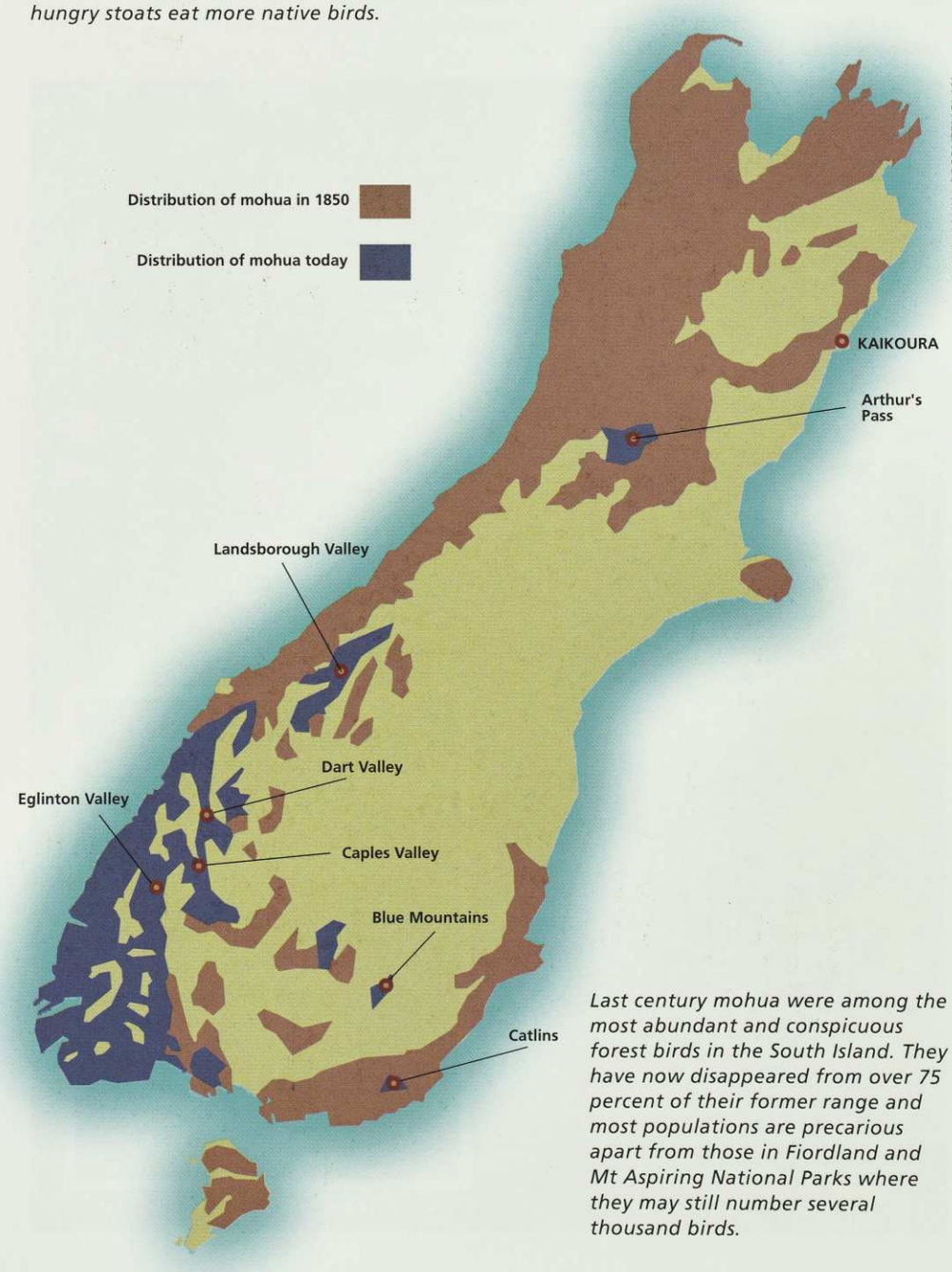
The concept of using poisoned hen eggs for stoat control is promising. Hen eggs are much easier to carry in the field than traps, and bait stations for poisoned hen eggs can be made much smaller and lighter than tunnels for traps. If large numbers of poisoned eggs (say five to ten) were placed in bait stations, they could be checked and replaced at one to two week intervals whereas traps must by law be checked every day. If poisoned eggs were used for longer than in the initial trials (two to three months rather than two to three weeks) even better results may be obtained.

However, research still needs to continue to find an alternative bait that will attract stoats and will be readily eaten, can carry a poison and will remain toxic to stoats over a long period of time – a tall order. Stoats are intelligent and cunning, and selective about what they eat. They are also well adapted to survive in New Zealand forests and are able to quickly respond to increased food supplies with a rapid increase in numbers. A long-life bait would be a distinct advantage in the battle to reduce their population.

Eric Spurr
Landcare Research, Lincoln

ROD MORRIS

Male flowers on a black beech. Every four to six years the massed summer flowering of beech trees is the forerunner to a phenomenon known as mast seeding. Autumn through to early spring sees vast amounts of seed fall to the ground leading to an explosion in mouse and then stoat populations – the latter feeding on the mice. As mouse numbers decline the hungry stoats eat more native birds.



FROM MOHUA RECOVERY PLAN

Last century mohua were among the most abundant and conspicuous forest birds in the South Island. They have now disappeared from over 75 percent of their former range and most populations are precarious apart from those in Fiordland and Mt Aspiring National Parks where they may still number several thousand birds.

reduced the long-term viability of the bird populations.

More recent studies of mohua, kaka and kakariki (yellow-crowned parakeet) confirm that stoats and probably rats are still having a major impact on mainland bird populations and that the process of decline is continuing.

DON GEDDES

Mohua search for food in the forest canopy, where they appear to thoroughly inspect leaves and twigs from all angles, and also in the lichen, moss and crevices on the trunks of beech trees. Spiders, weta, beetles, moths and other insects form the bulk of their diet.

ROD HAY

The work with mohua provides the first quantified evidence of the magnitude of stoat impacts on the long-term viability of a threatened endemic bird. Similar threats also face the New Zealand forest parrots, kiwi, kereru, robin, Hutton's shearwater, black stilt, takahe, and possibly other species such as our bats, kokako, and penguins.

FOUND ONLY IN the South Island, the mohua *(Mohoua ochrocephala)* is a small insectivorous bird which has disappeared from extensive areas of relatively unmodified forests since the arrival of Europeans. Historical records report that mohua were once among the most abundant and conspicuous forest birds in the South Island and Stewart Island and were present in most forest habitats of these islands – some 6.5 million hectares.

Mohua now only occupy about a quarter of their historical range (see map), and are continuing to decline. Their main predators are stoats. During most mohua

Climbing skills required. Peter Dilks gets a bird's eye view as he climbs up to examine mohua nests in the Eglinton Valley and follow the fate of eggs and chicks. The work requires specialised rock climbing and caving equipment to reach the nest holes which can be 30 metres up in the canopy. If stoat control is effective, almost all nests produce young and no females are lost to predation.

breeding seasons stoats are uncommon and few nests are attacked. However, a heavy seeding of beech trees every four to six years produces a chain reaction that leads to high stoat numbers in forests the following summer. The increased food availability allows increased litter sizes and survival of young, and insect, mouse and then stoat numbers increase dramatically. Stoat numbers can reach plague proportions.

In two areas studied during several high seed years – the Hawdon Valley in Arthur's Pass National Park, and the Eglinton Valley in Fiordland – about 70 percent of mohua nests were preyed on, apparently by stoats, and about half of all nesting females disappeared.

In populations with low productivity, the period between crashes is probably insufficient for mohua numbers to recover

Keeping track of the stoats

RELIABLE MEASURES are needed to assess how effective stoat control operations have been.

Conservation managers often ask whether stoats are present in an area, whether they are present in sufficient numbers to threaten a particular species or wildlife community, and if sufficient have been killed after a control operation to reduce or remove that threat.

Stoats were first radio-tracked in New Zealand by Elaine Murphy and John Dowding in 1990. Working in the Eglinton Valley, one of their first challenges was to come up with a radio-transmitter package that would stay on a stoat. By the end of the two-year study they had one, but it took considerable time (and a lot of frustration) to develop.

The study gained information on stoat home ranges, movement patterns and eating habitats. One of their main findings was that stoats were very mobile and covered large distances quickly. They regularly had stoats moving more than two kilometres in three to four hours, just while foraging in their normal – average about 120 hectares – home range. One juvenile female travelled 65 kilometres in four weeks.

As part of the Westpac sponsorship supporting DoC's Mohua Recovery Programme, the use of footprint tracking tunnels to work out whether stoats are present in mohua areas, was investigated in 1994.

These tracking tunnels provide a technique which has potential to assist in all levels of stoat population assessment. While the ultimate measure of the success of a control operation is significantly improved productivity and survival of the threatened species being protected, such detailed measures are not always possible.

Information on how much the stoat tracking rates vary (for example, how many footprints you record in an area per week, and how this changes over time), and whether footprints decline significantly or disappear after a stoat control operation, is needed.

To record the stoat footprints we are using special tracking tunnels. The tunnels contain a foam pad treated with a special concoction of chemicals, and treated papers are placed either side of this chemical ink pad. When a stoat runs through the tunnel its footprints are recorded permanently on paper.

Baseline information on tracking rates was gathered from November 1994 and February 1995 and the tunnels were useful for showing if stoats were present in the study areas.

Some declines were recorded after trapping and poisoning experiments. No footprints were found in one study area after all radio-tracked stoats were known to have been killed. After one week of poisoning and the death of half the radio-tracked stoats, the tracking rate in that area was also halved. Tracking also showed that at least one stoat remained in an area where we conducted Fenn trapping once trapping had ceased.

JANE SEDGELEY

JANE SEDGELEY

Footprint tracking paper (above) has shown that stoats seem to frequently visit the poison egg tunnels (right) but not eat the poisoned egg. Eggs appear to an effective lure but animals may visit several times before eating the egg and being killed.

DEPARTMENT OF CONSERVATION

Peter Dilks and Colin O'Donnell about to check a mohua in the Eglinton Valley where they have two study areas monitoring around 50 mohua pairs. Mist nets are erected under the forest canopy to catch the birds. Most of the adults have now been colour-banded and their nests located.

fully from high levels of predation. In the Eglinton Valley, for example, five years after the last stoat plague, mohua numbers have still not reached their former levels.

Mohua are more vulnerable to predation than most other forest birds. In fact as far as defence against stoats is concerned they do almost everything wrong. They nest in holes so that nest predators not only eat eggs and chicks but also incubating adults which are unable to escape. Only females incubate, so nest predation causes a biased sex ratio among adults. They also have long incubation and nestling periods during which they are vulnerable to predation. Chicks are very noisy on the nest, making them conspicuous targets for predators. Mohua nest later than most other forest birds and are still nesting when stoat numbers reach their summer peak.

Most of these features are shared by other hole-nesting birds in New Zealand, unlike hole-nesters overseas which generally have well developed predator avoidance strategies.

These findings led the Department of Conservation to undertake more research on methods for predator control. DoC's "Hole-nesting Forest Birds and Predator Programme" has been investigating three fundamental questions:

- are predators still having a significant impact on the long-term survival of forest bird populations?
- can we predict when predators will affect forest bird populations?
- can we increase the productivity and health of forest bird populations by controlling predators?

The programme, which has been running since 1990, has made considerable progress towards identifying the benefits of stoat control for native wildlife and refining trapping and poisoning techniques so that cost-effective control can be achieved over large areas.

PETER DILKS, Graeme Elliott and myself have been studying the nesting success of mohua in areas where stoats were both trapped and left undisturbed. During the last stoat plague in 1990, a 50-hectare block of forest was trapped intensively. Sixty-two stoats were caught during the breeding season and 80 percent of mohua nests were successful. However, only 36 percent of nests were successful in a similar-sized untrapped area and a high proportion of adult females were eaten by predators.

Mohua pairs produced nearly twice as many young in the trapped area from fewer nests. In the two years following the stoat plague, nest success was higher than previously recorded in both trapped and untrapped areas, indicating that trapping in non-plague years is also beneficial.

The success of this operation showed that intensive trapping can be effective at controlling predator numbers to a level that benefits threatened bird populations. This suggests that further development of stoat control techniques is warranted. The costs of not controlling stoats will lead to severe impacts on New Zealand wildlife communities in the longer term, and management of predator populations will be essential if mohua, and probably other wildlife populations, are to recover in the future.

COLIN O'DONNELL

Fenn trapping has been the traditional method of stoat control. While effective it is very labour intensive and costly. Traps are expensive and need to be set in tunnels so that non-target species are not caught. By law, traps have to be checked daily. Other methods of control, especially poisoned eggs, are now being tried.

Success was, in part, due to extensive trials of the effectiveness of trapping stoats using different bait types, tunnel designs and trap positions, during and following stoat plagues. The result is more effective prescriptions for control operations.

DoC is now doing more research to develop and refine control techniques in order to sustainably control stoats over large areas. Current projects include the development of poisoning strategies for stoats, designing the most effective layout for traps or poison baits, and understanding the "flow-out" effect and potential benefits of controlling stoats in small areas on neighbouring forest. Trapping could still be improved by finding even more effective lures and tunnel designs.

Mohua have a good potential for recovery if the factors that have caused their decline can be eliminated or reduced significantly. They lay up to four eggs, and are capable of raising two broods a year. DoC's Mohua Recovery Programme is now up and running. The programme is important because it also addresses conservation problems being faced by many other endemic forest birds on the mainland. Successful mohua recovery has implications not only for other hole-nesting species such as kaka, parakeets and robins, but for the whole forest bird community.

The long-term goal of the programme is to maintain and enhance mohua populations throughout their present range and beyond, by halting and reversing the degradation of the forest ecosystem. Eleven key sites for initial protection have been identified and predator control programmes are in place.

Westpac is sponsoring part of the recovery programme. The bank's Avian Domestic Insurance scheme uses the mohua as a "cover bird" and this is contributing $60,000 over three years to developing stoat control methods in the Eglinton Valley.

Promoting public awareness of mohua and of the values and ecology of mainland forests is another major aim of the programme. The mohua is one threatened species which is still accessible to the public in mainland forests. Managing the species within these habitats is a priority so that people will be able to see mohua, and other native forest birds, with ease in the future.

Stoat control operations are an increasingly important part of other threatened species recovery programmes in New Zealand. New approaches and attitudes towards the role of predator control in conservation management are now developing. Predator control is now a basic tenet in some threatened species recovery programmes, and controlling both introduced predators and competitors in large "habitat islands" on mainland New Zealand is becoming a reality.

As stoat control becomes integrated with other wild animal control initiatives, its cost-effectiveness will improve. The next challenge is the development of techniques for multi-species control programmes so that the full range of pests affecting our forests can be controlled at one time. ◆

Acknowledgments
Thanks to Elaine Murphy and Peter Dilks for their contributions to this article.

COLIN O'DONNELL *is a biologist with the Science and Research Division of the Department of Conservation in Christchurch. He is leader of DoC's Mohua Recovery Programme.*

ROD MORRIS

What happened to the Kauri national park?

After nearly 100 years of advocacy, the remnant kauri forests of Northland have at last been officially recognised as a great national treasure. If Maori claims across them could be settled, reports GORDON ELL, these areas would be in line to become New Zealand's fourteenth national park.

DURING THE 1980s Forest and Bird helped to develop a proposal to link Northland's kauri forests in a new national park. The society mounted a campaign, forged alliances with local businesses and local government groups, and published a calendar, poster and a number of campaign brochures.

Much of the campaigning since then has been of a more back-room variety. Because of Treaty of Waitangi claims over the whole area, progress has been governed by the changing political climate.

Now an interim report from the New Zealand Conservation Authority, the statutory body which has the job of investigating and recommending natural areas for protection, recognises several of the Northland forests as being of national park quality.

The report, however, stops short of recommending that the government confer national park status immediately, suggesting instead that Treaty of Waitangi

GORDON ELL/BUSH FILMS

The distribution of the ancient but threatened kauri snail coincides with the historic range of kauri forests. The snails feed on worms and insects and are highly mobile, travelling several hundred metres on moist, humid nights. With a thick, limey shell up to 75 mm in diameter, the snails are protected from birds and rats but not wild pigs which ravage their colonies and habitat.

claims over the affected Crown land need to be resolved before "any effective progress" can be made.

Focus of the proposed kauri national park is very broadly the Hokianga region, but the concept stretches to include historic gumland reserves near Kaitaia in the north and the extensive Waipoua Forest and Trounson Reserve in the south. It also stretches inland across the Northland isthmus to include Puketi and Omahuta forests, nearer the Bay of Islands. The lands found to have national park qualities total 76,458 hectares and are all currently reserves managed by the Department of Conservation.

National park status would give these areas a higher status in the hierarchy of protected areas in New Zealand, and would also provide a greater level of international recognition of their ecological values.

The outline of the suggested park follows some eight years of investigation during which more than 96,000 hectares of Crown land in Northland, in some 33 reserves, were assessed for their national park "values". These are defined in law to include natural features so beautiful, or ecological systems so scientifically important or unique, that their preservation is in the national interest.

The concept of a national park made up of fragmented areas is revolutionary. Whereas New Zealand's thirteen other national parks are all extensive areas of wilderness, Northland's forests are but islands in a settled landscape, albeit often large ones. Yet the very nature of these forests, usually standing proud on plateau and mountain range, makes them a vital inter-connecting element in the Northland landscape. There is a further unity in that each represents a different aspect of the kauri forest, or the Northland forest type – from the younger kauri forests and various mixed stands, to the mature giants of Waipoua or the abandoned kauri gumlands of Ahipara.

WHILE STILL impressive, the kauri forests of the north are only tiny remnants of forests which once stretched from the Far North, south to the Waikato, Coromandel and northern Bay of Plenty. While cleared in many places, they still covered more than a million hectares when the first European traders came looking for spars in the late 1790s.

Today less than one per cent remains unmodified, some 7,500 hectares, and these are protected in Crown hands. Another 60,000 hectares are regenerating secondary forest, mostly in Northland, and now the focus of the national park proposal.

The giant kauri trees, living perhaps to 2,000 years or more, are part of a forest type influenced more by subtropical climes than by the subantarctic which has shaped our other national parks.

A major part of the campaign to give these kauri forests national park status dwelt on the fact that none of the existing parks recognises the values of New Zealand's subtropical trees and plants. Trees such as the pohutukawa and the mangrove growing in the sea, are spectacular examples of native species which are not currently recognised in a supposedly representative system of national parks.

In all, the rich northern forests contain more than 600 different tree and plant species. That diversity includes many other regionally restricted forest trees, such as the leathery-leaved taraire, the mulberry-like whau, tanekaha, puriri, wharangi, and a host of other smaller trees and shrubs.

Some of these warmth-loving species may occur further south, just as southern rainforest trees often grow with the kauri. Yet, the northern forests also harbour 125 plant species not found naturally elsewhere. Some six percent of New Zealand's native flora is peculiar to the north.

Kauri itself usually grows with other trees in a mixed forest. Occasionally, perhaps along a sunny ridge, kauri dominates for an hectare or so, while elsewhere it grows in association with other rainforest trees in a more familiar Northland jungle. Forest descriptions such as podocarp/hardwood/kauri forest and kauri/hard beech forest link the dominant large trees with their associated species. Thus the kauri is seen as the common symbol uniting the various reserves in the proposed park.

The kauri park boundaries would also

E. Mervyn Taylor's wood engraving of Te Matua Ngahere, "Father of the Forest", one of the famous giant kauri of Waipoua.

GORDON ELL/BUSH FILMS

A ridgeline of healthy regenerating kauri – almost ninety percent of Northland's remaining kauri forest is secondary regrowth. Here the slopes below the ridge are dominated by other rainforest trees.

protect a range of animals, some peculiar to the region. New Zealand's two rare bat species occur in the forests. During the process of investigating the park proposal, further populations of the endangered kokako were discovered. Remnant populations of kaka and red-crowned kakariki depend on the shelter of these forests as do brown kiwi, kereru and the threatened kauri snail. Significant populations of lizards and native fish are recorded.

Besides forests, the park would include some scenic areas, notably the giant white sand dunes at the northern entrance to Hokianga Harbour. The Kahakaroa big dune, rising 200 metres from the ocean, has been cited as a scenic equivalent of the glaciers which infiltrate the forests of some southern parks. There is also an extensive area of historic gumlands included, above Ahipara, running south from Ninety Mile Beach.

Proposals to include the magnificent cliffs of Maunganui Bluff, rising 400 metres above the ocean, and the wild and scenic Kawerua coast, west of Waipoua, were passed over because of findings by the Waitangi Tribunal in favour of the Te Roroa tribe.

The major components of the park, however, are forests: running along the northern shores of the Hokianga harbour, and along the Maungataniwha Range from Herekino Forest to Puketi and Omahuta; and on the southern shores, the forest masses of Waima, Mataraua and Waipoua with outliers at Trounson Kauri Park, Kaitui and Kaihu, further south. The three major blocks are each big enough in themselves to meet the criterion of "sufficient scale" for conventional national park status.

This focus on the western coast of Northland helped to give the concept a unity; indeed as an option in the investigation it was known as the "Hokianga model" – a generous sweep of mature forests loosely focussed about the Hokianga Harbour.

There were some gems that did not make it including Pukekaroro, in lower Northland, where a landmark hill clad in younger kauri diverts Highway One in a broad curve; originally this hill, with its historic stone pa, was to be a gatepost for travellers entering the region to enjoy the park. Unfortunately, as the forests were

tested against the criteria for a national park, many of the linking kauri "islands" fell off the plan; places like Motatau and Hikurangi in the centre of the region, and Ruakaka and Waipu Gorge in lower Northland. Ultimately, Pukekaroro stood too far apart from the kauri heartland in the west. The proposed park boundaries now end on the northern slopes of Tutamoe, north of Dargaville.

The more significant exclusions, however, are on the east coast. Both Lake Ohia, a 30,000-year-old fossil kauri forest at Karekare Peninsula, and the extensive Ranfurly Bay reserve about Whangaroa Harbour were seen as too different and distant from the horizons of Hokianga to help make up a whole. The Bay of Islands forests were similarly rejected but also suffered by comparison from the intrusion of pine forests, logging damage, poor public access and invasive weeds.

ARGUMENTS for protecting the kauri go back nearly 140 years. In 1859, the geologist Ferdinand von Hochstetter complained the forests were being "ransacked and ravaged by fire and sword" and predicted the ultimate extinction of kauri.

In 1907 the botanist Leonard Cockayne argued for a national park at Waipoua. In 1948, Professor W. R. McGregor led a Forest and Bird campaign which raised 50,000 signatures and led to the creation of the Waipoua Forest Sanctuary four years later. Yet kauri and the northern forests generally stayed outside the network of absolutely protected reserves until the reorganisation of conservation administration in 1987. Only then, with the abolition of the Forest Service which managed most of the kauri, was it practicable to apply the National Parks Act to protect them.

Recognising this opportunity, local conservationists and park boards pressed for a special assessment of the wild lands of Northland and the creation from them of a Northland Kauri National Park. The fact that there were now only remnants of the former forests, simply served as further justification for preserving them with the maximum status.

After nearly a decade of renewed advocacy, investigation and public consultation, the arguments for national park status have been found to have substance. A new kind of national park has been defined in the mosaic of forests, unified by the past and present of the kauri.

As the authority's report notes, the frame of kauri forests standing above settled farmland and reflected in the tidal rivers defines the quintessential northern landscape today. The industries of kauri milling and kauri gumdigging created the North of today, just as the forests once helped condition the natural world of Maori. Now, for the first time, a New Zealand national park could take a large account of cultural history too, protecting plants, wildlife and scenery in a context of the local communities which have shaped and been shaped by the kauri.

Presently, however, the concept languishes. Maori tribes in recent years have lodged claims with the Waitangi Tribunal over all the forests in the park proposal. Until these outstanding Maori grievances are resolved, the Conservation Authority will not recommend that the government declare a national park. At the present rate of progress this could take many years.

As a Northland elder, supportive of the park proposal, said as Maori opposition grew – "Unfortunately, the Northland kauri national park has walked into the path of history". The findings of the Conservation Authority have, meanwhile, put a protective value on the remnants of the kauri forests and suggested how, given time and justice, they might one day be preserved. ◆

GORDON ELL/BUSH FILMS

Kauri usually grows with other trees in a mixed forest. Its huge crowns shelter a thick jungle of ghania cutty grass, the silvery astelia known as kauri grass (shown here) and fronds of nei nei and kie kie.

GORDON ELL *was involved in formulating the concept of a kauri national park while a member of the former Northland National Parks and Reserves Board. He is a former president of Forest and Bird and currently the society's nominee on the New Zealand Conservation Authority.*

Waikato magpie wars

Introduced into New Zealand from their native Australia in 1864, magpies are now widespread over both main islands, inhabiting forest edges and other more open habitats such as wetlands.

While not in the league of possums and stoats, magpies and mynas are increasingly being recognised for their damaging impacts on many native bird populations. JACQUI BARRINGTON examines some ingenious methods being developed for controlling these introduced pests.

OVER THE LAST three years, a Waikato valley east of the Hakarimata Range near Ngaruawahia has seen some innovative environmental work. Graham and Diane McBride began a programme of integrated landcare on the farm they've owned for 12 years. The work has included improving the wetlands, weed and pest control, and tree planting.

They tackled possums, hares, rabbits, feral deer, ferrets, cats and wild pigs. They dealt to the willows in the wetland that were choking the kahikatea and cabbage trees. They created three lakes, planted woodlots of black walnut and Tasmanian blackwood, set up a native plant nursery raising kahikatea, rimu and tanekaha seedlings, and planted at least 100 trees each year including some specifically to provide more food to encourage native birds. The trees thrived as did the wetlands. But no native birds returned.

Graham, who was born locally and has lived in the area off and on for some 20 years, mulled things over with the manager of the adjoining farm, Greg Barlow, and they came to the conclusion – somewhat reluctantly – that maybe the local increase in magpie numbers was to blame. Greg, an Australian by birth, was uneasy at the idea that these icons from

GEOFF MOON

JACQUI BARRINGTON

Philip Leyden with his double Larsen trap. The call bird's "suite" occupies the centre of the trap, while spring-loaded downward-sloping doors operated by a split perch, trap visiting magpies in the outside compartments. Philip is now manufacturing traps to order.

his country of origin might be the problem, but came around to the need to control their numbers.

It was Greg, using plans for a humane birdcage trap with two spring-loaded doors developed by a Danish gamekeeper in the 1950s, who knocked up a magpie trap. It was probably the first Larsen trap used in New Zealand.

Over the next two years Graham, Greg and a third adjoining landowner, Padam Malepati, trapped over 400 magpies between them. Graham advertised their work by stringing up the dead birds along his roadside fence. While some neighbours were disgusted and accused him of cruelty, the results speak for themselves.

For the first time in many years native birds have returned, along with small exotic finches. It is thought the three adjoining properties lie along a flight corridor from nearby native forest which the magpies had blocked. With the removal of the magpies, the corridor has been reopened, bellbirds are once again singing in the valley, and the first kereru in seven years and the first juvenile tui in 16 years have been sighted.

Some of those neighbours who criticised the programme have now thanked the trio and expressed their appreciation at hearing a dawn chorus of native birds once more.

BUT GRAHAM, Greg and Padam felt there was room for improvement. While Graham developed a lightweight version of the Larsen trap, Greg felt the Larsen was too small and obtained plans for a walk-in "letterbox" trap from the UK Game Conservancy. This trap is a free-standing structure, some 1.8 metres high and wide, and 2.5 metres long, with a wooden frame covered with wire mesh. The roof is recessed downward in the centre where a letterbox-style entrance is positioned the length of the trap with a number of wooden perches placed across it.

Once the magpies are caught, a quick blow to the head on a nearby fencepost stuns them. Then cervical dislocation (pulling their necks) or shooting in the back of the head with an air-rifle ensures a quick and humane death.

The trap is particularly suited to rural situations. It is far less labour intensive than the Larsen which must be continually cleared and reset. Its record is 16 magpies in one day. The secret of success is positioning, preferably on a hilltop with some tall trees nearby already favoured by magpies. Ideally, traps should be cleared late in the day when no other magpies are around. By limiting the amount of human involvement with the traps, other magpies hopefully won't associate them with people and will be less likely to get wise.

For those who worry about the caging of a wild bird, these traps are so efficient that the "call" magpie used to attract others to the trap can usually be changed daily, as soon as more are caught, thereby cutting to a minimum the time a bird is held in captivity. The call bird has a perch, a roof over its head, water and food in the cage (bread and dogroll go down a treat), and the bird rarely exhibits any sign of stress unless the cage is being moved.

Any trap should be firmly anchored to a fixed structure; on Waiheke Island two Larsen traps have been stolen, and in Hamilton call birds have been freed.

Greg and Graham are now looking at modifying the letterbox trap – by making the access smaller – to see if they can tackle the huge numbers of resident mynas. The trick will be to exclude harriers that otherwise come into the trap for a free lunch. The harriers can of course be released, but their presence prevents the capture of any further mynas.

IN ANOTHER part of the Waikato, at around the same time as Greg and Graham were developing their traps, engineer Philip Leyden was wondering what had hit the Owairaka valley near Te Awamutu, where he's lived for 25 years. Magpie numbers had rocketed from five in 1994 to around 40 the following year.

"It was like a scene out of Hitchcock's *The Birds*," he says. "They took over the skies and the land. Overnight the dawn chorus, apart from their own, dried up." Using his engineering expertise he modified the Larsen trap to a lighter, all-metal

The myna man

DAVID TINDALL spent much of 1995 painstakingly trapping 457 common mynas on Moturoa Island in the Bay of Islands. His research showed that when mynas were removed from an area, numbers of other birds quickly increased within the space of only a single breeding season. And the birds that bounced back the most were native birds, particularly tui.

Tindall, an Auckland University masters student, has suggested that for native birds, mynas may be the most threatening of the 36 introduced birds that have established in New Zealand since 1840. They are capable of colonising relatively unmodified habitats and have been reported in recent years in significantly increased numbers in a number of northern native forests.

The main impact of mynas on native birds appears to be through "interference competition" – physical attack, egg and chick destruction or other territorial behaviour – whereby mynas inhibit native birds from nesting in myna territories.

Tindall developed a trap for his research – a kind of cylindrical version of the magpie letterbox trap, but with ground-based funnels leading into it, and baited inside with copious amounts of bread and a call bird in a separate small cage. He reported that it worked well but is labour intensive. Avoiding all contact with the trap during daylight hours is essential.

With the enormous size of myna flocks – 1,000 in a single roost have been documented – it seems that baits using the avian narcotic, alphachloralose, are the control method of choice. A former Noxious Animal Board officer reports destroying some 3,000 mynas in a single operation.

Alphachloralose is legal for use by the general public at concentrations below 2.5 percent, and stupefies the birds painlessly for a short while, during which they must be dispatched, using the same methods as with magpies. Any uneaten bait must be gathered up.

Any non-target birds affected can be put in a warm dark place such as a cardboard box with ventilation holes placed in a hot cupboard, to sleep it off. Alphachloralose is also useful for catching your first magpie call bird.

GEOFF MOON

Myna and chicks in a nesthole taken from a New Zealand kingfisher. Introduced from Asia (via Australia) last century, mynas aggressively compete with many native birds for nesting sites. While mynas are most probably now a permanent part of North Island ecosystems as far south as Wanganui and Hawke's Bay, much research needs to be done on determining the effects of mynas on native bird productivity.

construction with four capture compartments instead of two, allowing two pairs to be caught at once. Over a six-week period he trapped some 70 magpies, before the native birds returned. His company, Leyden Fabrications, is now making traps to order, for sale at $350.

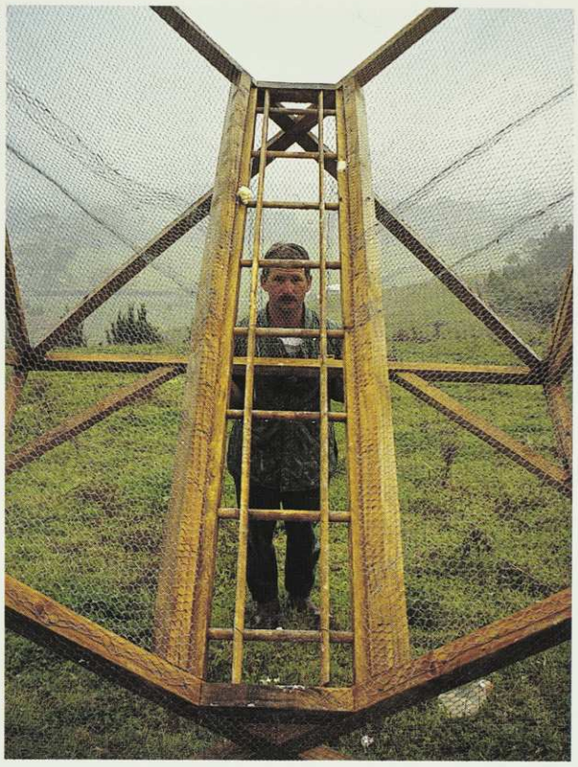
Magpies, and also mynas – unlike native avian predators of chicks such as harriers – appear to perform a kind of ethnic cleansing in their immediate area, playing a pivotal role in excluding native birds from mixed habitat like rural and urban areas with pockets of native forest.

Both species are also increasingly moving into bush areas and colonising the margins, with former tui nesting sites in the Urewera, for example, deserted since magpie arrival. The adverse effects of magpies and mynas are most severe when native birds are at their most vulnerable – at nesting time.

While the evidence that magpies impact on native birds is still largely anecdotal, it is convincing enough for the Waikato, Auckland and Northland Regional Councils to have included magpies in each of their Regional Pest Management Strategies – Northland's also includes mynas. In practice, however, the councils are only committed to handing out information to landowners on humane control methods, rather than to mounting control programmes themselves.

Official control programmes are

JACQUI BARRINGTON



Greg Barlow's walk-in "letterbox" trap and, right, Greg shows the entrance in the top of the trap with the wooden perches about 18 centimetres apart. The trap uses the lobster pot principle, and can work with or without a call bird. Copious amounts of mutton fat or dripping are placed along the perches and also on the ground inside the trap. Magpies are attracted down onto the perches, and when they spot the bait on the ground, fly down inside the cage, but cannot fly back out again. The door allows access to collect the magpies who tend to fly up into the corners of the trap. Spring and early summer are the best times to trap.

JACQUI BARRINGTON

unlikely until the level of effects of magpies and mynas on native birds can be quantified by hard scientific research. But this is the Catch-22. DoC, which has the statutory obligation to deal with threats to native fauna, has so far been unwilling to fund any research on the grounds that there is no "evidence" of the impacts.

Forest and Bird looks forward to the development of more research projects such as David Tindall's myna study (see box opposite). With a proliferation of threats now facing most native bird species, the contribution from magpies and mynas is one threat that should not be ignored.

To those who argue that the magpies and mynas are "just defending their families and territory" and that it's not their fault they were brought here, spare a thought for the harassed and displaced native birds whose nesting attempts are thwarted by the intruders, and who increasingly have nowhere else to go.

Note: Magpie/myna call tapes can be obtained from the Fish and Game Council, RD9, Hamilton for $10. Plans for the Larsen and the "letterbox" traps are available from Forest and Bird's Auckland and Wellington offices (please send a SAE). ◆

JACQUI BARRINGTON *is Forest and Bird's northern field officer and has led the campaign to have magpies and mynas recognised as significant pests of native birds.*

The YELLOWSTONE experience

lessons from the first national park

Bison or wild buffalo crossing a river in Yellowstone National Park. When European colonists arrived in North America, the bison population was over 75 million. A systematic slaughter (more than two million a year at its peak) wiped out two of the four subspecies and left only scattered remnants of the others. Yellowstone is now the only place in the world where bison herds have survived continuously since prehistoric times. Many migrate to lower-altitude areas outside the park for winter grazing.

THERE IS A BABBLE of conversation as the crowd is drawn, as if by a magnet, to the natural amphitheatre. Signs, and a solid boardwalk, halt the human throng at the edge of an expanse of grass. The crowd is remarkably well-behaved, rustling chip packets and slurping on cold drinks, ignoring the plaintive stares of scavenging squirrels.

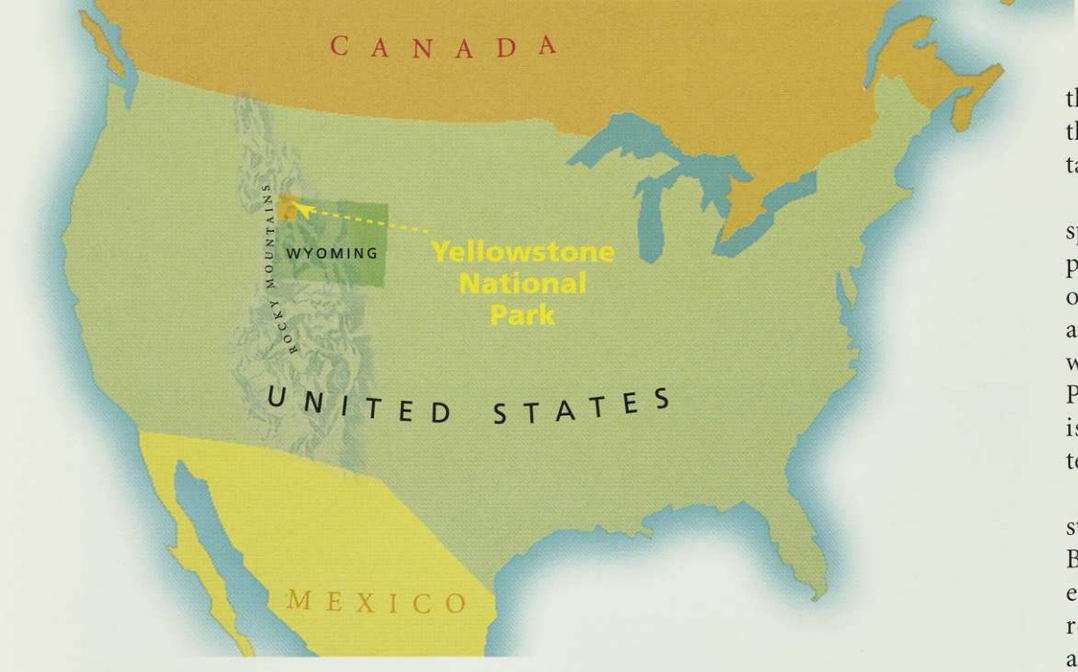
As everyone settles down, the conversation dies, and the scheduled time approaches. Then, at last, only three minutes late, the action starts. At first it is just a slight rumble, then a small explosion of steam and water, as if the lid of a boiling pot has finally lifted. Then comes a rushing, hissing roar and an immense column of steam and water powers into the air, dissipating and falling against the clear blue sky, blocking out the stark pine-forest skyline. A collective gasp of awe accompanies the frenzied clicking and whirring of

JEFF FOOTT PRODUCTIONS/BRUCE COLEMAN LTD

MIKE HARDING

Old Faithful is the most famous of Yellowstone's natural features, drawing visitors – more than 100 million people have stood and gazed at the spectacle – from all over the world. It is part of the extensive geothermal system that the national park protects. ▲

Booming visitor numbers and serious ecological disruption threaten national parks all over the world. Even the world's first national park – Yellowstone in the United States – has recently been placed by UNESCO on the List of World Heritage in Danger. MIKE HARDING visits Yellowstone and reports on possible lessons for New Zealand.



cameras. And, after only a minute or two, the spectacle is over; the geyser has – true to its name – faithfully performed again.

Old Faithful has been attracting crowds since Yellowstone, high in the Rocky Mountains in Wyoming, was set aside as the world's first national park in 1872. Containing over 10,000 geothermal features – a greater concentration of geysers, steam vents, mudspots and hot pools than the rest of the world combined – the park now attracts over three million visitors each year, sometimes 30,000 in one day. They are drawn to the area for the same reasons that tourists were drawn over 100 years ago – to view the spectacular natural features of this geothermal landscape and to experience nature untrammelled by human hand.

Yellowstone has become a world-renowned protected area, and the inspiration for national parks elsewhere. Its protection was an important milestone in the history of the USA – the blending of the growing philosophy of respect and protection for nature (espoused by east coast philosophers such as Emerson and Thoreau) with explorers' discoveries on the western frontier which confirmed that the country indeed possessed monumental natural scenery worthy of protection.

However, Yellowstone is not only special because it was the first national park. At almost 900,000 hectares, it is one of the world's largest national parks, and an important World Heritage Site. And, with the adjoining Grand Teton National Park and surrounding national forests, it is one of the largest relatively intact temperate ecosystems on the planet.

The park remains an important stronghold for bison, grizzly bear and elk. But perhaps its most important feature, especially to New Zealanders, is that it represents 125 years of the practical application of nature conservation theory. It provides a graphic illustration of the philosophical and ecological issues facing national parks in the USA and, to an increasing extent, New Zealand. Foremost among these is the challenge of defending conservation and wilderness values against increasing pressure for both recreation and tourism.

THE ORIGINAL purpose of setting aside Yellowstone National Park in 1872 was for a:

"public park or pleasuring ground for the benefit and enjoyment of the

Spectacular geothermal attractions, such as Mammoth Hot Springs provided the original inspiration for the establishment of Yellowstone National Park. One of the best known protected natural areas in the world, Yellowstone attracts over three million visitors every year.

MIKE HARDING

people [and] for the preservation, from injury or spoilation, of all timber, mineral deposits, natural curiosities, or wonders . . . and their retention in their natural condition."

Put simply, the area was protected for its monumental natural scenery and to prevent its despoliation by unscrupulous entrepreneurs, as had occurred at other natural wonders such as Niagara Falls. With only 10,000 visitors a year at the turn of the century, and caretaker management by the US Army, concerns about over-use and ecosystem protection were not major management issues then. In contrast, today's master plan for the park has translated the original purpose of scenery preservation to one principally focussed on ecosystem protection:

"To perpetuate natural ecosystems within the park in as near pristine conditions as possible for their inspirational, educational, cultural, and scientific values for this and future generations."

Changes in park management have been prompted by rapidly increasing visitor numbers, and by a growing realisation that protection of the natural features of Yellowstone requires protection of the ecological processes that link them.

Three major issues best illustrate the evolution of park management: the provision of visitor services; management of wildlife; and, the control of wildfire.

Visitor levels at Yellowstone rose only gradually until arrival of the motor car spurred a rapid increase to half a million visitors in 1940, over one million by 1950, and two million by 1965. To service these visitors, over 500 kilometres of paved roads, hotels, campgrounds, stores and visitor centres were constructed.

Maintenance of these aging facilities today soaks up almost half of the park's US$19.5 million annual budget. Furthermore, the Federal government has been compelled to embark on a US$300 million road upgrading programme. Visitors to the park face long queues at entrance stations, congestion on the narrow roads and full campgrounds. Park managers wish many of the roads and facilities had never been built, and now work at closing roads and removing structures. The next, controversial, step is to introduce a visitor limit – once the park is full, the gates will close. This will be unpopular but, park managers feel, it is the only way to protect park facilities and to enhance visitor experience. It has been an expensive lesson, and one that argues restraint in the development of facilities within parks.

MIKE HARDING

The much-maligned coyote is a natural resident of Yellowstone and suffered under predator eradication programmes earlier this century. The crucial role of predators in maintaining ecosystem stability is now recognised; the grey wolf, for example, is being reintroduced to the park.

Management of the park's wildlife, especially the large mammals, has also been difficult and controversial. Initially, animal populations were managed to provide hunting opportunities, to encourage visitor contact, and to address the concerns of surrounding ranchers. Plains bison were introduced to supplement the dwindling mountain bison herd, genetically mixing the populations. Wolves were eliminated to protect game animals such as elk, and cattle on adjoining lands, and mountain lions (cougars) and coyotes were dramatically reduced. Bears were fed park garbage at controlled feeding stations as part of the park's summer activities programme. The elk population was allowed to increase dramatically and then controversially culled.

Today, park managers attempt to protect essential winter grazing for bison and elk outside the park, but still cull hundreds of bison to reduce the chance of brucellosis transmission to cattle. An expensive reintroduction programme aims to re-establish grey wolf populations in the park (see box below), but only with a substantial compensation fund for ranchers who suffer stock losses. Elk, it is discovered, thrive on fire-dependent aspen regeneration which provides nitrogen critical for their winter diet. And, park interpretation now implores visitors to keep their distance from potentially

Bringing the wolves back to Yellowstone

AFTER 60 YEARS absence wolves are prowling Yellowstone National Park once again.

Eliminated from the park earlier this century, the grey wolf *(Canis lupus)*, has been reintroduced under an ambitious Endangered Species Act plan. After two decades of debate, fifteen wolves were transported from Alberta, Canada, in 1995 and placed in fenced enclosures in the backcountry of the park. The wolves acclimatised well and were then released into the wild. They have roamed over 80 kilometres from the release site and have produced pups.

The reintroduction plan aims to establish ten packs of wolves in the park by the year 2002. However, the plan has been strongly opposed by farmers in the region who have challenged it in the federal courts.

Compensation to farmers who suffer stock losses to wolves is available from an existing $100,000 nationwide fund. No claims have so far been paid in the Yellowstone area but seventeen different claimants have been compensated from the fund in other parts of the country.

Officials involved in the reintroductions say that so far they have succeeded beyond their expectations. Park managers hope that the programme will go some way towards restoring the original ecological balance provided by large predators in the park.

MIKE HARDING

Smokey Bear – bearer of the too-successful, but ecologically dubious, fire prevention message. Park managers now struggle to convince the public that wildfire is good – if not essential – for the parks.

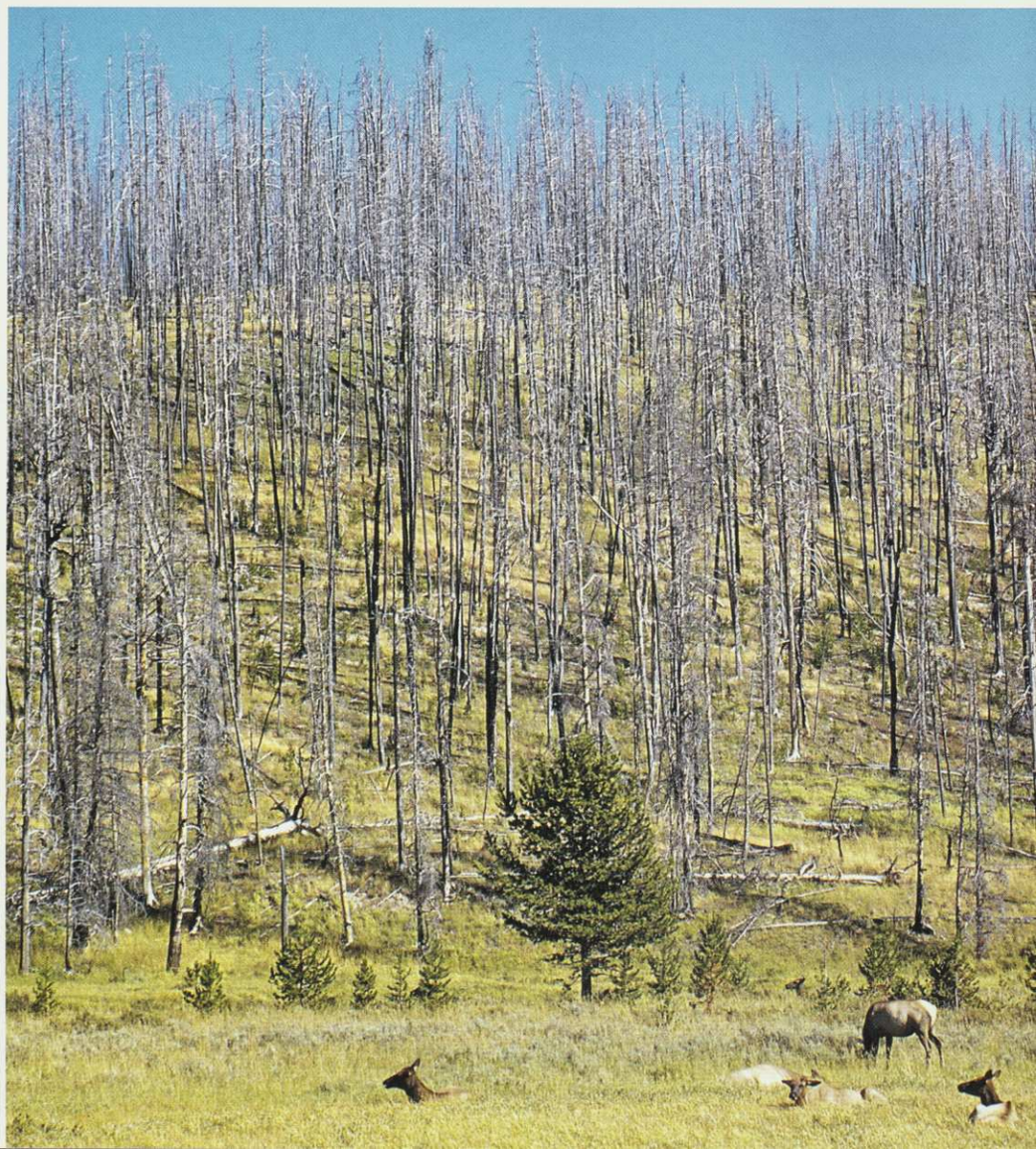
dangerous bears, and park managers prosecute visitors who fail to secure their food from bears in campgrounds. Wildlife management now also involves the protection of important habitat outside the national park, including lands managed by the US Forest Service (see box page 41).

However, perhaps most controversial has been the changing attitudes to wildfire suppression. In 1988, after years of Smokey Bear-style fire control, nearly 40 percent of the park burned during a hot dry summer. The nation was shocked and park managers were criticised. But the lodgepole pine *(Pinus contorta)* forest that blankets 60 percent of the park requires periodic burning for effective seed germination, and the meadows and aspen groves upon which grazing mammals are so dependent, are created and maintained by fire. Visitors to Yellowstone are now greeted by a patchwork of fire-damaged forest, and a carpet of very healthy pine regeneration. It has been a timely warning, park managers contend, about the need to respect natural ecological processes.

THESE LESSONS in nature conservation and park management can not be directly applied to a vastly different land such as New Zealand, where annual visitor levels to popular parks are measured in hundreds of thousands rather than millions; where large mammals are not part of indigenous ecosystems; and, where wildfire plays a very minor and sporadic role in natural vegetation succession. However, some important principles are relevant here.

First, the Yellowstone experience suggests that we should think carefully about how easy and comfortable we want to make access into protected areas, particularly national parks. Encouraging people to visit parks places emphasis on visitor numbers rather than visitor experience; quantity rather than quality. It can lead to congestion and costly facilities development and maintenance programmes. Parks have a role beyond that of other tourist destinations. They are natural shrines, providing opportunities – and sometimes the only opportunities – to contemplate and experience untouched nature.

To many people, the integrity of these shrines is reduced when we sully the park's natural environment with the everyday congestion and commerce of the built environment. However, that is exactly what we are in danger of doing when we chant the "two million visitor arrivals by the year 2000" mantra; when we consider major new roads in parks, such as the proposed Collingwood-Karamea road through Kahurangi National Park; when we open up pristine alpine areas to heliskiing in Mount Cook National Park; and when we promote competitive commercial running events through



Elk (introduced into New Zealand where they are known as wapiti) are indigenous to the Rocky Mountains of North America. In their native habitat they depend on open meadowlands that are created and maintained by wildfire – a natural ecological process at Yellowstone.

sensitive wildlife habitat in Arthur's Pass National Park.

In these instances we are promoting what American park commentator Joseph Sax calls "conventional service recreation", rather than "contemplative recreation". It is better, the Yellowstone experience suggests, to restrain, rather than encourage, park use; to limit facilities development to only essential structures and services; and, to concentrate on providing a rewarding interaction with nature for those visitors who make some personal effort to visit the parks on nature's terms.

Secondly, the lesson from Yellowstone is that, if New Zealand wishes to retain existing native plant and animal populations, we must continue to maintain and restore the full range of habitat that originally supported these plants and animals. Just as bison and elk herds depend on areas outside Yellowstone National Park, bird populations in our parks also utilise habitat beyond park boundaries. Kea leave alpine areas to feed in montane and lowland forests; kereru travel many kilometres to exploit seasonal food sources; kaka flock to lowland and coastal nectar supplies; and native fish in alpine streams require undisturbed river mouths and estuaries for successful breeding.

In theory, achieving complete habitat protection should be easier here where nearly all protected natural areas are managed by one government agency (DoC), than in the USA where management is split between several federal and state agencies. However, the loss of lowland, wetland, and coastal forest in this country means that habitat protection must frequently include habitat restoration, and that the linking and buffering of these restored areas with existing protected natural areas is critical. The cooperative management of public lands around Yellowstone National Park, prompted by the Greater Yellowstone Coalition, and the eventual linking of all major North American ecosystems, as proposed by the inspirational Wildlands Project (see box below), are two worthy models. These experiences suggest that, here in New Zealand, effort must be directed to restoring depleted lowland ecosystems, buffering existing protected areas, and linking both of these by restoring and protecting corridors of intact indigenous vegetation.

Thirdly, management of wildfire at Yellowstone has changed in response to the realisation that ecosystem processes must be protected. Although the present policy of allowing wildfires to burn is compromised by the need to protect structures within the park and property adjoining the park, it is still a deliberate attempt to maintain the area's original ecological processes. Wildfire does not play such a role in New Zealand's national parks, but other large-scale natural processes certainly do, such as the periodic and devastating forces of volcanism, erosion, and flooding. Park management should respect and accommodate these processes rather than attempt to control or divert them.

MIKE HARDING

Managing the surrounding ecosystem

YELLOWSTONE National Park protects only the core of the greater Yellowstone ecosystem which covers some 73,000 square kilometres – more than five times the size of Fiordland National Park and one of the largest relatively intact temperate ecosystems left on earth.

Twenty-eight public agencies exercise jurisdiction over this wider area and, to varying degrees, determine the future of the plants and animals that are components of this ecosystem. Threats to the ecosystem include a large proposed gold mine on federal land within a few kilometres of the park boundary.

In 1989 the Greater Yellowstone Coalition – a collection of over ninety groups and thousands of individuals – launched the Greater Yellowstone Tomorrow project. This five-year project aimed to create a blueprint for the sustainable management of the area by encouraging its coordinated management, and by improving the understanding of both the ecological and economic trends in the region.

Increasingly, federal agencies have coordinated their management of adjoining protected lands. Managers of both the national forests and the national parks now meet on the Greater Yellowstone Coordinating Committee to resolve important issues and to improve communication and coordination. The Greater Yellowstone Coalition hopes to eventually ensure that the associated private rural lands are also managed to conserve wildlife. In the long term it hopes to link and sustain the natural wealth of the greater Yellowstone ecosystem by "living off the interest the landscape provides, rather than drawing from its capital assets".

Meanwhile other conservationists are thinking on an even larger scale. While the Yellowstone region is a huge relatively intact ecosystem, it is isolated from other remnant natural areas in North America by modified lands.

As in most parts of the world, including New Zealand, protected natural areas exist only as disjointed fragments in a matrix of people-dominated lands, depleted of their indigenous character. Many parks and reserves are severely compromised by the loss of surrounding lowland habitat, the lack of connections to other protected areas, and inadequate buffering from adjoining land uses.

The visionary Wildlands Project is a response to this problem. The project aims to allow the recovery of whole ecosystems and landscapes in every region of North America by protecting or establishing a connected system of reserves. Its focus is on maintaining existing protected areas and establishing effective links between these areas. Its long-term vision is a situation where human habitation exists within a matrix of protected natural areas, rather than protected areas being isolated within a sea of modified land.

Trout v trout

MIKE HARDING

Yellowstone Lake, a major feature of the national park but where native cut-throat trout are threatened by recently introduced lake trout. Behavioural traits of the two species are distinctly different. In late spring and early summer, cut-throats move from the lake to spawn in the shallow confines of the Yellowstone River and various tributaries where they are eaten by their natural predators. Lake trout, meanwhile, are fish that dwell and spawn in deep water, thus making them inaccessible to the animals that depend on cut-throat trout.

UNTIL TWO YEARS ago, the 35,000-hectare Yellowstone Lake – one of the country's largest, highest and coldest lakes – was thought to be one of its least-modified aquatic ecosystems as well.

The lake contains a pure genetic strain of native cut-throat trout that are a nutritional staple food for 43 species of mammals and birds in the national park. The lake and the Yellowstone River, which flows out of it to the north, represented the last major haven for this species on the continent.

Then, in 1994, introduced lake trout, a voracious predator of cut-throat trout and other fish, were discovered in the lake.

The disruption to the ecosystem could be extreme. "To say we're on the verge of an ecological disaster here is stating it mildly," claims John Varley, director of the Yellowstone Centre for Resources, which coordinates scientific research in the park. The cut-throat population could be reduced by up to 90 percent, causing ripple effects across the ecosystem.

Yellowstone is not alone with these unwelcome intruders. Across the western states lake trout have devastated native fish populations in hundreds of lakes. Varley says it is part of a growing problem where zealous fishers illicitly transplant all kinds of non-indigenous sport fish into tarns and waterways where previously they did not exist.

"This whole business of stocking exotic fish is an epidemic," says Varley. "It's so widespread that in 10, 20, maybe 30 years there won't be a decent-sized lake with native trout left in it."

Initially, biologists assumed that the dumping of lake trout in Yellowstone Lake had been a recent phenomenon, and that they had 20 or 30 years to devise a strategy. But recent surveys have turned up larger-sized lake trout than expected, indicating that not only have they been present for years, but they are also actively reproducing.

Park officials have considered a range of radical options to control the exotic intruders including a plan for this current (northern) summer to lay down a web of industrial-strength gill nets in the lake to try to capture and kill mature lake trout before they reproduced. Holes in the webbing would be big enough to allow cut-throats to escape.

But scientists realise that total eradication of the lake trout is unachievable.

"We can attempt to control them," says Lynn Kaeding, a biologist with the US Fish and Wildlife Service, but the kind of control we're talking about is a forever proposition if we want to save the cut-throat population. Long into the future, it will represent a maintenance responsibility . . . just like patching potholes in the road."

Todd Wilkinson

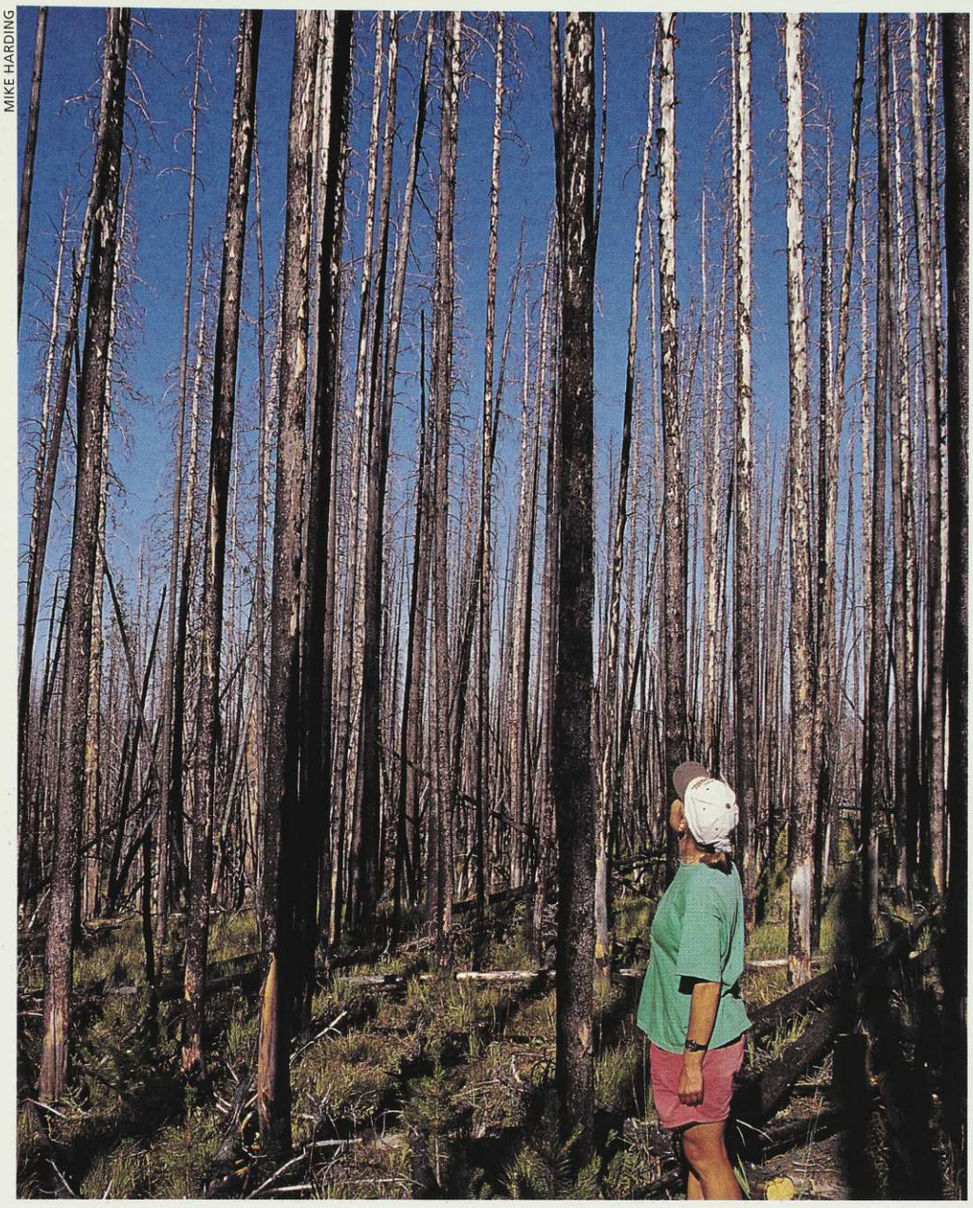
Perhaps a more important issue in this country is the control of the many introduced plants and animals that have upset the original ecological processes in our protected areas. Just as the exotic lake trout threaten native cut-throat trout in Yellowstone Lake (see box above), introduced fish have contributed to the impoverishment of New Zealand's indigenous freshwater fauna, and possums threaten many native bird populations in our forests. And while New Zealand already has an enviable record of successful pest eradication programmes, the Yellowstone experience suggests that we need to increase our efforts. Sustainable long-term biological control agents for major pests need to be developed; comprehensive pest control programmes, such as DoC's "mainland island" restoration programmes, should be extended to cover representative samples of all major ecosystems; and the killing of native animals, such as kereru, should remain prohibited.

PARK MANAGERS in the United States and New Zealand face similar problems and challenges. The ecological pressures here in New Zealand are at least as critical as those facing protected areas in the USA. The major difference between parks in the two countries is visitor pressure. There are almost 250 million people living in the United States and their national parks receive over 300 million visitors a year. Compare that with our population of 3.5 million, and annual international visitor arrivals of less than two million.

Congestion is not unknown in New Zealand parks, but it is certainly not commonplace. Neither is it difficult to experience wilderness and solitude in our parks, even within a few minutes of a road. However, this is not because of any conscious policy decisions on our part; it is simply a consequence of our relatively small population and geographic isolation.

As you enter Yellowstone National Park in summer the impressive natural scenery cannot completely distract you from the other visitors. After queuing to pay your entrance fee you need to plan ahead to avoid road construction works and to secure a tent site in one of the campgrounds. To reach the famous natural features like Old Faithful, Mammoth Hot Springs, or Yellowstone Falls, there really is no choice but to join the thousands of other vehicles that negotiate the park's narrow roads, and then to join the throngs of people on the paved trails – as if on a city street – for a closer view.

MIKE HARDING



Lodgepole pine (Pinus contorta) *seedlings flourish under the open canopy of their fire-damaged parents. In what ecologists claim was the best thing to happen to the park for years, fires ravaged 40 percent of Yellowstone in the summer of 1988.*

Buffalo or elk sighted on the roadside create tremendous traffic jams and fishers jostle for space along the Yellowstone River. This is not to say that the park is not well managed, and that you cannot still gain a wilderness experience if you leave your vehicle and head for the backcountry. Rather, it is a reflection on the huge numbers of people visiting the park during the summer months and the almost total reliance on the private motor car and the existing facilities.

While in New Zealand there is no urgent need to limit park use in most places, there certainly is a need to plan ahead to prevent excessive use and, if it occurs, to deal with it appropriately. The worst of the problems experienced at Yellowstone can probably be avoided by keeping motor cars and other machines out of parks; by limiting facilities development; and by encouraging contemplative recreation over conventional service recreation.

An acceptance that some uses of parks are more appropriate than others – that parks cannot be all things to all people – would be a good start. And, of course, the continued protection and restoration of the ecological integrity of parks remains of prime importance. The last thing we can afford to do is to be complacent. The people pressure facing parks in the USA will eventually confront us here. No one will thank us if we squander this opportunity to learn from the experience of those who have already suffered. ◆

MIKE HARDING *is a conservation consultant living at Arthur's Pass, and a former field officer for Forest and Bird.*

JACQUI BARRINGTON visits a new member of Forest and Bird's national executive and a passionate advocate for conservation in the Far North.

Winch's way

defending nature in Northland

ASCENDING THROUGH thick forest on a steep four-wheel-drive track out of Totara North, visitors could be forgiven for thinking they are approaching the retreat of someone who's turned their back on the world. But, to the contrary, the house at the top of the ridge – the home of Linda and Michael Winch – is the nerve centre for some of the more important environmental work currently being done in Northland.

Surrounded by 75 hectares of native forest, the house embraces a 180 degree vista over Mangonui Forest extending to the coast, while glimpses of Whangaroa Harbour appear between regenerating kauri rickers.

Here Linda prepares submissions for the Far North branch of Forest and Bird to all district and regional plans, scrutinises resource consent applications, has become something of a water extraction "expert" when she blew the whistle on grandiose pasture irrigation schemes (see *Forest & Bird* May 1994), raises funds for various conservation and restoration projects and tends her small personal native plant nursery.

When away from home, she may be attending the Northland Regional Council's Environmental and Rural Services Subcommittee meetings as their environmental representative – a position her persistent lobbying helped create some two years ago.

Or she may be out surveying Northland DoC's Protected Natural Areas network, a part-time contract position she has held since mid-1994. She revels in the fieldwork for its capacity to extend her ecological knowledge and skills, and also for the unparalleled opportunity of getting to know the special corners of Northland. Areas like the Ahipara gumlands plateau, or the coast north of Mitimiti threatened with neglect, grazing and forestry development, or Te Arai, the last remnant of pohutukawa coastal forest on the Aupouri peninsula but currently at risk from horses.

Prior to taking on this work she was part way through a BSc in plant science from Massey University – which included writing a natural history of North Whangaroa, covering the rare and threatened plant species of her own property. She plans to resume her course within the next two or three years.

The Winches purchased their Totara North property in 1987 when they were still living in Auckland's Wood Bay. As Michael is a civil engineer – he recently finished designing and managing the upgrade of the state highway through Waipoua forest – they spent the following two summers creating the access track themselves, including several stream crossings.

At the end of 1989 they sold their Auckland home and moved into a tiny caravan on site where they spent the next ten months building their new house. "It's amazing what two people can achieve with pulleys and ropes," says Linda wryly. They designed it as a showcase for pine, and installed solar power and water heating.

To minimise vegetation clearance, the house sits on an old logging skid where it was crossed by a pig hunters' track. The design and orientation were further dictated by the presence of a large kauri – now visible just outside the bathroom window – and a mature kawaka tree which sprouts through the deck.

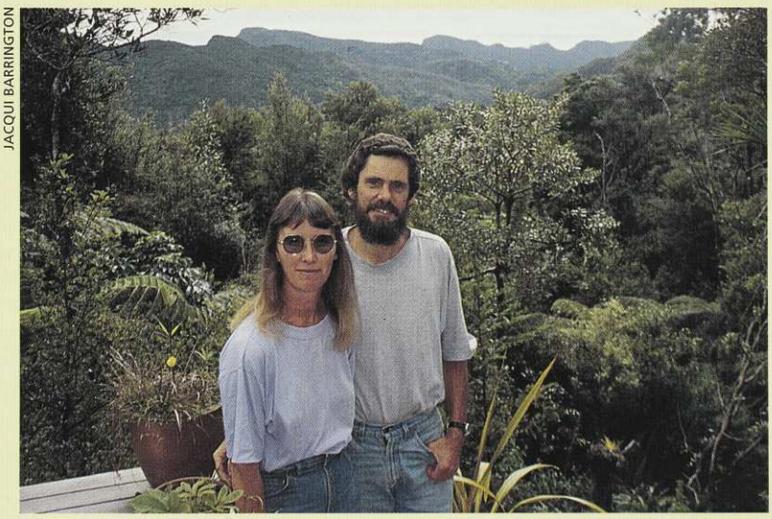
The Winches organised a QEII Trust covenant over their forest soon after they bought it. "Being here has taught me the real responsibilities of living in such a wonderful place," says Linda. "The heavy obligations to protect our native species and control plant and animal pests."

DUE TO ITS HIGH ecological rating, the Winches' property was included in DoC's 1080 drop over the adjoining Mangonui Forest in 1994. Their forest had only ever been selectively logged and never burnt, and contains more than 200 indigenous species of higher plants including 20 native orchids, and notable wildlife such as tusked weta, kauri snails and pied tits.

After the 1080 drop, Linda and Michael observed a huge improvement in forest health. But they still keep a selection of possum traps as well as ten permanently set bait stations – all positioned well up off the ground to protect the resident kiwi pair. Linda lights up as she recalls the first probe holes she and Michael found in a potted native seedling, and the night the female kiwi woke them by screeching right under the bedroom window.

Linda was born in 1954 in Pukekohe East, the winter her father put the cows into the bush to graze. Originally from Cornwall, his was one of the first immigrant families to arrive in Franklin District in the 1850s. Her mother was also from an immigrant English family arriving some 40 years later.

Childhood memories include events that belong to a less ecologically aware past – totara regularly sacrificed for the family Christmas tree, puriri felled for firewood, and sliding in nikau frond boles down bush slopes devoid of any understorey.



JACQUI BARRINGTON

However she points with pride to her maternal grandfather, who died when she was only 14 months old, and who donated several hectares of a Mahurangi headland for conservation.

At Pukekohe High School she excelled in the arts, maths and biology. Contemplating joining the diplomatic corps or doing social work, she eventually obtained a BA in English and history from Auckland and Victoria Universities and went on to teach. She met and married Michael during her student days, moving back to Auckland with him from Wellington in 1975.

Four years later the young couple embarked on their big "OE", visiting North America, Britain, parts of Africa, the Indian Ocean and Asia. The pollution they witnessed in northern hemisphere industrial regions made them acutely aware of the very special qualities of New Zealand and turned them into active conservationists. Michael's family had always enjoyed camping and tramping, and on their return they settled in the Waitakeres.

Galvanised by a Stephen King slideshow of Pureora logging in 1982, Linda joined Forest and Bird and the Native Forests Action Council and has been writing submissions ever since. "Just do it," she says. "Don't be intimidated, it's like composing a letter. You get better with practice."

Linda stayed a member of NFAC until 1991 when its philosophies took unpalatable directions and she turned her attention and skills to Forest and Bird. Since 1992 she has been secretary and then chair of the Far North Branch.

Under Linda's leadership the branch's sheer tenacity has won the grudging respect of local authorities. It is now consulted over resource management and wider environmental matters. With an active committee, the bank balance also looks distinctly healthier, boosted by good local sales of Forest and Bird diaries and calendars – more last year than any other branch. "You don't need a great brain or outstanding courage," she says. "It's the kind of unglamorous work like staffing stalls that will keep the society alive and financially afloat."

Four years ago the Far North branch, working closely with DoC, undertook the revegetation of Motupapa Island in the Kerikeri Inlet. This has given those involved enormous satisfaction and also led to Linda receiving a DoC conservation award in 1993.

The ambitious Whangaroa Ginger Project was set up in the same year under the auspices of the branch, with Linda as convenor of the nine-member committee. In collaboration with DoC, and funding from the Lottery Grants Board, it has coordinated five Task Force Green employees who have cleared 70 percent of Whangaroa's massive ginger infestation.

Linda marvels at the amazing diversity of Northland plant and animal life, and bewails the inadequate regional and district plans which refuse to take into account natural values beyond soil erosion and water quality. The branch's appeal on the Northland Regional Policy Statement for its inadequate protection of the natural environment will soon be heard by the Planning Tribunal.

Other threats to Northland's dwindling native wildlife and habitats are the clearance of regenerating shrublands – a stronghold for many kiwi – to fuel the boom in plantation forestry. Plus an ignorance of the threats to kiwi from pig dogs, and the spread of invasive forest plant pests like mistflower – which Linda insists should be renamed mistweed.

Cannabis growing, pig-hunting and kereru shooting – all often targeting conservation lands – are on the rise. Many of the conservation issues of the Far North are overlain with the huge unemployment levels and racial tensions of the region. It is one thing to tackle challenging conservation problems, but Linda sometimes despairs that the social and racial factors driving many of them are so complex and seemingly intractable.

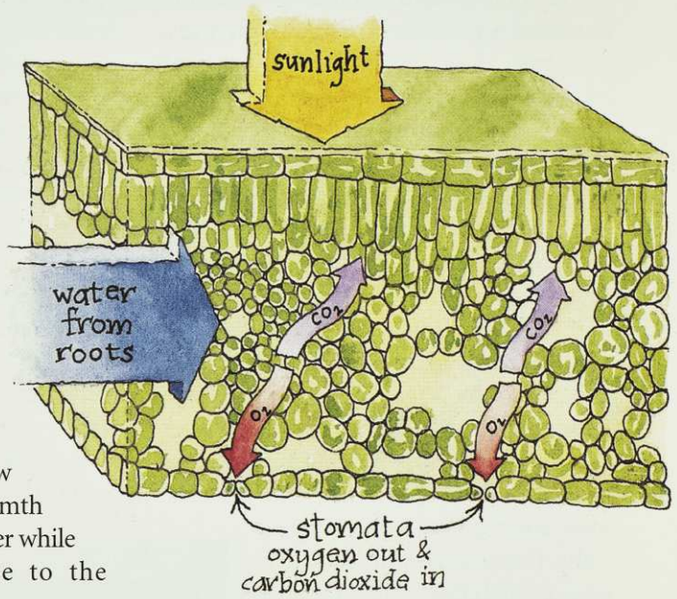
AS NIGHT FALLS, a morepork positions itself in a taraire tree overlooking the deck. Velvety green puriri moths flutter out of the wet darkness, lured by our light, and the morepork sweeps down silently to feast, soon to be joined by a second.

They're still around when we turn in for the night, and as I fall asleep to their cries, I recall another of Linda's childhood reminiscences: how she loved to lie in bed listening to the ruru's call from a puriri tree – one that escaped her father's axe – and how that sound signalled to her that "all's right with the world."

Well, all may not be right with the world Linda, but conservation in Northland is certainly in a lot healthier state with you around. ◆

JACQUI BARRINGTON *is Forest and Bird's northern field officer.*

Why tall poppies don't grow on mountain tops



The miraculous photosynthetic factory ▲ inside a leaf. Carbon dioxide is drawn in from portholes called stomata on the lower leaf surface while water arrives from the roots via a network of veins that would be the envy of Watercare. With energy from the sun and a kick start from their green pigment (chlorophyll), leaf cells are thus able to create sugar molecules.

TAKE A TWIG of leaves from a tawa tree and look closely at one of the leaves. The leaf is an elegantly designed factory with an upper surface that transmits the sun's energy to fuel the process of food production in the battery of cells within.

The basic process of making food from the sun is known as photosynthesis – that wonder of evolutionary technology that sustains most plant and animal life.

But take this tawa twig up into the mountains. The thin leaves would freeze in the cold; shrivel in the wind, dry air and intense sunlight; be torn by gales; and crushed by the weight of falling snow. Leaves that have evolved in lowland forests are unsuited to the alpine region, yet photosynthesis still has to take place if plants are to live and grow in these areas.

Cold slows down the process of photosynthesis, and excessive water loss causes plants to wilt and even die. Cold and water loss go hand in hand in the mountains where the chill wind whips away the warmth from the sunlit ground, and steals moisture from the pores on the lower surfaces of the leaves.

Alpine plants have developed ways of living that allow them to reduce the loss of warmth and water. Shrubs huddle together while cushion plants crouch close to the sun-warmed earth.

The most extraordinary of the cushion plants are the vegetable sheep – species of *Raoulia* and *Haastia*. Every plant is a model of mutual cooperation. At the tip of each branch, tiny woolly leaves are tightly clustered. Then the branches are packed together so tightly that you could walk upon the surface, and the whole plant canopy is domed to shed the blast of the fiercest gale and the weight of the snow.

Underneath this diminutive canopy is a different world, a miniature climate of still, moist air, several degrees warmer than the winds raging overhead. The growing buds are nourished by a soggy mulch of the plant's own dead leaves and branches. Nothing protrudes from the community of the vegetable sheep except after flowering when the thistledown fruits are raised for their seed to be carried away in the wind.

But even if the form of many alpine plants provides a more favourable microclimate for photosynthesis, there is still no place for the broad, thin leaf of the lowlands. While a broad surface enhances photosynthesis, the price is high. Only the toughest of leaves, coated with waterproof wax or woolly with hairs can survive the brutal wind and snow.

Shrub daisies, like *Brachyglottis* (formerly *Senecio*) *bidwillii,* have thick rounded leaves. Their glossy green surfaces endure hail and storm yet absorb the vital energy of the sunshine. The lower leaf surfaces wear a woolly carpet, not to warm the leaves, but to trap the water evaporating from the stomata – controlled portholes that also absorb carbon dioxide for photosynthesis.

The stomata must stay open to let in the carbon dioxide, and in the process, water vapour escapes. If the stomata were

More hazards than just wind and cold

EVEN IN THEIR MOUNTAIN fastness, alpine plants are not safe from human intervention. Alpine vegetation is adapted to kea beaks and grasshopper jaws, but not to the hungry mouths and sharp hooves of introduced sheep, deer, goats and horses.

Sheep still graze alpine herbs on South Island high country runs extending to the mountaintops. The tenures of many of these publicly owned leases are currently being reviewed and such fragile areas will hopefully be surrendered to conservation management.

Thar, the Himalayan mountain goat, were introduced to the Southern Alps early this century. Although the population has been reduced by helicopter hunting, the Department of Conservation seems determined to retain a managed herd rather than eliminate the animals altogether. This is regrettable since eradication is feasible and goats, perhaps more than any other species, climb higher, eat a greater range of plants (including otherwise inedible ones), and continue to thrive and multiply even as they degrade their habitat.

A new and less tangible threat now faces alpine floras worldwide. The Greenhouse Effect will raise temperatures – probably too quickly for specialised plant species to adapt – and plant communities are expected to shift, in order to follow their favoured environment. Lowland forest may extend further up the mountain, but if the mountain isn't high enough there is nowhere for alpine plants to go.

unprotected, the wind would constantly blow away the water vapour and the plant would wilt under the stress of dragging more water up from the frozen soil. The woolly layer over the stomata means that lost water molecules must first meander through the still air of a forest of hairs ensuring that evaporation is much reduced.

Another daisy, *Craspedia incana,* also goes to great lengths to reduce water loss. Its leaves are like sheep's ears, entirely covered with a white, woolly coat. So efficiently does this trap and still the air that the leaf surface may be as much as 10 to 15 degrees warmer than its surroundings. But the blanket comes at a cost: it also shields the leaves from the sun, and slows down photosynthesis and consequently the plant's growth.

The snow tussocks – various species of *Chionochloa* – with their tall, thin, relatively hairless leaves appear at first glance to be ill-equipped to cope with the drying winds. But their stomata are sunken in grooves and when water is scarce, each leaf will roll into a cylinder with the stomata inside, shielding the vulnerable pores from the outside weather. Their rapier-like leaves also draw water from the air in damp, foggy weather. So even when it isn't raining, water droplets catch on the leaves and slide down to water the roots below.

THESE ARE JUST SOME of the ways plant life has adapted to the challenges of living in the mountains. More than 600 species, most of them flowering plants, live above the treeline on New Zealand mountains. Of these, an amazing 93 percent are found only in the New Zealand region.

Such a large suite of unique plants, with such elegant adaptations for conditions above the snow line, might suggest that our alpine plants have been evolving on the mountains for an immense period of time. But this is not the case. New Zealand's mountains are young – less than two million years old – so our alpine plants are Johnny-come-latelys in evolutionary terms.

How has such a large and distinct alpine flora evolved here in such a relatively short time? Theories fall into two camps. Either we are seeing an explosion of evolutionary diversity, or somewhere, a nucleus of cold-tolerant plants persisted through the warm, mountain-less millennia, to form the basis of the present diversity of alpine plants.

Possible refuges for the hypothetical ancestral plants include Antarctica, before it became ice covered; a southern extension of New Zealand; or infertile or rocky places in the lowlands that mimic some alpine conditions. Such refuges may account for species like the snowgrasses, hebes, spaniards and members of the genus *Dracophyllum*, which have few close relatives outside New Zealand, suggesting they have evolved here during a long period of isolation. Other species like the willow herbs, the sedges and the rushes have close relations overseas, and might possibly have mountain-hopped from Asia, Indonesia, New Guinea and eastern Australia – their seed blown by the wind or carried by birds.

Other alpine species may be derived from warm-climate forest ancestors within New Zealand, such as the twiggy shrubs of the genera *Coprosma* and *Myrsine.*

All these sources probably contributed to the alpine flora but the extra stimulus for its diversity may well have been the tumultuous birth of the mountains themselves, creating a host of new places for plants to grow.

For mountain plants, New Zealand has truly been a land of opportunity. ◆

Ann Graeme

ANN GRAEME *is the national coordinator of Forest and Bird's Kiwi Conservation Club.*

ILLUSTRATION BY TIM GALLOWAY

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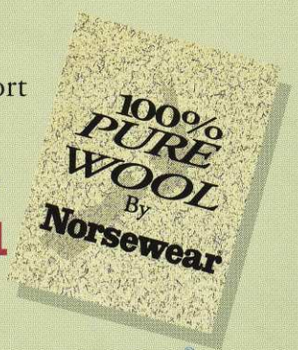

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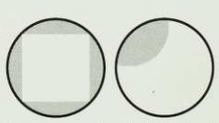
Good  Bad 

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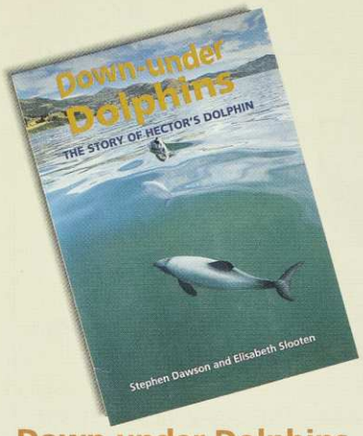
book reviews



Down-under Dolphins

by Stephen Dawson and Elizabeth Slooten (Canterbury University Press) 1996, 60pp, $19.95

In the late 1980s doctoral students, Slooten and Dawson alerted the newly formed Department of Conservation to the high numbers of Hector's dolphins drowning in set nets off the Canterbury coast – at least 230 between 1984 and 1988.

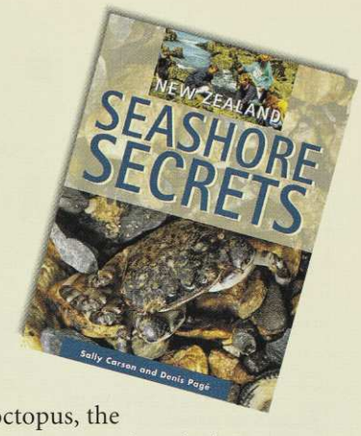
Their work also showed the vulnerability of this marine dolphin – the world's smallest and rarest – due to its small population (3,000 to 4,000) and slow reproductive rate. The Slooten/Dawson research and the advocacy of groups such as Forest and Bird led to the creation of the Banks Peninsula Marine Mammal Sanctuary in 1988.

Emerging from more than a decade of research, this book distils the conclusions of a sheaf of published scientific papers by the authors. The text is simple and lively and is liberally illustrated.

Ancestry, basic biology, behaviour such as bow riding and jumping, communication, sex and reproduction, and the appropriate human behaviour when near dolphins are explained. Concluding chapters focus on the set-net threat, how to support the conservation of dolphins, as well as describing a day in the life of the two scientists.

The recent government review of the marine mammal sanctuary confirmed the status quo rather than extend the sanctuary boundaries. This book confirms the need for further efforts to prevent the deaths in set nets of these special endemic mammals.

Eugenie Sage



New Zealand Seashore Secrets

by Sally Carson and Denis Pagé (Hodder Moa Beckett) 1995, 48pp, $19.95

To me the seashore has always been a source of wonder and surprise. Why do limpets look like Chinese hats? Have seaweeds got roots? What do barnacles do – besides hurting your bare feet? *Seashore Secrets* lives up to its title. It explains the secret life of common inter-tidal species, with colour photos and direct, simple text. It explains concepts, time and tide, rock, sand and muddy shores, and how plants and animals cope with the stress of living in the turbulent world between the tides.

Chapter titles are picturesque – "Under Cover" describes the camouflage techniques of octopus, the transparent glass shrimps and the camouflage crabs – "the make-up animals of the underwater world". And who could fail to read the chapter entitled "Sex on the Seashore"?

There is a conservation message in the final chapters, linking the well-being of the seashore to human activity and explaining marine reserves. I particularly liked the final chapter on the "seashore code".

Attractive, reasonably priced and durably produced, this is a book to help young people to a greater understanding of the treasures and pleasures of the seashore.

Ann Graeme

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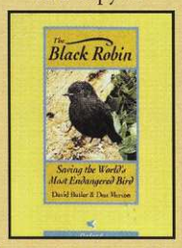

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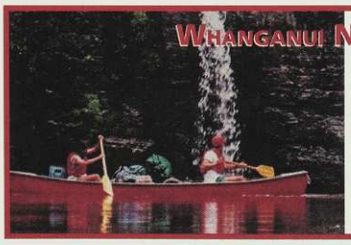

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AGM and council

FOREST AND BIRD'S annual general meeting and national council meeting were held in June at Porirua.

Ken Catt, Gordon Ell, Colin Ryder and Ken Spencer stood down from the national executive and were replaced by Mike Harding (North Canterbury branch), Mark Fort (Eastern Bay of Plenty), Barbara Marshall (Mana) and Linda Winch (Far North). All other sitting executive members were re-elected.

Massey University environmental law lecturer Peter Horsley inspired members with his thoughtful Sanderson Address on the ethical basis of conservation and our relationship with nature.

Margaret Peace and Gordon Stephenson were appointed distinguished life members of the society.

The minutes of the AGM and council meeting are available to all members. Please send a stamped addressed envelope.

Old Blues

OLD BLUE AWARDS for outstanding contributions to conservation were presented at the council meeting to:

- Muriel and Ronald Ericson for their work in the protection of Southland's Te Rere Reserve for yellow-eyed penguins.
- Betty Harris for her dedication to conservation as chair of the South Auckland branch and efforts to encourage farmers to protect native forest.
- Jim Holdaway for advocacy in the establishment of regional parks around Auckland and the protection of the Hauraki Gulf.
- Jim McMillan for his work for the Save the Sounds Stop the Wash campaign that drew attention to the damage to the Marlborough Sounds environment from the introduction of fast ferry services.
- Peter Maddison of the Auckland Central and West Auckland branches for advocacy, particularly of conservation in the urban environment.
- Mabel Roy, particularly for her commitment to the society's Tautuku Lodge in the Catlins.
- Isobel Thompson, in recognition of her long service to the Auckland Central branch.

IAN CLOSE

Betty Harris displays her Old Blue at the June council meeting.

North Canterbury branch scholarships

APPLICATIONS are invited for a Stocker Scholarship grant for a conservation project over the 1997 year.

The research or project must have special reference to the needs of the South Island and the objects of Forest and Bird. The grants are open to individuals or groups and a total of $3,500 is available for one or more applicants.

Please direct applications and enquiries to: the secretary, North Canterbury branch, Forest and Bird, PO Box 2389, Christchurch. Applications close on 31 December.

Green Ribbon Awards

PUHOI Forest and Bird members Arthur and Val Dunn have received a Green Ribbon Award in acknowledgment of "outstanding achievement" in enhancing the environment.

The Dunns have donated blocks of native forest containing rare species to DoC and the QEII National Trust. They have tirelessly made submissions on resource consent applications and are also active in propagating native plants for revegetation programmes.

Val and Arthur Dunn with an impromptu green ribbon. The official version was presented by Simon Upton in August.

The award was announced by Environment Minister Simon Upton to mark World Environment Day on 5 June.

Te Runanga O Ngatihine also received an award for their work to protect Motatau forest near Kawakawa, including pest eradication and fencing, and in developing a programme of environmental education for members of the iwi. Ngatihine were nominated for the award by Forest and Bird.

Wanted: morepork pellets

JAMES HAW is an MSc student studying the diet of moreporks. If members know of any morepork roost sites and are able to collect regurgitated pellets, he would be grateful to receive them. Please pack in a tightly sealed bag and note when and where they were found. If you find a dead morepork, James would find it useful for stomach analysis. Please label, freeze and advise him at: 9 Eclipse Place, Bucklands Beach, Auckland. Phone 09-535-8392.

Obituary: Noeleen Clements

NORTHERN BRANCH activist, botanist and long-standing fighter for conservation, Noeleen Clements, died in April after a year-long battle with cancer.

Noeleen and husband Toby ran the branch's botanical rambles for many years, acted as rangers for the Hewitt Reserve and educated hundreds if not thousands of people about trees, ferns and orchids. Noeleen's book on native orchids became a standard text for botanists and DoC. She received DoC's Conservation Award in 1994.

Toby and Noeleen were branch committee members for many years, assisted with Limestone Island's restoration and built a large beautiful native plant garden amid restored bush on their farmlet at Ruatangata near Whangarei. Noeleen died the day before a large open day, planned and promoted by the branch, was to be held on the property. In accordance with Noeleen's wishes, the function went ahead.

Around 300 people attended – most of whom knew nothing of the family tragedy – and over $1,500 was raised for conservation. It was somehow appropriate that events proceeded. Noeleen would never allow a fuss to be made about anything; she just got on and did a wonderful job of caring for native plants and ensuring other people cared for them too.

Her passing is a huge loss to conservation in Northland.

Jack Craw

Summer trip

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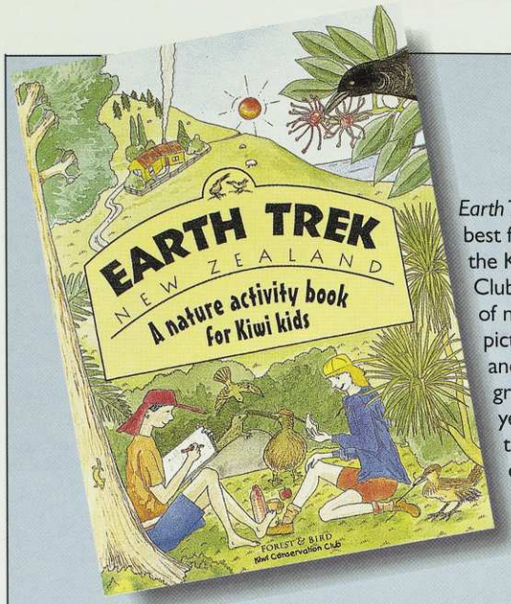

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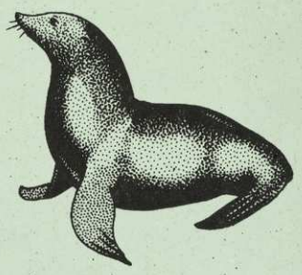

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By mail: **FREEPOST No. 669, Forest and Bird, PO Box 631, Wellington.**
By phone: **(04) 385-7374 with credit card details.** ***By fax:*** **(04) 385-7373.**
E-mail enquiries to: **office@wn.forest-bird.org.nz**

96/97

MEMBERSHIP FORM

MEMBERSHIP FORM

YES I want to join. Please enter a membership in the category ticked below.

Name (Mr/Mrs/Ms) _____

Address _____

_____ Telephone _____

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

GIFT MEMBERSHIP Join a friend by filling in their name above, and your name below. Gift memberships will be sent with a special gift card in your name.

☐ Please tick if you would like to be billed for renewal of this gift membership next year.

Gift from: (Mr/Mrs/Ms) _____

Address _____

_____

☐ Single	☐ Family	☐ Non-profit group	**$47.00**
☐ Senior Citizen	☐ Senior family		**$35.00**
☐ Student	☐ Schools / Libraries		**$30.00**
☐ Overseas			**$NZ67.00**
☐ Life (single only)			**$675.00**
☐ Corporate			**$275.00**

KIWI CONSERVATION CLUB
(for children up to 13, see over):

☐ Single	**$12.00**
☐ Family (no. of children) ____	**$20.00**
☐ Schools / Groups / Overseas	**$22.00**
Donation	$ _____

(all prices incl. GST)

☐ Enclosed cheque to Forest and Bird or:

Charge to my ☐ Visa ☐ Mastercard ☐ Amex ☐ Diners

Card No. ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

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Gift nature to a child you know...

For young New Zealanders: the

The Kiwi Conservation Club is for children up to 13 years. It encourages an appreciation of the natural world, and promotes fun, conservation-based activities. KCC members receive:

- quarterly copies of the KCC magazine. This is full of interesting stories, games, jokes and projects to take part in.
- the local KCC newsletter about local trips, beach cleanups, or walks especially for kids.
- the KCC member's badge and sticker.
- the KCC membership certificate with the Kiwi Conservation Code.

Give a gift of nature to a child with a membership to Kiwi Conservation Club on the attached form

FOREST and BIRD lodges

Ruapehu Lodge,
Tongariro National Park

Set within the national park at Whakapapa Village, this lodge is available for MEMBERS ONLY, and is an ideal location for tramping, skiing, botanising and exploring.

The lodge holds 32 people in four bunk rooms, and provides all facilities except food and bedding. Private parties are restricted to 10 members.

Bookings and inquiries should be made to PO Box 631, Wellington (04) 385-7374. The lodge is very popular, and bookings may be made six months in advance, if secured with a 20% deposit. The rates are reasonable, and fluctuate seasonally.

Full payment is required four weeks prior to occupation, after which time there is no refund for cancellation.

William Hartree Memorial Lodge,
Hawke's Bay

Situated 48 km from Napier, 8 km on the Puketitiri Road (sealed). The lodge is set amid a 14 ha scenic reserve and close to many walks in the area, eg, Kaweka Range, Balls Clearing, hot springs and museum.

The lodge accommodates up to 15 people with 10 bunks and a further 5 mattresses. It has a fully equipped kitchen including stove, refrigerator and microwave plus tile fire, TV, hot showers and flush toilet. You will need to supply your own linen, sleeping bags etc.

For information and bookings please send a SAE to Margaret O'Rourke, 518 Kennedy Road, Greenmeadows, Napier, (06) 844-8301.

Arethusa Cottage

An ideal base from which to explore the Far North. Near Pukenui in wetland reserve. Six bunks. Fully equipped kitchen. Separate bathroom outside. Inquiries and bookings to Pat Platt, Waterfront Rd, Pukenui, RD4, Kaitaia, (09) 409-8757, or Sue Beauchamp, 1 Heretaunga Cres, Cable Bay, RD3 Kaitaia, (09) 406-1525.

Tautuku Lodge

State Highway 92, South East Otago. Situated on Forest and Bird's 550-ha Lenz Reserve 32 km south of Owaka. A bush setting, and many lovely beaches nearby provide a wonderful base for exploring the Catlins. The Lodge, the Coutts cabin and an A-frame sleep 10, 4 and 2 respectively. No animals.

For information and rates please send a stamped addressed envelope to the caretaker: Miss M. Roy, Papatowai, Owaka, RD2. Phone (03) 415-8024.

Tai Haruru Lodge,
Piha, West Auckand

A seaside haven set in a large sheltered garden on the rugged West Coast, 38 km on sealed roads from central Auckland. Close to store, bush reserves, and tracks in the beautiful Waitakere Ranges.

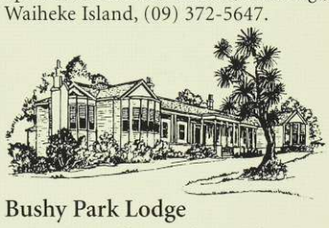
Bedrooms include a double and 3 singles, plus large lounge with open fireplace, dining area and kitchen. The self contained unit has 4 single beds, a living room with kitchen facilities. Bring food, linen, and fuel for fire and BBQ.

For details and rates send stamped addressed envelope to Ethne Richards, 25 Aldersgate Road, Hillsborough, Auckland. (09) 625-8973.

Waiheke Island Cottage

The cottage at Onetangi has comfortable bunk accommodation for eight people and has a stove, refrigerator, and hot water. Adjacent to a 49-ha wildlife reserve, it is in easy walking distance from shops and beach. It is reached by ferry from Auckland City (six or seven returns daily) and by bus or taxi from the island ferry wharf. Everything is supplied except linen and food. No animals.

Different rates apply for winter and summer. For rates send an addressed envelope to the booking officer, Maya Spence, 16 Hobson Terrace, Onetangi, Waiheke Island, (09) 372-5647.



Bushy Park Lodge

At Kai Iwi, 24 km northwest of Wanganui on sealed road off State Highway 3. Historic homestead, fine grounds and 89 ha of virgin bush with tracks and trees identified.

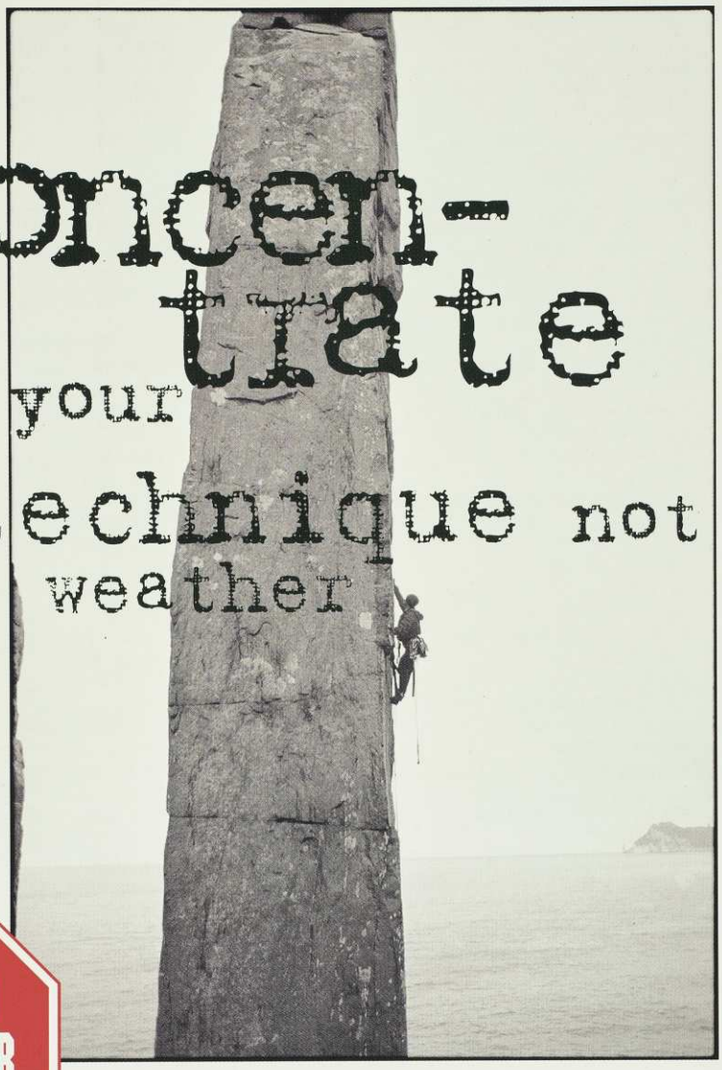
Bed and breakfast. Accommodation for 15 in six bedrooms, single and double beds, electric blankets, heaters and vanity units. Dinners available on request. Recreation room.

Open 7 days; reduced off-peak rates.

Separate self-catering accommodation for up to 13 is available outside the main house, including kitchen facilities, mattresses and pillows. Toilets and showers are in adjacent building.

Bookings and information leaflets: Manager, Bushy Park Lodge, Kai Iwi, RD 8 Wanganui, (06) 342-9879.

Concen-trate on your technique not the weather



GORE WIND STOPPER Outerwear

At 10°C, a 25km/h wind chills your skin to 0°C. Cold enough for you to wish you were somewhere else. Gore WindStopper fabrics from the makers of Gore-Tex® fabric, are completely windproof. No more wind chill. And it's highly breathable which means you can be active and won't overheat or drown in your own sweat. So when you're pushing your limits, whether it's a new 25 on the Totem Pole, a steep backbowl on the Main Range, a gnarly mountain bike track or even just outside enjoying the view, WindStopper clothing lets you concentrate on your technique not the weather.

DURABLY WINDPROOF

VERY BREATHABLE

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