

# Forest monitoring on Pitt Island: "Just you ask the plants"

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Dedicated to the memories of Dr Lucy Moore, botanist, and Jim Moffett,  
farmer

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# Summary

In March 1998 Amanda Baird and I remeasured 10 permanent vegetation monitoring plots located in various parts of Pitt Island Scenic Reserve. We also revisited a series of photopoints and four exclosure plots. The first plots were established in 1980, and were remeasured and added to by me and Sue Scheele in 1987 and 1993.

During that 18 years of monitoring, we have observed and documented in detail the rapid regeneration of forest in sites free of heavy grazing and browsing pressure. Conversely, we have recorded the equally dramatic collapse of forests and woodlands where there are many cattle, sheep and pigs. We have written, published and distributed reports detailing these findings after each visit.

The southern blocks of Pitt Island Scenic Reserve (Rangiauria, Glory and Canister Cove blocks) are now in good condition and improving year by year. So too is Caravan Bush, a private protected area. However, the Waipaua Block, the living heart of the island, is in dire straits. There is a fundamental clash there between the aims of traditional hunting (of feral pigs and sheep) and forest restoration. If this is not resolved soon, not only will the forests and woodlands be rapidly lost but the Chatham Islands nikau will be decimated in its only stronghold. The feral pigs and sheep so prized for hunting are, quite simply, preventing natural regeneration, the life-force of the forest, from taking place.

There is at least one possible solution: to give both hunting and forest conservation a reasonable deal by segregating the uses in the Waipaua Block. This would mean constructing a dividing fence and permitting part of the reserve to be used primarily for hunting, whilst the remainder was managed for forest restoration. It would make most ecological sense for the hunting area to be in the southwest of the block. If the proposed corridor, designed to connect the Waipaua Block with the southern blocks for fauna and flora purposes, was widened to the northeast, it would not only make a better connection but a bigger hunting area would be possible without impacting too much on the nikau.

There is sufficient goodwill, mutual respect and common ground between the interested parties to give cause for optimism that a lasting solution to what seems like an impasse can be reached quite soon. Everyone has expressed concern for the well-being of the Waipaua Block forests and nikau. It's a good point to work from. The Pitt Island Reserves Committee and the Chatham Islands Conservation Board are the best-placed groups to facilitate discussion and decision

The plight of the endemic nikau is highlighted by comparison with healthy nikau forest elsewhere. The possible use of tree ferns as ecological indicators is examined. One tree fern, mamaku, may be a very rare endemic, and needs urgent study. The value of flax in providing shelter and wildlife habitat is well proven. Its use in revegetation is advocated. A technique for more rapid

frequent monitoring of vegetation condition and trend is proposed, to complement the existing monitoring and to allow management of the reserve to be more responsive.

As Lucy Moore used to say, there's no substitute for "asking the plants" the story they have to tell.

# 1. Introduction

When I started work as an ecologist with DSIR's Botany Division in the 1970s, a wonderful scientist, Dr Lucy Moore, was still there. She was leathery and fearsome, and at an age when most people settle for a well-earned rest, scorned the idea of retirement. Lucy had forged a reputation for excellence and practical clear-headedness in a science dominated by men, and she worked in the wild places of New Zealand without Toyota Hiluxes, helicopters or aluminium boats. She bequeathed her entire life savings to the nation for conservation.

Lucy always said "just you ask the plants, they'll tell you": that if you wanted to find out what was happening ecologically, you had to go to the plants and listen to what they said. After 25 years in the profession, it's advice I see no reason to discard.

When I first visited Pitt Island, in 1980, it was specifically to "ask the plants". Geoff Park and I had the job of mapping the vegetation patterns and setting up a system for monitoring the changes as time went by and different management practices had their effects. Another leathery character was there then, Jim Moffett. Opinion is divided as to whether he was a hero or a villain for setting aside land on the island for conservation under Crown control. I happen to think his was a heroic vision. Without Jim's actions, there would be far fewer native plants on Pitt Island to ask today.

The vegetation plots set up in the Pitt Island Scenic Reserve in 1980 were remeasured and added to in 1987 by Sue Scheele (Landcare Research - Manaaki Whenua, Havelock North) and me, and again in 1993. Since then, Amanda Baird (Department of Conservation, Chatham Island) and I have worked on the Pitt Island vegetation in 1995, 1997 and 1998. This work has led to a series of reports (Walls 1988, Walls & Scheele 1995, Walls & Baird 1995). Each report has sounded an alarm about the rate of forest loss when there are too many big animals (sheep, cattle and pigs), whilst observing the amazing recovery when these animals are controlled to low levels.

The 1997 work was done at the same time as Peter Dilks (Department of Conservation, Christchurch) was looking at the big forest birds (tui, parea and kakariki) on the island. We all came away highly concerned at the plight of both the birds and the nikau palm (cabbage tree) forests, especially in the central Waipaua Block. (Nikau on the Chathams is an endemic species of

*Rhopalostylis*, yet to be scientifically named. It is known locally as cabbage tree.) So too were the Lincoln University entomologists Rowan Emberson, John Marris and Katrin Schops, who had been looking for and trying to conserve the special insects, including the Pitt Island longhorn beetle and the coxella weevil.

This collective concern resulted in the production in August 1997 of a discussion document, *"Love them or lose them.... the palms of Pitt Island and their wildlife"*, by Geoff Walls, Peter Dilks and Amanda Baird. It was put together in consultation with the entomologists, other biologists and ecologists with Chathams expertise, and a range of conservation managers. The document was aimed at alerting Pitt Island residents, the Pitt Island Reserves Committee, the Chatham Islands Conservation Board, and the Department of Conservation to the seriousness of the ecological deterioration in the heart of the island. It also offered discussion on all the management alternatives that had been proposed until then.

The response to the document has been predictably mixed. The Department of Conservation, charged with the responsibility of conserving the special natural values of the reserve, has been put in an awkward position: its conservation management has been found wanting, whilst it strives to foster a good working relationship with the islanders. Those islanders who use the reserve for hunting and other recreation have reacted defensively at first, whilst others have expressed support for active forest restoration.

The brilliant thing is that we are now getting somewhere. The issue is out in the open, and the interested parties are listening to one another. The Pitt Island residents have requested the opportunity to put their side of the story, so publication of the *"Love them or lose them"* document has been put on hold to allow that perspective to be added. The Conservation Board is getting involved. So far, everyone has said they care about the forests, and that they want them to be there for their mokopuna, for generations to come.

All that gives me great hope that an accommodation will be achieved soon, whereby both the recreational traditions and the needs of conservation will be served. Some kind of working compromise will be necessary to achieve that outcome. So too will a spirit of willing co-operation. There are healthy signs of that developing already.

The 1998 work, spearheaded by Amanda Baird and me, was a further remeasurement of all 10 of the vegetation plots last measured in 1993. In the process we converted them to the standard 20 m x 20 m forest plot system used throughout New Zealand. That means all our vegetation monitoring plots in the Chatham Islands are now set up on that system.

We also inspected the exclosure plots set up in the Waipaua Block in 1995 (Figures 1 & 2), revisited some key photopoints, had a look at the Waipaua Block woodlands and checked out some rare plants. A morning was spent with the children at the Pitt Island School, and another with hunters in the Waipaua Block, discussing the issues and tossing around some creative solutions. A day was spent preparing for a Conservation Board visit that got called off at the eleventh hour. We carted fencing material for a new exclosure and at one stage got caught up in the great cattle muster - a memorable event.

In the field, we were helped by three remarkable Department of Conservation staff: Wendy Hare from the Tuku, Hilary Aikman from Wellington and Sandy King, whose base at Caravan Bush we invaded. Whenever we needed local help it was cheerily given (including sorting out my gammy knee!).

## 2. The vegetation plots

This is the first part of the story the plants have to tell. The locations of the 10 plots are shown in Figure 2. Six are in the southern portion of the reserve, known as the Canister Cove and Glory Blocks. The other four are in the Waipaua Block. The essential data from the plots is presented as a series of charts in Appendix 3.

### • PLOT 1, FOREST EDGE, GLORY BLOCK (FIGURE 3)

This plot is tucked into the rapidly regenerating northern edge of the Glory Block forest, right next to the fenceline that until 1997 divided the block from the adjacent Canister Cove Block. For nearly 20 years the Glory Block has been recovering from the former impacts of domestic stock and abundant wild (feral) animals (pigs and sheep). The signs of recovery were there in the first plot remeasurement in 1987: lots of tree seedlings coming away on the forest floor and out in the open. The old tree canopy, though, opened up to the elements by the clearance that created the forest edge, was crumbling fast.

The canopy crumbling process has continued, as recorded in the 1998 remeasurement. However, to counter that there has been a marvellous upsurge in saplings of mahoe (*Melicytus chatbamicus*) and hoho (*Pseudopanax chathamicus*), which are repairing the holes in the old canopy. There has been a substantial reappearance of wheki (*Dicksonia squarrosa*). These, along with masses of saplings of tarahinau (*Dracophyllum arboreum*) and karamu (*Coprosma chatamcua*), are restoring a forest along the open edge. Already the former grassland has been replaced by bracken-like ferns, blackberry, bidibidi, flax (*Phormium tenax*) and pohuehue (*Muehlenbeckia australis*), and the young trees and tree ferns are coming through this temporary cover.

Plot 1 then is an excellent demonstration of forest recovery, even in an exposed site, following the exclusion of farm stock and the control of feral animals to low levels. The changes since 1980 are shown in chart form in Appendix 3.

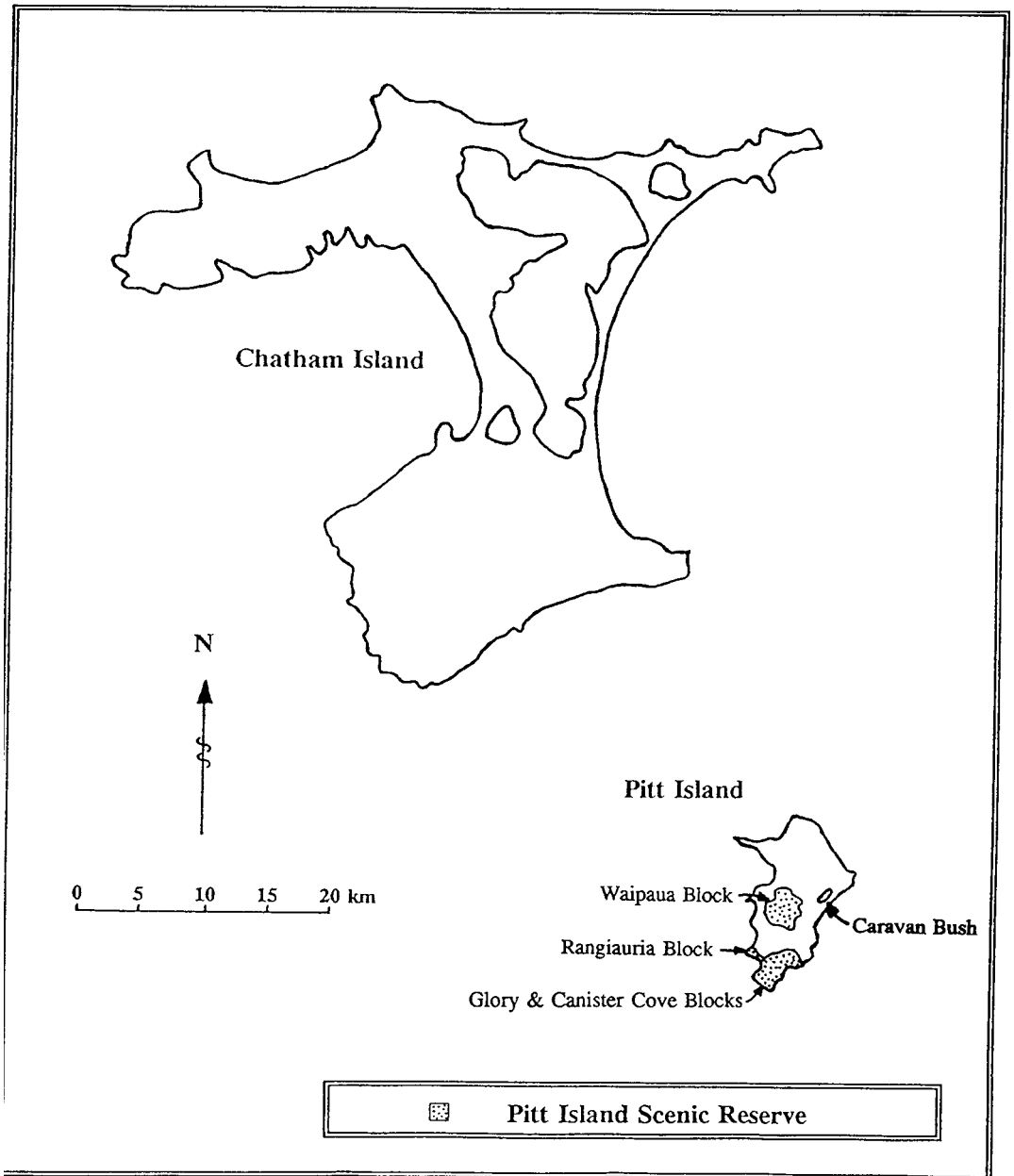


FIGURE 1.  
Map showing the location of Pitt Island Scenic Reserve and Caravan Bush.

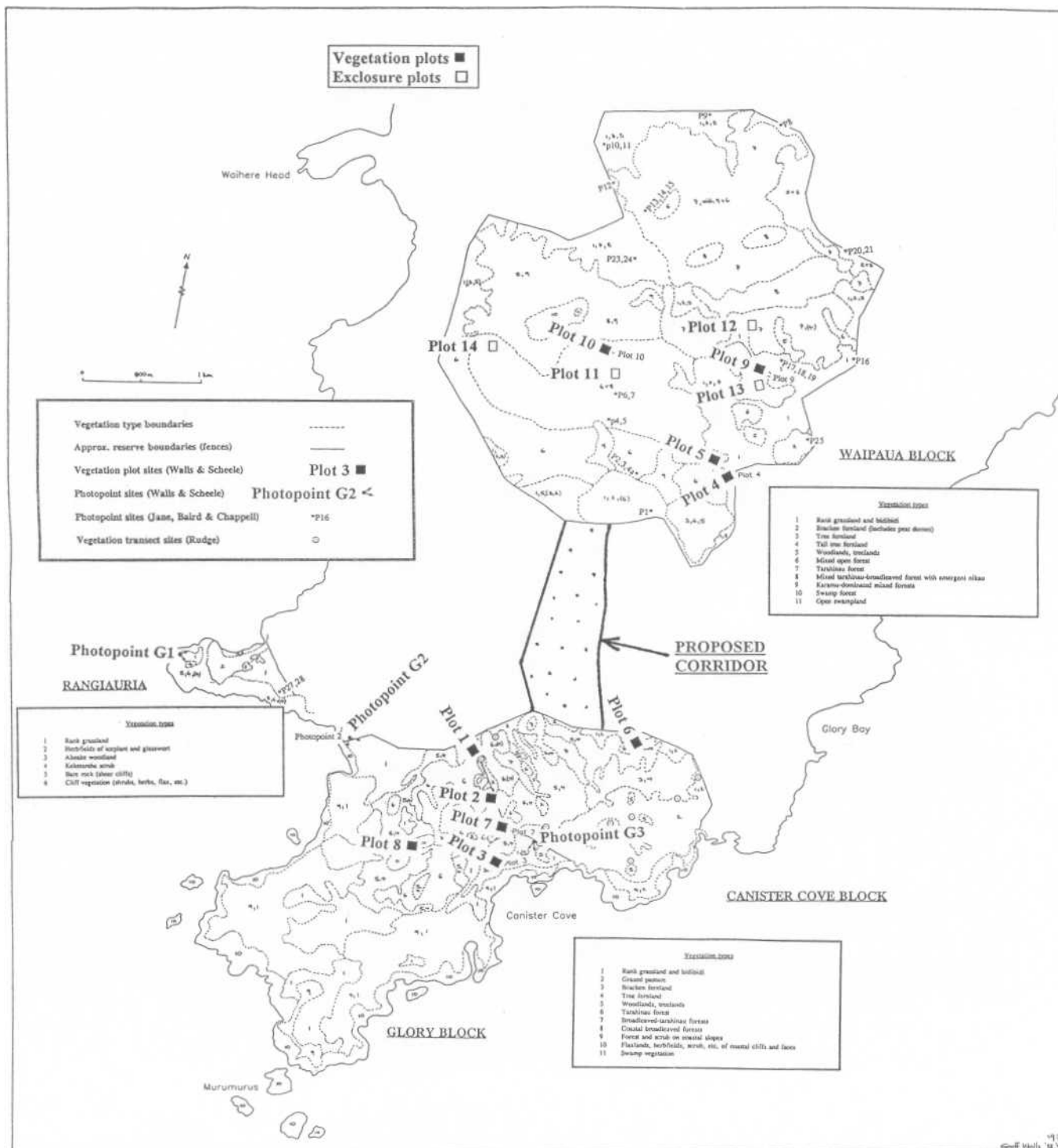


FIGURE 2. Map of Pitt Island Scenic Reserve, showing the blocks, their 1987 vegetation types, the locations of the vegetation plots (Plots 1-10), photopoints (G1-G3) and exclosure plots (Plots 11-14), and the approximate boundaries of the proposed corridor.



• PLOT 2, WOODLAND BASIN, CANISTER COVE - GLORY BLOCKS (FIGURE 4)

Plot 2 is about 500 m southeast of Plot 1, in a broad basin filled with woodland. Quite by chance it straddled the dividing fence (it was put in just before the fenceline in 1980). So between 1980 and 1994 (when the concept of a scientific reserve for the feral sheep was abandoned) it had a regime of numerous sheep on the Canister Cove side of the fence; and none on the other side, just some pigs.

On the Canister Cove (sheep) side of the fenceline, the old trees have quietly crumbled, without any chance of replacement until recently. Since the removal of the sheep, there has been a flourish of sprouts (epicormic shoots) from the tree bases. Small seedlings of trees have begun appearing, especially beneath tree and tree fern canopies.

On the Glory side of the fence, the forest regeneration is far more advanced. The canopy recovery first recorded in 1993 has continued apace, with many of the epicormic shoots reaching the canopy and a great recruitment of new trees of hoho. Tree ferns have regenerated well, and in their shelter numerous young mahoe, hoho and karamu have formed a dense understorey. Out in the open, in what used to be hard-grazed pasture, the rank grass is beginning to be broken up and replaced by ferns, vines and tree seedlings.

Strangely enough we found no seedlings of nikau in or near the plot, despite the proximity of several adult palms. This may be because of a lack of bird dispersers of seeds, especially parea, in this part of the island. It is also likely to be because of the pigs which continue to use the area. They are in high enough numbers now to be impairing the forest recovery process, and their fondness for nikau seed is well known.

Appendix 3 charts the documented canopy changes in the plot as a whole. The fact that canopy recovery showed up earlier than in nearby Plot 1 is probably due to the more sheltered situation of Plot 2, allowing the seedlings to establish and grow up faster.

• PLOT 3, SEAWARD SCARP, CANISTER COVE (FIGURE 5)

Remeasuring Plot 3 is a hideous experience. It requires being encased in bidibidi-proof clothing and repeatedly scrambling up and down a very steep face in almost impenetrable vegetation. Amanda and I have decided that in future it will be remeasured using photography and abbreviated forays into its interior, rather than the full-blown plot technique.

The site is actually in the Glory Block, despite being on the flanks of the stream that tumbles into Canister Cove just below. In 1980 it had the remains of a coastal forest canopy of ribbonwood (*Plagianthus regius* var *chathamicus*), tarahinau, matipo (*Myrsine chathamica*) and karamu. This canopy looked pretty tatty and there was no regeneration. Since then it has

totally fallen apart, as charted in Appendix 3. So few living trees are now left standing that it is hard to think of it initially as a place for forest. However, a closer look reveals a remarkable forest bounce-back following the removal and control of the big animals that were there in 1980.

The process Sue Scheele and I first saw in 1987 has continued apace. There has been abundant regeneration of trees of hoho, mahoe, tarahinau, matipo, ribbonwood, karamu and akeake (*Olearia traversii*), now up to 3 m tall. Many tree ferns have appeared too, and vigorous bushes of kawakawa (*Macropiper excelsum*). Flax has arrived on site and has grown very fast. Ground ferns have flourished. The former grasses, pasture herbs and bidibidi are being squeezed out, and a new forest is forming.

This site has been virtually browser-free since 1980, due to the control operations and its harsh terrain. Despite its difficulties for the human observer, the plot demonstrates the impressive natural forest regeneration response when given the chance.

#### • PLOT 4, FOREST EDGE, SOUTH-EASTERN WAIPAUA BLOCK (FIGURE 6)

Plot 4 is about 1 km southwest of Hapua Hill, on another forest edge. As shown by the charts in Appendix 3, the canopy has continued to collapse since 1980. All tree species, without exception, have declined in number. From a well-defined edge, where a dense-canopied forest met grassland, there is now a tattered woodland margin.

The pasture grasses and herbs have become rank, but feral sheep and pigs still use the area. They have been present in sufficient numbers to prevent forest regeneration. There has been little establishment of tree seedlings or epicormic shoots. Little tree fern regeneration has taken place, and the more palatable ones (*Cyathea* species) have been impacted upon most.

This plot illustrates the plight of the forest edges and exposed woodlands in the southern Waipaua Block, where there are still too many sheep and pigs to allow forest regeneration. Instead, the forest has crumbled into woodland, and if that process continues even the woodland will be lost.

#### • PLOT 5, SHELTERED WOODLAND, SOUTH-EASTERN WAIPAUA BLOCK

Plot 5, a mere 60 m northwest of Plot 4, has become a seething mass of blackberry (Figure 16), terrible to work in. But it wasn't always so. In 1980 it was an open woodland of trees over grazed pasture. Since then, domestic cattle and sheep have virtually gone, and the use of the site by feral sheep and pigs has declined substantially, especially as the blackberry has taken hold.

Unlike Plot 4, forest recovery here has proceeded rapidly. As charted in Appendix 3, slight tree loss was recorded between 1980 and 1987. Since then,

there has been an increase in numbers, through regeneration of karamu, hoho, mahoe, tarahinau and three species of tree ferns (including the palatable gully fern, *Cyathea cunninghamii*). This has been complemented by the development of a dense understorey of saplings, ferns and vines. The former pasture has totally disappeared.

There have been two keys to the recovery. The first is the site's sheltered situation, like that of Plot 2. The second is the blackberry. What makes the site awful for people also discourages the pigs and sheep that are in the vicinity. The blackberry has provided a barricade between the young growth of trees and tree ferns on the forest floor and the big animals that would like to eat them. It will probably disappear within a decade, shaded out by the new forest it has helped to create.

Plot 5 illustrates that woodlands can quickly regenerate to forests, given the chance.

#### • PLOT 6, FOREST, NORTHERN CANISTER COVE BLOCK (FIGURE 6)

Plot 6 is tucked inside the forest out of the prevailing winds (but not southwest storms). This forest was heavily used by domestic stock prior to 1980, when it became part of the reserve set aside for the feral Saxon merino sheep. Until 1994 it was used by the sheep, sometimes intensely. Now it is free of big animals except for pigs.

As shown in Appendix 3, tree numbers declined somewhat for the first three plot measurements. The latest remeasurement has shown a reversal of that trend, with the recruitment of several tree ferns, mahoe and hoho. The canopy gaps created by storm damage in recent years are filling with this regeneration.

Over the last five-year period, a prolific regeneration of tree seedlings of all the canopy species and numerous ferns has taken place on the forest floor. Since tarahinau is the main canopy tree, producing a great rain of its needle-like leaves, this gives the lie to the belief that "tarahinau poisons it for other plants". Amanda and I believe that the natural condition for tarahinau forest is that it has numerous other species in all tiers. We think that the almost "pure" areas of tarahinau trees with little beneath are artefacts produced by prolonged browsing by stock and feral animals. Once the browsers are gone, the other plants rapidly return, as recorded in this plot.

Plot 6 also speaks of the effect on forest processes by feral sheep, by showing what happens when they are removed. The difference between the 1993 and 1998 measurements was sheep.

• PLOT 7, REVERTING GRASSLAND, GLORY BLOCK (FIGURE 7)

In 1987, when we set up this plot, it was in an area of rank grassland on a gentle slope high above Canister Cove. It had once been forest-clad, and a few tarahinau trees remained. It had been grazed hard until 1980, and we wondered what its fate would be.

Nothing much had happened by 1993, except for the appearance of flax, an increase in the creeping herb *Pratia arenaria*, and the expansion of an area of blackberry in one corner.

In 1998, these processes have continued. The blackberry has expanded further, the *Pratia* has retreated, and there are still no signs of any tree seedlings. The big change though is in the flax; at its current rate of expansion, it will completely cover the plot and destroy the former pasture within the next decade. This should allow the establishment of tree seedlings within the shelter of the flax, as we have observed nearby.

• PLOT 8, SWAMP, GLORY BLOCK (FIGURE 8)

In the central Glory Block, at the very head of the stream that flows into Canister Cove, is a swampy area in a broad basin. In 1980 it had just been burnt and it was full of stock and feral animals. By 1987 most of the animals were gone, and rapid change was taking place in the vegetation. Sue Scheele and I set up Plot 8 to follow the change.

When we remeasured the plot in 1993, we found that, of the few trees, nearly half had died, but to compensate there was a dramatic regeneration of seedlings and saplings, mostly tarahinau and keketerehe (*Olearia chathamica*). Flax and ground ferns had also flourished, and overall the swamp looked much healthier: damper and spongier. Meanwhile, the stand of tarahinau and akeake trees on the rise to the east of the swamp had fallen apart, presumably trashed by southwest gales.

The 1998 remeasurement is a continuation of that story. Most of the trees present in 1993 have died, but the recruitment of new karamu, akeake and keketerehe has more or less compensated (Appendix 3). The swamp is now positively bristling with youthful tarahinau and keketerehe, jostling to create a new forest canopy. Among them are some karamu, akeake, hoho and rautini (*Brachyglottis huntii*). Flax has continued its invasion, both in the swamp and on the surrounding slopes. Underfoot, the sphagnum moss is thriving.

Despite the continued attentions of pigs, this wetland area is rapidly restoring itself. In sharp contrast, the adjacent stand of trees has been smashed still further and looks like an old shipwreck. In time, though, with the help of the sheltering flax, it will rise again.

• PLOT 9, PEAT DOME, EASTERN WAIPAU BLOCK  
(FIGURE 9)

When you take off from the Pitt Island airstrip, you normally rise up over a bleak-looking brownish area before banking away over forest and pasture. The bleak area is the peat dome, and Plot 9 is situated near its northern edge, at the south end of the Half Chain. It was established by me and Sue Scheele in 1993, in response to Amanda Baird's expression of concern about its condition (Baird 1993).

In 1993 the dome looked terrible. It had lost its forest cover, there was virtually no regeneration, and its living peat was blowing and washing away. Cattle, pigs and sheep were the culprits. They ate, trampled and rooted up the tree seedlings that were attempting to become established and prevented the other plants (ferns, sedges, rushes, herbs, mosses and grasses) from binding and sheltering the peat.

Amanda and I decided that an enclosure was also necessary on the dome. In 1995 we laid out two side-by-side 20 m x 20 m plots (collectively called Plot 13), only about 40 m from Plot 9. One of the pair was then fenced by Kenneth and Judy Lanauze. In just three years some measurable differences have shown up. Inside the fence are more tree seedlings, especially of palatable species such as karamu and rautini. Outside, there are still enough feral sheep and pigs to be steadily removing significant numbers of regenerating seedlings. Should this continue, we expect a dense forest to form only within the fenced enclosure. Elsewhere on the dome a woodland will be all that can develop.

The enclosure tells the story of the sheep and pigs. Plot 9 tells the story of the cattle. They have been more or less absent from the dome for the last three years, and the response in the vegetation is amazing. Tarahinau, the dominant tree of the former forest cover, has gone delightfully berserk. Watched over by the few remaining old trees are thousands of seedlings, already up to 80 cm tall. There are some small karamu, hoho and hokataka too, but the attentions of the pigs and sheep are keeping them in check. Appendix IV charts the changes in the vegetation cover over the last five years. It doesn't do justice to the great change in the tarahinau, because the percentage cover rating scale is not linear, and a single rating change can mean a big difference in actual percentage ground cover:

Rating (see Appendix 3):	0-1	1	2	3	4	5	6
Ground cover (%):	0-1	c.1	1-5	6-25	26-50	51-75	>75

We have no doubt that the remaining animals are impeding the forest recovery on the dome, as the enclosure has shown, but the removal of the cattle has kick-started the tarahinau resurgence. With still better animal control, the peat dome will rapidly become far from bleak.

• PLOT 10, NIKAU FOREST, CABBAGE TREE, WAIPAUA BLOCK (FIGURE 10)

There are many places in the Waipaua Block I find magical. Cabbage Tree is one of them. It is a vantage point from which the whole block can be seen, as well as interesting vistas of southern Pitt Island and its little outliers. It is also the epicentre of the Chatham Islands nikau, for which it is named. All around its flanks are numerous palms, holding their fronds high to catch the sun's energy.

The last of the plots established by Sue Scheele and me, Plot 10, is on the north side of Cabbage Tree, just below the summit. We set it up in 1993, again in response to various expressed concerns, this time about the condition of the nikau.

Since 1993, there have been losses and gains in the canopy in Plot 10, as charted in Appendix 3. Over half of the tarahinau trees have collapsed, and one of the tall old palms has died. By way of compensation, there has been a recruitment of tree ferns into a lowered canopy, and seedlings of hoho, mahoe, tarahinau and kawakawa have made it to sapling stage. There are plenty of tree seedlings on the forest floor, including those of nikau, but most are being browsed, trampled or rooted up by feral sheep and pigs. We scoured the plot and the wider vicinity for nikau older than a year, finding only the occasional one deep in entanglements of supplejack.

What we are witness to at Plot 10 is part of the wider picture in the surrounding country of the Waipaua Block. We are observing the progressive collapse of the tarahinau canopy that used to tuck up just beneath the nikau heads, providing support and shelter. The tall elegant nikau, probably hundreds of years old, are being left high and dry, out in the full force of the elements. So they are dying, having their heads blown out and being pushed over ... at an alarming rate. The sheep and pigs, most prized as a hunting resource, are preventing their regeneration.

There's the problem in a nutshell. Sue and I wrote about it and provided photo evidence in our document entitled *"Collapse or recovery: Pitt Island vegetation 1980-1993, with reference to Chatham Island"* (Walls & Scheele 1995). Amanda Baird and I raised it again in our 1995 report (Walls & Baird 1995). Amanda, Peter Dilks and I focused on it even more strongly in 1997 in the *"Love them or lose them"* document (Walls et al. 1997). We cannot have this knowledge and just stand by and let the great Pitt Island nikau forest disappear off the face of the earth, especially in a reserve set aside for nature conservation. We have gone to the palms and asked them. They have told us very clearly:

*"We are in dead trouble. We are getting old. Our mates are dropping around us. The animals are killing our young ones".*

There is more of the nikau story to come, later in the report.

### 3. The photopoints

The locations of three photopoints set up in 1987 in the southern blocks of Pitt Island Scenic Reserve are shown in Figure 2. All were revisited in 1998. There have been quite dramatic changes in the vegetation in just over a decade.

These photopoints provide the second part of the plants' story in this chronicle. They tell of the power of the regenerative process. Even on the hardest sites, such as the extreme west of Rangiauria, forest wants to grow back. Where there is more soil and better shelter, it grows back faster. On Pitt Island, all the forest needs to return is relief from big animals.

#### • PHOTOPPOINT G1, RANGIAURIA

At this site, poised high on the great dark brooding volcanic mass of Rangiauria, there is a sense of the power of the land, sea and climate. Even there on the exposed outer face of the headland, forest would have grown. There are still a few gnarled akeake trees as reminders, and wind-rounded bushes of keketerehe clinging to the rock. The fires, cattle and sheep of the farming era opened the forest and let the wind in. As a result, by 1980, when I first saw it, little was left of the former forest, and the remaining vegetation had hardly responded to the relief from grazing that the newly-built fence had given.

In 1987, the place had begun to heal. The skeletons of the tree and shrub daisies were still there. Flax, grasses and bidibidi were beginning to cover the barren ground.

Over a decade later, this process has greatly advanced. The flax has taken over wherever there is soil, displacing most of the grasses and bidibidi. Grasses, mostly native, have established on rock formerly clothed in ground-hugging succulent herbs such as iceplant. Some bare places have been colonised by little plants. Much of the skeletal woody material has gone, but some akeake trees have sprouted enthusiastically from their bases.

A new forest is on its way. It will take a long time, as the soil rebuilds and the storms rip through, but it will eventually happen.

#### • PHOTOPPOINT G2, NORTH-WESTERN GLORY BLOCK (FIGURE 11)

This photopoint looks on to a sweep of hill country running inland from the coast. In 1980 it was still being grazed, but was retired soon afterwards. Most of the land was covered in pasture, with a scattering of remnant trees, echoes of the former forest cover.

By 1987 the pasture was rank and full of bidibidi. The skeletons of trees still lay about the landscape. Flax had begun to appear. By 1993, the process had advanced rapidly. The drifts of bidibidi had grown, the flax had expanded dramatically, remnant trees and shrubs had crumbled, and eroding scars had begun to heal with small plants.

The 1998 picture shows that this process of healing has continued along the same course. The flax is yet more dominant, fast closing out the pasture and bidibidi. This will provide shelter within which forest tree seedlings can get established. In another 30 years, I am confident, there will be forest again on this country.

- **PHOTOPOINT G3, ABOVE CANISTER COVE**

The third photopoint is on the fenceline that from 1981 to 1997 separated the Canister Cove and Glory blocks. The wire and battens have been removed, leaving only the posts to mark the line that kept a flock of feral sheep for posterity to the east and allowed regeneration of the vegetation to the west.

The 17 years of regeneration is very evident in the photos from this point. By 1987 it was well under way, following the same pattern as at Photopoint G2. The pasture was rank and full of bidibidi (Figure 16), and flax had made an appearance. By 1993 flax was abundant, breaking up and replacing the pasture and bidibidi. Now it is even more dominant, and the first young trees are beginning to appear. A little more sheltered than the G2 site, this area will regain its forest sooner.

## 4. The exclosures

There are now four exclosures in Pitt Island Scenic Reserve, all in the Waipaua Block. They were commissioned by John Holloway (then Director of Science and Research, Department of Conservation) and built in 1995 by Kenneth and Judy Lanauze on sites selected by Amanda Baird and me. Each exclosure is designed to exclude big animals from a 20 m x 20 m vegetation plot. Each has another such plot alongside, but outside the fence, for comparison. The exclosure locations are shown in Figure 2.

Since the exclosure plots (and their comparisons) were remeasured in 1997 and reported on in the *"Love them or lose them"* document (Walls et al. 1997), we simply checked them this visit. I shall give only brief summaries here.

- **PLOT 11, WOODLAND BASIN, CENTRAL WAIPAUA BLOCK (FIGURE 12)**

This is an open woodland site, characteristic now of much of the Waipaua Block. There are plenty of feral pigs and sheep in the vicinity, and this shows.



Within the enclosure the grass is long and rank. Beneath the trees though are seedlings of mahoe and nikau, and epicormic shoots of karamu and matipo. A small wheki has shown up too. Outside it is a different story. The grass is grazed down, there are pig rootings, and any seedlings, epicormic shoots or ferns that try to grow are quickly knocked back.

It is clear that better pig and sheep control will be needed in this woodland area for forest regeneration to be possible.

#### • PLOT 12, TARAHIKAU FOREST, HALF CHAIN

Tarahinai forests are the ancient powerhouses of peat production on the Chathams. This enclosure was chosen to measure the impact of feral animals on the heart of the system on Pitt Island.

Within the enclosure, three years of browsing relief has led to the establishment of numerous tree seedlings on the ground, including many young nikau. Some seedlings have already become saplings. Lush epicormic shoots have appeared at the bases of matipo and karamu trees. A deep litter of needles has developed on the ground.

Outside, where there are pigs and sheep, it looks superficially similar. A close look, though, shows much trampling and browsing, a thin disturbed litter, no epicormic shoots and only very small seedlings, not yet big enough to be munched. What this means is that the process of healthy forest cycling and regeneration is being disrupted. The long-term consequences are inevitable: loss of ecological integrity of the forest, which will crumble away into woodland and thickets of tree ferns, as much of the Waipaua Block is already.

#### • PLOT 13, PEAT DOME, EASTERN WAIPAUA BLOCK

This enclosure has been reported upon earlier in the report, as part of the discussion of Plot 9 in the section on the vegetation plots remeasured in 1998. In brief, it illustrates the negative impacts of sheep and pigs on forest restoration on the peat dome, and the benefits that would occur if those animals were better controlled.

#### • PLOT 14, NIKAU PALM WOODLAND, WESTERN WAIPAUA BLOCK

This site was chosen to follow the fate of the palms in a woodland situation. Its story is most distressing.

Already, two of the five palms inside the enclosure have been blown over. Dense grass has grown up, making life difficult for tree seedlings. However, many epicormic shoots have appeared at the bases of karamu, matipo and akeake trees, and in their shelter are seedlings of kawakawa, mahoe and matipo.

Outside the enclosure, one karamu tree has died. There are no epicormic shoots or tree seedlings: all are browsed off by sheep and pigs.

The only hope for nikau - and any of the trees in this situation - is thorough control of the sheep and pigs. This would allow the standing broadleaved trees to survive and spread via their epicormic shoots, providing places for seedlings to establish. The introduction of flax is another useful prospect, as discussed later in relation to woodland management.

## 5. Nikau

Nowhere in the Chathams is nikau forest in good condition. Not even in Nikau Bush Conservation Area on Chatham Island, where there has been wonderful regeneration for about 15 years, is it yet safe. We should celebrate the wealth of young plants on the ground, but there is still nothing between them and the old palms far above. And Nikau Bush is tiny.

A healthy nikau forest looks quite different. One such is at Morere Springs Scenic Reserve in northern Hawke's Bay, famous for its divine hot springs in a beautiful nikau forest setting. Soon after returning from the March 1998 visit to Pitt Island I made a pilgrimage to Morere Springs. I wanted to reassure myself that somewhere these wonderful palms were in good nick, to remind myself what a healthy system should look like, and to take a few photos. Although it made me even more concerned for the plight of the Pitt Island nikau, it was a true delight, an experience I'd urge anyone to seek out.

At Morere are all ages of nikau (Figure 13). The bush hasn't been grazed for many decades, and although there are a few goats, deer and possums rattling around the system, the forest is in such good heart that it is coping just fine. There are tall palms high in the canopy, with kereru (native pigeons, the New Zealand equivalent of parea) gorging themselves on the fruit. There are shorter palms pushing up into that tier. The understory is full of youthful nikau, with various heights of trunk. On the ground are masses of seedlings, from those newly germinated in the deep leaf mould to those that, like some at Nikau Bush, have big fronds and the beginnings of a trunk.

That is how the Pitt Island nikau forests were before the cattle, sheep and pigs arrived. 150 years of their presence has deprived the forests of whole generations. That's why we are seeing only the stranded ancient palms, the unsupported old-timers. That's why they are dropping like flies. Every time a gale comes through, it's like another sweep of winter flu through the old people.

Having looked again at Morere Springs, so soon after working on Pitt Island, I am even more certain that fast action is required. But the action also has to be appropriate. It won't be good enough to knock the sheep and pigs back a bit, or to shift them out for a while. The mosaic approach of fencing little pieces will never allow the recovery of the forest ecosystem that is the cradle

of the nikau. Only really good sustained control, or partitioning of the Waipaua Block to permanently exclude pigs, sheep and cattle from most of the nikau area, will be good enough.

We must not forget that Chathams nikau is unique to the Chathams, and that the Waipaua Block is its turangawaewae, its only heartland.

## 6. Tree ferns

Tree ferns are naturally abundant in Chatham Islands forests. They are found everywhere except where cattle have been for a long time. They play important roles in forest regeneration, both as gap-fillers when canopy holes open up and in providing starting places for tree seedlings.

Tree ferns on the Chathams frequently persist or even proliferate as the original forest structure breaks down in the presence of domestic stock and feral animals. They grow rapidly and give the appearance of healing the scars. However, this is mostly an illusion. They certainly provide shelter and cranies for new canopy trees, but in the face of continued animal pressure they cannot substitute for a proper forest structure. The broad umbrellas of their fronds hide the fact that there is no real canopy, and perhaps little understorey or ground cover.

There are four main species, and a fifth that has a bit of an identity problem. Not all are equally vulnerable to the attentions of domestic stock and feral animals, or to exposure to the elements. Therefore they act as ecological indicators of varying sensitivity, providing insights into the history, condition and trend of forest sites. A basic field form for monitoring tree ferns, as a complement to rapid vegetation monitoring, is offered in Appendix II.

- **WHEKI, *DICKSONIA SQUARROSA* (FIGURE 14)**

Wheki is distinguished by its harsh-feeling fronds which have a dark midrib, lack of a "grass skirt" of dried hanging fronds and a slender trunk clad in the dark erect snapped-off bases of old fronds. It is the commonest and most versatile of the tree ferns on the Chathams, found in the depths of forests, on forest edges, in swamps and out in the open. It grows to 7 m tall (trunk height).

Wheki is the toughest and most resilient of the tree ferns. It certainly gets flattened by cattle and trampled and rooted up when little. However, it is evidently not very edible, and can spring readily from the base of even dead-looking adults. Its trunks are good perching places for tree seedlings, small ferns and orchids. Tree seedlings that can "live on air" and get their roots down to the ground quickly, such as hobo, mahoe and tarahinau, often start off on wheki trunks. This does not apply to nikau, even though seedlings do occur on wheki.

Wheki is a classic indicator of forest degradation. Where it is dominant, there is a long history of animal presence, and perhaps of past burning. Where it is absent (except in very wet places, in the most exposed coastal sites and in dense colonies of burrowing sea birds), the ecological degradation is severe indeed.

- **WHEKI-PONGA, *DICKSONIA FIBROSA* (FIGURE 14)**

Wheki-ponga is a close relative of wheki, but not quite so tough and less common as a result. It too has harsh fronds, but they have a much paler midrib, greenish brown in colour. The fronds do not break off when dead, and hang down to form a distinctive tan "grass skirt". The trunks are fat and cuddly (no other tree fern could be described like that!) and are as good as those of wheki for perching plants, if not better. Wheki-ponga can reach 6 m in trunk height, and grows in much the same range of places as wheki.

Wheki-ponga is probably as inedible as wheki, but not as resilient. It cannot sprout from its trunk or trunk base, so when damaged isn't able to rise again so easily. It is an indicator then of lesser forest degradation, but can certainly persist in the presence of cattle, sheep and pigs, so long as their densities aren't too high.

- **PONGA, SILVER FERN, *CYATHEA DEALBATA* (FIGURE 15)**

Ponga is a classic New Zealand symbol, as any follower of netball or rugby will know. Few people recognise it in the bush, though. It is easily distinguished by the white undersides of its fronds. Also by its fattish trunk that bristles with the stubs of its broken-off old fronds. Ponga grows to about 6 m tall in the Chathams. It is not happy in the damp, and prefers drier slopes and spurs. It thrives in shade, but also grows well in the open. Plants rarely perch on its trunks for long.

Ponga is certainly more palatable to animals than wheki or wheki-ponga. Young fronds within reach are browsed by cattle and sheep, maybe also by pigs. However, ponga is reasonably tough and can persist in the presence of some animals. It is therefore a more sensitive indicator than wheki-ponga of browse history, and an indicator of drier soils. It is, not surprisingly, a lot less common than either wheki or wheki-ponga. Where young ponga are prevalent, the forest is either on the improve or in the early stages of decline.

- **GULLY FERN, *CYATHEA CUNNINGHAMII* (FIGURE 15)**

Gully fern is the tallest of the tree ferns. It can reach 12 m trunk height in the Chathams, though much taller in New Zealand. It has a slender trunk with a characteristic diamond-shape pattern created by the scars of the fallen fronds.

Its living fronds form a delicate green umbrella. Orchids sometimes grow on the trunks of old gully ferns, but like nikau trunks they are usually clean.

Gully fern is the most sensitive of the tree ferns to soil fertility and exposure. It grows best in the most fertile soils, moist but not wet. It is a true forest dweller, and doesn't like being out in the open. Pitt Island forests, especially the woodlands and edges, are littered with the dead trunks of gully ferns, exposed to the elements and killed as the forests have been opened up. The diamond-patterned trunks can persist for many years, with not a living gully fern within coo-ee.

Gully fern is also most sensitive to animal impact. It seems to be very palatable, and is vulnerable to trampling and rooting. It disappears fast in the presence of cattle, sheep and pigs, but conversely bounces back rapidly in forests with good animal control (such as the Glory Block and Caravan Bush). It would have been abundant in the old forests of Pitt Island, but, like nikau, generations of its young have been wiped out and the old trees can't survive exposure.

• **MAMAKU, BLACK TREE FERN, *CYATHEA MEDULLARIS*, OR IS IT? (NOT ILLUSTRATED)**

There are tree ferns on Pitt Island that botanists over the years have called mamaku. They are like gully ferns, but more robust and darker, their trunks and frond bases being covered in blackish hairy scales. They grow with gully ferns, and there aren't many of them.

From my experience of mamaku in New Zealand, where it is one of the commonest tree ferns in the bush, the Chathams entity is not mamaku, but obviously a close relative. Amanda Baird and I suspect it is a Chathams endemic: found nowhere else on earth. If so, it is one of the rarest ferns in the world, and going out fast. It appears to hybridise with gully fern. The fact that it lingers on and can regenerate in forests virtually free of browsing animals (the Glory Block and Caravan Bush) suggests it is highly vulnerable to their attentions, also to deterioration and loss of its forest habitat.

This fern may be one of the most sensitive indicators of animal presence and canopy deterioration in the Chathams. Because of its rarity alone, it should be studied - urgently. It would be a brilliant subject for a university study.

## 7. Waipaua Block woodlands

There has been a distressing deterioration in the condition of the forests and woodlands of the southwestern sector of the Waipaua Block (Figure 12) in the time I have been "asking the plants". I began mapping the vegetation in the block in 1980 and finished the job in 1987 (Walls 1988). The maps in

Figure 2 stem from that time. However, I am aware that they need updating, particularly for the Waipaua Block.

Since 1987, forests in the southwestern Waipaua Block have become woodlands, and woodlands have gone to grass or fernlands. What then has happened? It is the process we have recorded at Plots 4, 10, 11, 12 and 14. Any of the forests or woodlands regularly used by feral sheep and pigs are falling apart through exposure, and there is insufficient regeneration - if any - to retain or restore them.

The browsing-rooting-trampling animal thing is well known. The exposure thing isn't, but it is just as important. All plants need side shelter, especially forest plants. Otherwise the wind rips through, hammering their stems and growing tips. The stems house the delicate systems that transport food and water between roots and foliage. Tree bark is designed to protect these systems, which lie just beneath the surface, but it can't cope with too much exposure. If it gets damaged or thinned, insects, fungi and other tiny agents of death and decay can get a toehold.

Growing tips are usually cradled within older leaves, and therefore well protected except from above. If an understorey is missing, the older leaves are prone to getting whipped about or ripped off, exposing the new buds.

If the depletion of undergrowth is extreme, as it is in practically all of the southwestern Waipatia Block, even the root systems of the plants are exposed. The big old roots suffer bark damage, both from the animals and from the elements, and weaken their grip. The fine feeding roots, designed to operate in deep forest leaf litter, have to scratch a living somehow, usually in competition with dense grasses and in the face of constant trampling.

No wonder these forests and woodlands are falling apart so fast. Every time a gale blows through there are branches on the ground and fewer trees left standing. Every year trees die.

That's the bad news. The good news is that even the tattiest woodland can be restored to forest. All that is necessary is good sustained animal control. Mother Nature and Old Man Time will do the rest. Our plots and photopoints in the Glory Block, and the exclosures in the Waipaua Block, tell us that. They also tell us that forest recovery is best where there is at least a canopy of trees: it takes a lot longer where there is a grass cover.

The basic problem in the southwestern Waipaua Block situation is that that is where the clash between traditional pursuits and conservation comes head to head. It is a prized area for hunting, and for family outings. But it is also a major part of a reserve set aside for nature conservation. There is no doubt that the woodlands are very pleasant for people, and favoured by pigs and sheep. But they are truly alien environments for forest flora and fauna.

Decisions have to be made about the Waipaua Block. It is the heart of the island, yet its nikau are in serious trouble, its forests are crumbling, and its woodlands are blowing away. I hope this report helps the decision-making process. I'm sure there are workable solutions to the problems. Some of the possibilities are discussed a little later in the report.

## 8. The corridor

The corridor is a magical proposal. It hasn't yet happened, but it is vital to the shape of the Pitt Island of the future.

What is proposed is to link the Waipaua Block to the two southern blocks of Pitt Island Scenic Reserve, the Canister Cove and Glory blocks. The approximate boundaries and nature of the proposed corridor are shown in Figures 2 & 12. It is a strip of land about half a kilometre wide connecting the two big sections of the reserve. The idea is to fence it off so that it can be restored to forest, thereby allowing an avenue for birds, insects and native plants to travel between the larger tracts.

This is an excellent proposal. It is the kind of ecological and visual linkage that those who are trying to manage forest remnants anywhere in the world are keen to achieve. It comes at a cost - the sacrificing of about half of the Canister Cove Block to farming - but it is a worthwhile trade. If put into practice, it will be a great step forward in conservation for Pitt Island, and will be a model to be proud of.

Forest restoration within the corridor may benefit from a human hand. The woodlands in that strip are skeletal, to say the least. Every year they get thinner and smaller. I think a planting programme to speed up the process of forest restoration is desirable. The obvious plants to use are akeake, karamu, matipo, tarahinau, hoho, mahoe and, as discussed next, flax. The use of exotics such as tree lucerne has also been mentioned. So long as they did not become weeds, these could be helpful, and an attractant for birds and bees.

In light of the Waipaua Block situation, and the possible need to segregate the hunting zone from the forest restoration zone, there may be a better place for the proposed corridor to go. Curving it to the northeast would allow for more practical zoning (see Appendix 1). Broadening it to the northeast would make it more effective.

## 9. Flax

Flax is a great healer. It feeds and nurtures birds and insects. It shelters forest plants. It shelters houses, gardens and domestic stock. Its gum is good for cuts and sores. Chatham Islands flax grows rapidly, and breaks the wind very effectively. We have seen the healing power of flax in the Glory and Rangiauria blocks. We are seeing it now in the Canister Cove Block and in Caravan Bush.

Kenneth Lanauze pointed out that there is no flax in the south and west of the Waipaua Block. Nor is there any in the corridor area. Maybe that's part of the problem, he suggested, and therefore part of the solution.

Planting flax along the western and southern sides of the Waipaua Block would do several useful things. It would provide employment. It would provide shelter from the prevailing winds. It would provide a seed source for the natural spread of flax, helping to break up the grass sward and provide shelter for tree seedlings. It would attract birds such as tui. Some initial protection may be necessary to get the flax beyond the reach of hungry sheep, foraging pigs and leaning cattle.

Planting flax in the corridor would serve the same functions. It would already have fencing protection.

## 10. Making forest conservation and traditional recreation compatible - potential solutions

We've identified the clash between forest conservation and traditional recreation activities in the Waipaua Block. The challenge is to make them compatible. If that isn't possible, the aim then would be to bring the interests as close together as they can come, so that everyone feels involved and okay about what's happening. Both interests share a strong common feeling: care for the bush in the heart of Pitt Island, and a desire for it to be there for future generations. That's an excellent point to start at.

In the "*Love them or lose them*" discussion document (Walls et al. 1997), Amanda Baird, Peter Dilks and I discussed each of the options presented to us for management of the Waipaua Block:

Option 1. Better culling of pigs and sheep;

Option 2. Control of pigs and sheep to near-zero levels;

Option 3. Subdivision to confine hunting to part of the block;

Option 4. Subdivision and rotational stocking;

Option 5. Fencing a series of little exclosures.

We concluded that Option 2, control of pigs and sheep to near-zero levels, is by far the best option for conservation of the forests, nikau and wildlife. It would also be cheap. However, it is the least acceptable to the hunters, of course, requiring them to totally give up one of their cherished traditions.

The only remaining practical option, in which both parties get a reasonable deal, is Option 3, subdivision to confine hunting flocks and herds to part of the block. All the other options are either expensive, impractical or inad-



equate to allow proper forest restoration. They should therefore be dismissed, otherwise much time and energy will be wasted.

I hope Option 2 remains open for healthy debate nevertheless. Meanwhile, I have some scenarios mapped out for Option 3. They are shown in Appendix 1. Each involves running a fence through the south and west of the Waipaua Block, linking up with the western boundary of the corridor. It could be done in a variety of ways. Each scenario would mean taking a big chunk out of the Waipaua Block, and giving it over to hunting. The rest would be managed for forest restoration. If the eastern boundary of the corridor was curved to the northeast, the main tracts of Pitt Island Scenic Reserve would be linked better, and the area for hunting would be maximised.

If the block between Hapua Hill and the Waipaua Stream was added to the reserve, an even better corridor connection would be made. It might also enable a bigger area of southwestern Waipaua Block to be considered for designation as a hunting zone.

At present I can't see any workable alternative. The sooner a decision is made, the sooner this issue will be resolved and everyone can get on and make the best of it. Otherwise, the forest will certainly keep degrading, and the children whose company we enjoyed at the Pitt Island School will see it go within their lifetimes. They, and those who treasure Pitt Island from afar, are unlikely to thank us for having messed things up.

## 11. Rapid monitoring

The final subject to introduce in this report is that of ecological monitoring of the vegetation. It is time-consuming and fairly costly to do the kind of vegetation monitoring Sue, Amanda and I have done over the last 18 years. It also requires a training in the rather complex techniques, and a detailed knowledge of plants. It is superb for gathering a lot of information about the whole structure of a site and the processes of change that are operating on the vegetation. It is less able to survey the situation rapidly over a wide area.

With that in mind, and the clear need to keep a better check on the ecological condition and trend of the vegetation in the Pitt Island Scenic Reserve, I have put my mind to devising a user-friendly rapid technique. It offers the prospect of being able to go to a whole series of fixed points, all around the reserve, and check on the vegetation every year. It could make comparison of the results of different management techniques quick and easy. The prototype field form is shown in Appendix 2, It is accompanied by a specific form for monitoring tree ferns, also offered in Appendix 2.

This rapid assessment technique isn't designed to replace the more detailed plot monitoring. It is intended to complement it and enhance its value. It could be used on its own, and with modification could be used more or less anywhere, but as yet it does not have the benefit of being a nationally accepted standard. It is another tool to allow us to "ask the plants".

## 12. Conclusions and recommendations

1. There is no substitute for "asking the plants". Vegetation is a product of the conditions and history of a place, and it can't wander away. Plants are sensitive and visible indicators of the ecology. They splendidly answer when the question is asked: "What's the story here on Pitt Island?".

***Recommendation:** That the vegetation monitoring programme in Pitt Island Scenic Reserve continue, with the permanent plots and photopoints that are the basis of this report being remeasured in 2003.*

2. The 1998 vegetation monitoring work fully confirms the basic conclusion of the "Collapse or recovery" report from the 1993 monitoring (Walls and Scheele 1995) and the "Love them or lose them" discussion document (Walls et al. 1997): that there is a fundamental clash between traditional hunting and forest ecosystem restoration in the Waipaua Block of Pitt Island Scenic Reserve. Continuation of the status quo will lead directly to forest destruction and loss of the current woodlands. Urgency is required in addressing the issue. There is a great deal of goodwill and common ground between the interested parties.

***Recommendation:** That dialogue between representatives of the Pitt Island Reserves Committee, the Chatham Islands Conservation Board and The Department of Conservation to seek solutions to the problem continue as a matter of high priority.*

***Recommendation:** That the Pitt Island Reserves Committee submit its written perspective as soon as is practical, so that the "Love them or lose them" discussion document can be completed and used in the dialogue process.*

3. The vegetation plots in the Glory Block of Pitt Island Scenic Reserve have shown that there has been excellent forest recovery at all monitored sites, despite initial canopy collapse, due to 18 years of relief from heavy browsing pressure. This recovery has even taken place in the central swamp. Flax has led the recovery in dense grassland (former pasture).

***Recommendation:** That the control of browsing animals to low levels continue in the Glory Block, and that the vegetation monitoring also continue.*

4. The vegetation plots in the Canister Cove Block of Pitt Island Scenic Reserve have shown that prolific regeneration of many forest plants has taken place since the removal of feral sheep in about 1994. Forest recovery lags well behind that in the Glory Block, but it is following the same course. Regeneration of forest plants under a tarahinau canopy gives the lie to the belief that "tarahinau poisons it for other plants".

***Recommendation:** That the control of browsing animals to low levels continue in the portion of the Canister Cove Block not being returned to grazing, and that the vegetation monitoring also continue.*

5. In the Waipaua Block of Pitt Island Scenic Reserve the vegetation plots have shown a different picture. There has been forest recovery in one sheltered woodland site in the southeast, where blackberry has formed a thicket that discourages animals. However, there has been continued rapid deterioration and little regeneration in forest edges and exposed woodlands. There has been progressive collapse of nikau forests, with no regeneration, leaving the old palms high and dry, terribly exposed to the elements. On the peat domes, forest recovery has been stimulated by cattle removal in the last few years, but is being impeded to such an extent that a proper forest cover will be unable to develop if the status quo continues. Where forest recovery is being prevented or impeded - most of the block - feral sheep and pigs are to blame.

***Recommendation:** That much better control of feral sheep and pigs be carried out and sustained in the Waipaua Block, except for areas specifically set aside for hunting as a primary purpose (see also 7, 10 and 13).*

***Recommendation:** That the vegetation monitoring programme be continued and enhanced (see also 7 and 14).*

6. The photopoints in Pitt Island Scenic Reserve have demonstrated rapid vegetation recovery in the absence of heavy browsing and grazing pressure. On Rangiauria, the healing process of rebuilding soil and vegetation structure is considerably advanced: flax, grasses and ground-hugging herbs have established; megaherbs and forest will eventually arrive. On hill country in the Canister Cove and Glory blocks, denuded of forest for pastoral farming but essentially ungrazed for 18 years, there has been rapid colonisation by flax. The few old trees have crumbled, but are now being replaced by the first young trees.

***Recommendation.** That the current good control of animals in these areas be sustained, and that the photopoints be revisited in 2003.*

***Recommendation:** That the portion of the Canister Cove Block being returned to pastoral farming be well fenced to prevent escape of animals into the conservation area, and that photopoints within it be established with reference to past photopoints set up by Rowley Taylor and Mike Rudge of Ecology Division, DSIR.*

7. The four enclosure plots within the Waipaua Block provide support for the vegetation plot and photopoint findings. 1998 inspections confirmed the trend, recorded in detail in 1997, of deterioration due to pigs and sheep of woodlands, taiahinau forest and peat dome, whilst inside the enclosures where the animals couldn't go there was recovery.

***Recommendation:** That the enclosures be maintained in good condition and next remeasured in 1999.*

***Recommendation:** That the extra exposure planned for the nikau forest north of Cabbage Tree be constructed as soon as practicable.*

8. Nowhere in the Chatham Islands is nikau in good condition. Not even in Nikau Bush Conservation Area on Chatham Island, where there is encouraging regeneration, is nikau yet safe. Comparison with healthy nikau forest, such as that at Morere Springs Scenic Reserve in northern Hawke's Bay, shows up the desperate lack of a healthy age range and forest structure in the Chathams, especially in the stronghold of Pitt Island.

***Recommendation.** That urgent protection from feral pigs and sheep be given to as much of the Waipaua Block nikau as possible, and be sustained.*

***Recommendation:** That anyone with a real interest in the future of the Chathams nikau visit places like Morere Springs Scenic Reserve, Kapiti Island and the Heaphy Track coast to see nikau in a healthy state.*

9. Tree ferns provide a convenient ecological indicator of the history and continuing impact of browsing in the Chatham Islands. They are naturally common in the forests where they play important roles in regeneration. However, they cannot compensate alone for lost forest structure. The five species are arranged along a spectrum of browse sensitivity from relatively resistant to highly vulnerable. One species, mamaku, needs its identity sorting, and may be one of the rarest plants of the Chathams.

***Recommendation:** That consideration be given to using tree ferns as ecological indicators in vegetation condition/trend monitoring in Pitt Island Scenic Reserve and elsewhere in the Chatham Islands.*

***Recommendation:** That research into the identity and conservation status of mamaku in the Chathams be studied as a matter of urgency.*

10. There has been huge and widespread deterioration in the condition of the natural vegetation within the Waipaua Block since 1980. Forests have become woodlands, woodlands have gone to grass or fernlands. The vegetation map completed in 1987 is now out of date. The process has been most rapid in the southwestern portion of the block, incidentally the most valued area on the island for recreational hunting, and continues unchecked. Trees fall or get damaged through exposure and regeneration is prevented by browsing animals, with the inevitable result that total loss will occur. It is predicted that under the current regime most forest and woodland will disappear within the lifetimes of Pitt Island's children. However, the process can be reversed with good animal control, and even the tattiest woodland can be restored to forest.

***Recommendation:** That the fate of the Waipaua Block be decided as soon as possible, and that zoning and subdivision for different purposes be seriously considered (see also 13).*

*Recommendation: That a management regime of effective and sustained animal control be put in place in the portion of the Waipaua Block designated for forest restoration.*

*Recommendation: That the vegetation map of the Waipaua Block be revised.*

*Recommendation: That the current system of vegetation monitoring in the Waipaua Block be maintained and enhanced (see also 9 and 15).*

11. The proposed corridor to connect the Waipaua Block with the southern blocks of Pitt Island Scenic Reserve is a great step forward. It is vital to the future shape of the island. If put into place it will be a model to be proud of internationally. As currently proposed it has some limitations. It would be much more effective and would allow more practical zoning of the Waipaua Block if curved and broadened to the northeast. Its function would be achieved earlier and enhanced with deliberate revegetation.

*Recommendation: That the creation of the corridor proceed as soon as practical, but that its design take into full consideration the Waipaua Block situation and be part of its resolution (see also 13).*

*Recommendation: That serious consideration be given to the broadening of the corridor to the northeast (see also 13).*

*Recommendation: That once the corridor is fenced, planting of appropriate trees, shrubs and flaxes be carried out to fill gaps and enhance the habitat.*

12. Flax is a great healer. Its healing power has been well demonstrated and documented in the Glory and Rangiauria blocks of Pitt Island Scenic Reserve. It is showing the same value in the Canister Cove Block and Caravan Bush. There is no flax in the south and west of the Waipaua Block, but its use there could be very beneficial to retention and restoration of the forests and woodlands.

*Recommendation: That a programme of planting flax along the south and west boundaries of the Waipaua Block be undertaken, perhaps in conjunction with revegetation of the corridor (see 11).*

13. There are various options for solutions to the conflict between traditional hunting and forest restoration in the Waipaua Block. By far the best choice is a solution whereby both interests get a reasonable deal. The only such solution in my opinion is subdivision of the block to confine the hunting flocks and mobs to part of the block, allowing the forest to recover in the rest. The forest recovery portion should be linked to the southern blocks by the corridor.

*Recommendation. That the Waipaua Block be subdivided with a fence, linking with the western boundary of the corridor.*

*Recommendation: That traditional hunting of feral sheep and pigs be permitted as a primary use of the south-western portion of the block, and that forest restoration be the prime purpose of the remainder.*

*Recommendation. That serious consideration be given to taking into the reserve the piece of land between Hapua Hill and the Waipaua Stream, in order to make a better corridor connection and to allow a larger area for hunting.*

14. The current system for monitoring the vegetation of Pitt Island Scenic Reserve is superb for recording and understanding the condition and trend of the vegetation at fixed sites long-term. However, it is labour intensive and requires a high level of experience. There is room also for a rapid user-friendly technique for checking the condition and trend of the vegetation more regularly and at a greater range of sites, to ensure management is effective and responsive.

*Recommendation: That the prototype rapid monitoring technique I have designed be trialled in the field, and if it proves useful that it be made a regular annual part of the conservation management effort in Pitt Island Scenic Reserve.*

15. I see a great deal of goodwill, mutual respect and common ground between the groups interested in Pitt Island Scenic Reserve. There is a shared keen sense of caring for the heart of the island, the Waipaua Block, even if the aims differ. This gives great hope for achieving a lasting solution to the current dilemma.

*Recommendation: That the dialogue continue, facilitated by the Pitt Island Reserves Committee and The Chatham Islands Conservation Board.*

## 13. Acknowledgements

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## 14. References

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