

Love them or lose them ... Palm forests of Pitt Island and their wildlife

An ecological assessment of management
needs, with comment from Pitt Islanders

Geoff Walls
Freelance Ecologist
Christchurch

Peter Dilks
Department of Conservation
Christchurch

Amanda Baird
Department of Conservation
Chatham Island

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Summary

In late May 1997 we remeasured the vegetation in four pairs of enclosure plots in the Waipaua Block of Pitt Island Scenic Reserve. The plots were set up two years earlier, to get some "hard data" on the condition and trend in the forests of the reserve. We found an alarming death rate in the old palms (*Rhopalostylis baueri* subsp. "Chathams", known as both cabbage tree and nikau on Pitt Island), and no recruitment of young ones. The blame for the lack of recovery can be squarely pinned on the wild pigs and sheep in the reserve. Those animals are responsible too for the lack of recovery in the tarahinau (*Dracophylluni arboreum*) forests and the mixed-species woodlands, and for the skewed regeneration on the peat domes.

During the same visit, a determined effort was made to get a handle on the birdlife, following on the heels of a series of bird surveys, trackings and counts. At the moment, the Waipaua Block is the best habitat left on Pitt Island for bush birds, including the threatened Chathams tui (*Prosthemadera novaeseelandiae chatharnensis*) and parea (*Hemiphaga novaeseelandiae chathainensis*). It is the best habitat left too for Pitt Island's insects and other hidden creatures. One of these is the almost extinct Pitt Island longhorn beetle (*Xylotoles costatus*), an animal that may now be as rare as the famous black robin.

The Waipaua Block is the last stronghold of the Chathams nikau on earth. But with the present numbers of pigs and sheep, the palms will disappear, the remaining forests will fall apart and the opportunity to get the birds and insects back will be lost. The decision has to be made very soon whether the prime purpose of the Waipaua Block is conservation of the Pitt Island fauna and flora, or traditional recreational hunting. Otherwise it will be too late for forest recovery.

The best option for conservation is to intensively control the numbers of pigs and sheep in the Waipaua Block. Setting aside part of the Waipaua Block for hunting, and accepting that this means loss of the forests and woodlands there, is a viable alternative. Subdividing the block with excellent fences and rotating the pigs and sheep within to allow pulses of regeneration has been suggested for overlapping sustainable hunting with forest restoration. The rates of forest loss are now too rapid to allow this to work. Incentives to relocate the pigs and sheep on less valuable land should be actively explored.

The proposed forest corridor between the Waipaua Block and the scenic reserve blocks to the south is vital for long-term fauna restoration and protection. Intensive predator control at both Caravan Bush (Preece Covenant) and Rangiauria is strongly recommended.

This report was drafted in 1997 as a discussion document and circulated for comment. It provoked vigorous debate *on* Pitt Island, culminating in a written response from Pitt Island residents. That response is appended to the document in its entirety. It reveals a spectrum of opinion regarding future management directions, ranging from greatly enhanced ecological restoration

to retention in perpetuity of populations of feral sheep and pigs for hunting purposes within the reserve. A strong dissatisfaction with the Department of Conservation's current management aims and practice is expressed, along with the desire that the Pitt Islanders take a leading role in the future management of the reserve to better suit their needs. There is general concern for the nikau, but differing suggestions as to how to protect them. Our interpretation of the causes of the nikau problem is questioned, wind being cited as an alternative cause. Whilst we acknowledge the experience and keen observation behind that critique, we nevertheless firmly stand by our assessment.

1. Introduction

Imagine Pitt Island without its graceful palms; without parea, the pigeon. This plant and this bird are different from those on the New Zealand mainland, and are among the most endangered species left (Molloy & Davis 1994, Canterbury University Press/The Contributors 1996). Pitt Island can guarantee them both a secure long-term future. But unless something changes, that hope will soon evaporate.

In recent years, the conservation arena in the Chathams has been fraught with tension. There has been an apparent conflict between government-sponsored efforts and island residents' desires. Much of the conflict has been over control of land and resources. Although enormous strides have been made in resolving such conflicts, and wonderful partnerships between the parties have been established, some of the problems persist.

On Pitt Island, the major issue at present is a conflict of interest over the use of the Waipaua Block of Pitt Island Scenic Reserve (location map, Figure 1). Department of Conservation, charged with protection of natural and historic features and also with providing for recreation, has attempted to do both. It has allowed wild pigs and a flock of feral Saxon merino sheep to remain in the Waipaua Block as a hunting resource. Control of these animals to roughly-defined levels has been vested in the local hunters.

Meanwhile, the state of the forest in the reserve, and its function as a haven for fauna and flora, have been investigated. We report on the latest aspects of that investigation. We are disturbed by what we have found, and wish to sound an alarm.

Systematic vegetation monitoring has been going on in the reserves of Pitt Island since early 1980 (Park 1980, Rudge 1988, Walls 1988, Baird 1993, Walls & Scheele 1995, Walls & Baird 1995, Walls 1999). A comprehensive system of vegetation plots and photopoints has been set up (Figure 2) and regularly revisited. Each report has focused on the impact of browsing animals on forests and forest regeneration.

The studies have progressively led to the inescapable conclusion that in the presence of substantial numbers of domestic or feral sheep, cattle and pigs,

the forests cannot regenerate, and that forests and woodlands in this circumstance crumble and disappear very rapidly. By contrast, these studies have shown that the removal of the sheep, cattle and pigs invariably results in remarkably rapid forest regeneration. Yet there is still not universal acceptance of those conclusions, and the importance of the Pitt Island palms and their plight is not fully recognised.

In autumn 1995, four exclosures (squares about 22 metres x 22 metres, fenced to keep out pigs, sheep and cattle) were built by Kenneth and Judy Lanauze in the Waipaua Block (for locations see Figure 2). They were the suggestion of John Holloway, then Director of the Estate Protection Division, Department of Conservation, who visited the island to see at first hand the situation being debated. Within each exclosure a 20 m x 20 m standard forest plot was set up and measured by Amanda Baird and Geoff Walls (Walls & Baird 1995). For comparison, another such plot was set up and measured immediately alongside. These four pairs of plots were remeasured in May 1997 by the same people, helped by Sandy King (Department of Conservation, Pitt Island) and Lynnell Greer (Department of Conservation, Northland).

Also on Pitt Island at this time were Peter Dilks and Belinda Studholme (Nelson). Their task was to investigate the tui population, and the range and quality of bush bird habitats. Their work builds upon decades of dedicated bird investigations on the island and its near neighbours Rangatira (South East Island), Mangere and Little Mangere (Tapuaenuku).

Other work accomplished in May 1997 by this team included revisiting other vegetation plots and photopoints, establishing a new plot in the coastal herbfields of Rangiauria, planting out threatened plants raised in cultivation, and spending time with the pupils and teacher of Pitt Island School.

A draft of this document was circulated for discussion, particularly within the Pitt Island community, the Chatham Islands Conservation Board, the Department of Conservation, and the national network of forest and island ecologists. Comments from the Department of Conservation and ecologists were quickly received, but the Pitt Island and Chatham Island responses took much longer. Sandy King of the Department of Conservation coordinated the production of the written submissions from Pitt Island residents. Meanwhile, all the established forest plots within the Pitt Island Scenic Reserve were remeasured, and a further report was written (Walls 1999). The Pitt Islanders' submissions, reproduced in their entirety in Appendix 1, cover that report as well. We have added our own brief comments on those submissions (see Postscript). Otherwise, the document retains its original format.

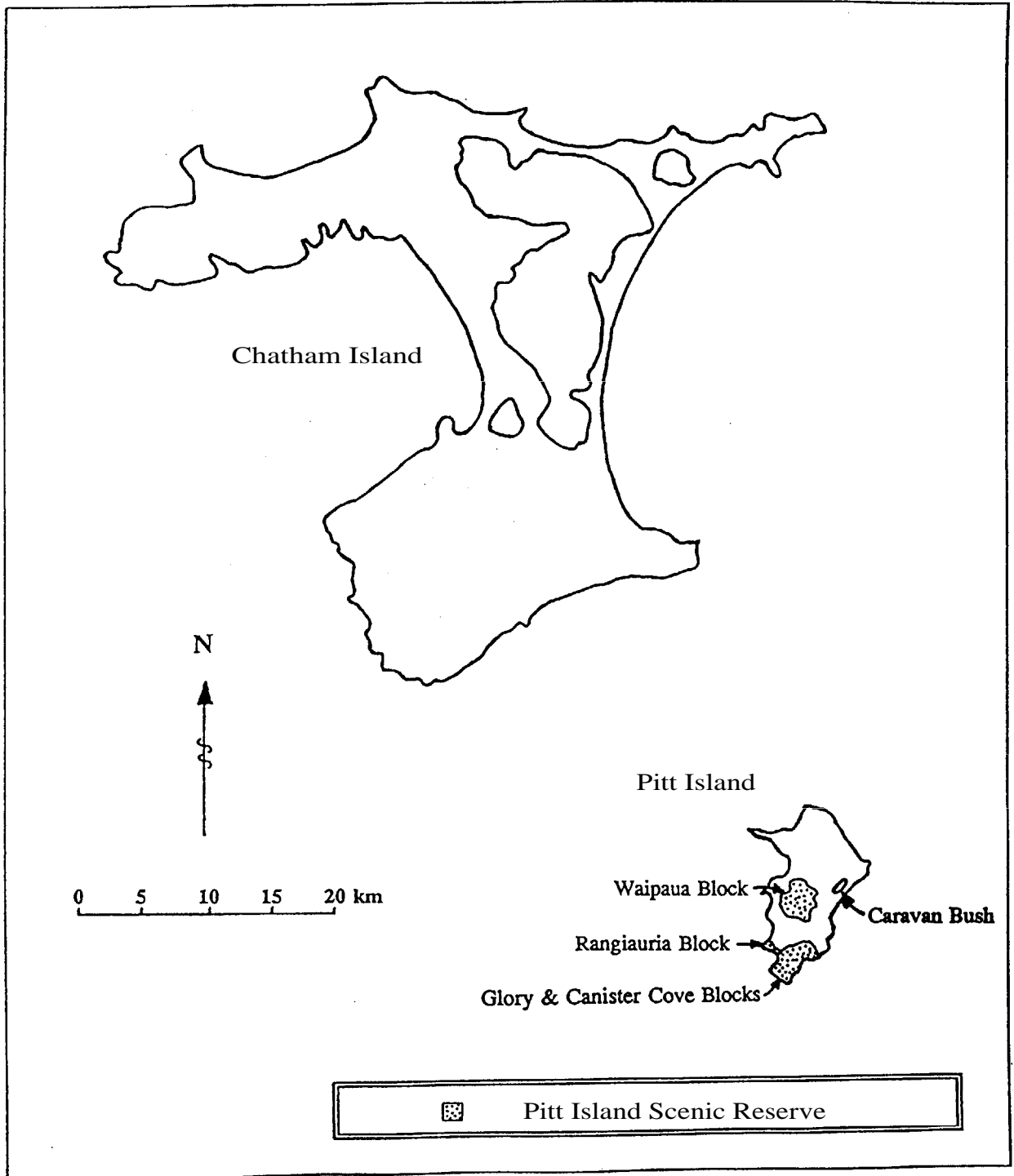


Figure 1. Map showing the location of Pitt Island Scenic Reserve and Caravan Bush.

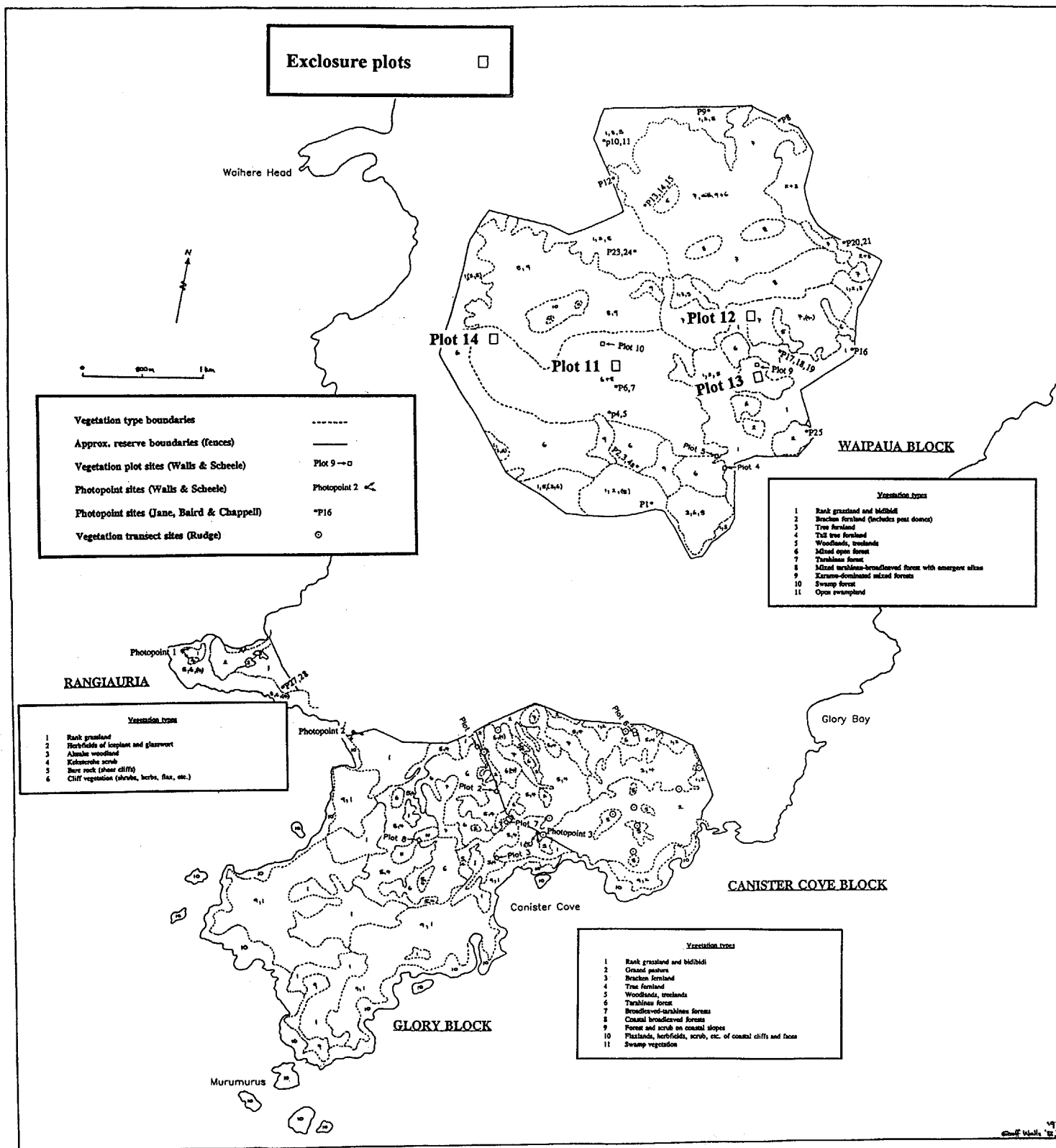


Figure 2. Map of Pitt Island Scenic Reserve, showing the blocks, their 1987 vegetation types, and the locations of the enclosure plots.

2. Our findings

2.1 THE ENCLOSURES

- **Plot 11, woodland basin, Waipaua Block (Figures 4 & 5)**

This enclosure was set up to track the fate of mixed woodland in the heart of the reserve, with and without the attentions of big animals. In 1995, it was predicted that within a few years the difference between inside the enclosure and outside would be apparent (Walls & Baird 1995). After only two years it was quite graphic.

Within the enclosure, the pasture grasses and herbs had grown rank. Tree seedlings of several broadleaved species had already appeared: those of mahoe (*Meliccytus chathamicus*) are up to 40 cm tall, and nikau was represented. Epicormic shoots had grown up on the bases of trees of matipo (*Myrsine chathasnica*) and karamu (*Coprosma chathannica*). One small tree fern had appeared.

Outside the enclosure, the pasture had remained close-cropped, and pigs have continued to regularly root up the available ground. There were only a few tiny tree seedlings, too small to be browsed yet, and no epicormic growths.

It was already clear in 1997 that at this site there was hope of forest recovery in the absence of pigs and sheep, but not while they continued in their present numbers.

- **Plot 12, tarahinau forest, Half Chain, Waipaua Block (Figure 6)**

The tarahinau (*Dracophyllum arboreum*) forests are the ancient powerhouses of the peat soils on the Chathams, with their steady rain of needle-like leaves. This enclosure was sited in such a forest, to see whether or not the browsing animals were impeding the regeneration required to counter natural canopy losses.

Within the enclosure, two of the seven hokataka (*Corokia macrocarpa*) trees in the subcanopy had died in two years, as a result of wind and old age. No canopy trees had died. There had been an overall 12% increase in the numbers of tree ferns, most of this due to a 23% increase on the forest floor. There were no tree saplings in 1995, but by 1997 there were two mahoe and one karamu. Lush epicormic growths had appeared at the bases of matipo and karamu trees. On the ground, there had been a radical increase in both numbers and size of tree seedlings: tarahinau, nikau and all the broadleaved species were represented.

Outside the enclosure it was a contrasting story. No trees had died, although branches had been blown down, but there had been a 5% loss in tree fern numbers (11% loss on the forest floor). There were no saplings and very few epicormic shoots. Although there were some tree seedlings on the ground, their numbers and size had not grown.

The enclosure and plots on this site were beginning to tell us that, although the cattle had gone, there were still too many sheep and pigs in this forest to allow natural regeneration processes to occur. What this also means is that the present structure of the forest is not natural: it should have a much denser understorey of saplings, seedlings, ferns and vines.

- **Plot 13, northern peat dome, Waipaua Block (Figure 7)**

This enclosure was set up to investigate the impact of big animals on the peat domes. These domes have been built by tarahinau forests, but have been deforested to such an extent that only a handful of crumbling trees remain as reminders of the former forest cloak. There are no trees in the enclosure or plots.

Within the enclosure, by 1997 there had been a major increase in the number of tarahinau seedlings and saplings 45-70 cm tall (the tallest height class). Seedlings and saplings of hokataka and karamu were present, as were rautini (*Brachyglottis huntii*) seedlings. There had been a 180% increase in the number of small tree ferns.

Outside the enclosure, considerably fewer tarahinau seedlings and saplings had made it into the 45-70 cm height class, and there had been a big decrease in numbers in the smaller height classes. There were no hokataka or karamu, and almost no change in small tree fern numbers.

What had happened is that, although the recent removal of cattle from the peat dome area had allowed regeneration of tarahinau and other forest plants to begin, pigs and sheep were severely impeding this process. Small seedlings, saplings and ferns were browsed off, and rooting was destroying even the largest saplings and tree ferns. The result, if this continues, will be that tarahinau forest will recover only within the enclosure. Elsewhere on the peat dome, a patchy treeland will form.

- **Plot 14, nikau palm woodland, western Waipaua Block (Figure 10)**

This is the most distressing of the enclosure sites. It was chosen in 1995 to follow the fate of the woodland containing nikau palms.

Within the enclosure, two of the five palms had blown down and died within the space of only two years. This meant a 10% loss amongst all trees in the enclosure. Dense epicormic growths had appeared at the bases of karamu, matipo and akeake (*Olearia traversii*) trees. There were no tree seedlings or saplings in 1995, but by 1997 some seedlings of mahoe, hoho (*Pseudopanax chathamicas*) and kawakawa (*Macropiper excelsum*) had grown up to 40 cm tall. They were all in the shelter of the trees, where vigorous grasses were shaded out, giving the seedlings a chance. There were as yet no nikau seedlings.

Outside the enclosure, one karamu tree had (lied and fallen, making the tree loss in the plot in two years 5% overall. There were no epicormic shoot

growths, saplings or tree seedlings. The few small tree ferns in the plot had somewhat increased in number.

This story is a sorry one. It tells of rapid tree loss, especially among the soaring palms. So long as pigs and sheep remain in their present numbers, there is no chance of forest recovery, and it will be only a few years before even the woodlands have gone. The only compensation, and it is very slight, is that, now cattle numbers are low, tree ferns may increase and hopefully provide a few perches for tree seedlings.

The enclosure though provides some hope for both the forests and the palms, despite the losses already witnessed. It shows that, in the absence of browsing animals, even scattered woodland trees can sprout anew from their bases, to provide shelter for seedlings of a future forest. The palms cannot sprout like that, but as long as there are enough adults left standing, forest trees to provide a habitat (nikau cannot readily establish in open ground), and big birds to disperse their fruits, a new generation of palms is possible. Let us be quite clear about this: time is fast running out.

2.2 OTHER VEGETATION OBSERVATIONS

- **Nikau forests and woodlands (Figures 8, 9, 10, 11 & 12)**

Chathams nikau are different from those in New Zealand's mainland. The adult palms look different, and their seedlings look bigger and broader in the leaf. They are now recognised as a separate botanical entity, but have yet to receive a scientific name to register that difference. They appear to be the southernmost palms in the world. In a word, they are special. On Pitt Island there is an obvious historical pride in the nikau, although they have yet to be nurtured.

Everywhere that there are adult palms of nikau in the Waipaua Block - be it in forest or in woodland - there is a disturbing amount of recent death among them. Most of this has been inflicted by wind: whole palms have been blown over, some have been snapped, others have had their heads blown out. A few appear to have died from old age, exposure or disease. The pattern is ecologically alarming. There is now no doubt that the adult nikau population is fast declining throughout its last remaining stronghold, the heartland of Pitt Island.

Making the decline in the adult nikau look even bleaker is a lack of younger ones. There are no palms smaller than the tall old adults. There is a light scattering of seedlings on the forest floor, but they are being eaten off and rooted out as they appear. The only plants looking old enough to be starting to form a trunk are a few isolated individuals protected from sheep and pigs by especially dense entanglements of supplejack and swamp vegetation or steep streambanks.

We are sure that what we see now, tall palms towering above the forest, isn't natural. We believe that their heads used to just protrude from a dense

tarahinau canopy. That canopy has crumbled as the forest has been cut into and browsed, allowing the wind in to do most of the damage. The nikau have been left high and dry. Tough as they are, they are still not able to withstand the continued onslaught without the shelter of a new canopy.

In human terms the nikau population in the Waipaua Block of Pitt Island is like a retirement village without a health service. There are no children, no teenagers, no young adults, no-one of middle age even. Only old-timers, totally left to their own devices. Very vulnerable, with not much time left.

We looked at the flowering and fruiting of the nikau. There are plenty of flowers being produced each year, resulting in prolific fruit set. Some of this fruit is being dispersed by birds, probably tui, parea, blackbirds and starlings. Parea, present in the block in low numbers, may be the only ones that can manage the largest fruit. The fruit are not all so large though, and the smaller fruits at the outer ends of the bunches are available to the other birds. The appearance of seeds and seedlings well away from the palms indicates that there's no problem with bird dispersal.

Pigs eat most of the fruit that falls to the ground, even after it has passed through a bird, grinding it to smithereens. They are no use as dispersers. They ruin the chances of most of the seedfall germinating. Furthermore, they root up seedlings and, like the sheep, trample and browse them. Germination and establishment of seedlings depends on adequate moisture, shelter and nutrients. Only on untrampled, unrooted ground beneath trees are these potentially available: tree fern trunks, although they provide germination sites, do not provide enough nutrients for baby nikau. The long-term maintenance of nikau requires a functional forest floor ecosystem, but that is what the pigs and sheep are destroying. We believe that the adult palms require a whole forest structure to thrive also.

Exclosure Plot 14 is in a site where nikau are most vulnerable. We have selected another site for an exclosure plot to follow their fate where they should be least vulnerable: in dense forest. Dense forest containing nikau isn't easy to find now on Pitt Island. The site we have chosen is on the slope running north of the high point in the reserve aptly named Cabbage Tree. Because of the degraded nature of this forest and the high numbers of pigs and sheep there, we will be very surprised if this site paints a different picture to the one just described. However, we feel it is, sadly, necessary to go through this process - unless the animal management regime changes radically in the next year, of course.

Geoff Walls mapped the vegetation of Pitt Island Scenic Reserve over a decade ago (Walls 1988, Walls & Scheele 1995, Figure 2). In the Waipaua Block, much of what was mapped then as woodland is now open pasture with only the odd tree, and much of what was mapped as forest has since become woodland. The change is as fast as that! The same process has happened in the Canister Cove Block and in the area between it and the Waipaua Block (part of which is proposed as a forest corridor). By contrast, the woodlands and forests of the Glory Block have thickened up, as discussed below.

- **Rangiauria herbfields (Figure 13)**

Rangiauria, or Black Rock, looms over the western part of Pitt Island with a mystical presence. The scenic reserve contains the great basalt massif itself, and the neck of land running out to it. It has been fenced off for about 18 years, although the odd sheep and pig have penetrated the fence over the years.

This whole place would have previously been cloaked in wind-smoothed coastal forest, dominated by the tree daisies akeake and keketerehe (*Olearia chatbanaica*). On rock ledges and the most salt-thrashed faces the Chathams megaherbs (the forget-me-not *Myosotidium hortensia* coxella (soft-leaved speargrass) *Aciphylla dieffenbachii*, and the giant sowthistle *Embergeria grandiflora*) would have hung out. Decades of farming have wiped out the forest, the only reminders being the odd trunk or bush, and the megaherbs have all but disappeared.

However, the regeneration miracle we have witnessed elsewhere in the Chathams once stock have been excluded can be seen here too.

A series of photopoints to chart the regeneration process has been set up in the past. We retook them this trip. What they show is a great increase in flax everywhere except on bare rock, and a resurgence of small ground herbs. It is still too soon to see any sign of tree daisy regeneration.

The megaherbs are making a comeback. We set up a 20 m x 20 m plot to study the interplay between them, the low-growing herbs, grasses (tussocks) and flax. We expect the flax to gradually increase at the expense of tussocks as the lost soil rebuilds. Tree daisies should eventually reappear. But the fate of the herbs is less predictable: after a period of proliferation they may be forced to beat a retreat back to the ledges and exposed faces, or they could persist beneath the trees and shrubs.

- **Canister Cove and Glory Block regeneration (Figures 14 & 15)**

This southern end of the island has been the testing ground for a variety of conservation ideas over the last two decades. Both blocks have been fenced for most of that time, but for different reasons. The Canister Cove Block was fenced to preserve a flock of the distinctive Saxon merino feral sheep. The Glory Block was fenced to keep them out, and the cattle, pigs and domestic sheep as well.

Now, both blocks have much lower numbers of all these animals (though pigs are still fairly common), in order to groom the habitat for birds, and the fence between them has been dismantled. Forest regeneration is well under way now, that in the Glory Block being 14-15 years ahead of that in the Canister Cove Block. We have a series of photopoints and vegetation plots to follow that process, and the changes are graphic, as we observed this visit.

Whilst this seems like a success story for conservation, it has a major downside. It has diverted the idea of maintaining sheep and pigs for recreation into the Waipaua Block instead, and that very special place is being devastated by them before our very eyes.

2.3 BIRDS

- **Chatham Island tui (*Prosthemadera novaeseelandiae chathamensis*), Figure 16**

Chatham Island tui have recently disappeared as a breeding bird on Chatham Island. Now Pitt and Rangatira islands are their remaining strongholds. Although some tui breed on Pitt Island, it appears that the bulk of the population breeds on Rangatira. There is no information, at present, on whether the tui population is static, expanding, or contracting.

In winter almost all tui leave Rangatira and fly to Pitt Island, where they spend the winter in the forested areas. Birds return to Rangatira in spring (September and October), to re-establish their breeding territories. Initially, birds will commute back and forth from Pitt Island on a daily basis. Flax, which provides an important nectar food source for tui, flowers earlier on Pitt than on Rangatira, and until flowering is well under way on Rangatira, birds regularly commute between the two islands. In October 1996 miniature radio transmitters were attached to ten tui. Males especially were recorded travelling back and forth between the two islands, sometimes daily and at other times spending several days on one or other island. When breeding commenced in early November all of the breeding tui remained on Rangatira. However, as soon as the chicks left the nest, some males returned to Pitt and only visited Rangatira on brief occasions. Most females followed at a later date. All of the birds with transmitters attached on Rangatira when found on Pitt Island were resident in the Waipaua Block.

During spring, flax nectar is the most sought after food by tui. It is likely that the coastal slopes of Pitt Island Scenic Reserve around Canister Cove are the most important tui feeding areas, although birds will visit all areas of flowering flax and at this time are also seen on Mangere Island. However, during winter, fruit makes up most of their diet, and the Waipaua Block with its more diverse vegetation types becomes vital. The most important fruit sources during winter are ngaio, hoho, matipo, karamu and mahoe. Nikau fruit may also be important. In May 1997, tui on Rangatira were most often encountered in fruiting ngaio trees, whereas on Pitt Island they were mostly in hoho trees.

The main purpose of the bird investigation on Pitt Island in May was to determine the winter distribution of tui and the usage of the Pitt Island forested areas by them during winter. We also recorded the ratios of banded to unbanded birds we encountered. We visited most of the forested areas on the island.

Since tui were rather inconspicuous we played recordings of Chatham Island tui song at intervals to attract birds so we could see if they were banded or not. Up to the end of February 1997 there had been 164 tui colour-banded on Rangatira Island. Recording the ratios of banded to unbanded birds can give some indication of total population size. Unfortunately it appears that during winter, adult tui show little reaction to recorded tui song. All but one of the banded birds we attracted to the calls were juveniles and it is likely that most of the other unbanded birds were juveniles. On Rangatira Island, in May 1997, adult tui showed no reaction to recorded calls, and birds singing nearby when tapes were played showed no reaction.

Field survey for tui went as follows:

Caravan Bush (Preece Covenant), 21 May 1997

This bush remnant is owned by John and Bridget Preece and is proposed as a conservation covenant area. It has been fenced to exclude stock and wild animals for several years. We played tapes on a transect just inside the front (coastal) edge of the bush and then crossed through the middle and travelled along the back fence.

Waipaua Block of Pitt Island Scenic Reserve, 22 and 24 May 1997

On the 22nd we walked across the Half Chain and around the western end then back through the centre over Cabbage Tree. On the 24th we crossed through the centre on the 4-wheeler track and then came back around the southern edge of the reserve.

Glory and Canister Cove Blocks (Southern Pitt Island Scenic Reserve), 23 May 1997

We crossed from the northern side of the reserve via the central fence to the coast then travelled along the coastal track to the western side of the forested area and back around to the north.

North Head area, 25 May 1997

From Ken and Eva Lanauze's house we walked through the coastal forest to the east and northeast of Hakepa Hill (Walkemup). The forest in this area is grazed and patchy with extensive areas of pasture. We walked a loop in the northern end of this forest and returned back around the coast.

Tui were present in all areas but we would have seen few birds if we hadn't played recorded calls.

Table 1. Results of field survey for tui, May 1997.

Area	Un-banded	Unident-ified	Banded	Total
Caravan Bush	9	1	0	10
Waipaua Block (north)	28	10	3	41
Southern Reserve	17	1	2	20
Waipaua Block (south)	48	6	6	60
"North Head"	8	2	0	10
Total	110	20	11	141
Waipaua Block (both areas)	76	16	9	101

As can be seen from Table 1 the Waipaua Block is by far the most important area on Pitt Island for tui in winter; 72% of tui we encountered were found there. This reserve is probably a critical feeding area for much of the tui population left in the Chathams. Groups of up to 14 birds were attracted to recorded calls and similar-sized groups were seen feeding on ripe hoho fruit on several occasions. The open "parkland" of the Waipaua Block provides many such feeding trees, but this open grazed habitat also provides ideal conditions for feral cats.

Pitt Island forests are vital winter feeding habitat for the Chatham Island tui population, and it is likely that the health and productivity of these forests is

an important and possibly limiting factor on the overall Chatham Island tui population. By itself, Rangatira Island can only support low numbers of tui through the winter. This makes better conservation management of the Waipaua Block on Pitt Island essential for the long-term survival of the Chatham Island tui.

- **Parea or Chatham island pigeon (*Hemiphaga novaeseelandiae chathamensis*), Figures 16 & 17**

Parea were seen during the May 1997 visit only in the Waipaua Block around the Half Chain, and on the western side of the reserve. Initially, three birds were seen together just to the north of the Half Chain, and a short time later two of these birds were seen at the same time as another pair which were in a valley further to the south. So at least four parea, and probably a minimum of five, were present. The habitat present in the Waipaua Block appears to provide very suitable habitat for parea, similar to the core parea area in the Tuku Valley on Chatham Island. This habitat should be able to support many more parea. However, at certain times of the year, parea feed extensively on the ground, where they are very vulnerable to predation by feral cats. They are also vulnerable whilst on their nests. It is likely that predation by cats is keeping the numbers of these big pigeons low on Pitt Island.

- **Kakariki or Chatham island red-crowned parakeet (*Cyanoramphus novaezelandiae chathamensis*), Figure 17**

During the May 1997 visit, parakeets were heard only in the Waipaua Block and only on three occasions. Their numbers appeared to be very low, although they may be seasonally inconspicuous. Feral cats are known to also prey heavily on parakeets. Cat control in the Tuku on Chatham Island has allowed parakeet numbers there to increase. This further reinforces the case for cat control in the Waipaua Block.

- **Other birds (Figures 18 & 19)**

Chatham Island fantail (*Rhipidura fuliginosa penitus*) numbers were high in all areas we visited in May 1997. Tomtits or miromiro (*Petroica macrocephala chathamensis*) and Chatham's warblers (*Gerygone albofrontata*) were common in the Waipaua Block and Caravan Bush. Tomtit numbers appeared to be especially high in Caravan Bush, which may be a reflection of the cat control being carried out there.

- **Sandy King's bird counts (January-February 1996)**

Sandy King, who lives on Pitt Island and works for the Department of Conservation, did a large number of 5-minute bird counts in summer 1996. Her count lines were located in the following places:

Northern: Caravan Bush;

Central: the Waipaua Block of Pitt Island Scenic Reserve, in the vicinity of Cabbage Tree;

Southern: the Canister Cove and Glory Blocks of Pitt Island Scenic Reserve.

The results of these counts are displayed in chart form in Figure 3. They show that Caravan Bush was the "birdiest" place, in that it had the highest total of birds counted. Second was the Waipaua Block, with the southern blocks a distant third. These differences are statistically significant, but make sense only with a more detailed look.

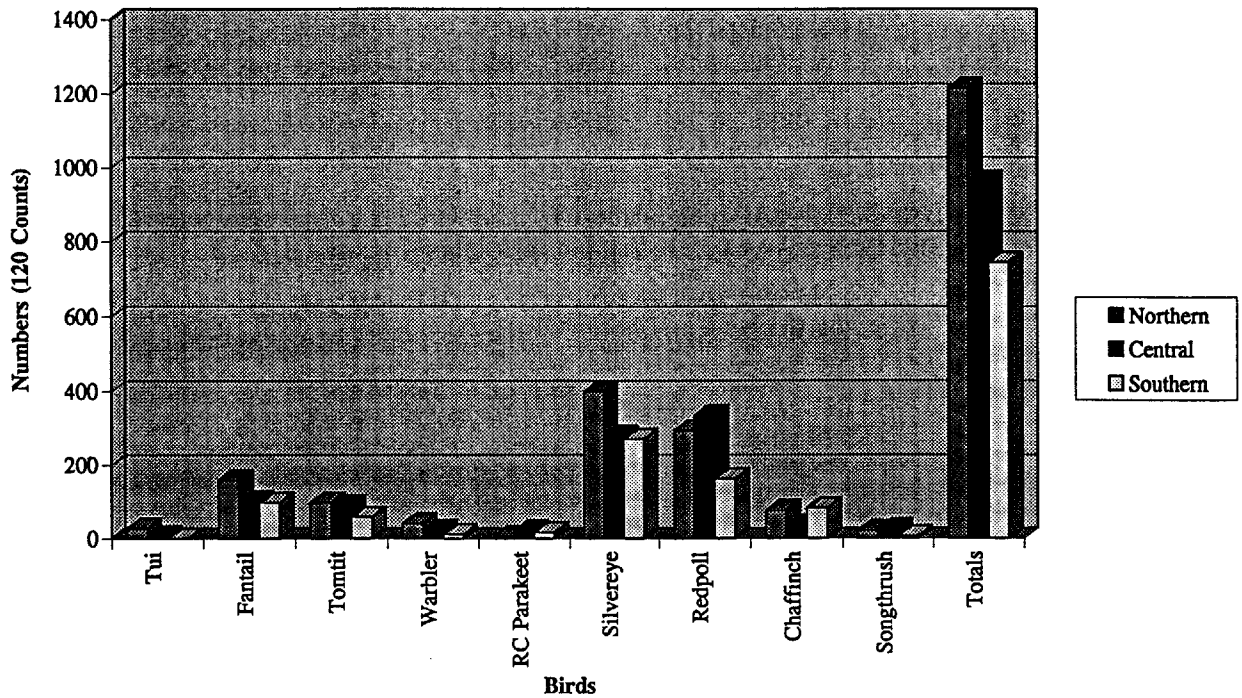


Figure 3. Chart of Sandy King's bird count results.

Most of the birds counted are small: silvereyes (*Zosterops lateralis*), redpolls (*Carduelis fammea*), fantails, tomtits, warblers and chaffinches (*Fringilla coelebs*). Of these, silvereyes and redpolls are highly mobile in the landscape, whereas the others tend to remain in much smaller home ranges. All eat invertebrates (insects, spiders, etc.), but silvereyes also rely on fruit, and redpolls and chaffinches eat seeds consistently. Of the larger birds, tui were counted more in Caravan Bush, but red-crowned parakeets and songthrushes (*Turdus philomelos*) were counted more in the Waipaua Block. These larger birds eat a combination of fruit, invertebrates, seeds and foliage. Tui and red-crowned parakeets are highly mobile, but the parakeets are strictly forest dwellers.

The results of the counts suggest that the southern area, apart from its valuable flaxlands, is poorest habitat for all types of land birds. The reason is fairly obvious: it doesn't contain as much fruit-bearing vegetation and shelter. It is ironic that this area has been selected for bird conservation ahead of the others. The results also highlight the value to birds of small but diverse and fertile forest remnants like Caravan Bush. It is likely that the greater densities of birds counted there are the product of the improved quality of