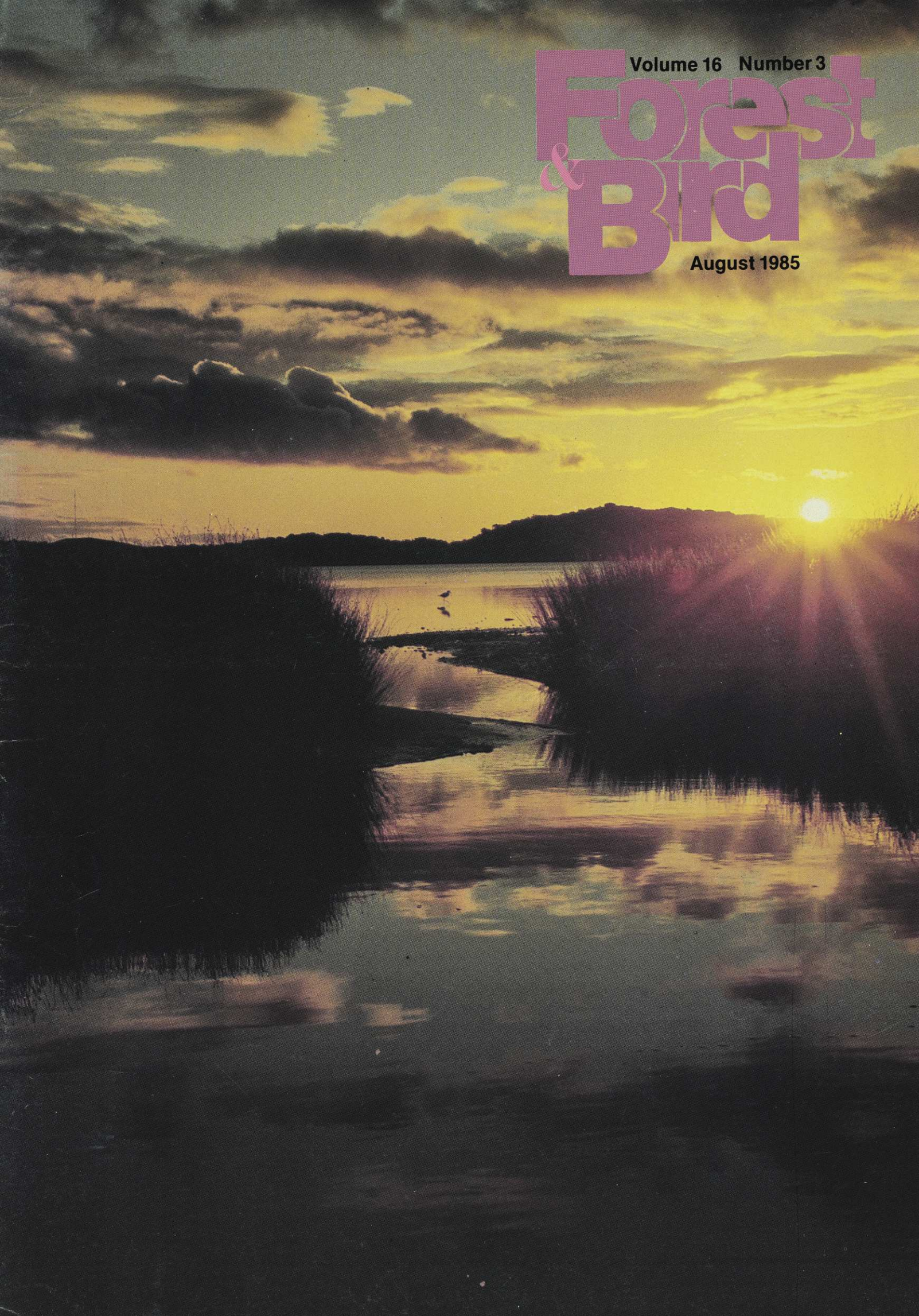

Volume 16 Number 3

Forest & Bird

August 1985

But where is its pack and ice axe? Pukeko are known to be extremely adaptable, colonising areas cleared by man with alacrity, so perhaps it should come as no surprise to discover one at 2350 metres, near the Tasman Saddle hut.

Geoffrey Tunnicliffe of the Canterbury Museum reports in the March *Notornis* magazine that famous explorer Charles Douglas had commented: pukeko . . . "can cross the main range, but many must perish on the journey as I have often found them dead on glacier and snowfield." However, most pukeko are less adventurous than the one pictured, living in the main from 366 metres to sea level.

Photo: Dave McNulty, Mount Cook National Park guide

Issue Number 237

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Cover caption:

The long orange rays of a winter sunset play on the waters of Pauatahanui Inlet, just north of Wellington. The Society's efforts to transform this area into a reserve are outlined on page 2. Photo: T. Fitzgibbon.

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Forest & Bird

Strangers in our midst

The history of animal introduction into New Zealand has not been a happy one — especially that brief span since the arrival of the first European settlers. Pigs, goats and sheep came first (deliberate introductions), along with less welcome rats. In 1837 the first possums arrived; the procession increased with domestic rabbits in 1838; red deer and hares in 1851; fallow deer and the first wild rabbits in 1864; hedgehogs in 1870; and sambar deer in 1875-76. Still to come were wapiti, chamois and tahr.

The Society has been concerned since its inception with the problems these unwanted animals have caused. As late as 1979 it published a booklet by a former president of the Society, entitled *Deer and Resulting Devastation in New Zealand*, which argued for complete eradication of certain species "when humane methods become practical." That time has not yet arrived; meanwhile control will have to suffice.

But how effective is that present control? The Forest Service, which has responsibility for wild animal control, argues in the first of three articles on the subject (Page 5) that deer and possums should now be accepted as a permanent feature of our wildlife. Critics will point out that control measures could be sterner, and that the proper place for recreation hunting areas is not adjacent to National Parks (Mount Aspiring, for example). While it may be difficult, if not impossible, to exterminate the more common deer and possum, could the same be said of tahr? The Government is soon to release a document on the future of tahr, but meanwhile a commercial hunting ban remains, applying in particular to Mount Cook and Westland and National Parks.

Dr Carolyn King, an expert on stoats and weasels, believes there is no point in trying to control these mustelid predators, except to safeguard the North Island kokako, the takahe, the black stilt and the kakapo on Stewart Island. Higher priorities, in her view, are saving habitats, ecological research and general conservation education. Her provocative article on stoats is on page 7. Finally, scientists Colin Ogle and Peter Wilson have been investigating the widespread decline of native mistletoes; their findings point to the possum as the culprit.

Society conservation officers Terry Fitzgibbon and Kevin Smith take a critical look in separate articles at the performance of Lands and Survey and the Forest Service over the protection of some key native areas.

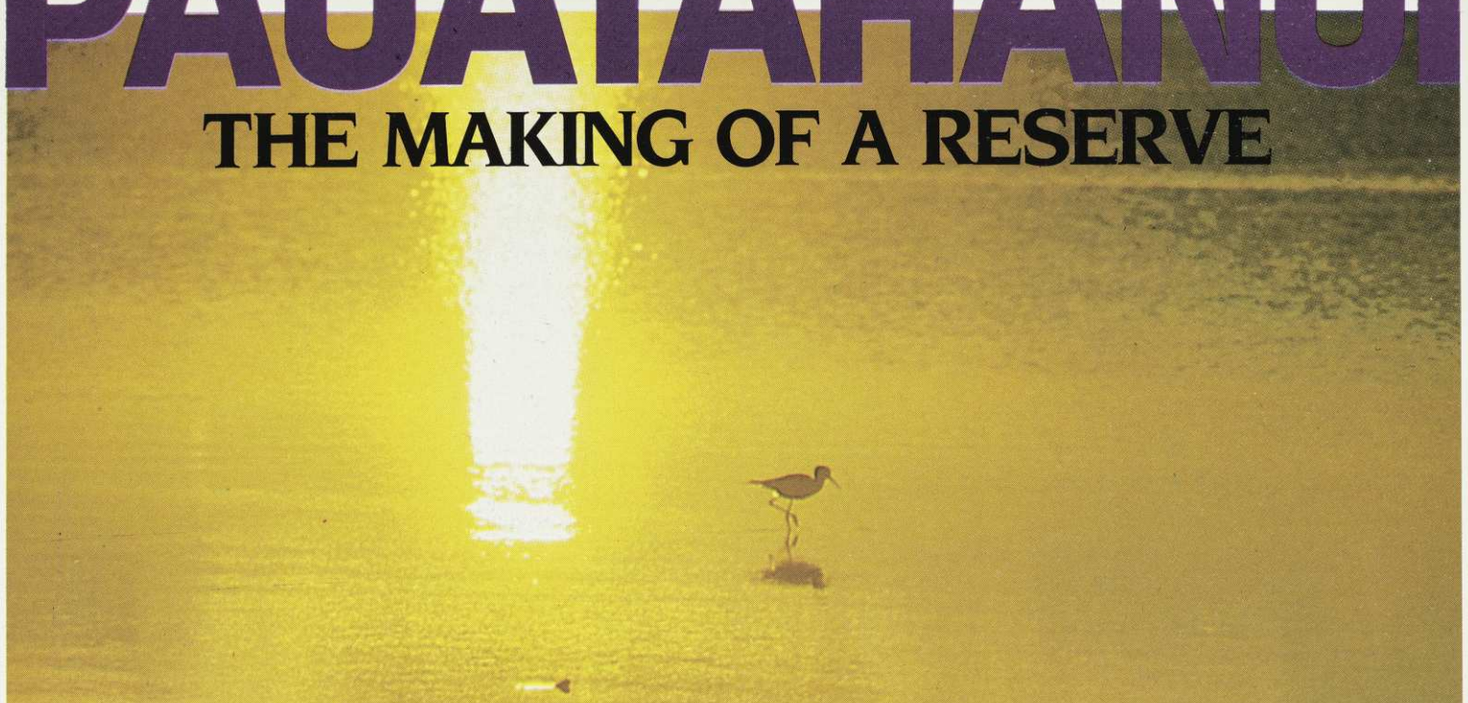
The response to our Quest competitions — announced in the May issue — has been far from overwhelming, so we have extended the deadline. Parents and teachers, encourage children to enter, and remember the prizes are not insubstantial — the short story carries a first prize of $90.

This issue the Society is introducing a number of exciting products which should appeal to members — greeting cards, a poster, sweatshirts and t-shirts. Do support what is becoming an increasingly-used service. The mail order catalogue is a part of the magazine this time and is on pages 39 and 40.

Gerard Hutching, Editor

PAUATAHANUI

THE MAKING OF A RESERVE



An exciting Society project is now underway to restore a 43-hectare marshland reserve for wading and shoreline birds at the head of Pauatahanui Inlet near Wellington. New Zealand wading and shoreline birds have not been widely recognised as being under threat and have often lost out due to massive drainage for farmland and reclamation. These birds are the larger portion of our rare and endangered native species.

The project is long term with the first phase up to 1986; the completion of facilities for visitors, and tracks and hides, is now the focus of a national appeal launched by the Society to raise $35,000. David Collingwood, prior to retiring from Head Office, was jointly responsible for this project and here he describes the reserve and the work of the Society members in developing it.

From the rise behind Pauatahanui Cottage one gazes over a landscape of reeds and glistening pools left by the tide.

Pauatahanui Cottage is the oldest building in the historic village of Pauatahanui. Built in 1860 by Thomas Hollis Stace, the cottage nestles below the rise which originally housed Ngatitoa chief Te Rangihaeata's pa 'Matai taua'. The pa site was later taken for the 58th Regimental Stockade in 1846 and now is occupied by St Albans Church.

The cottage, now owned by the Royal Forest and Bird Protection Society, has been renovated with the financial assistance of the Stout Trust, while the garden is being developed as a typical settler's garden of the 1860s. The premises are the base for the Society in its day-to-day management of the Pauatahanui Wildlife Management Reserve, which is across the road from the cottage.

Kawhia Harbour and Farewell Spit are the nearest comparable sized areas for wading and migratory birds on the west coast, and although godwits and knots once used Pauatahanui for their New Zealand sojourn, they became seasonal visitors because of man-made disturbances to the habitat. Some years ago the land was extensively drained to produce a cricket ground, a go-cart track, to enable stock grazing and to prevent flooding of neighbouring properties. This has affected almost all of the reserve.

These intrusions have largely become derelict; nature and its tides have gradually overwhelmed the go-cart track and the cricket ground, and the drains are now mostly clogged with rushes. Although evidence of tramplings by cattle and sheep still remain in pockets of oozy mud, nature is re-asserting itself and turning the place into a potentially rich area for both plants and animals.

The final modification was the burying of the Kapuni Gas pipeline to Wellington in a trench right across the site in the 1970s. This disturbance was beneficial, however, as it cleared reeds along the easement for the pipeline, thus producing valuable pools and loafing areas for birdlife. (The Society is carefully weeding the route, and whitefaced herons, spur-winged plovers, pied stilts and banded dotterels use it as valuable habitat.)

Surprisingly, these major man-made modifications seem to be a boon for the birdlife now that nature has re-established its dominance.

The search

In 1979 Brian Ellis — our ICBP representative at the time — and I commenced the search for a suitable area to establish a wading bird reserve in the lower North Island. We examined several locations but finally opted for Pauatahanui. With the approval of the Executive, and with President Tony Ellis's enthusiastic interest, we approached Bing Lucas, who is now Director-General of Lands, with our proposal.

A pied stilt, delicately perched on one leg. Winter sunset, Pauatahanui Reserve.
Photo: Terry Fitzgibbon

Much has flowed from this meeting; the Domain Board, which had responsibility for Pauatahanui Domain (as the area was then known), voted itself out of office and the area was gazetted as a Reserve for Government Purposes. The intention to vest day-to-day management in Forest and Bird was advertised and the Society was charged with the preparation of a draft management plan.

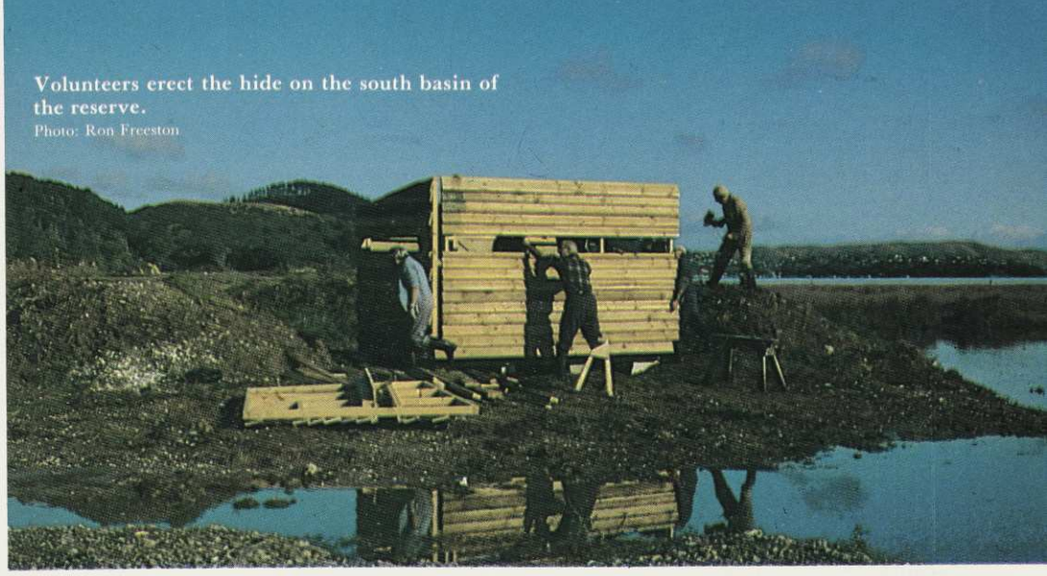
This is a unique arrangement, the first time in New Zealand that a voluntary body has been given the day-to-day management of a Crown reserve.

After protracted legal proceedings, and with the considerable assistance of Keith Owen of the Wildlife Service, the draft management plan was finally approved in August 1984. This enabled the Society work on the reserve to start in earnest. The Minister of Internal Affairs, Dr Peter Tapsell, formally handed the management over on May 13, 1985.

Gum-booted efforts

Initially a new fence was erected along the north-eastern boundary by Society members to prevent stock from wandering all over the reserve.

During the last week of September and first week of October 1984 very high equinoctial tides coincided with our building of the water control structure.



Volunteers erect the hide on the south basin of the reserve.
Photo: Ron Freeston

No sooner had we laid the waterproof accelerated concrete than the tides were upon us. Thankfully everything set perfectly.

Eric Parker (Upper Hutt), Ron Freeston (Lower Hutt), John Smith (Mana), Frank Galvin (Wellington), Conrad Pharazyn (Upper Hutt), Tony Burgess (Lower Hutt), Kevin Kerr (Kapiti), Jean Luke (Kapiti), Roy Slack (Mana), and others from the five branches, deserve the highest praise for their diligence and hard gum-booted efforts. Further work from these and other "work parties" will continue over the months ahead before the reserve's planned public opening in late 1986.

Noel Hellyer, Deputy Director Wildlife Service, has shared the overall responsibility for the reserve. Noel firmly pulled on his Forest and Bird member's hat from the beginning of the project and has thrown himself into the thick of planning, site appreciation, and layout and at weekends shared the hard work of fencing, concreting and planting, and in the evenings lecturing on Pauatahanui. The Society and I pay tribute to Noel Hellyer for the privilege of working with him and for his expertise and quietly proffered advice.

In 1984, so that facilities could be built near and yet not on the reserve, the Society purchased Lot 7, a block of 1.8 hectares between the Pauatahanui Hall and the garage, with half the funds provided by the QE II National Trust. The five Wellington branches are now raising funds to re-imburse the Society's initial contribution. This piece of streamside land runs from the roadway opposite the cottage as an access to the reserve. Lot 7 is being landscaped to become an extension of the reserve with tree plantings, ponds, a car and bus park, and picnic ground.

The basins and trackways

As the tides were regularly inundating the large depressions of the old go-cart track (now called the southern basin) and the cricket ground (northern basin), the birds would flock to these areas to feed during high tide and go elsewhere as the water receded. We therefore decide to retain the water by means of inlet sluices which would trap the receding tides and make it worth the birds' while to stay.

A constant level of water can now be maintained within the northern and southern basins. By constructing in each a number of low islands — some with shells and gravel on top, some with low bushes for cover — safe habitat can be established for shoreline birds such as caspian terns, godwits, spur-winged plovers, banded dotterels, sandpipers and pied stilts. Although island construction is still only at a rudimentary stage, they are already being used by such birds — much to our delight.

Suitable shrubs are now being planted as a screen along the tracks. Surprisingly, birds will tolerate a moving head over a shrub screen, but they quickly take to wing if they see any legs and arms moving.

Since we wish to encourage undisturbed nesting, roosting and feeding, the tracks have been located along the edge of the reserve behind plantings of low hedges of *plagianthus, olearia* and flaxes. Access paths to the hides in the centre of the reserve are being similarly planted.

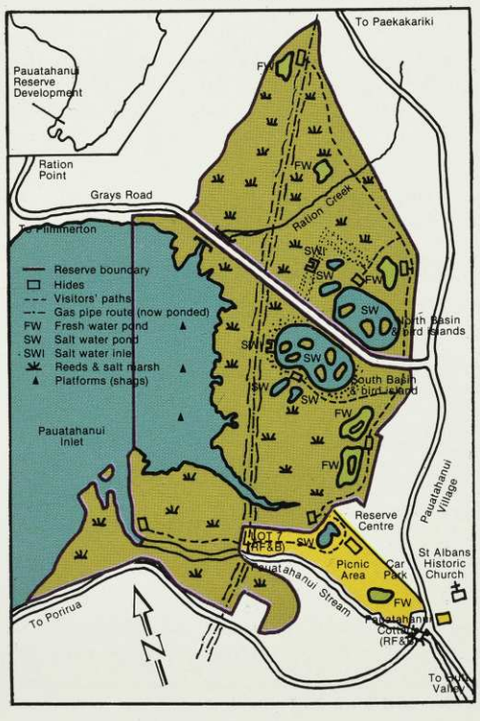
The habitats

Society members will soon be planting up the stream banks of the Pauatahanui Stream with overhanging ngaio and flaxes with the aim of introducing the rare brown teal.

The extensive rushes and raupo beds provide suitable habitat in places for the fernbird, now absent from the southern North Island. It is proposed to reintroduce these birds with the assistance of the Wildlife Service, after a continuous programme of wild cat, stoat and ferret trapping.

At the southern extremity of the reserve fronting onto Pauatahanui Inlet, the prevailing winds have formed a dune of shells and sand, behind which is a swamp of dense raupo and flaxes. The secretive spotless crake inhabits this swamp, and is more often heard than seen. I have also heard its low purring note near the lower course of Ration Creek within the Reserve. It is hoped this little swamp rail will prosper with our improvements to the habitat.

PAUATAHANUI RESERVE DEVELOPMENT



Vegetation

The Society aims to protect and enhance the vegetation of the reserve; thus we have adopted very strict rules regarding plantings. For instance all must be cuttings or seedlings from plants already growing on the reserve, or in certain cases from plants we know once grew there, and are still growing nearby within the catchments of the Ration and Pauatahanui Streams which disgorge through the reserve.

Members involved in the planting and maintenance have included Nick Lambrechtsen (Wellington), Henry James (Wellington), Euan Nicol (Wellington), Suzy Williams (Lower Hutt), Paul Hughes (Mana), Stan Butcher (Lower Hutt), and many other Society members, their children and friends from the region.

Records and sketches from the 1840s have given insights into the likely cover in the higher parts of the reserve which have now been invaded by exotic grasses.

It is interesting to note that most exotic plants die when they get their feet in salt water. A stand of dead macrocarpas along the raised bank which once bordered the old cricket ground provides mute evidence of a combined high tide and stream flood which inundated the reserve in the 1960s. The native salt marsh plants have flourished however. A good 80 percent of the reserve is pockmarked with meadows of bright green *Selliera radicans* and *Salicornia australis*, with tidal pools and expanses of *Samolus repens*, the creeping sea primrose, and the yellow *Cotula coronopifolia*.

The historical nature of the area will be enhanced by a karaka grove to be planted on the Forest and Bird land at the entrance to the reserve. Early European travellers recorded the presence of karaka trees here as a food source for the Maoris of the pa on the hillock above. Other parts of this access land along the stream boundary will be planted in typical coastal forest.

Three rare and endangered plants are present.

Cotula dioica ssp Monoica is a little "batchelor's button" growing vigorously in one place where earth had been thrown up from a ditch last century. Colin Ogle, Society member and a Wildlife Service botanist, has produced a plant list for the reserve. He excitedly showed me this native plant, saying it was a threatened species only present elsewhere on the Makara coast some 40 km away. Needless to say Colin has grown many cuttings of this plant for expanding its numbers in the reserve.

Mimulus repens, New Zealand musk, is also a rare plant of the Wellington region, known from only one other locality. It was found in a drain within the reserve.

Hiding in one location among the sea of reeds, is a small very rare reed of the Wellington region, *Schoenus nitens*. Its protection is now thankfully assured within the reserve, which is possibly its only site.

Wildlife aplenty

The whole reserve is built on thick beds of shells apparently overwhelmed by silt run-off from the catchment when it was cleared of forest during the last century. These beds are almost a metre thick — whole shells unbroken as if they had been suffocated in their prime. Now the mud flats are the lively home of the same bivalves, turrets, pipis, cockles and the large wedge shells *Tellina (Macomona) liliana*. The sand burrowing and surface dwelling whelks are also common.

Of great interest are the mudflat snails *Amphibola crenata*. These archaic snails have lungs and represent a stage in the evolution of animals leaving the sea for the land. Plentiful in tidal pools, they choose to concentrate along the high tide fringes where the water covering lasts only an hour or so. They burrow beneath the surface when the tide arrives and emerge with the ebb to resume their feeding on the rich organic food of the muds. Feeding continuously, they produce an endless trail of almost pure faecal matter.

Also near high tide mark are the little burrowing crabs, *Helice crassa* whose tunnel entrances are everywhere. Their companion species is the stalk-eyed mud crab, *Macrophthalmus hirtipes*. While building the water control structures I noticed these crabs indulging in free rides on the tide. One was seen to travel up-stream for 100 metres! When the tide was at full spate over the weir, hundreds of small yellow-eyed mullet took the roller-coaster run into the basin beyond. Needless to say, the resident white faced herons busied themselves marshalling these fish into the shallows of the basin before gobbling them up.

On 25 and 26 November 1984 high tides were trapped and held for the first time by the southern flap gate, and the birds arrived on cue to enjoy the water which thankfully didn't ebb away.

The increase in birdlife was immediate. For the first time, three caspian terns were sighted and the pied stilt residents rose from 5 to 30. A rare pectoral sandpiper arrived, also two spur winged plovers and there was an immediate increase in ducks, not all of them mallards. Sharp-tailed sandpipers faced the wind in a flock of 15.

We rushed around sealing up leaks in the basin and went home satisfied with the words of an Ornithological Society bird counter who had spent the day surveying Pauatahanui Inlet: "We only found one tern, I came here and most of the birds are in the reserve". That said it all for us.

The work ahead includes the building of two bridges and the completion of nearly 3 km of tracks. Two out of the planned seven fresh water ponds have been established and one of the seven hides has been built. The planting of thousands of shrubs, drain clearance, contouring, pond and island formation and the building of a visitor/reserve centre are yet to be completed.

All this first phase is planned to be finished by the end of 1986, at a cost of $77,000, but because of helpful assistance from the Stout Trust and the QEII National Trust, plus other funding, there remains just $35,000 to be subscribed. A national appeal has been set up to raise this, to ensure the completion of the planned first phase, which will allow members and the public to use the reserve and its facilities

How To Help

Please send any donations to: Royal Forest and Bird Protection Society, PO Box 631, Wellington. Every donor of $50 or more will receive a certificate as a Founder Subscriber.

All donations will be receipted for tax deduction claims and cheques should be made out to: Royal Forest and Bird Protection Society.

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HELP US PROTECT OUR ENDANGERED ANIMALS, PLANTS AND HABITATS.

WILD ANIMAL CONTROL:

CHANGING EMPHASIS TOWARDS THE 1990s

by Ken Miers, Director, Environmental Forestry Division, Forest Service

A land of lush and virtually ungrazed vegetation greeted the first non-Polynesian settlers to New Zealand. Seemingly millions of years of isolated evolution, with no threat from browsing or grazing animals, had produced a multitude of palatable plants species almost completely unequipped to cope with the tide of exotic mammals so enthusiastically released.

Recent research, however, does point to the moa living in forest margins, suggesting that it was a forest browser and not only the grazer of open grasslands as previously thought.

Possums, deer and goats thrived in the new environment, and their numbers increased exponentially. Under this attack, the palatable and luxuriant forest understorey was rapidly depleted, but it was not until these animals reached very high densities that their real impact was truly appreciated; by then the damage was substantial, and in places irreversible.

These peaks in numbers occurred at different times for different species, depending on the biology of the animal and when and where they were liberated. Rabbits, for example, were numerous in parts of the South Island in the 1860s, long before they had established in the North Island and long before many other animals had been introduced.

Government control

As the knowledge dawned that most exotics had become pests, the Government attempted to control their numbers; the vast red deer herds which had spread over much of the country were the first to feel the effects of this new approach when Government operations started in the 1930s. Prior to this, culling carried out by Acclimatisation Societies had been ineffective.

Hunters on foot, under the control of the Department of Internal Affairs, concentrated on areas where deer numbers were highest, rather than those where soil conservation, or farm and forestry damage was a problem. Only in a few cases were the operations long or intense enough to reduce populations below what natural increase would put back.

Possums also found New Zealand vegetation to their liking, and their spread was rapid. Numbers reached high levels before it was accepted possums were causing damage, and although some people were advocating control as early as the 1890s it was not until 1922 that liberations were made illegal and commercial trapping allowed.

The threat of high wild goat numbers did not attract any attention until the 1930s, by which time they were competing seriously with sheep for grazing and depleting a wide variety of palatable native plants. By then the species had probably been feral for more than 100 years. Government control operations began in 1937.

Chamois and tahr were also controlled from 1937. Chamois, especially, were at home in sub-alpine grasslands, spreading rapidly from Mt Cook to as far as Haast and Arthur's Passes by the late 1930s. They were calculated to have dispersed at the amazing rate of 10 km a year from their time of liberation until the early 1970s. Tahr, on the other hand, did not spread as rapidly but their preference for sparsely vegetated, steep alpine bluffs damaged native plants which were already subject to a precarious existence. In certain locations, concentrated tahr numbers have been claimed to have eliminated some alpine plant species.

Until the mid-1950s hunters and trappers were mainly responsible for wild animal control. When the Forest Service took over control operations (1956) it was apparent that periodic clean-ups of "problem" animals in high density areas were not having a significant effect. Despite deer tallies of up to 40 per day for some hunters and as many as 2000 per man a summer, the annual deer kill was increasing with no apparent impact on the growth and spread of herds. By now the various populations or herds were combining through their expansion.

A change of emphasis in control philosophy started at this time. Although planning was aimed at achieving maximum kills, an area might now be granted priority because of forest damage or erosion. Instigated by the then-Director-General of Forests, Lindsay Poole, this change meant there had to be some downstream value at stake to justify the considerable cost of animal control. Money could no longer be spared to control animals in low priority areas. Adequate control, let alone extermination, of deer, tahr and chamois and possums would not be possible until new methods were devised.

Commercial intervention

The development of the commercial venison recovery industry by James Maddren in the 1950s gave the control effort a much needed shot in the arm. Helicopter hunting by the late 1960s had created a multi-million dollar export trade, with the peak reached in the 1971 season when an estimated 131,000 carcases were exported. Of course, total kills were well above this figure. Reductions of the order of 70 percent were noted in some areas over only three years (eg Landsborough Valley to the Arawata Valley in Westland), and commercial operators were forced into more remote regions.

Tahr and chamois did not escape the commercial recovery frenzy. From 1973 to 1975 nearly 25,000 tahr were shot for export, severely reducing animal densities throughout their range. Chamois, too, proved to be easy targets from a helicopter and large numbers were removed from the Southern Alps.

By the mid-1970s the aerial hunters' deer recovery rates, in particular, began to fall and for the first time it was felt some measure of control had been imposed on hoofed animals. The best time for reducing populations was during spring when deer family groups were breaking up prior to calving. Young deer no longer under parental care were shot, while herds withered because no young ones were coming on.

Live deer recovery was the next development, spurred on by deer farming and the subsequent dramatic rise in the price of live deer. There were never as many live deer caught as had been shot in the early 1970s, but 1979 saw a peak of 25,000 captures, a figure which has fallen considerably since.

Possums did not face a similar decimation through the 1960s and 70s, but between 1976 and 1980 a dramatic increase in auction prices for raw possum pelts led to more commercial trappers and an increase in their catches. In 1979–80 more than three million pelts valued at more than $23 million were exported. Possum numbers fell significantly but not to the same extent as deer, chamois or tahr, and in recent years prices have fallen and possum numbers have once again increased significantly.

Deer, chamois and tahr numbers are now down from the highs of 30 years ago, and the forests where they ranged are showing adequate regeneration. In the face of this control strategies have again changed, and all wild animal control is now governed by the Wild Animal Control Act 1977.

Recreational hunting

Recreational hunting areas (RHAs) — officially gazetted blocks of land set aside for hunters where commercial hunting is banned — have been established as a result of clauses in the Wild Animal Control Act. It is intended that recreational hunting should be the main form of control in these areas, although other methods can be used when recreational

A striking demonstration of the effects of deer browsing, with the enclosure plot to the right in contrast with the stripped vegetation alongside.
Photo: Forest Service

hunting is not effective. Other control is unlikely to be necessary in the foreseeable future as deer numbers are declining in virtually all of the nine gazetted RHAs, thanks to recreational hunters.

The Forest Service has now moved to managing herds in RHAs if numbers drop below levels necessary for reasonable recreational hunting and where there is no likely excessive damage to the environment. Game management is a sensible possibility and can be achieved through a variety of means: restricting hunter take, imposing closed seasons, and relocation of livestock from other herds. Some of these practices are already pursued in RHAs. The North-West Nelson RHA has a policy that allows hunters to take stags only, and sambar deer have been captured in the Manawatu for relocation in the Waiotapu RHA near Rotorua. Other RHAs may have similar measures imposed if animal numbers continue to fall.

Regulation of live recovery

Helicopters must still be used to keep hoofed animals to their low levels. Dwindling wild animal numbers have meant reduced returns, and therefore the number of helicopters operating has been restricted. An unregulated "open slather" policy would effectively destroy the industry by making it uneconomic for many.

Goat problem

Until recently goats were neither valued commercially nor as a trophy animal. Numbers therefore grew unhindered and the only control was by official hunters on foot. In the meantime numbers grew to high levels, especially in the bush clad hill country of Taranaki and the King Country where helicopter recovery was ineffective.

However, a dramatic rise in the past 12 months in prices of goats — sought for mohair and cashmere fibre production — has seen large numbers taken out of the bush and sold. Does, used as foundation stock for cross-breeding with mohair Angora bucks or as surrogate mothers for embyo transplants of angora and other fine wool species, fetch more than $100 each.

If mohair prices remain high for a further three or four years, feral goat numbers will possibly be significantly reduced in more accessible areas. A major concern is that goats might escape and form feral populations in areas where there were none before. Farmers will have to be educated about goat management and tough fencing regulations will be needed to stop this happening.

A look to the future

Back in the 1960s one would probably not have predicted what has actually taken place in the field of wild animal control. Looking 20 years into the future from now is equally speculative. One would hope that we have learned our lessons well from past mistakes. Now that we have relative control over deer and tahr numbers we must never again allow them to return to the damaging levels of 30 or more years ago.

However, we must also face the reality that extermination of deer, possums, goats, chamois and even tahr is not possible. Introduced mammals are now an integral and permanent component of our ecosystems as are introduced birds. Perhaps it is time they were recognised and managed as a national resource rather than as introduced pests fit only for extermination.

The game management principle of sustainable yield harvesting of deer, practised in many countries, will become an important part of wild animal control in New Zealand, with recreation and commercial hunters controlling numbers to a level that retains sufficient animals for future hunting but holds them below levels likely to cause excessive environmental damage and lead to uncontrolled growth. Such a system, provided it is supported by hunters, will be self-maintaining. The well-being of our soils, waters and vegetation will always remain of prime concern, and in areas of particular environmental value (National Parks and Scenic Reserves) heavy culling or even local eradication will be aimed at.

The possum outlook is less clear. Even during the peak fur price period of 1979–80, possum populations were not decimated and since then numbers have risen. Commercial possum trappers must be encouraged, and the best that can be hoped for in the foreseeable future is that numbers are kept low to moderate, with more intense control in areas where vegetation damage is excessive, or where Tb outbreaks in livestock occur. The annual take of possums is likely to fluctuate, as it has in the past according to market pressures, with peaks every eight to 10 years.

Tourism, agriculture, scientific research and recreation now gain some benefit from the presence of introduced wild mammals. These benefits must be balanced against the cost of lost native plants and animals and changed ecosystems which can never return to the pristine condition of yesteryear.

Tahr in the Southern Alps. The Society believes that, while it is probably impossible to eradicate other introduced animals, tahr is one species which could be exterminated, given concerted effort and a strong political will.
Photo: Forest Service

Stoat in the dock

by Dr Carolyn M King

Most people in New Zealand dislike stoats, not only because they are introduced aliens; there are many other introduced animals that are accepted without question, and granted to have a permanent and deserved place here — for example, sheep, cattle and people. It is not even simply because stoats are carnivores; there are other introduced carnivores which are regarded as positively desirable — for example, domestic cats, sheep dogs and people. No, the problem with stoats is that they have long, thin, sneaky bodies, sharp, mean, sneaky faces and they live in the bush and eat birds.

People tend to distrust them because of their appearance, and so are more than ready to overestimate the damage they can do to forest wildlife. The argument runs something like this: there are fewer birds than there used to be; stoats are nasty, vicious predators that kill a lot of birds; therefore, in order to protect birds, we must control stoats. Logical, reasonable, true? No, no, no. Even if the first two statements were perfectly correct, the third is not a valid deduction from them: and in fact, the first two statements are only partially right anyway.

A stoat killed in a correctly-set Fenn trap is killed almost instantly, usually by double fracture of the spine. The author contends that stoats have caused little damage to bird populations in New Zealand, either in the past or the present, and that money spent on trying to control them is wasted.
Photo: Carolyn M King

Fewer birds?

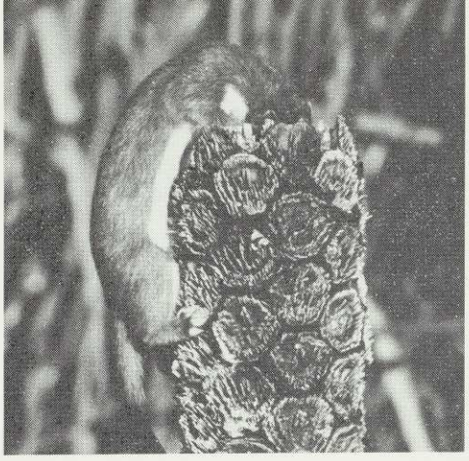
How often have you heard it said, or said to yourself, that there are fewer birds in New Zealand now than in primeval times? This lament is generally true, but it can still be misleading, because there are some respects in which it is not true. For example, you must first state clearly whether you mean that there are fewer *species* of birds, or fewer *individual* birds of all or any species; and also whether you are talking about native species only or introduced ones as well. If you mean there are fewer native species, the facts will bear you out, at least for the inhabitants of land and freshwater; on the main islands, about 50 native land and freshwater species have disappeared, or have been drastically reduced, since around 1000 AD (including some which survive on offshore islands), whereas only 10 species have arrived unaided (and are therefore included with the natives) since the beginning of European settlement. Some of the 12 or so species regarded as ''native'' but indistinguishable from their Australian relatives (eg the pied stilt) are probably self-introductions dating from between 1000 and 1840, so the total number of species arriving since 1000 is probably more than 10; but it certainly isn't enough to balance the loss of 50, unless you add the 36 species introduced by man. These would be almost enough to balance the gains against the losses, at least in terms of total numbers, though not, of course, in quality and distribution: sparrows and starlings are no substitute for bush wrens and huias, in appeal or in replacing the losses in our forests. So, in gross terms there are fewer native land and freshwater species than there were, and of course those that have gone are often the most unique and precious, while those that replace them are often common in other countries.

If you mean that there are fewer *individual* birds now than in primeval times, we immediately hit the problem of making assumptions about what the undisturbed numbers were like. Before about 750 AD there were no observers; then there were observers but no records; and by the time there were records, the birds were no longer undisturbed. Still, it would be reasonable to suppose that the average density of birds in the bush was higher a thousand years ago than now; but again, that is a general statement that needs qualifying. Some species are a lot *more* common now than then, mostly those that have thrived on the extended open spaces created by man, or on the food he provides — the herring gull and the harrier hawk, to name only two. But regrettably, these are in the minority: the list of species that have suffered losses in their numbers is far longer than the list of those that have benefitted. And again, the scales are weighted against the old endemics, the most precious and unique of the native species. It is the robins, the blue duck, the black stilt and the takahe (all found only in New Zealand) that have become scarcer, while the pied stilt and the white-eye (indistinguishable from their Australian relatives) thrive.

Stoats eat birds

Stoats are killers, yes, but not vicious, since only people, not animals, can be ''addicted to vice''. Stoats are efficient, yes — at least as far as any predator is, which means that a hunting stoat does not always catch everything it stalks, and probably knows all too well how it feels to be hungry. Stoats kill a lot of birds — well, it depends how you define ''a lot''. If you collect a sample of dead stoats and cut open their stomachs, the chances are that you will find feathers in about half of them. That may mean the stoats often kill birds, but it does not necessarily mean that the stoat living in a given place must be killing a large proportion of the total numbers of local birds. Stoats are relatively scarce animals compared with birds. For example, in 40 ha of forest in the Hollyford Valley in summer there might be around 150 pairs of birds, plus their young, and, at the very most, one stoat. This one would probably not be there all the time either, because usually the density of stoats is much lower than one per 40 ha — which means that the local resident animal might visit any particular 40 ha only every second or third day. So even if the stoat kills a bird every day of its life, the amount of damage it can do is limited from the outset by the fact that potential kills are not only hard to catch, but also much more numerous and more quickly replaced than are stoats. Most of the 150 pairs and broods of birds in that 40 ha will never be at serious risk from it, and most will die from causes other than predation.

Conversely, birds do not form the staple diet of stoats, the main contribution towards the nutritive requirements of each day, largely because the ones most frequently eaten, the small bush birds, are light in weight and supply few calories. The really important items for stoats are mammals — especially rabbits in the open country, possums and rats in the bush. In the northern hemisphere, there are many different kinds of wild small mammals — field mice (distinct from and more abundant than the feral house mice we have), voles and lemmings — which are the most important foods for stoats there. People have tended to assume that stoats in New Zealand must eat disproportionately more birds in order to make up for the lack of field mice, voles and lemmings here. But even that quite reasonable assumption has turned out to be wrong, at least when you compare the proportion of birds eaten by stoats in our National Parks with the proportion eaten by stoats on British game estates.



One of the problems in studying stoats is being able to observe them. This photograph is a rare example of one captured live in action. Stoats can climb large trees to the full height of the forest canopy, running fearlessly along the branches and down again head first.
Photo: A. Brandon, Taranaki Daily News

Control of stoats

All discussions of control of stoats are confounded by irrelevant human prejudices. Stoats have a reputation as vicious, alien killers that seems to have an extra-ordinary effect on people. The sight of a helpless little feathered bundle clamped between the jaws of a steely-eyed stoat is virtually guaranteed to get even the calmest, nicest, most logical member of the Forest and Bird Society all steamed up in a matter of seconds. We have to recognise how important this human reaction is, because it goes a long way toward explaining why some people simply cannot accept the rational arguments against conducting a general programme of stoat control, not even in National Parks. Yet all the evidence points towards the conclusions that stoats have in fact had very little to do with the catastrophic extinction of our native birds in the past, and that, except in two or three specific places, control of stoats now would do practically *nothing* to protect the native birds that remain. However much these statements may seem to contradict all you ever believed about stoats, yet the reasons for them are simple and logical, they have nothing to do with compassion or prevention of cruelty, only with the necessity of avoiding unwise expenditure of the scarce funds available for protection of our wildlife.

First, over most of the country, stoats have played a very minor part in these historic extinctions, partly because they arrived late (1884 onwards), long after Norway and ship rats, cats, dogs and human hunters had removed all the most vulnerable birds on the mainland, and partly because stoats have never reached most of the offshore islands where many more very vulnerable birds lived. Westland and Fiordland were the only mainland areas still relatively free of disturbance by the time the stoats arrived, and the destruction of the last of the ancient ground-dwelling birds (the kakapo, saddlebacks, thrushes and bushwrens) of the south and west from 1890 onwards was eloquently described by many contemporary writers. Observers such as Douglas and Harper were in no doubt that stoats were to blame, but they overlooked another, far more dangerous enemy, ship rats, which arrived at about the same time and certainly could have achieved the same effect with or without the help of stoats. The evidence against stoats as contributing to extinctions in the south and west is circumstantial, and would never stand up in a court of law; that does not mean they were innocent, only that they were not *solely* to blame.

Elsewhere in the country, there is no evidence against them at all. In fact, attacks by stoats on the Westland thrushes and saddlebacks, though well known, were quite exceptional; of the 153 distinct populations of birds known to have disappeared from the islands of the New Zealand group (excluding the outlying islands) since 1000 AD, stoats could have come into contact with only five (3 percent) that are now extinct and 11 (7 percent) that are still threatened. Stoats were perfectly *capable* of causing wholesale slaughter, but they never had the opportunity; it was the Polynesian hunters and the European sailors and their rats and cats which had the luck to discover undisturbed, tame and defenceless birds on every island they visited.

Second, the natural environment in New Zealand is totally different now from the way it was when the first predators arrived and the old conditions cannot be restored by predator control or any other means. The forests have been radically diminished, dissected and irretrievably changed by browsing deer, goats and possums; the old network of relationships to which the original forest dwellers were so well adapted has been torn apart. The past has gone as permanently as if it had never been; and even if the predators could be totally exterminated, the most sensitive of the native birds now confined to predator-free offshore islands, have no recognisable home to return to. The effects of predators in the past cannot be undone by predator control now; it is too late to slam the stable door, since there is now not only no horse, but no stable.

Third, control of stoats would probably not have any effect on the numbers of those hardy species of birds that still manage to survive in the bush today. Not only is it very unlikely that stoats can, in fact, be kept at artificially low numbers, but also, there is no guarantee that individual birds of the non-endangered species saved from predation will necessarily live much longer. Other factors besides trapping determine the numbers of stoats, and other factors besides predation determine the numbers of birds. The trick to understanding both these statements (which are really the same) is to think of life and death among animals as a bank balance.

Bankrupt birds

If you see people spending lavishly on luxurious cars, trips abroad and dinners at expensive restaurants, you know it could mean that either they must have a large income, or that they will soon be broke. Only if you are allowed to see their bank statement, and read both the credit and the debit columns, will you be able to tell whether they are genuinely wealthy or just spendthrifts. Everyone understands that a person's financial position is determined not by expenditure alone, but by the *relationship* between expenditure and income. So it should be easy to see that populations of birds are just the same, and can be easily understood if we think of breeding as income and death as expenditure.

The common small bush birds live short lives, and many of them die every year; but those deaths are usually balanced more or less by the large number of young they rear each season. Take for example the fantail: adult females commonly lay 3, 4 or even 5 clutches a year, averaging 3–5 eggs per clutch, but fewer than one in a hundred adults survive long enough to breed in more than one season. They have high incomes and high expenditure every year, and their bank balance (the population density) tends to be unsteady, but over the long term there is plenty of income available to counter the heavy outgoings. Birds in this position are like the genuinely wealthy — they can suffer heavy mortality year after year without serious effects.

But not all birds are adapted to produce a lot of young. Some, like the takahe, lay only one clutch a season, of 1–3 eggs each, so obviously their income is small, and they normally match it with very small expenditure. Their bank balance is steady and reliable — until something happens to increase the cost of living too much. Then there is no way of increasing income sufficient to restore the balance, and disaster follows. Birds in this position are like the spendthrift to whom no bank manager will grant an overdraft — they can suffer heavy mortality only for a limited time, and then they become extinct.

Unfortunately, many of the most unique of New Zealand's ancient birds, such as the moa, huia, thrush, bush wren and hosts of others, had evolved the low-income, low-expenditure pattern. The arrival of the first predators suddenly increased the expenditure; no possible increase in income could compensate; the birds swiftly disappeared. But the common bush birds that still survive were used to heavy mortality, and the predators merely took those that would soon have died from some other cause.

This is why the coming of the predators did not have the same results for all birds; it is also why it is difficult to control predators such as stoats, which have the same high population turnover characteristic of small bush birds.

Stoats killed in traps are merely rescued from dying of some other cause — usually starvation — just as small bush birds killed by stoats are rescued from dying of some other cause — most often causes that were operating long before the stoats arrived.

So people who demand that we should control stoats in our National Parks in order to protect the last of our native bush birds are really asking the impossible; it is totally impracticable (or at least, outrageously expensive) to achieve any real control over stoat populations, and even if it were possible, it is probably not necessary in the great majority of reserves, in which the native birds that remain have proved themselves able to cope with all the changes brought by the human invasion of their home — not only stoats, but also the loss and modification of the forest and the whole range of alien mammal and bird intruders. The only exceptions are the takahe and the North Island kokako, the only two endangered species on the mainland to whom stoats may still be a hazard. Even for these, stoat control is lower on the present list of management priorities than the bird's primary needs, which are for adequate secure habitat and food supplies; and no other endangered species on our list is threatened by stoats at all.

The verdict

Surprising though it may seem, the verdict must be that stoats are in fact responsible for relatively little damage to our bird populations, either in the past or the present. They have contributed to only a handful of extinctions, all in Westland and Fiordland; as far as we know they have little effect on the densities of the surviving bush birds; and attempts to control them now would be unjustifiable everywhere except as part of the integrated programmes to save the takahe and North Island kokako. Stoats arrived long after the most vulnerable birds had already been removed by other predators, and the populations of birds that are left are controlled more often by other factors — normally habitat and food supplies — than by predation by stoats. There is a limit to the damage that predators can do, because only certain kinds of birds are vulnerable to it, but there is no effective limit to the damage that habitat destruction can do, because all birds are vulnerable to that. We should not waste our energy and resources worrying about stoats, while there are any native forests and wetlands still at risk.

FOOTNOTE:
Further details and full references to the information in this article can be found in the author's recently published book. *Immigrant Killers : Introduced predators and the conservation of birds in New Zealand* (Oxford University Press, 1984). Carolyn King is the author of some 35 scientific papers on mustelids, and is an acknowledged expert on the stoat and weasel in particular. She has worked as a scientist with DSIR Ecology Division and the New Zealand National parks Authority, and is currently engaged in research at Pureora Forest Park for the Forest Service. Dr King is also scientific editor for the Journal of the Royal Society of New Zealand.

Dr King has presented the Society with recommendations on how we should deal with stoats and the threat they pose to native birdlife. No one is better qualified to offer this advice. Dr King's research in New Zealand has concentrated on the problems that concern us — the effect of stoats on their prey and the effectiveness of control measures on stoats. Few ecologists have been as conscientious in presenting their findings so promptly and clearly to those most concerned.

Her conclusions presented in this article may come as something of a shock. A blow to one's prejudice is always painful. Are we really to sit back and allow this alien predator continued freedom to kill our birdlife? Yet the facts appear that stoats on mainland New Zealand are, with few exceptions, no longer a threat to our birdlife and in turn our efforts to trap these animals are similarly ineffective. In brief, any damage stoats are capable of inflicting on bird populations will have already occurred. We have been well advised that our efforts to conserve birdlife should not be diverted from that of ensuring protection of their habitat. Any member interested in pursuing these theories and their ecological background will enjoy Dr King's recent book, *Immigrant Killers*.

Peter Gaze, Society member and ecologist.

New Zealand's mistletoes, some of which are notable for their brightly-coloured flowers, are becoming scarce in many regions and extinct in some. This article links mistletoe decline to the spread of possums.

A European mistletoe, *Viscum album*, is traditionally remembered for its supposed mystical powers (as will be familiar to readers of Asterix books), and for its romantic connotations at Christmas. However, the term mistletoe can be used more widely for any plant in the family Loranthaceae which is a perching parasite of other trees and shrubs. Processing green leaves for stems, mistletoes presumably synthesise their own carbohydrates but must obtain water and minerals from their host plants.

Milford Sound and Mitre Peak form a backdrop to an isolated silver beech tree with a large, flowering mistletoe (*Peraxilla colensoi*) plant, 5 January 1985.
Photo: R. H. Taylor.

Where have all the mistletoes gone?

by Colin Ogle[1] and Peter Wilson[2]

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(2) Ecology Division, DSIR, Nelson

New Zealand's mistletoes

Six of the nine endemic species are much-branched shrubs with somewhat leathery leaves in opposite pairs. Some have conspicuous, red or yellow flowers (*Peraxilla, Alepis, Trilepidea*) while in others (*Ileostylus, Tupeia*) they are small and greenish-yellow.

The three remaining native mistletoes are members of the genus *Korthalsella*. All are small herbs with semi-succulent, green, flattened or rounded stems, and only vestigial leaves. Their flowers are minute.

All our mistletoes have fleshy fruits with a single seed embedded in a sticky matrix, making them well-suited to bird dispersal.

The decline of mistletoes

Formerly, the species with brightly coloured flowers were widespread and abundant in New Zealand, at least in beech forests, as noted by Potts (1882), Field (1885), and Laing and Blackwell (1906). More recently, the red-flowered

Peraxilla (*Elytranthe*) *tetrapetala* was still common in the Tararua Range. Ian Powell reports that during Christmas in 1924 he saw a lot of mistletoe on beech along the track from Totara Flat to Dalefield, and a year later mistletoe flowers littered the ground from Tauherenikau Hut to about half way up to Bull Mound. Over the past 10 years or more, Tony Druce has found very few mistletoe plants in the Ruahine and Kaimanawa Ranges, and none in the Tararua Range, although Les Pracy recently saw flowering *P.(E.) colensoi* in the Tararuas. Druce considers that mistletoes, once a major component of our forests, are now extremely rare wherever possums have been present for any substantial time.

A 1980–84 inventory of threatened plants of the Wellington region made by members of the Wellington Botanical Society contains only one recent record of a leafy mistletoe, being a solitary plant of *Ileostylus* (*Loranthus*) on an isolated shrub of rohutu at Heretaunga.

In the early 1960s, *Peraxilla tetrapetala* and *Alepis* (*Elytranthe*) *flavida* were known to one of us (C C O) and Dr Ian Atkinson on mountain beech close to the Chateau in Tongariro National Park. Dr Atkinson reports that these mistletoes were rare elsewhere in the Park at that time, but land around the Chateau was regularly trapped for possums. Both species have now disappeared from this area (Wilson 1984).

Dr Ruth Mason recalls that mistletoe was very abundant in the Ureweras in the late 1920s, while Michael Greenwood and Tony Druce observed *P. tetrapetala* in abundance in the Ruahines during the 1940s, where it is now rare (Wilson 1984).

***Korthalsella salicornioides* in fruit, on manuka, western shore of Lake Wairarapa, March 1984.**
Photo: C. C. Ogle.

***Alepis flavida* with flowers and ripe fruit on mountain beech, eastern shores of Lake Poteriteri, Fiordland National Park, January 1984.**
Photo: C. C. Ogle.

***Ileostylus micranthus* on mountain totara, Lake Poteriteri, January 1984.**
Photo: C. C. Ogle.

Trilepidea (*Elytranthe*) *adamsii*, the sole member of an endemic genus, was last seen alive in 1954, and is thought to be extinct (Given 1981). In much of the North Island and large forested tracts of North-West Nelson it is now remarkable to find a plant of *Peraxilla* or *Tupeia*, while *Ileostylus*, at home on a wide range of hosts, is mostly uncommon.

There are some local exceptions. In a berry-fruit orchard beside the main highway at Otaki, *Ileostylus* occurs on eight plants of *Coprosma crassifolia* among a few totara trees, and occurs on totara itself where there are isolated trees in pasture of the Takaka Valley in North-west Nelson. *Ileostylus* is on salt-march ribbonwood and hawthorn in Golden Bay, and on a wide range of host trees, including kowhai, silver birch and willow, in farmland of the Nelson district, where *Peraxilla colensoi* occurs on isolated beech trees also. Most of these sites appear to be "special cases", where possums are unlikely to occur, would be heavily trapped, or where there is a wide range of alternative possum foods, including pasture plants.

Conditions which previously favoured mistletoe survival can change rapidly. Mark Bellingham reports that in an area of swamp of the upper Hokianga Harbour, *Tupeia antarctica* was common on shrubs of *Coprosma propinqua* up to 1982, but when water levels were lowered by draining, presumably giving access to possums, the mistletoes disappeared within a year, although they still remain in unmodified swamp nearby.

Certain parts of New Zealand have never had possums, and there, not surprisingly, one or more leafy mistletoe species are common. D'Urville Island has an abundance of *Tupeia* on five-finger (Ogle 1983), *Ileostylus* is common there, and although *Alepis flavida* has not been recorded there before, on 8 April 1985, PRW found large clumps of it on several large hard beech trees 50–150 m a.s.l. up a dry spur on the western side of Mill Arm, Greville Harbour.

***Peraxilla tetrapetala* flowering on mountain beech, Chateau Tongariro, Tongariro National Park, December 1963. This mistletoe is no longer known in this area.**
Photo: C. C. Ogle.

***Korthalsella lindsayi* s.s. on *Melicope simplex*, Mataroa, Taihape, December 1984.**
Photo: C. C. Ogle.

Direct evidence of possums

One of us (Wilson 1984) has shown possums were a major cause of the decline of mistletoes, during a five-year study in Mt Misery, Nelson Lakes National Park. Possums were first recorded in this part of the Park around 1965 (Rowley Taylor). The study area contained three leafy mistletoe species, *Peraxilla colensoi, P. tetrapetala* and *Alepis*. Marked mistletoe bushes were examined three-monthly for signs of possum browse and flowers or fruits. The amount of browsing damage was scored on a scale of 0–4, and each November the increase or decrease in the size of each mistletoe was assessed on the same scale.

Both *Peraxilla* species averaged almost one browsing attack per year and in over half these attacks more than 50% of the plant was defoliated. On average, *P. colensoi* plants decreased slightly in size but *P. tetrapetala* exhibited a dramatic decrease. By comparison, six unbrowsed plants of *P. colensoi* and seven of *P. tetrapetala* on the same transect averaged 35% and 20% *increases* in size respectively.

It was also found that flowering, and hence the availability of seed for dispersal, is markedly reduced by the small size of plants which had been browsed persistently. Even with fewer than two possums per hectare, which is four or five times lower than in some more diverse forests of New Zealand (Clout and Gaze 1984), the Mt Misery area is undergoing a marked decline in mistletoes.

Waitutu forest

During a survey of wildlife in Waitutu State Forest in January 1984, members of the Wildlife Service party were impressed by the variety and abundance of large mistletoe plants throughout western parts of the forest (Elliott and Ogle 1985). However, only one of the four survey teams working east of the Wairaurahiri River saw mistletoes, and it seems that in this part of Waitutu mistletoes have, at the best, a patchy distribution, and many have been reduced in numbers and range. Possums are common to the east of Wairaurahiri River, but are almost unknown to the west. New bridges build across the Wairaurahiri and other rivers is probably helping the spread of possums westward.

In Waitutu, *Peraxilla* (*Elytranthe*) *colensoi* was the most showy species. Its presence on tall silver beech (apparently its only host tree there) was often indicated by fallen scarlet flowers carpeting the ground. The flowers contain nectar, and bellbirds, silvereyes, and, unexpectedly, since it is regarded as an insectivore, a yellowhead were seen feeding in them (Kath Walker pers. comm.). It is possible, of course, that the yellowhead was taking insects from the mistletoe flowers. Less abundant, but still widespread, was the smaller scarlet mistletoe, *P. tetrapetala*. It was more common on higher altitude mountain beech and silver beech, *P. colensoi* being absent above 600 m.

Because it grows on low spreading branches of mountain beech along lake edges and forest clearings, the plants of *Alepis flavida* with their yellow-range flowers were the most readily seen *in situ* at Waitutu. On the eastern shore of Lake Poteriteri, between the two unnamed rivers on either side of Poteriteri hut, a count of mountain beeches showed that of 212 beech trees, 55 bore one or more plants of this mistletoe.

By January the fourth mistletoe seen at Waitutu, *Ileostylus micranthus* had finished flowering but small, green fruits were seen. While its flowers are insignificant when compared with *Peraxilla* and *Alepis*, its ripe fruits are yellow, 5–8 mm in diameter. Most remarkable at Waitutu was the abundance of this species and its ability, unlike the other species of mistletoe there, to use a wide range of host plants. The 19 different host species recorded included mountain totara, pink pine, six species of small-leaved *Coprosma*, horopito, tree fuchsia, southern rata and the liane, *Rubus schmidelioides*.

South Westland and Fiordland

Some mistletoe species are still abundant in parts of South Westland. Possums are known there, but according to Less Pracy there were very few before 1960, and even now they are in very sparse, scattered populations south of Paringa to Jackson Bay. He believes they were spread deliberately, including very recently into the Lake Ellery and Haast Road regions.

During a search of beech forest adjacent to the road from Paringa River to Haast Pass in February 1984, PRW noted that *Peraxilla colensoi* was abundant, and, on average, in much larger clumps than in the Nelson Lakes study area. Peter Gaze reports that *Alepis* was quite widespread in forested areas he visited during 1984 between the Karangarua and Paringa Rivers. It was mostly growing on the outer branches of *Coprosma propinqua* bushes.

Over the first week of January 1985, while touring South Westland and Fiordland, Rowley Taylor found that *P. colensoi* was plentiful, in large clumps and in heavy flower, from Paringa to Haast; on both sides of Smoothwater River; at Cascade River on bush edges around Smiths Ponds and Colin Creek and through the forest canopy on surrounding country; from Haast to the Gates of Haast; and, with *P. tetrapetala*, at Haast Pass. Possum numbers in these areas still appear to be too low to have any noticeable effect on mistletoes.

Taylor notes there were many fewer mistletoes in the parts of Fiordland that he visited than in South Westland. From west of The Divide to Milford, where possums were liberated before the turn of the century (Pracy 1974), Taylor found only six *P. colensoi* plants, all large and in flower. On 5 January, he found *P. tetrapetala* on silver beech in the Eglington Valley, four plants at Lake Gunn and one, past flowering, at Knobs Flat. However, at the latter site about 10 days earlier both *P. tetrapetala* and *P. colensoi* were reported by Kath Walker and Graeme Elliott to be common, but heavy rain destroyed many of the flower buds and open flowers. Possums were in the Eglington Valley by 1960 (Pracy 1980).

The contrasting observations on mistletoes at Knobs Flat highlight several problems in assessing the abundance of mistletoes, particularly when an abundance rating is made from sightings of flowering plants. Different observers, varying climatic conditions, and precise time of year can all give apparent differences in mistletoe numbers at a given site, or between sites.

Furthermore, individual bushes of mistletoe which are browsed but not killed can recover if browsing pressure is reduced. Les Pracy reports that near Lake Wanaka in the Makarora Valley up to Camerons flat, mistletoes were severely defoliated by possums by 1950, but that in 1961 he observed some regrowth, and by 1978 mistletoe plants were again quite commonly seen. In other areas, too, reported gains or losses of mistletoes might sometimes be the result of changes in size and flowering state of plants rather than from the establishment of new plants or death of older ones.

Korthalsella mistletoes

Although possums browse leafy mistletoes, little is known about their effect on the three species of tiny, almost leafless, *Korthalsella* mistletoes. All occur in areas infested with possums, and the rarity of reported sightings of *Korthalsella* probably reflects the difficulty of seeing the plants. Nevertheless, since all are species of scrub and shrublands, *Korthalsellas* are likely to have suffered from extensive clearance of their habitat in the past few years.

K. salicornioides occurs on the majority of older bushes of manuka and kanuka in an area on the west shore of Lake Wairarapa, but it takes careful searching to spot it. Near Taihape, the flat-stemmed *K. lindsayi* is similarly difficult to see where it grows on *Melicope simplex*.

There are only two records of the third *Korthalsella, K. clavata*, in the North Island, so that it may have always been a rare plant there, but it occurs locally in parts of the South Island. Hugh Wilson (1978) reports it as being fairly common on *Coprosma*, mountain wineberry, matagouri, and kohuhu in Mount Cook National Park.

Mistletoe conservation

There remain many unanswered questions about New Zealand's mistletoes. For example, how important were they to indigenous wildlife for nectar and fruit, and, conversely, how important were birds to mistletoes for pollination and seed dispersal? Until recently there were few answers, but in 1985 in South Westland, Colin O'Donnell's study revealed tuis and kakas taking nectar of both red mistletoes, and silvereyes, bellbirds and blackbirds feeding on fruits of *Peraxilla colensoi*. PRW found bellbirds eating *Alepis* fruits on D'Urville Island. Many beech forests are poor sources of nectar and fleshy fruits, the more so since deer, possums and other browsers have depleted plants such as fuchsia, broadleaf, *Pseudopanax* species, and large-leaved *Coprosma* species. One can still study bird/mistletoe relationships in South Westland and in Waitutu forest but this may change rapidly as possums spread.

Why are mistletoes not more common on certain islands with suitable host plants but without possums? If possums

were involved in the presumed extinction of *Trilepidea adamsii*, then why did that mistletoe apparently disappear from Great Barrier Island, which has no possums? If *Trilepidea* still occurs, then Great and Little Barrier Islands would seem likely places to search.

Why do leafy mistletoes persist in some eastern and southern parts of the South Island, despite the presence of possums? Are there other animals which eat the flowers or fruit without depositing seed on new hosts or do some introduced birds such as chaffinches destroy mistletoe seed if they eat the fruits? Is disease a factor? How long would it take to establish the relative importance of various factors, if more than one is involved, and is there time to do this if mistletoes are already under threat?

What can be done now to conserve mistletoes? Some have been successfully protected on isolated host trees by constructing possum-proof barriers around the trunk, but this protects no more than a few mistletoe plants. Establishing mistletoes on host trees in urban areas and perhaps around dwellings in forests where possum numbers are kept down could have similar local success.

While it might be unusual in New Zealand to speak of "marooning" as a technique for saving threatened plants from extinction, the technique is now well-known for certain native animals (Williams 1977), and could be equally valid for preserving some plant species.

***Tupeia antarctica* in flower; growing on ribbonwood in Peel Forest.**
Photo: B. J. Molloy.

As with vulnerable birds, the main prospects for large populations of mistletoes might lie in establishing the species on islands which are free of the problem animals, or on islands such as Kapiti and Codfish if they can be cleared of possums. Ian Atkinson reports that heavily-browsed plants of *Ileostylus* on karo bushes on Kapiti Island have recently begun to produce new leafy shoots, following the massive reduction in possum numbers there through hunting in 1983–84.

Whatever the answers to these questions, we believe that time is running out for at least the two *Peraxilla* species, *Tupeia antarctica* and *Alepis flavida*. Although not mentioned in *Rare and endangered plants of New Zealand* (Given 1981), *Peraxilla colensoi* has been added to a new working draft of Dr Given's checklist of threatened plants, with a rating of vulnerable. We recommend that the conservation status of *all* mistletoe species be re-evaluated and that action be taken to preserve, and if possible enhance, their remaining populations.

ACKNOWLEDGEMENTS

Our thanks go to all those named in the text for their personal communications on mistletoes and/or possums, and to Dr M. Crawley for his editorial comments.

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BOOM & BUST AGAIN?
AOTUHIA

Conservationists and government farm developers are still at odds on the question of retaining high value shrublands on ***publicly owned lands*** *earmarked for farm settlement. Society Conservation Officer Terry Fitzgibbon reviews the Lands and Survey Department's proposal to create 12 farms in the remote eastern hinterland of Taranaki.*

"A huge, shaggy and lonely land ....
No smoke of settlers' fire gave civilised touch to the silent expanse
Valley and hill and glinting stream and dark solemn forest lay bathed
In soft blue haze, myserious, unpeopled; as untouched by man as it might have been a thousand years ago."[1]
(James Cowan [1892], one of Aotuhia's earliest settlers.)

Aotuhia's remote "bridge to nowhere" was again re-opened in May this year with a flourish and a parliamentarian's earnest prayer that history wouldn't repeat itself. The story of the Aotuhia hill country echoes the saga of other New Zealand pioneering forest clearances — this tangled web of bushclad valleys has been cleared, and has reverted on a number of occasions since the first European settlers pushed their way into the Wanganui River hinterland with axe and flame. After several hiccups Lands and Survey are again proposing to "tame" these strongly regenerating shrublands with grandiose plans of 12 farmblocks and a projected $10 million budget. Immense effort and cost has already been expended despite repeated cautionings from economists and conservationists. To what end?

Vivid accounts tell of the hardships encountered by the first European settlement around and after the 1890s. A pioneering determination to subdue nature was squarely challenged by the obstacles of steep, forest-clad ridges, persistent rain, slushy tracks, slips, fogs and swollen rivers.

A ghost town

Most of the region's earliest hopeful settlers arrived by way of the Wanganui River, the only means of communication and transport until the Whangamomona Road and bridges were opened. By the early 1920s the district supported some 40 families with the township of Aotuhia boasting a schoolhouse, post office and community hall. The cycle of problems then began — floods and slips, strong hill country reversion, low produce prices, skyrocketing loan and rent charges and stock losses all took their toll.[2] Almost all the settlers walked off their land during the 1930s depression and Aotuhia quickly became a ghost town.

Lands and Survey tried to "recondition" some 2,000 hectares of abandoned lands in the 1940s only to be thwarted by further extensive flooding. Since then various groups have lobbied to have the area developed, culminating in the 1979 Land Settlement Board decision to develop some 4,300 hectares into a dozen farm-ballot units. More then a million dollars has recently been spent on roading, buildings and shrubland clearance.

One glance at a topographical map of the North Island confirms the remoteness of the Aotuhia district. Wedged midway between the volcanic massifs of Ruapehu and Egmont, the area is surely the last vestige of misdirected pioneering optimism. Today, once again the prospects for hill-country farming are particularly grim. Escalating interest rates, costs of transport, farm establishment and maintenance are causing concern. Poor returns on produce, the Government's "more market" emphasis, budget cuts and the call to concentrate Land Settlement schemes on intensifying production on already cleared land paints a bleak picture for hill country farming, particularly in isolated areas. Taranaki farm block ballots were withdrawn from sale last year. Clearly, the whole proposal needs to be re-evaluated.

Moratorium needed

It is also timely that a nation-wide review of Land Settlement programmes is underway, sparked by Treasury's "Economic Management : Land Use Issues" report in July last year. This report queried the wisdom of continuing marginal farmland expansion, and suggested a redirection of efforts into more economic avenues. It is the Society's view that Treasury's "10 percent guideline" for giving the nod to farm development programmes should be supplemented by wide-ranging environmental evaluations. In the case of Aotuhia this has been sadly lacking; only now is a management plan being put together. This document could in fact be merely a "window dressing" unless the fundamental question of options is also addressed. A moratorium is needed until these matters are evaluated.

Recent visits to Aotuhia by Society members have prompted further concerns. A large catchment has been crushed and burnt destroyed a walkway entrance and a proposed reserve of steep, strongly regenerating shrublands. The latter was earmarked for reserve in the Department's 1978 *Land Use Study*[3] and is part of a network of forested lands requiring protection. Some 5,000 hectares of uncommitted Crown lands were then identified for reservation, but to date the Department has failed to initiate any change in land status. The official word, echoed in the Wanganui National Park report, is that "formal reservation will be delayed pending finalisation of the Aotuhia farm development boundaries". The Society has also been advised that this "expedient" measure avoids the cost of resurveying prior to fencing farm unit titles. Our research has shown that almost 2,000 hectares could be reserved immediately, and much of the balance protected by bringing the survey of fringe and shrubland areas ahead of any pasture development.

Reserve shrublands now

The Society has no quarrel with a decision to continue farming on already cleared lands. Much of the fertile valley floors are well grassed. If pasture improvement was confined to these lands and most of the shrublands fenced and reserved, the Department could usher in the long-awaited change of emphasis for its development programmes. Thus, conservation and development would be integrated, a theme the Land Settlement Board has firmly embodied in policy but not often in practice.

The management plan being drafted clearly needs to resolve the conflict between retaining the important regenerating shrublands and the desire to clear them to make the units economic.

Devastating clearance on steep land which even feral goats struggle to climb. Such areas should have been left alone.

The Society wants clearance halted and a reduction in the number of units proposed, although the farming lobby may not welcome this because of the money recently spent. However, it is surely better to scale down now than later, when even more could be wasted on an economically dubious scheme.

Aotuhia's regenerating shrublands have now reached an interesting and critical stage in the cycle towards mature canopy forest. Much of the manuka-kanuka shrubland is now dying off and is being replaced by tree ferns and hardwood species. Since these areas are at least one third of the way towards becoming varied mature forest, their reservation is even more essential.

Clarkson (1981)[4] notes that the presence of tree ferns in steepland gullies very often indicates poor drainage or slip-sites with thin, depleted or low fertility soils. Research underway by Paul Blaschke near Aotuhia confirms that hill country development in these sensitive areas is unlikely to be an economic or ecological success. Their work lends weight to the earlier land capability survey of the Ministry of Works (1975) which calls for the retirement of steepland reverted areas and development of only 2,400 hectares of the area.[5]

Aotuhia's shrublands act as "biological corridors" between the mature forests of the Wanganui and Poarangitautahi blocks. These corridors need to be retained and allowed to regenerate. These shrublands are the home of a large number of kiwis. Any further clearance would destroy many of these ground-dwelling birds and numerous other species. No investigation has yet been carried out of habitats, plants or animal species within the areas proposed for crushing and burning.

Uncommon birds

Peter Winter, the Society's Taranaki branch chairman, reports that there is a kokako colony near the Round Hill area in the easternmost portion of the block. Kaka, parakeet, morepork, robin, pied tit, fantail, grey warbler, pigeon, bellbird, whitehead, silvereye, tui and both shining and long tailed cuckoo, have been sighted both in and around the bush surroundings.[3] Blue duck have been sighted on one of the as yet unreserved tarns at the head of the Porangi Stream. Both the sighting and the tarns are uncommon in this area.

The Society has asked the Department to initiate a Protected Natural Area survey of these lands in the event of development proceeding. We have also asked the Land Settlement Board to adopt the new definitions of native forest recently adopted by the Forest Service which includes "locally important vegetation for wildlife habitat" and "areas of native vegetation of any height including manuka-kanuka *containing regenerating high forest species*". These definitions should also assist in determining which areas require preservation.

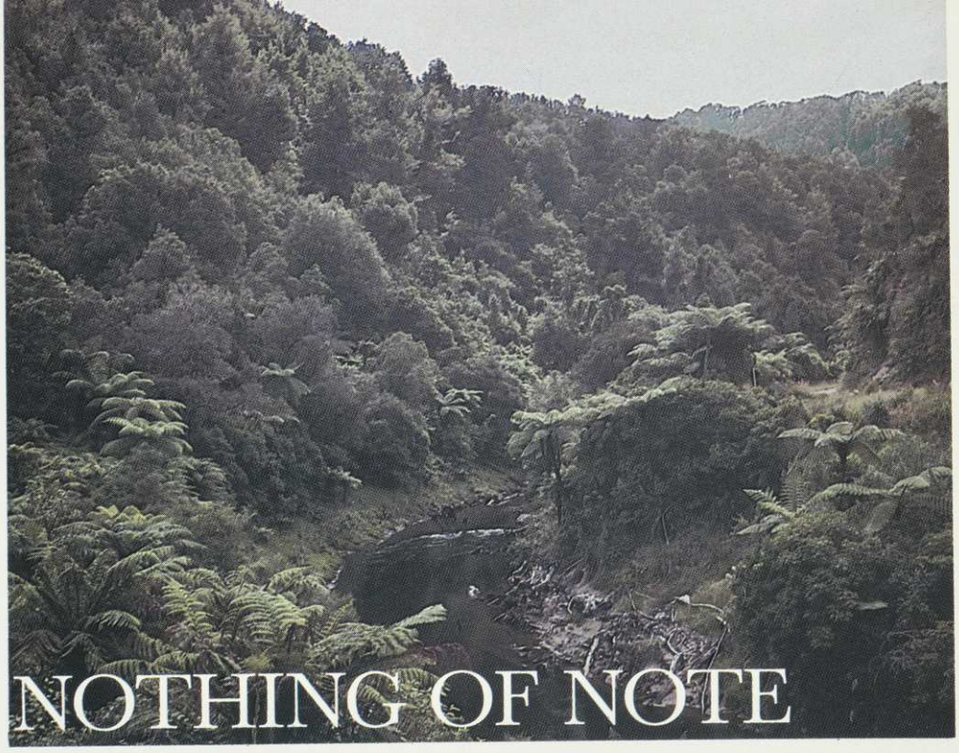
Reserves should be established before any further development. This would ensure such lands would later be covenanted or excluded from settlement titles. In addition, Lands and Survey and the Forest Service should be tackling the immense problem of goat, possum and wild cattle browsing more vigorously.

Aotuhia's finger-like valleys are generally mist-shrouded and rain-soaked through the winter months. The bulldozer-crusher is presently poised at the top of a steep shrubland hill awaiting the dryer spring-summer months. It should be rendered immobile by sound decision-making.

FOOTNOTES

1. Department of Internal Affairs, *Settlers and Pioneers* (1940), Wgtn p 81.
2. Report of Special Committee, *Deterioration of Crown Lands* (1925). Appendix to Journals of House of Reps., C. 15 draws attention to excessive clearance and continuing high costs of curbing reversion, etc.
3. Lands and Survey and Forest Service, *Aotuhia Regional Land Use Study* (1978), convenors: Fitzgibbon, T. and Armitage, I. Wgtn. p 64, 68, 90 and Maps #4, #6, and #304.
4. Clarkson, B. *Vegetation Studies in the Taranaki Land District* (1981) unpub D.Phil., Uni of Waikato, Hamilton. p 278–85. See also (3) above, p. 19, 37 and 40.
5. M.W.D., *Land Use Capability Assessment : Aotuhia* (1975), Water and Soil Division, Palmerston North. Survey and farm block area not dissimilar.

These strongly regenerating shrublands and forest have been destroyed by the crusher (top centre) since this photo was taken. The area was earmarked for reserve in 1978.
Photos: Terry Fitzgibbon



The Tangarakau River flows through North Taranaki's Waitaanga State Forest, a large part of which has a prospecting licence over it. Pictured here is the Tangarakau Reserve, downstream from where the licence has been granted.
Photo: Lands and Survey

NOTHING OF NOTE IN NORTH TARANAKI?

by Terry Fitzgibbon

Mt Egmont, the brooding peak punctuating the National Park and dominating the whole cape region, has suffered from countless numbers of people teeming over and around its accessible volcanic slopes during the last decade. The 1983 Egmont National Park Plan, recognising the problems that increasing visitors cause, suggested the park should not be the only place for recreationalists within the region.

The good news is that to the north-east of New Plymouth, between the Mokau River and the proposed Wanganui National Park, a vast forested hinterland has immense reserve potential. At present Government and local body agencies are investigating this potential. Some 50,000 hectares of rich and varied forest form an almost unbroken mantle between the bleached grey coastal cliffs of Tongaporutu and the deeply gorged Wanganui River terraces to the south.

Because management and control of these lands is split between private owners and government agencies, unprecedented co-operation will be needed to achieve a measure of protection over the forest. The Society's principle that "forest life knows no man-made boundaries" is surely relevant here.

It is already well known that the area supports an abundance of wildlife, including kokako, kiwi and bats. This wilderness of precipices, deep ravines and waterfalls has a varied and fascinating forest structure. Almost pure stands of buttressed pukatea, grey columns of miro and matai, fresh green tawa and kamahi, giant kahikatea and shaggy rimu and rata compete for space in the valleys and on the slopes, while mountain totara and black and hard beech crown the steep and narrow ridgetops.

The Mokau River has been nominated for the list of protected wild and scenic rivers. Already the river is much used by boaters, rafters and whitebaiters. Recreational use of the adjoining forest is currently limited, although further linked tracks and huts are planned.

However, proposals to reactivate mining within North Taranaki cast a shadow over the fate of these superb natural resources. The 10,500 hectare Mokau coalfield, between the Mokau and Awakino Rivers, is now being investigated in earnest by the Ministry of Energy as a supply for a large thermal power station.

It is envisaged that an estimated 100 million tonnes of coal will be mined, both by opencast and underground methods. Just to the south a further 20 million tonne resource within a similar sized area is owned by Ohura Timber and Coal Products Ltd, who intend to mine it. A prospecting licence has just been granted to the Ohura Coal Co Ltd over a large part of Waitaanga State Forest. They envisage spending $200,000 so it may be assumed the company is reasonably confident of finding economic fields.

What would be the effect of these major projects?

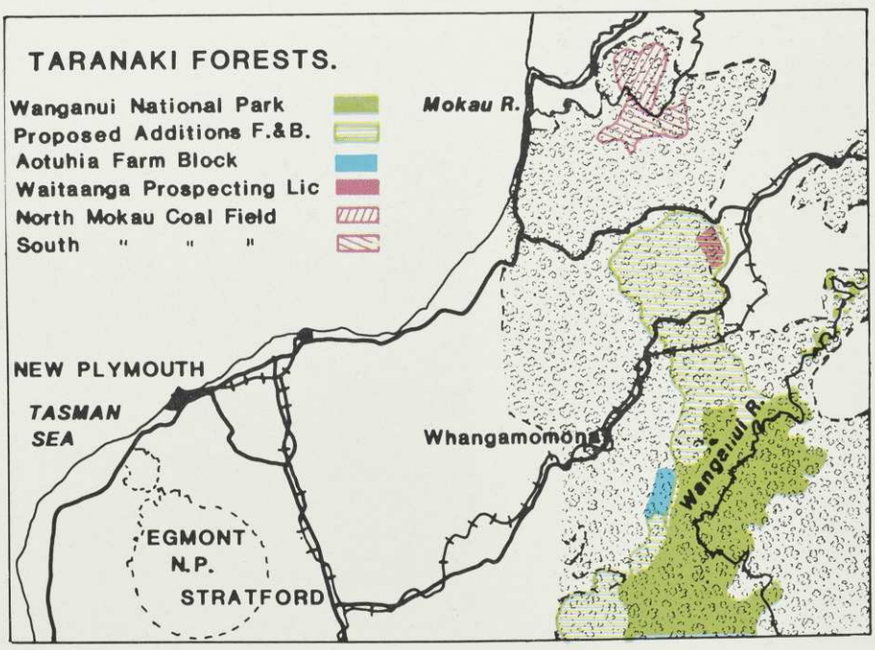
Chairman of the Taranaki National Parks and Reserves Board, Mr Neville Davies, says the Board "is gravely concerned when such development has the potential of being indiscriminate in relationship to other values, and particularly with potential of severe environmental contamination of the adjacent reserves and watershed."

The forests are a protective mantle over this geologically unstable country. If the forest is damaged or removed, severe catchment problems will arise as the rivers already carry heavy amounts of sand and silt in wet weather. Much else in the forest would be affected. All these impacts need to be assessed in a far less cursory manner than the replies to the EIR questionnaire appended to the Waitaanga prospecting application.

To the question "Present land use?", the answer given was "State Forest — no land use." Another question: "Birdlife, wildlife and ecology: anything of note?" The answer: "The usual native fauna but *nothing of particular note*." (Author's italics).

The Wildlife Service, on the other hand, has rated the area "outstanding value habitat." Obviously, the usual checks and balances are insufficient.

Let us hope the inter-departmental survey will do more than just an "inventory and balance" — firm recommendations for reserves must be made so that the community and nature don't take back seats around the negotiation table.



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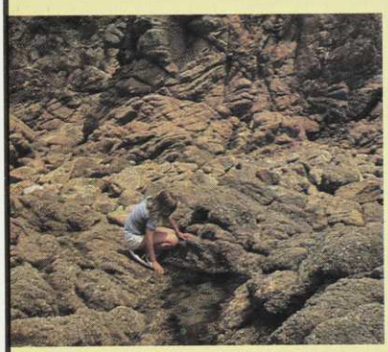

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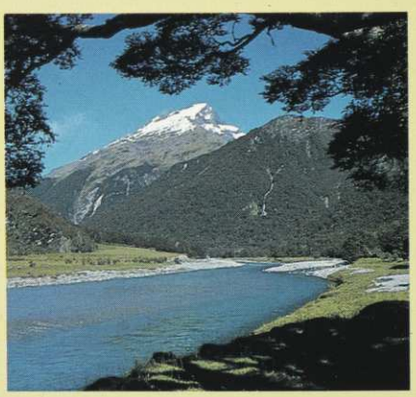

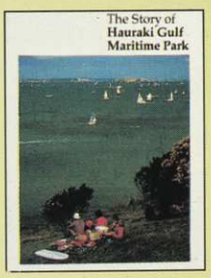

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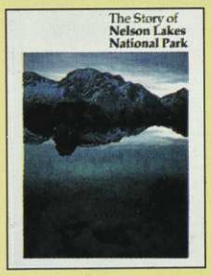

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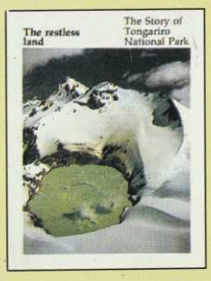

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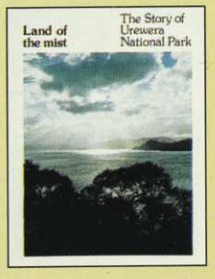

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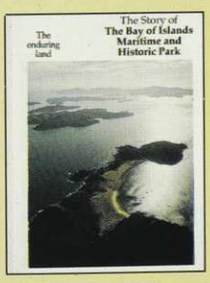

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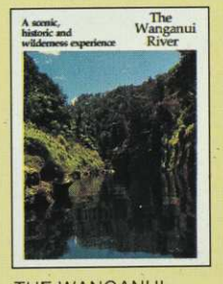

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Kevin Smith, Society West Coast Conservation Officer, calls for

A fair deal for the forests of Abut Head

On a map of the South Island, the small bump halfway down the West Coast marks Abut Head — a densely forested headland which juts defiantly out into the breakers of the Tasman Sea. A well-known landmark to West Coast fishermen, it lies just to the north of the Okarito Lagoon and the Waitangiroto River white heron colony.

The five kilometre-long headland is surrounded by imposing physical barriers which have so far ensured its protection. Flanking Abut Head are the rampaging waters of the Whataroa River, a wild coastline, the beautiful Saltwater Lagoon and the hidden waterways and dense podocarp forests of Saltwater State Forest.

Today, however, logging roads are fast closing in on Abut Head, threatening its 580 hectares of privately-owned forests of rimu and kahikatea. Behind the scenes, conservation groups have been appealing for many years to the Forest Service and Lands and Survey to safeguard this important area. Compensation to the owners by way of an exchange of timber or land or by direct cash payment would be required. Fitful negotiations on these aspects have been unsuccessful. Acting on legal advice, the Forest Service recently notified the sawmiller, Derek Banks of Christchurch, that he was entitled to road access through Saltwater State Forest. This road will be bulldozed along the banks of the Whataroa River through virgin forest zoned for addition to the Saltwater Ecological Area.

In response, the West Coast branch of Forest and Bird and Christchurch NFAC are together spearheading a public campaign to protect Abut Head. West Coast author and Society councillor, Peter Hooper, describes Abut Head as "one of the most important stretches of privately-owned unspoilt coastline in New Zealand".

Historic event

It is ironic that Abut Head should be the scene of controversy today, for 125 years ago the area was the setting for the most significant event in West Coast history.

In the autumn of 1860 at a small Maori village or kainga on the edge of the Saltwater (Poerua) Lagoon, the Crown Land Agent, James MacKay, successfully negotiated with the three principal Poutini Kai Tahu chiefs — Tae Tae, Tarapuhi te Kaukihi and Werita Tainui — for the purchase of the

The Government holds the key to reserving Abut Head, one of the most important stretches of privately-owned coastline in New Zealand. Saltwater Lagoon lies at top left, with Abut Head sandwiched between the Tasman Sea and the Whataroa River.
Photo: Guy Salmon

West Coast. One of the few small reserves retained by the Kai Tahu covered the Poerua Kainga — the residence of Tae Tae — and an adjacent burial ground. The Abut Head freehold land borders this 'native reserve' and the adjacent lagoon.

To the Poutini Kai Tahu, a semi-nomadic people, the Poerua kainga was a favourably-sited summer residence. The dark waters of the lagoon yielded waterfowl, inanga and tuna (eels) in abundance. Kuku (mussel) were plentiful along the rocky coastline; kaka, kereru and other forest birds were readily available in the lush forests embracing the lagoon.

Little has altered since the time of Tae Tae. The lagoon and bush-clad hills remain superbly pristine; birds, fish and seafood still abound. In fact, the Saltwater area is now widely recognised as a place of extraordinary beauty and of outstanding conservation value. All the publicly-owned land along the Saltwater coastline is set aside for permanent protection either as the Saltwater Lagoon Scenic Reserve or the Saltwater SF Ecological Area. But the forest on the rolling hills stretching from the lagoon to the tip of Abut Head is doomed unless more vigorous attempts are made to seek its protection.

Dramatic landforms

Abut Head is one of the most dramatic coastal landforms on the West Coast, its total splendour best revealed by scenic flights. Its sinuous moraine ridges are composed of rock debris dumped here over 14,000 years ago by successive advances of massive ice sheets which spread down the Whataroa Valley. Centuries of pounding by storm driven seas have cut sheer coastal cliffs along the moraine's coastal edge. Boulders won from the cliffs litter the coastline and provide a refuge for lazing fur seals. Gentler hills, scarcely altered since their ice age creation, slope down to the Saltwater Lagoon and Whataroa River. A small flood plain terrace alongside the river supports a forest-fringed swamp.

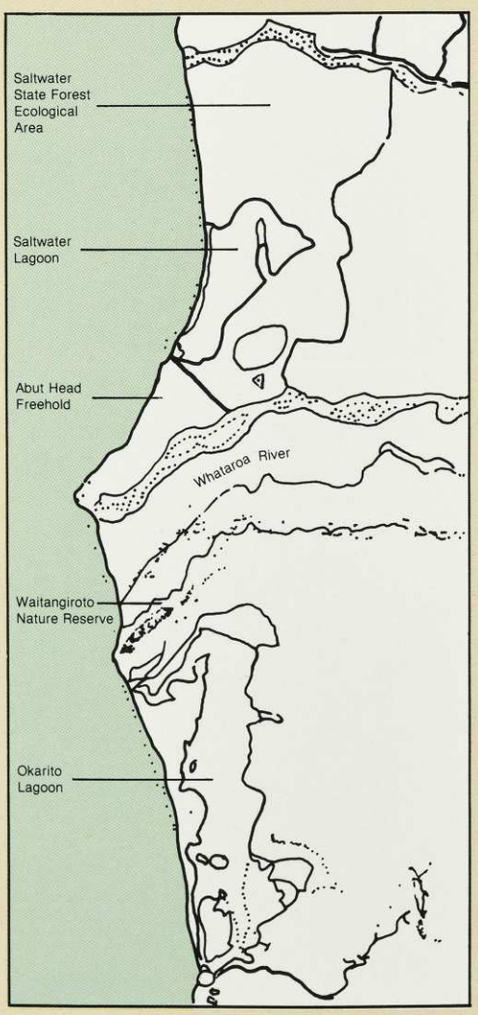
Coastal podocarp-hardwood forest, tightly bound together by lianes of supplejack and kiekie, covers the moraine hills. Ancient rimu, often heavily laden with epiphytic growth, project over miro, kamahi, quintinia and other lesser trees. Seasonal splashes of colour from ephemeral clematis blossoms and the scarlet flowers of the winter rata vine brighten the dark forest greens. From viewpoints on the 100-year-old miners' trail that winds through the headland forest, tall feathery stands of kahikatea trees can be seen ringing the open swampland of the river flat. The mountainous ramparts of the Southern Alps provide a distant backdrop.

On summer evenings, the primaeval appearance of the swamp is given voice when the male bittern booms out its resonant call. The surrounding forests of Abut Head are usually alive with birdsong. Together with the intact catchment forests of the Saltwater Lagoon, they support the highest abundance and diversity of bush birds recorded in south Westland. Kaka, kakariki, robin and falcon inhabit the forests. They are all declining native birds, gradually retreating from the chainsaw to the remaining tracts of untouched forest. In winter, when food is scarce elsewhere, tuis congregate on these coastal hills seeking out rata nectar and karamu berries.

The Wildlife Service have classed Saltwater Forest as an outstanding wildlife habitat and have specifically identified Abut Head as a wildlife habitat of note. In a 1981 submission they urged the Forest Service to acquire Abut Head for reserve purposes. Lands and Survey received similar advice in 1980 from Dr Peter Wardle, senior botanist with the DSIR. More recently the Nature Conservation Council and Commission for the Environment have called for the reservation of Abut Head.

Ministerial praise

Russell Marshall, Minister for the Environment, has backed this conservation quest. Writing to Christchurch NFAC, he noted that ''the outstanding ecological, recreational, scenic and scientific values of the Abut Head freehold forests are worthy of preservation and the addition of these forests to the Saltwater Lagoon Reserve — Saltwater SF Ecological Area would make the combined area one of the finest lowland reserves in New Zealand''.



For its part the Forest Service has identified the coastal portion of Saltwater forest as an important recreational and historical area. An as yet unpublished report tabulates the area's rich Maori and European history. A concentration of historical sites and artefacts, from Maori middens to water race tunnels, are identified around the Saltwater Lagoon. The track along Abut Head is noted as having historical and recreational values.

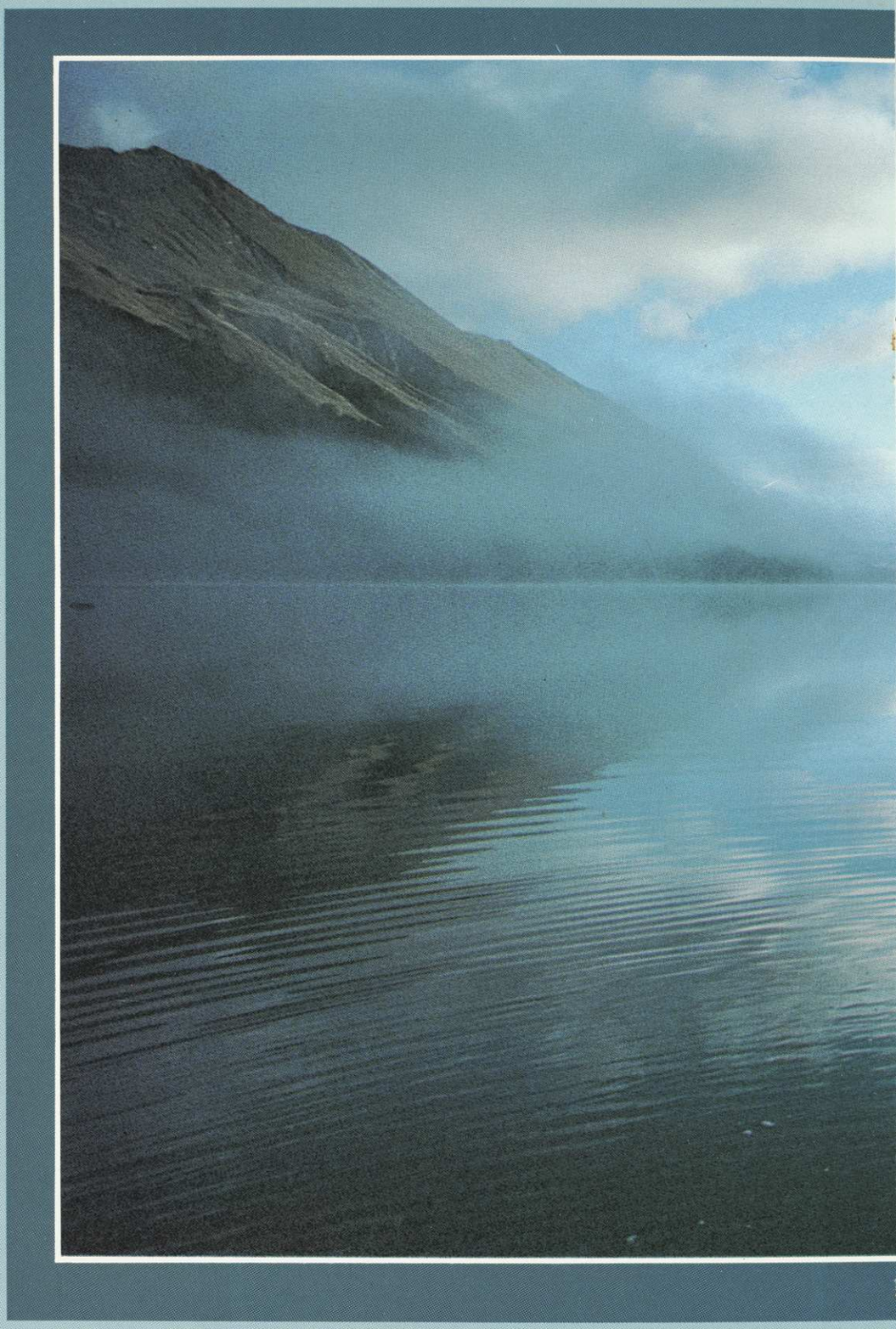
The Forest Service says that the Abut Head freehold land would be a national asset if retained in its natural state and would complement the nearby dedicated reserves. However, the key to reservation lies in the Forest Service offering the sawmiller alternative timber in exchange for the cutting rights, then negotiating either for the purchase, lease or covenant of the freehold land.

Uncommitted timber resources are located nearby in Lake Ianthe State Forest. This heavily modified forest contains about 80,000 cubic metres of ''surplus'' podocarp timber in deteriorating, partly-logged stands. The timber is not needed to meet existing contracts and is more than double the volume required for an exchange. But the Forest Service opposes the release of this timber for reserve purposes, saying it should be included in a sustained yield logging circle after 1990. Yet this volume would add only an insignificant 100 to 150 cubic metres per annum to the assured annual cut of 8,000m³ from North Okarito State Forest and the inland portion of Saltwater State Forest. A timber exchange would suit the sawmiller as it would avoid expensive roading.

Agreements for reservation should also be possible with the owners of the land. Dr Barrie Donovan of Christchurch says that his family, which owns two of the freehold sections — the sawmiller owns the other — does not wish to see Abut Head devastated and would consider reservation proposals.

The Forest Service's reluctance to release timber for reserve purposes is a familiar scenario to conservationists. Despite its professed change of direction, the Forest Service seems once more unable to pursue the protection of native forests with even a fraction of the energy and resources it expends in the pursuit of timber production from native forests.

If Russell Marshall's vision is to have any chance of success, the Government must override the Forest Service's objections and make a meaningful offer to the sawmiller and landowners. Otherwise, the forest of Tae Tae, which have endured since the ice age, will be lost.



Metre-high red tussocks used to spread across the vast Southland plain but today they have been replaced by farmland. In western Southland, at the Mavora Lakes and in the nearby Gorge Hill Scientific Reserve, are found the largest areas of red tussock left in the province. These low altitude red tussock grasslands may hold the key to the survival of the rare flightless takahe (*Notornis mantelli*).

Mavora Lakes, once a pastoral lease but now under direct Crown control, is very popular with Southland holidaymakers. There is widespread support for the Mavora Lakes and their surrounding mountain lands and river valleys to be permanently protected as a National Reserve.

This photograph, looking up North Mavora Lake to the Livingstone Mountains, was taken by Barney Brewster as part of a number to be chosen for the Society's 1986 High Country calendar. This particular photograph does not appear in the calendar, but has been used for the Society's new poster (details in the mail order catalogue).

Proceeds from the sale of the calendar will help with the Society's pastoral lease campaign, our major fundraising campaign in 1985. The thrust of the campaign is to give more prominence to the truly "forgotten habitats" of the South Island high country and seek greater protection for them.

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THE WEKA

VICTIM OR VILLIAN

Could the weka, one of our more endearing native birds, thanks to its cheeky, fun loving nature, be a risk to Kapiti's little spotted kiwi population? The possibility was floated in the February issue of Forest and Bird. This article, by DSIR ecologist Ian Atkinson and Kapiti Island Lands and Survey Ranger Peter Daniel, challenges such a notion and the assumption behind it.

In recent years there has been an increasing tendency to treat the weka as if it were an introduced predator no different from the rat, cat or stoat. This prejudice is associated particularly with wekas introduced to islands where vulnerable species of birds, or their eggs, are sometimes eaten by wekas. The prejudice is now appearing in print, as for example the articles in *Parkscape* December 1984 and the February 1985 edition of *Forest and Bird*. It has perhaps been stimulated by the campaign to rid Codfish Island of wekas, a campaign we fully support. In this instance there is proof that wekas introduced to that island threatened the survival of Cook's petrels, a seabird known to breed on only one other island.

The possibility of eradicating wekas from Kapiti Island has been raised by Mr Jim Jolly in the *Forest and Bird* article, as he believes they may threaten the survival of little spotted kiwis. In this case we think the argument is based on inferences and assumptions that should not go unchallenged.

Wekas were introduced to Kapiti Island around the turn of the century. Little spotted kiwis were not introduced until 1912 — although Mr Jolly raises the possibility that they had persisted there from the last ice age. This seems unlikely, for Maori informants of early writers about Kapiti apparently made no mention of kiwis having been there and Cockayne, who spent 14 days on the island in 1906, suggested that "flightless birds of various kinds" should be introduced. Whatever their origin, it is clear that little spotted kiwis, if present on the island before 1912, must have been present in very small numbers.

Wekas were "everywhere" on Kapiti Island by 1924 when A. S. Wilkinson became caretaker of the island. Despite this presence of wekas, Wilkinson (1949) records that by 1924 little spotted kiwis had colonized the higher parts of the island above Rangatira and in the Te Rere and Kaiwharawhara basins. Since then both wekas and little spotted kiwis

Male weka feeding chicks
Photo: P. Daniel

A male little spotted kiwi in an aggressive pose
Photo: P. Daniel

have increased: a Wildlife Service survey in 1982 found little spotted kiwis inhabiting all suitable habitats, with a breeding population exceeding 1000 birds.

Puzzling reference

No studies of the numbers or breeding of little spotted kiwis on Kapiti Island were made until 1980, when Mr Jolly and his team began their work. It is difficult therefore, to understand the reference in the articles to a "disquieting trend" that has emerged "over the last five years" when earlier studies are lacking. The cause for his concern, however, is that two-thirds of the eggs produced by the 10 pairs of kiwis he studied have apparently been lost to wekas.

It may be thought that eggs are a major food item of wekas because a little spotted kiwi egg eaten by a weka is pictured in the article and is described as one of many. A recent PhD study of wekas made on Kapiti Island by Mr A. J. Beauchamp failed to show any evidence of kiwi egg predation. No egg shell was found in stomachs or faeces and the diet consisted largely of invertebrates and various fruit from native trees. There is no doubt that some wekas eat some kiwi eggs but the question not yet answered is whether this happens often enough to adversely affect kiwi numbers. If two-thirds of the eggs were lost, what happened to the remaining third?

Losses of eggs and chicks, caused by predators and other factors, are common in any population of breeding birds. These losses become important only when the number of young birds reaching adulthood falls short of the number of adults that die each year. In that case the population must decline. If we assume that a kiwi's adult life averages 20 years and that we have a breeding population of 1000 birds, then 50 young birds must be added to the breeding population each year if the population is not to decline. Put another way, each pair need produce a grown-up offspring only twice in their lifetime in order to replace themselves. We have no evidence of a decline in the breeding population of little spotted kiwis on Kapiti Island.

The 10 pairs of kiwis studied represent no more than 2 percent of a population of 1000 birds. It would be risky to generalize from such a small sample unless one was sure it was representative. There are two reasons why we doubt that it is. First, some kiwi burrows are more than 2 m in length while others are short. Eggs in short burrows are more likely to be found by wekas. This crucial point is not discussed in the article although in an earlier 1983 article Mr Jolly stated that "all egg losses have been from the part of the study area where burrows were shorter and presumably more accessible to the weka".

Second is the unavoidable effect of human disturbance on the birds studied. We know that the Wildlife Service team have taken great care to minimize this disturbance, but birds are caught, measured and weighed at all stages of the breeding cycle, transmitters are fitted, and video recorders set up outside nesting burrows. Wekas are highly inquisitive opportunists, and it is therefore possible that this human activity around the kiwis and their nesting burrows has increased the chances of wekas finding kiwi eggs.

Kiwis vulnerable?

The article implies that wekas probably attack kiwi chicks, because kiwis seem "peculiarly vulnerable" to wekas. There is evidence to the contrary. Mr Beauchamp's study showed that although wekas often call at night, they are unlikely to kill birds then because they cannot see adequately in the dark. Kiwis and their chicks are active at night when wekas are less active and a well-camouflaged chick may be difficult to find, either at night or during the day. At present, there is no evidence that wekas kill kiwi chicks. Furthermore, on several occasions little spotted kiwis have been seen chasing wekas at night.

Because kiwi chicks were rarely, if ever, reported on Kapiti Island before the current intensive study began, one must accept that they are not conspicuous. The article states that in four seasons of all-night patrols only 17 chicks have been found. But how many hours have been spent in actual searching? And what are the chances of a small party, using only headlamps in sometimes thick undergrowth and rugged terrain, finding more than a fraction of the chicks present?

We do not wish to belittle the importance of the research undertaken by Mr Jolly and his team. Nor should anybody underestimate the difficulty of studying a burrow-nesting nocturnal bird. As Mr Jolly pointed out, future research is designed to test these questions concerning the interaction between wekas and kiwis, and as we have pointed out, many questions remain.

Wekas and kiwis are the only flightless predators among New Zealand native birds. Wekas belong to the rail family, a group that includes the banded rail, marsh crake and takahe. Most New Zealand rails are closely related to rails in Australia or the Pacific Islands. Wekas, however, like takahe, are flightless rails which have been long enough in New Zealand to diverge significantly from their flying ancestors. Not less than 6 species of flightless or near-flightless rail have become extinct in the South Pacific during European times. In the same period wekas have disappeared from eastern South Island, most of Stewart Island, and from almost all of the North Island except Gisborne. Thus some island populations of wekas will always be needed to safeguard the species.

Unique weka

Wekas are among the most enjoyable of our native birds to watch, and there is no other place in the lower North Island where this is easier than on Kapiti Island. Their mammal-like behaviour, inquisitive nature, tameness in man's presence, protectiveness shown to chicks and primaeval-sounding call combine to set the weka apart from all other New Zealand birds. These intrinsic values must be recognised, just as we recognise those of the kiwi. If it was shown that wekas threatened the survival of little spotted kiwis on Kapiti Island, removal of wekas would need to be considered. But if kiwis are established satisfactorily on islands free of wekas, an option currently being pursued by the Wildlife Service, any threat posed to the kiwis by wekas on Kapiti Island would become less critical.

We should not be trapped into managing an island nature reserve solely for one species of bird, unless this is the only way to save that species from extinction. Other birds and other values of the whole island system must be kept in mind when deciding our aims for management.

Editor's footnote: Since receipt of this article, we have heard of a 75 percent reduction in the weka population in the Gisborne area. As yet no cause has been determined for such a dramatic loss, although avian disease or the effects of the drought have been mentioned as possibilities.

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.... BUT WHAT RISK CAN WE ACCEPT?

asks Jim Jolly, Scientist, N.Z. Wildlife Service, in his reply to the above article.

I wrote the article on little spotted kiwis both to draw attention to problems facing the little spotted kiwis on Kapiti Island in trying to breed in the presence of wekas, and to promote discussion of the issues concerned.

The response by Ian Atkinson and Peter Daniel raises some valid points but, regrettably, also accuses me of showing a prejudice against wekas and using unsound arguments.

It is not possible in a *Forest and Bird* article to present all the results of five years of research. This does not mean that the arguments presented and views expressed are based on "inferences and assumptions", as alleged by Atkinson and Daniel. The statements in my article are based on our research findings and cautious interpretations of them. In contrast, Atkinson and Daniel have, I believe, made several unsupported and incautious assertions, some of which need further comment.

The history of the growth of the little spotted kiwi population on Kapiti is even less well known than its origin. Atkinson and Daniel correctly point out that the kiwis increased in the presence of wekas, but this is not to say that this happened at times of high weka density. Weka populations are known to fluctuate wildly on the mainland and, if similar fluctuations occurred on Kapiti then it is possible that the kiwi population increased only at times of low weka numbers.

My concern for the kiwi population today is based not only on the fact that wekas have preyed on two thirds of kiwi nests in the two study areas but also that:

- The eggs from 90 percent of the 32 kiwi nests found so far in our study have been lost.
- There has been no chick production in the young forest study area.
- Our chick searches in older forest have found some chicks where we know a few nests survive.
- Our habitat surveys of the whole island and 580 hours of chick searches over half of it, indicate that these disturbing findings apply to the little spotted kiwi population of the whole island.

In spite of these high losses, Atkinson and Daniel rightly point out that as the kiwi is a long-lived bird, few young birds need to be recruited to the adult population each year to prevent it from going into decline. However, it is unsound for them to base their argument on an average adult life expectancy of 20 years. The average life of kiwis is unknown and could just as easily be 10 years. One must argue from the evidence, which indicates that for the whole island (of which only a maximum of one-third appears to produce chicks), only 3 percent of eggs hatch.

For the kiwis to achieve a stable population then, not only would adults have to live 20 years on average, but also 50 percent of all juveniles must survive to breed. Previous studies of birds of many species have found that much higher losses occur at this stage of their life-history.

Atkinson and Daniel also believe that techniques used in our study have caused the high incidence of weka predation. They suggest we have led wekas to the study nests. If this was so, then it is difficult to explain how the eggs in nine of the 32 nests were already broken when we first found the nests. Furthermore, we arrived to find wekas in the act of preying on eggs in five other nests. Nests are visited by us much less frequently than is implied by Atkinson and Daniel because we can detect the presence of the incubating male from some distance by use of radio-telemetry. We have, in fact, never been caught at a nest by a weka and have no evidence that our activity attracts wekas to nests.

Atkinson and Daniel also allege, incorrectly, that the nests we studied are not a representative sample. Radio-telemetry has enabled us to track the kiwis to their nests and to determine whether or not nesting was successful irrespective of the length or conspicuousness of the breeding burrow. We now know that by no means all egg losses are from that part of the study area with shorter burrows.

Atkinson and Daniel are also incorrect in suggesting that wekas cannot prey on kiwi chicks because the chicks come out of their nests only at night. The chicks are active, often unaccompanied by adults, in daylight at both dawn and dusk. Wekas are known to attack fully-fledged young birds of other species. The chances of actually seeing a weka prey upon a kiwi chick are extremely small — as are the chances of finding fragments of eggshell in weka faeces when, at the most, only one or two kiwi eggs are available to any pair of wekas in an entire year. Neither comment by Atkinson and Daniel gives any insight into the problem.

Atkinson and Daniel conclude by pointing out the undisputed value and attraction of the weka. I agree with their sentiments but they should not overlook the fact that the little spotted kiwi population on Kapiti is of far higher value than the wekas, both scientifically and to the New Zealand public as a whole, as it is the last known population of one of only three kiwi species. It is therefore extraordinary that Atkinson and Daniel should state that "... if kiwis are established satisfactorily on islands free of wekas, ..., any threat posed to the kiwis by wekas on Kapiti Island would become less critical." Any threat to the kiwis on Kapiti will always be critical. As mentioned in my original article, there are only two other islands, Little Barrier and Codfish, where a population anywhere near as large as that on Kapiti could establish.

Whatever our research effort, it may never be possible to *prove* "... that wekas threatened (sic) the survival of the little spotted kiwis..." — at least not until it is too late. I suggest that the question Atkinson and Daniel should ask themselves is, "How much *risk* to the endangered kiwi species is acceptable for the sake of the wekas?" This is the crucial question I intended to raise in my article.

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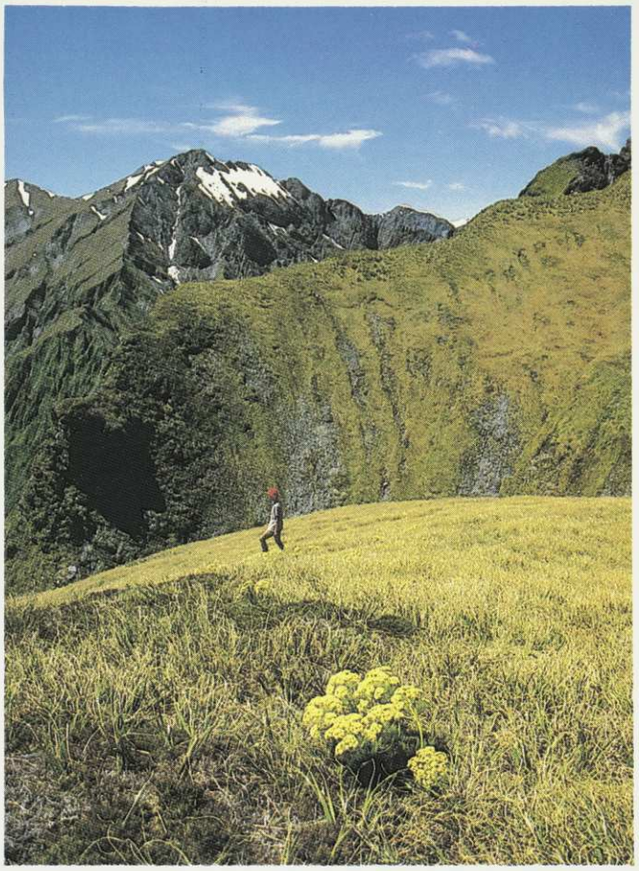

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FOUND

the elusive Fiji petrel

by Dick Watling

Last recorded being seen in 1855, the Fiji petrel was re-discovered last year.
Photo: D. Watling

For many ornithologists, the Fiji petrel (*Thalassidroma (Bulweria) macgillvrayi*) has long had the status of "missing, believed extinct."

Between 1855, when the bird was described by a British Museum scientist from a specimen taken off the Fijian island of Gau (pronounced ngau with a soft ng), until 1984, the petrel was never officially sighted.

Its existence during that time was questioned, debated, shuffled. Some authorities considered it extinct, others merely "lost or missing."

In May 1983 a search was begun of the rugged, 140 km² island, where 54 percent of the land area supports dense rain forest. Formerly there were walking tracks across the island, but these are no longer in use, and today all the islanders live on the coast, very much oriented towards the sea. They rarely, if ever, enter the forest interior.

During the first two visits (seven were made in all) extensive discussions were held with villagers, skins of a black-winged petrel and a wedge-tailed shearwater were shown and a reward offered for information about the Fiji petrel. Potential nesting sites were assessed, and trails cut to the summit and across the northern ridge.

Nesting burrows of suspected collared petrels (*Pterodroma brevipes*) were found during a search on the first visit and the identification confirmed when villagers subsequently collected a young bird about to leave the nesting burrow in August 1983. Evidence that wild cats preyed on the petrels was soon found, and trap lines for cats and rats were laid. No Fiji petrel remains were found, however.

On the fifth visit, in February 1984, spotlighting was tried for the first time. In April-May spotlighting was augmented by the use of amplified collared petrel calls. During four nights of poor weather with continuous light rain and cloud, spotlighting attracted more than 165 collared petrels into a site near the summit.

Among those, on April 30, a single Fiji petrel flew into the light! It was examined, weighed and measured. The next day the petrel was photographed before being shown to villagers and then released by the Paramount Chief of Gau.

A later attempt to capture a Fiji petrel failed. Although the search has revealed that it survives on Gau, nothing more is known about it. While its numbers cannot be estimated, the fact that this distinctive petrel has not been seen at sea indicates the population must be small. There are records of "dark" petrels from Fiji waters but large numbers of migrating shearwaters pass through Fiji every year, the melanistic individuals of the collared petrel are almost black and other dark petrels have been recorded in Fiji waters, so confusion abounds.

The Fiji petrel's status must be considered precarious, although it appears to be under no new threats. Breeding conditions on Gau appear favourable, with approximately 75 km² of densely forested and rugged terrain. It may be that the Fiji petrel nests only on the high, cloud-covered ridges; on the other hand the collared petrel nests lower down.

Three main predators are a danger: the Polynesian rat (*Rattus exulans*), the house rat (*R. norvegicus*) and wild cats. Surprisingly and fortunately there are no wild pigs on Gau, although domestic pigs roam free around villages and plantations. The mongoose is not found on Gau.

Although the collared petrel seems to be nesting successfully, its seasonal breeding in the first half of the year may swamp wild cat predation. If, as is possible, the Fiji petrel has a more prolonged breeding season later in the year, the species may suffer disproportionately.

Historical conditions on Gau may have been different. Even the highest ridges presently cloaked in undisturbed mature forest bear evidence of extensive earthworks — fortified refuges which would have been used in times of tribal warfare. Large areas of grassland and reeds not used today possibly indicate a larger and more industrious population that once existed. All these factors may have affected the Fiji petrel in former times.

If, as proposed by New Zealander Mike Imber, the Fiji petrel is a relic species derived from petrel ancestors, those ancestors may have spread north during a colder epoch. The return of tropical conditions may now account for a small surviving population.

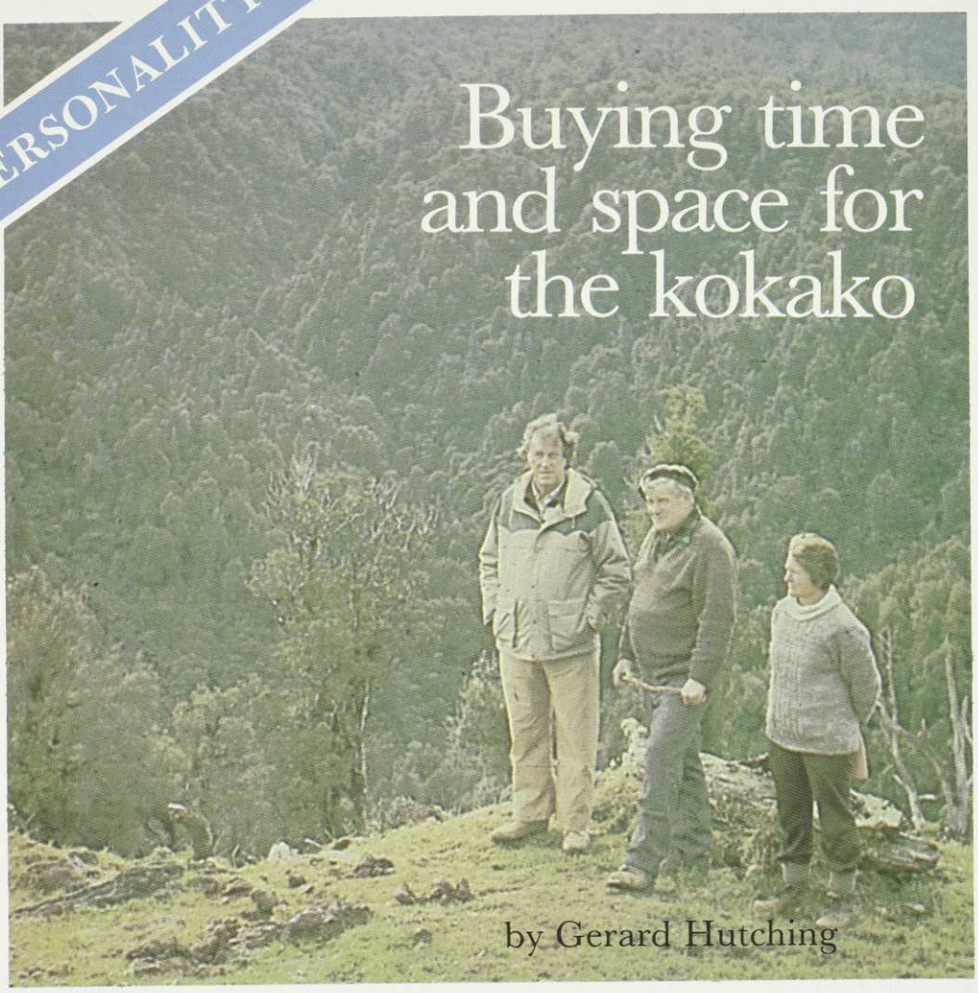
The apparent restriction of the bird to Gau is, perhaps, puzzling. The island differs from other Fijian islands in that it does not have wild pigs. However, we do not know if pigs have always been missing from Gau, and nor do we know if the petrel is restricted to the island.

Research on of the Fiji petrel will continue, but Gau's isolation, its extensive and and rugged forests will make it difficult and expensive. New Zealand's efforts with the Taiko will be watched with keen interest; perhaps Chathams' techniques will be applied on Gau.

Acknowledgements
The search was sponsored by the Central Manufacturing Co, Suva, and the International Council for Bird Preservation. Fiji Air assisted with travel to Gau. The help of Ratu Marika Uluidawa Lewanavanua, the Paramount Chief of Gau, was crucial to the success of the search, and in addition the hospitality of his wife Adi Ta and household was overwhelming. The Society is funding Mike Imber to work on the petrel this summer.

PERSONALITY

Buying time and space for the kokako



by Gerard Hutching

Pat and Arthur Cowan with Sir Edmund Hillary on Mt Rangitoto.
Photo: Commission for the Environment

The North Island kokako, assailed on one side by man's clearance of its habitat, and on the other by competition from possums and the threat of predators, needs all the help it can get. Arthur and Pat Cowan are a farming couple who, more than most, have tried to ensure this endangered wattle bird and other native wildlife will survive.

The Cowans are modest about their efforts for conservation, even if their efforts are far from modest: the most outstanding example being the purchase of 1250 hectares of land from under the nose of potential agro-forestry developers on Mt Rangitoto near Te Kuiti. In addition the Cowan family have three large tracts of bush in QEII National Trust open space covenants.

Arthur Cowan's special feeling for the land could be connected with the fact that he was born and raised within a stone's throw from where he now farms. His father he remembers as "quite a keen conservationist", and a person who regretted the amount of bush clearance he had done as a young man. In his latter years Mr Cowan senior did his best to replant areas in native trees.

In 1948 Arthur and Pat Cowan bought a property next door to his childhood home. The previous owners were Maori who made a practice of burning the fern and manuka on the ridges in order to create tracks in and out of the land, but fortunately the bush in the gullies survived. Today, hundreds of hectares of mature forest still remain, enveloping their home in a green embrace.

For the Cowans, the saga of the sale of Rangitoto began in 1979. Climbing to almost 3000 feet, the mountain is the headwaters of the Waipa River. Most of the land was owned by timber company Henderson and Pollard, who over the course of 25 years cleared out the podocarps first, then took out the tawa. By the late 70s they wanted to sell and interest was high in the farming community for land that contained good contours and had a ready water supply. It was also a fine habitat for kokako.

"Once we knew it was going to be for sale we moved everything. We tried the local council, Lands and Survey, the Forest Service to see if they would save it. It was far too important an area," Arthur Cowan recalls.

It became well known that the Cowans wanted to protect the land. A local farmer then let on that he had made an offer, and in what Arthur sees as a way of easing his conscience, the farmer allowed the Cowans a month to put in a similar figure. If they could raise the money, the land was theirs.

"The next day we went to Auckland and by the greatest amount of good luck we discovered Mr Pollard was sympathetic. He said that if we came up with an offer to meet the one he had ($125,000), we could have it. We were given 24 hours to make up our minds," says Arthur.

Drastic measures were called for, and taken; the Cowans mortgaged their farm and worked out that they could continue for two years before feeling the pinch. After the sale, they investigated the possibility of running a deer recovery operation, which showed that they could hold on for a further two years. Always, of course, they could have sold to a developer, a tempting prospect once the price of land started to soar in the 1980s. That was never a serious option, however.

One agency the Cowans initially overlooked was the Wildlife Service. In fact the Service had been interested in buying the land when it went up for sale, but money was (and still is) scarce for buying reserves. Regretfully they had to pass up the chance when Henderson and Pollard first offered it, but after the Cowans had bought the land the Service got into contact with them.

The Wildlife Service, in conjunction with the Department of Lands and Survey, then bought the property, taking the financial weight off the Cowans' shoulders. Wildlife are negotiating at present to buy a block adjacent of a similar size.

The officer who was dealing with the Cowans at the time was Graham Adams, now an assistant director of the Wildlife Service. He says he had heard the land had been sold, but any apprehension he felt about its new owner disappeared during a flight over the Rangitoto Range.

"It became apparent during the flight that Mr Cowan was a very committed person to the area. I was deeply impressed about his concern for many things — the threatened blue duck, flooding downstream and so on.

"He was a man of the land who had been living there a long time and who understood its values.

"I have never encountered another person in New Zealand who has matched him in what he did. He could have suffered financially from what he did, but he went ahead and did it from a deep-seated feeling for the land," Graham Adams says.

By now the Cowans had "got the bug", and when a smaller block was offered of 363 hectares they bought that too. The land, also on Mt Rangitoto, has had an open space covenant placed upon it.

As an executive member of the Native Forest Restoration Trust, Arthur Cowan has been keenly involved in replanting thousands of trees. On the reserves on Mt Rangitoto alone more than 20,000 trees — mainly kahikatea and totora — have been replanted to help heal early development scars.

On the question of covenanting, Arthur Cowan believes that the value of the land can be increased in monetary terms if a covenant is placed upon it — a persuasive argument to many farmers.

"The bush will be seen as an asset. If it's not in the immediate future, it will be a much greater asset as time goes on," he believes.

Now 68, he describes himself as "semi-retired. I can do things now that I wasn't able to do before. We are now hoping to acquire more reserves."

Among his other voluntary posts he is an executive member of the Otorohanga Zoological Society and on the advisory committee of the Pureora Forest Park. He is also an active member of Forest and Bird.

In January 1984 Arthur Cowan was awarded an MBE for work in the field of protective conservation in the Waikato and other areas.

He praises his family for their much needed support, especially since his efforts have not always been applauded by a conservative farming community.

"My two daughters and two sons are all very willing to support things when they come up. My son-in-law was a Wildlife Officer for seven years," he says.

When asked whether he sees himself taking the balanced view of conservation and development, he immediately answers that he is likely to argue for a balance. A few seconds reflection and he amends the statement:

"But ... I think the balance was struck 20 years ago. Today I'm more extreme because the balance is long gone. The argument now should be for preservation," he says, pointing out that land already cleared should be made more productive.

The Cowan home, surrounded by forest.
Photo: G. Hutching

Society's Lodges and Houses

Bushy Park Lodge
Kai Iwi, 24km north of Wanganui on sealed road.

Historic homestead, fine grounds and view. 89 ha of virgin bush with tracks and trees identified.

Accommodation: for 12 in five bedrooms, single and double beds. Sleeps 18 with mattresses. Bedding, linen and towels supplied. Showers, drying cupboard, kitchen with electric stoves, refrigerator, deep freeze, cutlery and crockery. Bring own rations. Milk may be ordered.

Fees: (House Guests) Members $14 single, $18 double. Non-members $20 single, $25 double. Children 5–12 $6. Continental breakfast available $4. (Day Visitors) All adults $2, children 5–15 $1, Family $3 or $5. Closed to day visitors but not House Guests Mon & Tues.

Books and Information Leaflet: Custodian, Bushy Park Lodge, Kai Iwi, RD8 Wanganui. Telephone Kai Iwi 879.

Okarito Beach NFAC Cottage
Sleeps 4–6 in basic but comfortable facilities, water, wood stove, 2 rooms. Sited in historic township, coastal and bush walks, Okarito lagoon, Westland National Park and glaciers. $3 per person per night. Bookings: Kevin Smith, Box 57, Harihari, Ph 33090 Harihari.

Patoka Lodge, Hawke's Bay
The lodge is situated 48km from Napier on the Puketitiri Road and 8km past Patoka, amid the 14ha William Hartree Memorial Scenic Reserve.

The Lodge accommodates 10 people. Extra mattresses and pillows are available to sleep up to 20. The lodge has a full equipped kitchen, including refrigerator.

Visitors supply their own linen and cutlery. The nearest store is 8km away. No animals are permitted.

For rates sent a stamped addressed envelopes to the Booking Officer, June Northe, 212 Kennedy Road, Napier, Telephone Napier 438-193.

Ruapehu Lodge, Whakapapa Village, Tongariro National Park
Ruapehu Lodge is now available for MEMBERS ONLY, and all bookings must be made with the Society's head office, P.O. Box 631, Wellington.
Fees: Winter Season (1 June to 31 October and Christmas and Easter holidays $8.00 per night. Summer Season 1 November to 31 May) Adults $6.00 per night Children $3.00 per night

Full payment must be paid four weeks before occupation, (otherwise bookings may be forfeited) after which time there is no refund for cancellation.

No animals or pets are allowed in the lodge or the National Park.

There is no key at the lodge, but one will be posted ten days before occupancy. No member may occupy the lodge without first booking through Head Office, Wellington.

Tautuku Lodge, Coastal Otago
Situated 72km from Balclutha on State Highway 92, Tautuku Lodge on the Society's 550ha bush-clad Lenz Reserve in coastal south-east Otago.

The lodge is fully equipped and accommodates eight or nine people. Bring with you food supplies, bed linen, blankets, towels, tea-towels etc.

For rates apply to the Booking Officer Miss M. Roy, Papatowai, Waipati, RD, Owaka, enclosing a stamped addressed envelope.

Turner Cottage, Stewart Island
Turner Cottage, is on Stewart Island and is a two-roomed dwelling furnished for three people.

For details write, enclosing a stamped, addressed envelope, to: "Turner Cottage", C/o Mrs N. Fife, P.O. Box 67, Halfmoon Bay, Stewart Island.

Tai Haruru Lodge, Piha, West Auckland
A seaside home situated in Garden Road, Piha, 38km from central Auckland. Eight minutes' walk from the Piha store, with right-of-way access to the surf beach and close to bush reserves and walking tracks in the Waitakere Ranges.

The lodge is fully equipped and sleeps six to eight persons. It has a large lounge with open fire, dining area, and modern kitchen.

You will need food supplies, bed linen, towels, and tea-towels.

Different rates apply for winter and summer, for rates send a stamped, addressed envelope to the Booking Officer, Mrs B. Marshall, 160 Valley Road, Henderson, Auckland. Telephone 836-5859.

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

Different rates apply for winter and summer. For rates sent an addressed envelope to the Booking Officer, Mrs R. Roley, 23 Stoddard Street, Mt Roskill, Auckland. Telephone Auckland 696-769 (evenings).

CONSERVATION UPDATE

Heritage Department at the Crossroads

As you read this, the Government either will have made or is about to make some of the most far-reaching decisions on environmental administration in New Zealand's history. The Society regards the setting up of a Heritage Department (for want of a better name) as the most important goal of the environmental movement for decades.

The Heritage proposal should see:

- Better management of already protected lands, forests and waters.
- Better stewardship of the thousands of hectares of publicly owned Crown lands and forests which now little used and are likely to be allocated for more intensive uses.
- Stronger and more cohesive advocacy of protection values to the Government when it wants to allocate public resources.
- A more rational integration of conservation and development outside development departments.
- Greater accountability of decision makers — for environmental, economic and social matters.

The Forest Service and its allies have been fighting hard to keep control of native forests — farmers too are worried about changes in management of Crown leasehold lands which don't have freehold rights. Their arguments against the Heritage Department are: a good past record of the Forest Service(!?), possible high costs, disruption of careers and the difficulty of passing the necessary legislation this year. We believe these arguments lack substance and do not focus on the decision-making principles behind the Heritage department proposal.

In response, the Forest Service has proposed two alternatives: Instead of the minister making allocation decisions they suggest that the Crown Estate Commission could be delegated to do the job — an unwise move, since ministers should be responsible to ensure greater accountability. They also suggest that there should be a Forest and Land Development Commission to oversee the management of native forests and leasehold lands. This would create the problem of the leasehold and forest developers ganging up against the conservation representatives on this Forest and Land Development Commission — the Commission would then have the ungainly appearance of a three-headed monster.

The second option proposed by Forest Service is a replay of the Forests and Lands department merger, with the same unsatisfactory roles for the two commissions as above. This merger failed two years ago and needs to fail again.

The Society is seeking an institutional framework within which lands can be cared for properly and protection values are not swamped when allocation decisions are made. Let us hope the Government maintains its election pledge when it meets later this month.

Kauris win temporary reprieve

The Society has asked the Minister of Forests to withdraw his consent for mining prospecting by Canyon Resources Ltd in the Russell State Forest.

Already the Minister has intervened to ensure that only hand prospecting methods be used in the proposed 1100-hectare ecological area, one third of which is covered by the application.

The mining company now has to reapply for its prospecting licence as it failed to adequately notify the public of its intentions. This provides an opportunity to ensure the entire kauri forest is safeguarded from prospecting or mining.

Ahuriri protection still sought

The Society's recent annual report stated that South Canterbury's Ahuriri River had been granted protection by the Government. However, it has been pointed out that the Government only announced the Ahuriri would not be interfered with by *hydro* developments.

In fact, the Ahuriri is not yet protected, and there is a renewed threat of irrigation extraction. The National Water and Soil Association recommended a draft national water conservation order that would, if adopted, provide a measure of protection to the river. However this is subject to an inquiry before the Planning Tribunal later this year.

The Environmental Defence Society is representing non-government organisations involved in the case. Some Forest and Bird branches have already contributed to the Ahuriri fighting fund, but further contributions would be welcome by EDS (PO Box 5496, Auckland). The catchment of the Ahuriri is the principal habitat for the world's rarest wading bird, the black stilt, making protection vital.

Park to be or not to be?

Just over 19,200 hectares of land in the Cox River-Binser Saddle area could be included in the Arthurs Pass National Park. The long-awaited report outlining the possible extension has just come to hand. It embraces nearly 7,000 ha of unalienated Crown land, 8,900 ha of State forest and nearly 3,400 ha of the Mt White Station run. The report canvasses other options for these lands such as private disposal, State forest or reserve. The authors of the report have only given the area a rather lukewarm rating for protection "because there is little known biological data" — this is unfortunate and Society members should press for Park inclusion plus further research where needed. If you known of or are interest in the area, write to the Department of Lands and Survey, Christchurch for a copy of the report. The deadline for submissions is 30 August 1985.

Far north reserves

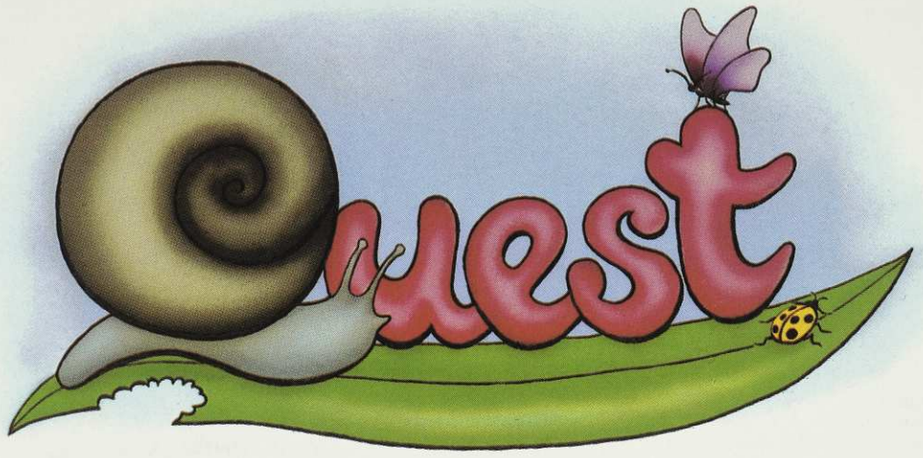
The Society is delighted to hear that the Lands and Survey Department has made a decision to ensure all Crown lands along the Pouto Peninsula coastline remain in public ownership. Our northern regional field officer, Mark Bellingham, reported in the May issue that "no lead has come from Lands and Survey" on this matter; thankfully this has now occurred. Mention of the Department was also ommitted from an article on Unuwhao, on page 9 of the May issue. In fact, Lands and Survey support the idea of a special reserve on this area in the far north.

We have also advised that that Lands and Survey staff are now of the opinion that pastoral farming "should not now proceed at this time" in the Spirits Bay catchment at Te Paki. A full biological assessment of this and other areas of public lands in the Te Paki region should now be given a high priority to ensure that these important natural areas obtain national or other reserve status.

Notable and Historic Trees

Work is underway to grant legal protection to New Zealand's notable and historic trees. A working party has been set up to look at the following issues: A Notable and Historic Trees Board; a tree register, a tree survey; the employment of a tree administration officer. A report and recommendations will soon go to the Minister for the Environment.

Terry Fitzgibbon, Conservation Officer.



Unfortunately for most of you, your first Quest may have reached you too late for you to enter our competitions. For this reason we have kept them all open until September 23rd, so dig out your old copy and have a go for the prizes.

We would also like to know just how many Quest readers there are out there, so we have included a slip for you to fill in and return to us, with room for your suggestions as to what you would like to see in your own magazine.

Piers Hayman, Editor

This hedgehog was painted by Dahlia Prokop, a student illustrator from Canada who is visiting New Zealand for six months to sketch and paint our wildlife.

The Gardener's Friend

It is easy for us to be critical of the early European settlers who brought in all those 'foreign' animals and plants. Nowadays we are much more aware of how disastrously simple it is to upset the natural balance between one species and another, for we are able to look around us and see the results of past mistakes.

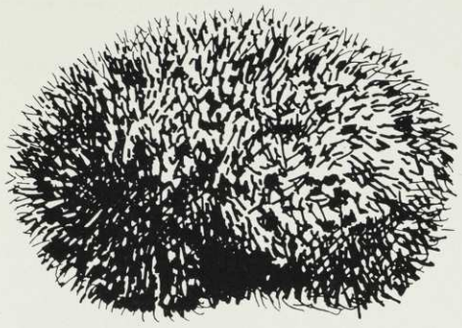
Perhaps if we ourselves had been among the pioneers struggling to build a new life in a rough land thousands of miles from home, we too would have been lonely and homesick. Perhaps we would have welcomed, as they did, the introduction of creatures that we knew so well, for it would all have helped to make a strange country feel like home. The lilting song of blackbird and skylark, the cheerful chirp of sparrows, the friendly snuffle of the hedgehog....? Well, perhaps not, but it *was* for chiefly sentimental reasons that the hedgehog was imported from Britain, the first pair arriving in Christchurch in 1869.

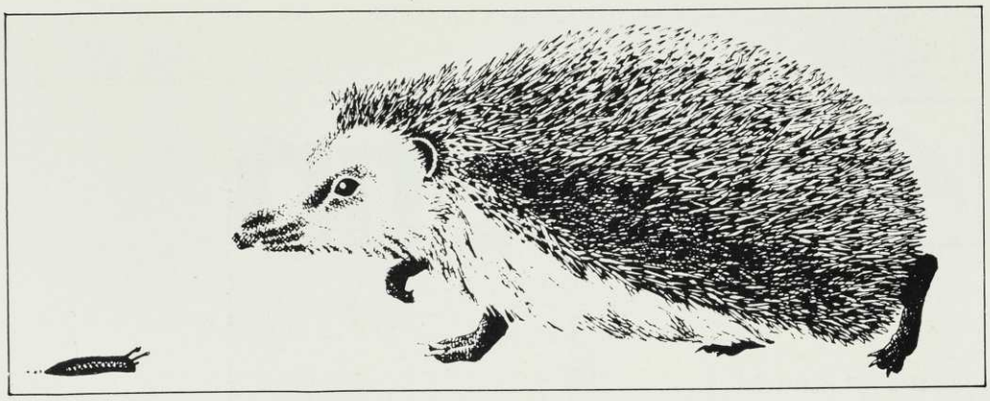
The hedgehog is an old and wily animal whose family dates back some 60 million years. That means that he has been around on this earth much longer than we have, for our first real ancestor, *Homo erectus*, lived only about 1 million years ago. The hedgehog, therefore, has successfully survived all the changes that have occured over those millions of years, which must mean he is well able to adapt to different and varied circumstances.

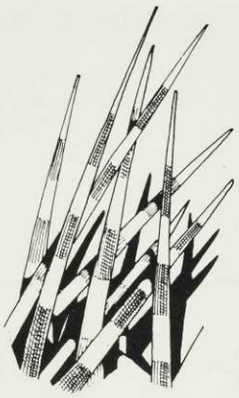
Part of his success must be due to his excellent defence system. He carries more than 16,000 sharp spines on his body and is able to curl himself up when danger threatens into a very unfriendly ball of prickles. This is enough to deter just about every would-be predator that he might meet in his homelands of Europe and Asia, and it is only very recently in hedgehog history that something has arrived against which his prickles are no defence. Fortunately, cars and trucks are not found everywhere, so he is only in danger when he is actually on a road himself.

New Zealand is the only country where hedgehogs have been successfully introduced. There are none in the Americas, nor Australia, nor any of the other places that have been colonised by Europeans. Most of the early New Zealand importations were to Christchurch and Dunedin, but the hedgehogs soon spread, and by 1910 they could be found all over the lowland areas in the South Island. Their rapid spread was not entirely due to their own efforts. There were many helping human hands, for the hedgehog was a welcome addition to the garden as he ate not only insects and spiders, but slugs and snails, those unwanted visitors that had arrived by mistake along with some of the imported plants.

Between 1907 and 1912 hedgehogs were liberated in the North Island as







Curling up into a ball of prickles (top left) protects the hedgehog from most would-be predators. Each spine has alternating bands of brown and white, usually 3 of each (left). This mottled colouring acts as a camouflage for the hedgehog while asleep during the day.

Although you may see hedgehog casualties on the road, it is only a tiny proportion of the total number of hedgehogs that are killed by traffic here in New Zealand. Of 214 hedgehogs tagged by R. E. Brockie in suburban Lower Hutt between 1970 and 1972, only 4% were actually run over during that period. Out in the country the proportion would be even smaller.

well, and today you will find them just about everywhere where the conditions suit them.

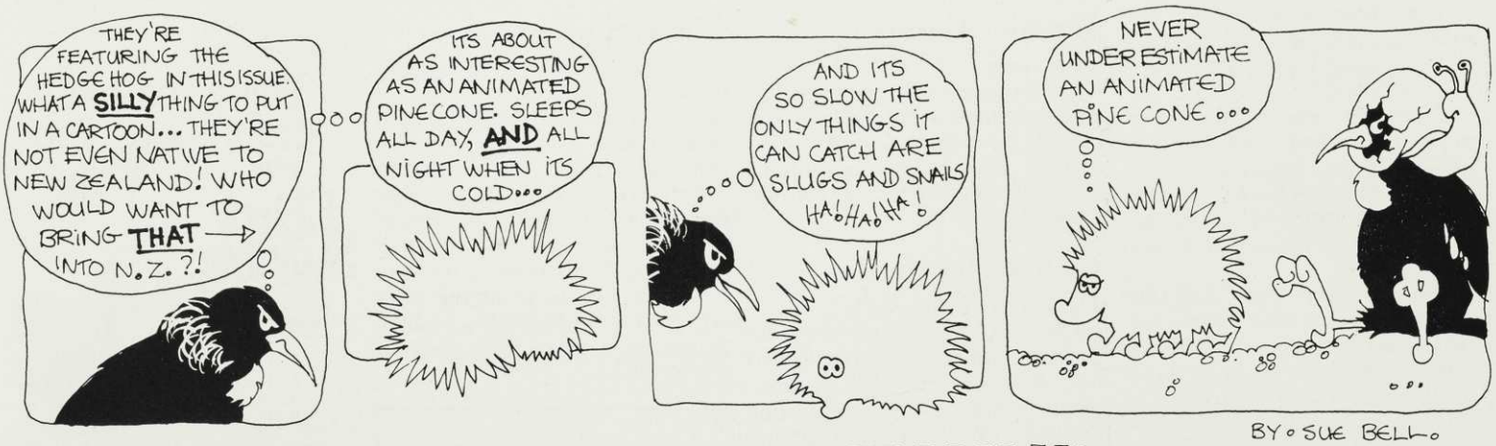
Apparently they do not like it to be too wet, nor too cold, for their distribution as recorded by R. E. Brockie in 1975 showed them to be absent from areas where the rainfall was above 250cm a year, or where there were more than 250 frosts in a year.

In the European winter the hedgehog hibernates. He rolls himself into a ball in a pile of dead leaves and goes into a deep sleep until the weather is warmer again. The reason for this seems to be not so much because he can't stand the cold, but because there is no food around for him at that time of year. Pet hedgehogs that are fed regularly at the back door, may not hibernate to the same extent as their less fortunate brethren out in the woods.

In the winterless north of New Zealand the hedgehog has adapted to the fact that there is a plentiful supply of food all the year round, and may not hibernate at all. Elsewhere, he will spend the colder parts of the year in a winter nest, where the brown and white bands of colour on each spine will make him very difficult to spot among the dead grass and leaves.

You will not often see hedgehogs, even in the summer, for they prefer to sleep during the day. In England we used to put a saucer of milk out in the evening for the ones that lived in our garden. We were able to get to know them quite well, for hedgehogs are very fond of milk.

Piers Hayman



QUEST SURVEY

(CUT OUT)

I am a reader of Quest. My name is: _____

I am ☐ years old and I live in: _____ [name of place]

I think Quest should include: [Put a tick ☑ in the boxes by the ones you like best]

Articles ☐, stories ☐, illustrations ☐, competitions ☐, readers' letters ☐.

Other suggestions: _____ My favourite natural history subject is: _____

Please return your completed slip to: Quest Survey, P.O. Box 33220 Takapuna, Auckland 9.

These pages sponsored by the J. R. McKenzie Trust

Bulletin

Annual General Meeting

This year's Annual General Meeting was held on Saturday, June 22 at Victoria University, Wellington, with Dr Alan Edmonds in the chair and 95 members present.

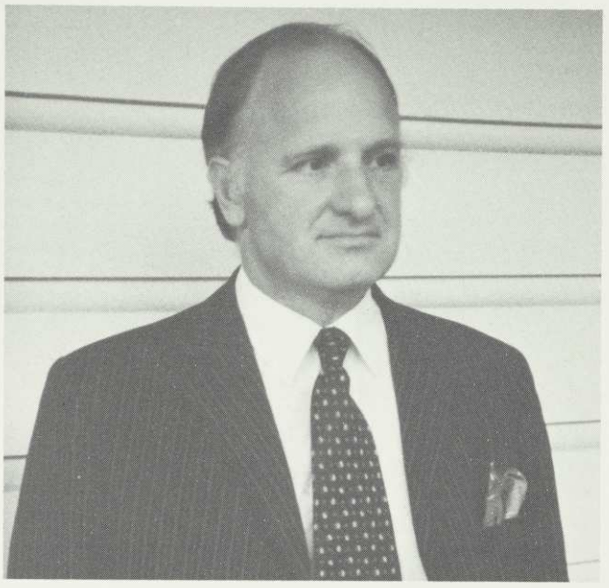
Following a discussion of the Annual Report, three remits were discussed by the meeting. Only one of these was carried — it alters the Constitution to require that a specified percentage of members call a Special General Meeting rather than a specific number (an increased membership has made the latter out of date). Following the AGM a Council meeting was held. The list of newly elected officers for the coming year can be found on page 33.

Audrey Eagle, former executive member, and member of the Nature Conservation Council, as well as a Society officer for more than 23 years, was appointed a distinguished life member in recognition of her service to the Society. She is the well known author of *Trees and Shrubs of New Zealand*.

Two new branches and one new section were formed, at Te Puke, Oamaru and Whangarei respectively.

Following notice from the previous council meeting, the future of Bushy Park was discussed at length. The Society decided to retain the property, noting improvements in management and income.

Sixteen remits were then considered, nine of which were carried. The councillors showed concern at the lack of progress in dealing with *Clematis vitalba*. The question of Chatham Island peat mining and protection of the kea was discussed. It was agreed that further action would be taken on these issues. A student membership of $10 has been introduced, upon presentation of an ID card.



On the move

Two Society members were honoured recently with changes in their careers. President **Dr Alan Edmonds** became manager of the QE II National Trust on July 1, having switched from the position of Reader in Biological Sciences at Waikato University.

Former President and executive member **Tony Ellis**, Q.C. has been appointed a judge in the High Court at Hamilton.

The Society extends its congratulations to Dr Edmonds and Justice Ellis, and wishes them the best for the future.

Summer Camp

Organisers of the Havelock North summer camp report that it is oversubscribed and ask that people no longer write in to register. This is the only summer camp to be held this coming summer.

Camera wanted

The Society is in need of a 35mm single lens reflex camera for its conservation work. Anyone who feels they may be able to help, please contact: Joan Leckie, PO Box 631, Wellington, or phone collect 728-154 (Wellington).

The best legacy

Bequests to the Society are one of the best methods of support it has had. However, it's not always easy to find out how to go about leaving a donation or gift in your will. Now the Society has prepared a pamphlet which sets out clearly and concisely how to give your children and grandchildren the best bequest of all: the preservation of New Zealand's native plants and animals. Write to the Secretary, RF & BPS, PO Box 631, Wellington for a free copy.

Correction

We could have been rightly criticised in the last issue for excessive optimism when we stated in the inside front cover caption that kokako are found in Whirinaki Forest. Sadly there have been no recent sightings of the bird there. (P.S. Next time you are in Whirinaki, make sure you drop into the Minginui store and spend a little locally, and tell people how much you enjoyed the forest.)

MEMBERSHIP APPLICATION

TO: THE NATIONAL SECRETARY
ROYAL FOREST & BIRD PROTECTION SOCIETY OF NZ INC
P.O. BOX 631, WELLINGTON

YES, I want to join the Royal Forest and Bird Protection Society. Start my subscription to *Forest and Bird* magazine immediately.

Please tick the appropriate category:

Subscriptions	1985
☐ Junior (under 17 or at school) Age	$10.00
☐ Ordinary	$20.00
☐ Family (Partners with or without children) No. of children under 17	$20.00
☐ Senior Citizen (Over 60) partners or single	$15.00
☐ Life	$250.00

Name: _____

Address: _____

_____

_____ Telephone _____

FOR OFFICE USE ONLY

Membership No. _____

Postal Code _____

Branch _____

Date Received _____

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☐ Life	$250.00

Name: _____

Address: _____

_____

_____ Telephone _____

FOR OFFICE USE ONLY

Membership No. _____

Postal Code _____

Branch _____

Date Received _____

THIS PLANT NEEDS PROTECTION

Photo by courtesy of Wildlife Service

SO DO YOU!

Protection!
You need it just as much as the endangered (in the wild) kaka beak. However, your protection comes in the form of future financial security.
With National Provident Fund, that's exactly what you get.
As New Zealand's largest Superannuation Fund, we can start you on an investment plan now, that will provide you with a sizeable, supplementary income in the future. What's more, it's fully guaranteed by the Government.
National Provident Fund. We don't make excessive claims or promise to turn you into a millionaire overnight. What we can do is make you very comfortable in retirement.
And that's just the protection you need.

NATIONAL PROVIDENT FUND

- Annual Tax Saving on an income of $15,000 up to $437. At $30,000, save up to $631, etc.
- Government guaranteed security on an investment in a $2 billion plus Fund. Contributions now exceed $120,000,000 p.a.
- Flexible contributions — pay what you like, when you like.
- A wide range of retirement options with the choice of an instant lump sum payment including partial withdrawal, or a monthly pension for life.
- Retirement payments, adjusted to help cope with inflation, and maintain financial security and independence when you stop working.
- Secure no-nonsense retirement planning that doesn't require a medical, has no age limit, and, most importantly, has no entrance or management charges.
- New Zealand's largest and most experienced superannuation organisation.

NATIONAL PROVIDENT FUND

GOVERNMENT GUARANTEED SUPERANNUATION

Phone your nearest National Provident Fund Office or write to Private Bag, Wellington, for a complimentary brochure.

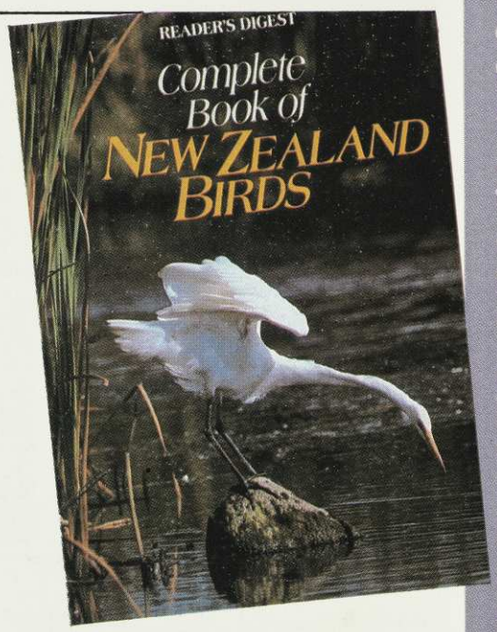
NP 204

Forest and Bird August 1985
MAIL ORDER

THE NATURAL GIFT FOR PEOPLE WHO CARE

How to help conservation and yourself! This issue the Society has produced a number of its own products — goods designed to appeal to YOU, members of the largest and longest standing conservation organisation in New Zealand. These products are value for money, they make ideal gifts, and at the same time they are supporting the conservation work of Forest and Bird.

BOOKS



Readers Digest Complete Book of NZ Birds
A collaborative effort from NZ's best known ornithologists, this beautiful book has two introductory sections: on the main types of habitats of our birds, and on "The Life of Birds." 320 pages, more than 300 outstanding photos. Retails at $45, reduced to **$41.00!**

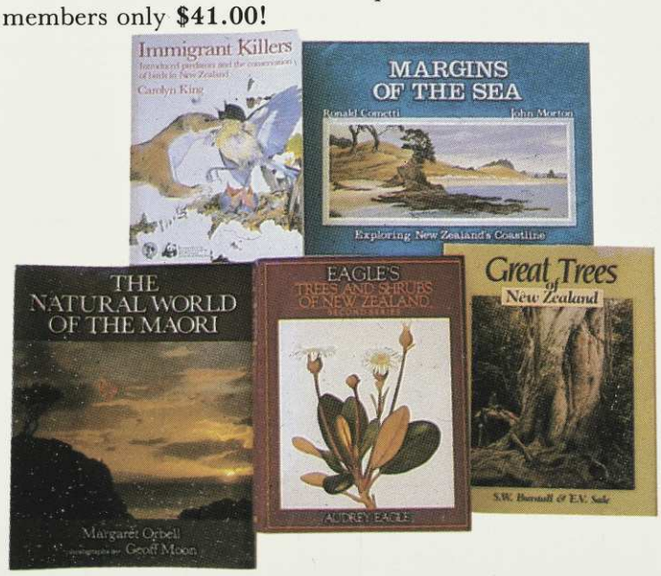
Eagles Trees and Shrubs of NZ (2nd Series). Stocks are dwindling of this much acclaimed work. Was $95, now only **$45.00.**

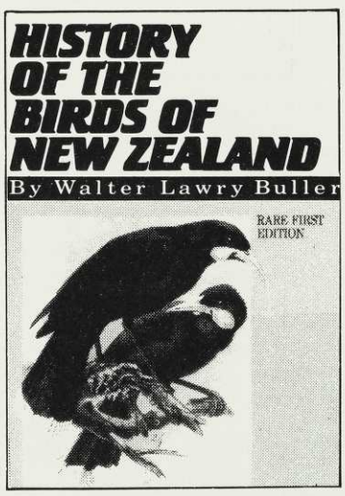
Immigrant Killers, by Dr Carolyn King. A controversial book on a controversial topic. Described as a "beautifully produced, thoroughly researched and readable account." Usually $27.50, reduced to **$25.00.**

Margins of the Sea, by John Morton, illustrated by Ronald Cometti. The little known world of our shoreline is opened up for us by a marine biologist and wildlife artist. Captivating descriptions of 38 locations around New Zealand. Usually $39.95, down to **$36.00.**

Great Trees of NZ, by S. W. Burstall and E. V. Sale. A celebration of 100 great trees, including native and introduced species. Usually $27.50, reduced to **$25.00.**

The Natural World of the Maori, by Margaret Orbell, photos by Geoff Moon. NZ's best known natural history photographer combines with anthropologist Orbell to produce a scholarly yet magnificent looking book on a lost world. Use the discount coupon from The Listener. Retails at $44.95, to members only **$41.00!**





A History of the Birds of NZ, by Walter Buller. Published by the Society, this facsimile is a collector's item and an investment. Was $750, but offered at the bargain price of **$600.**

CURRENT POPULAR PRODUCTS

Mountain scene greeting card, a bargain at **$3.00** for 10.

Teaspoons, silver plated with F & B logo, **$3.00.**

Key rings with tui logo, **$2.50.**

Boxed green Bic Pen, with F & B log, **$2.00.**

Labels — self adhesive for recycling envelopes, illus with delightful bird pictures, only **$1.00.**

Wrapping paper, just the thing for Christmas, a giveaway at **60c.** Illustrated with Janet Marshall birds.

Badges. F & B cloth badge for sowing on packs, bush shirts **($2.50)**; Car Sticker **($1.00)**; lapel badge **($1.50)**.

Posters: Native Bush Birds of NZ, by Janet Marshall, **$4.00**; Birds in NZ wall chart, **$3.50.**

Forest and Bird journal binder to keep all your beautiful issues. Holds 12, **$12.00.**

Cassette. 30 birds captured on this delightful New Zealand recording. **$11.50.**

NEW PRODUCTS!!

GREETING CARDS

"Old Yellow" — Chatham Island black robin. Artist Pauline Morse was specially commissioned by the Society to paint this outstanding picture. Will endear itself to all bird lovers — and win over anyone who isn't! **60c** each or 8 for **$4.00.**

Historic poster reproduction — This reproduction of a 1920s Society poster will appeal to those with a sense of history. **60c** each or 8 for **$4.00.**

The Royal Forest & Bird Protection Society
caring for our natural heritage

POSTER

"Wonders never cease . . . do they?" The Society has just produced a new poster advertising itself and its concerns. Dramatic and beautiful, it's priced at **$5.00.**

T-SHIRTS AND SWEATSHIRTS

With a Forest and Bird logo and a picture of the black stilt — just the thing for the outdoors.

T-Shirts — red, sky blue or honey. Children's sizes (6, 8, 10 or 12 ages): **$9.50.** SM, M, OS, XOS: **$11.00.**

Sweatshirts — red, sky blue or honey. Children (age 6, 8, 10 or 12): **$19.00.** SM, M, OS, XOS: **$22.00.**

ORDER FORM

Please send the following items:

Article	Qty	Price

Total Sales Value (Minimum $4.00)	
Postage and Packing on Orders Over $10	$1.00
Total Amount Enclosed	

OFFICE USE
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Kakariki (parakeet) celebrates the end of clearfelling in Mokihinui State Forest, Buller County. Young members of the Buller Conservation Group recently dressed up as native birds for a tea party among the blackened stumps of last summer's firestorm. For many years conservationists have been pressing the Forest Service to plant exotics on the plentiful areas of derelict land on the West Coast, but the clearfelling of publicly-owned land has continued in violation of the Government's 1975 Indigenous Forest Policy. In the last two years, 2500 hectares of native forest has been clearfelled on the Coast. After a barrage of criticism, the Forest Service has agreed to implement the 10-year-old policy, and clearfellings for exotic conversion will cease later this year.

Photo: Barney Brewster
Art direction: Peter Lusk

The common kowhai *(Sophora microphylla)* is noted at this time of the year for its glorious flowers. Found from North Cape to Southland, kowhai also occurs in southern Chile, where ocean-borne seeds have germinated.

Photo: J. H. Harding