Holes in the fence: The vegetation of Chatham Island reserves, 1990-1996

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Summary

In 1990, in response to a request from Department of Conservation, Geoff Walls and Sue Scheele set up a series of plots and photopoints to monitor vegetation condition and trend on Chatham Island. Six years later, in April 1996, those plots and photopoints were revisited, reviewed and remeasured by Geoff Walls and Amanda Baird. The plots were simultaneously converted to conform to the 20m x 20m forest plot standard developed by the NZ Forest Service.

In all sites where effective control of feral and domestic browsing mammals has been sustained, there has been substantial forest recovery through forest floor regeneration, even if the canopy has deteriorated. Conversely, on sites where the presence of browsing mammals has continued, there has been structural decline or inadequate regeneration in the forests. Poor fences, and lack of fence maintenance, are the prime problem.

This work shows that a better management effort is required to achieve effective long-term forest conservation on Chatham Island. An ongoing adequately resourced programme of fencing and fence maintenance is the fundamental requirement. This needs to be complemented with sustained control of possums, feral pigs, feral cattle and goats.

Parallel work done on Pitt Island tells the same story.

1. Introduction

Far out in the Pacific, exposed to tropical storms and polar air, the Chathams have long gone their own special way. The first people to step ashore would have found a staggering richness of birdlife in the wetlands and large forests, and masses of great sea mammals around the coast. Most of that richness is now lost forever, but enough remains to enable restoration of glimpses of that amazing heritage. That is what the establishment of protected areas and the species recovery programmes have been aiming at in the last few decades.

Protecting Chatham Islands vegetation has been slow in getting going, much slower than protection for birds, for some reason, especially on Chatham, the main island. It seems that the basic principles of vegetation patterns, wind impact, browsing animal threat, succession, regeneration and weed invasion have been poorly understood by landowners, visitors and conservation managers alike.

In 1980, at Department of Lands and Survey request, a series of vegetation monitoring plots and photopoints was established in newly created reserves on Pitt Island. Their aim was to investigate and provide "hard data" on the

condition and trends of the vegetation. They have since been added to and remeasured twice: in 1987 (Walls 1988) and 1993 (Walls and Scheele 1995a), telling a remarkable story of collapse under browsing pressure and recovery when protected.

In 1990, at Department of Conservation request, a parallel series of photos and photopoints was established by Geoff Walls and Sue Scheele on Chatham Island (Walls and Scheele 1990). About half were in reserves, but the others were on private land that had no protective status. It is with a great deal of delight that we can report that in the six intervening years most of the pieces of private land containing plots have been protected for conservation by their owners.

In April 1996, we remeasured eleven of the twelve 1990 plots on Chatham Island, inspected three others set up in the burnt-out Ocean Mail wetland reserve in 1995 (Walls and Baird 1995b) and established a new one in Nikau Bush Scenic Reserve. The study was set up as an "unprogrammed research investigation" commissioned by Canterbury Conservancy of Department of Conservation. Its basic questions were:

1. What is the condition and trend of the vegetation at the plot and photopoint sites on Chatham Island?

2. What is the adequacy of coverage of the existing vegetation monitoring sites on Chatham Island?

3. What are the implications for conservation management of the vegetation condition and trend?

This report provides answers to those questions and others that emerged during the field work.

2. The plots

The twelve plots established in 1990 were 25m x 25m squares, gridded into 5m x 5m squares in which canopy trees, subcanopy and understorey trees, shrubs, saplings and tree ferns, and ground cover plants were counted and assessed (Walls and Scheele 1990). In 1996 these plots were converted to the standard 20m x 20m forest plot developed by the New Zealand Forest Service (Allen and McLennan 1983; Allen 1993), to allow standardisation of data and analysis.

The conversion process, and the pros and cons of conversion, are discussed later. Here, for simplicity, the figures for changes in tree numbers within each 25m x 25m plot are given, whilst changes in the other tiers are discussed descriptively. Plot and photopoint locations are shown in Figure 1.

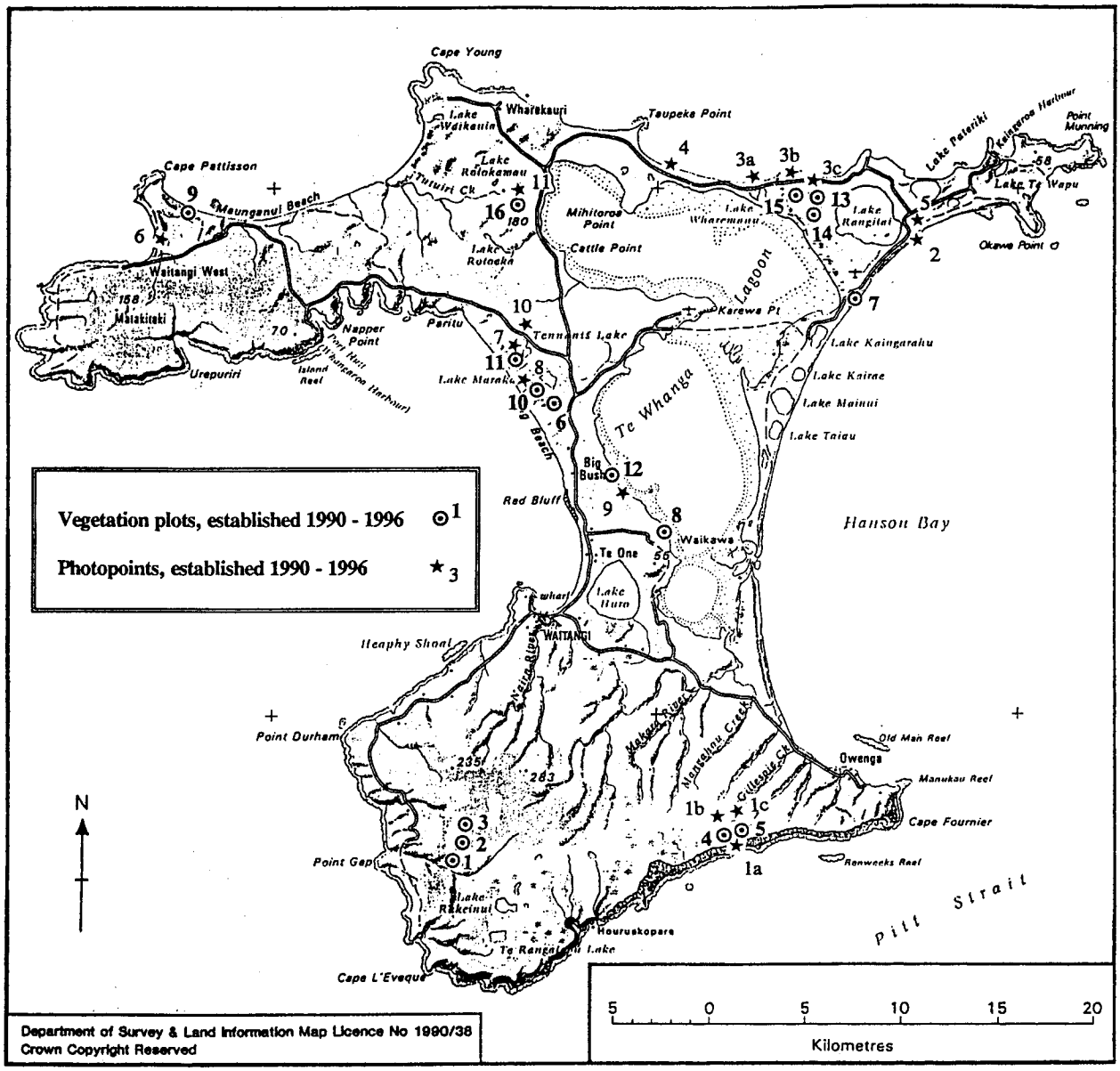

FIGURE 1
Map of Chatham Island, showing locations of vegetation plots and photopoints.

2.1 PLOT 1: "ABYSSINIA", TUKU NATURE RESERVE, 24/4/96

The canopy looks better. There is understorey regeneration now, but cattle and pigs are impeding its growth. Better control of these animals is required for lasting forest recovery.

This plot is in forest dominated by large kopi (*Corynocarpus laevigatus*) trees, with slender matipo (*Myrsine chathamica*) and some karamu (*Coprosma chathamica*) also in the canopy. In 1990, little grew beneath the canopy, except a few tree ferns, and on the ground was sparse low-growing vegetation. Since then the feral sheep, cattle and pigs there have been fairly well controlled, and possums have been given a good clean-up. This had the al-

most instantaneous effect of producing a recovery in the tattered kopi canopy to the obvious benefit of the near-extinct parea - and of allowing a crop of tree seedlings to begin growing on the forest floor. So by 1993, when a brief inspection was made, the plot and its surrounding forest was looking in far better condition and well on the road to full recovery (Walls and Scheele 1995).

Sadly, that recovery has not proceeded as well as it might. The canopy trees have held their own and look great - in fact so great has been the canopy stability (very unusual for the Chathams) that the only numerical change since 1990 has been the disappearance of two dead matipo trees (fallen and rotted). Of the 22 tree ferns alive in 1990, two have since died. These changes are displayed in Figure 2.

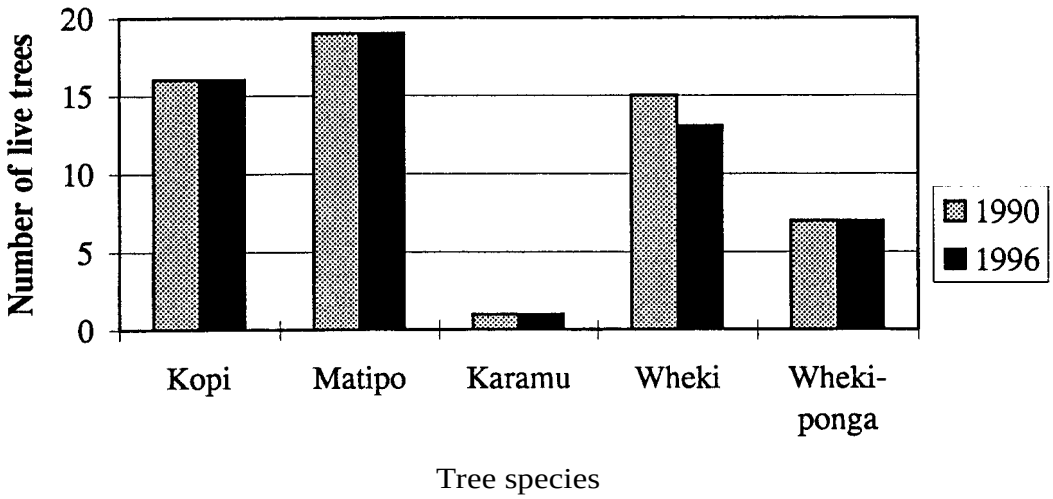

FIGURE 2
Plot 1 - tree composition changes

A quite dense understorey has grown up since 1990, but appearances are deceiving. There are many seedlings and saplings, mainly of kawakawa (*Macropiper excelsum*) and karamu, with some mahoe (*Melicytus chathamicus*), hoho (*Pseudopanax chathamicus*), matipo and kopi. There are also many ferns on the ground and a lot of hook-grass (*Uncinia uncinata*). The problem is that all except the kawakawa is being browsed by feral cattle that cruise through from time to time. They are preventing any of the regenerating tree species from getting above browse height and going on to replenish the canopy. Pigs too are prevalent enough to be ripping up the forest floor and making a significant impact on regeneration. Figures 13 and 14 illustrate what is happening.

2.2 PLOT 2: "SWAMP GROVEL", NORTHERN TUKU NATURE RESERVE, 25/4/96

This dense forest is thinning as it ages: the canopy because of natural competition, the understorey because of browsing (mainly by cattle). Better animal control is needed.

The forests in this part of the island are dense, wet and dark, dominated by large tarahinau (*Dracophyllum arboreum*) trees whose needles rain down and muffle everything beneath. They are home too to the rare endemic tree *Myrsine coxii.* Since the late 1980s the area has had an intensive cat and possum control regime on behalf of the taiko, but recently the effort has been shifted elsewhere.

The tree and tree fern densities in the plot are astonishing: >1900/ha and >1800/ha respectively. Since 1990, as shown in Figure 3, there has been a slight loss from the canopy of trees of tarahinau, matipo and korokio (*Corokia macrocarpa*). A more significant loss has been suffered by the *Myrsine coxii* (37.5% have died since 1990) and wheki (*Dicksonia squarrosa*) (15% have died). The change in wheki is structurally the most important, since wheki makes up 90% of the tree ferns of the forest. Tree ferns are terribly important in these forests, providing perching places for other ferns and establishment sites for tree seedlings out of reach of cattle, sheep and pigs.

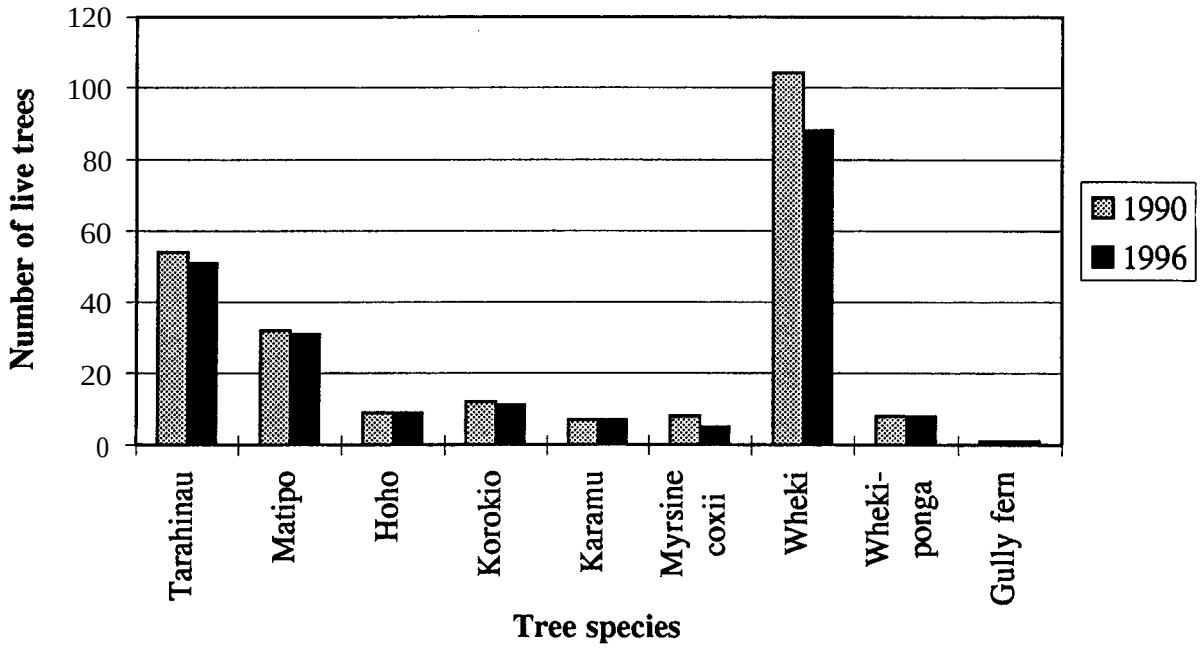

FIGURE 3
Plot 2 - tree composition changes

On the ground, tree ferns are regenerating in canopy gaps and there arc many small seedlings of hoho, matipo and *Myrsine coxii.* None of the seedlings are getting much taller than 30 cm before being browsed off. Saplings and epicormic tree shoots are being suppressed by browsing too. Feral cattle are

the main culprits, but pigs and possums, and possibly sheep, are also responsible.

2.3 PLOT 3: TUKU NATURE RESERVE

This plot, about 1 km south of Plot 2, was selected in 1990 to complement and compare with it. It is in the same forest type, but on slightly drier ground. Pest control prior to 1990 was nearly zero, but has since been stepped up. We were so pushed for time that we decided not to remeasure Plot 3 this year.

2.4 PLOT 4: RANGAIKA SCENIC RESERVE, 26/4/96

The forest edge is recovering from its past degradation. Feral pigs are still a problem though.

Sited atop the dramatic seacliff scarp at Rangaika, this plot was chosen to follow the progress of the coastal forest edge. Battered by a history of land clearance, stock impact and storms, this distinctive edge is frequented by old slumped keketerehe (*Olearia chathamica*). It was hoped it would recover with the exclusion of stock. Rangaika Scenic Reserve was one of the first areas to be protected for conservation on Chatham Island, and was fenced to exclude domestic stock in the early 1980s.

Plot 4 is one of a contrasting pair. 120 m to the east, on the other side of the reserve fence, is Plot 5, deliberately set up to follow the coastal forest edge situation in the continued presence of domestic stock.

In Plot 4 since 1990, there has been an 8% loss of canopy trees (mainly keketerehe) and an 8% loss of large tree ferns: wheki and gully fern (*Cyathea cunninghamii*) (Figure 4). Nearby, outside the plot, some of the large tarahinau and matipo trees have fallen. To compensate, many bushes of flax (*Phormium tenax*), saplings of tarahinau, keketerehe and *Hebe barkers* and numerous tree ferns (mainly wheki-ponga, *Dicksonia fibrosa*) have sprung up (Figure 15). On the forest floor and on tree fern trunks are many new seedlings of keketerehe, tarahinau, hoho, karamu, mahoe and matipo. Therefore the forest edge here looks to be well on the recovery road.

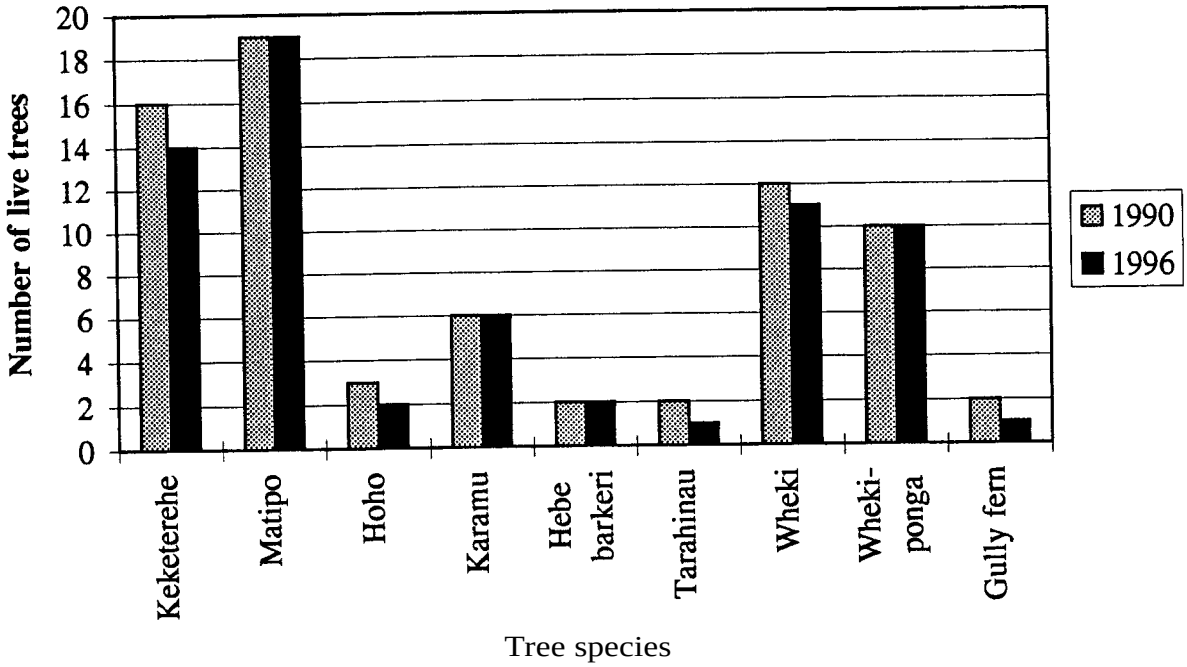

FIGURE 4
Plot 4 - tree composition changes

The only question then is that concerning feral pigs. They are abundant in the area, judging by the extensive and deep rootings, both in forest and out in the open. It is certain that they are inhibiting forest recovery, possibly quite profoundly in places, but they may be a mixed blessing in rank grassland. There, rootings may be providing the means for flax to become established, thereby breaking up the sward and hopefully making it easier for forest plants to establish in future.

2.5 PLOT 5: RANGAIKA, UNPROTECTED COASTAL FOREST EDGE, 20/4/96

There is significantly more forest deterioration than in Plot 4, and a lack of regeneration. The difference - the presence of domestic stock - will eventually lead to the loss of this forest.

As already stated, this plot provides the contrast and complement to Plot 4. 120 m to the west, it is on Alfred and Robyn Preece's farmland, where sheep and cattle are run. Its vegetation - apart from the impact of stock - is similar to that of Plot 4, though *Hebe barkeri* is absent from the canopy and korokio is more prevalent - at least it was until 1990.

Our remeasurement of the plot shows that there has been significantly more canopy and tree fern loss since 1990 than in Plot 5 (about twice as much). 18% of the keketerehe have died, 20% of the wheki have died, and there are now no live korokio trees left (Figure 5).

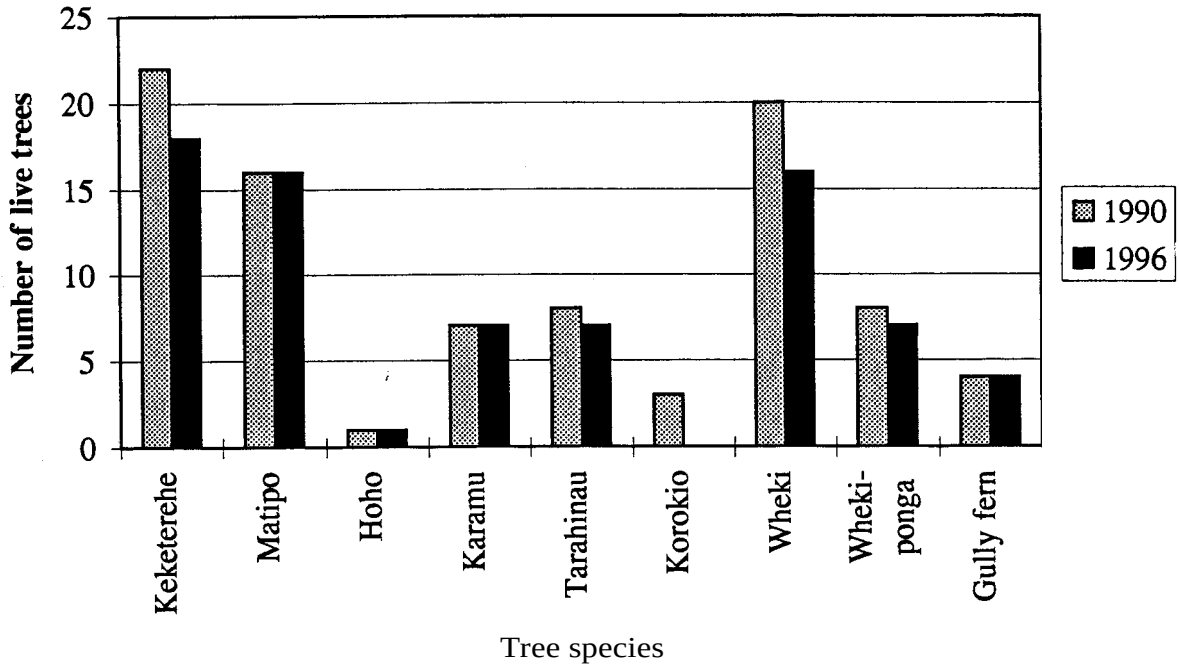

FIGURE 5
Plot 5 - tree composition changes

Although the potential for regeneration is obvious - there are many seedlings of tree species and small tree ferns present - the cattle, sheep, possums and pigs are preventing that happening. Our prediction is that in the continued presence of these animals - especially the cattle and sheep - the forest will crumble, to become tree fernland, which in turn will depart the scene in favour of rough pasture. Plot 4 demonstrates already the recovery that would take place if the cattle and sheep were fenced out.

2.6 PLOT 6: HENGA SCENIC RESERVE (FOREST MARGIN), 17/4/96

This corner of the reserve is still being browsed, preventing the kind of forest recovery so evident nearby. Repairs to the fence and regular surveillance are needed.

This plot was set up to investigate a bit of a mystery. Why was the prolific regeneration, a feature of the rest of the forest of this showpiece reserve (fenced off in around 1979), absent from this forest edge? After all, the regeneration was right alongside, like a green wave.

In 1990 it was thought that there might be a peculiar edge effect whereby the forest floor regeneration was impeded by exposure to cold southerly winds (Walls and Scheele 1990). However, an inspection in 1993 showed a mass of seedlings and saplings establishing on the site, but signs of browsing by sheep, so the conclusion was reached that enough stock had been getting into the reserve in the past to prevent seedling establishment at this spot (Walls and Scheele 1995b).

This suspicion has been confirmed by the latest remeasurement of the plot. As shown in Figure 6, a few kopi, matipo and karamu have died (amounting to 7% of all trees in the plot). This should have encouraged forest floor regeneration, if anything. Now, however, not only are there very few of the seedlings and saplings we saw in the plot in 1993 left, but the taller wave of mahoe saplings has been beaten back. Possums are not to blame, because they have been well controlled in recent times. Browsing by stock (probably sheep) is clearly the cause, and it is obvious that better fence surveillance and maintenance in the reserve is required. As a first step, the fence should be checked for weaknesses in this vicinity.

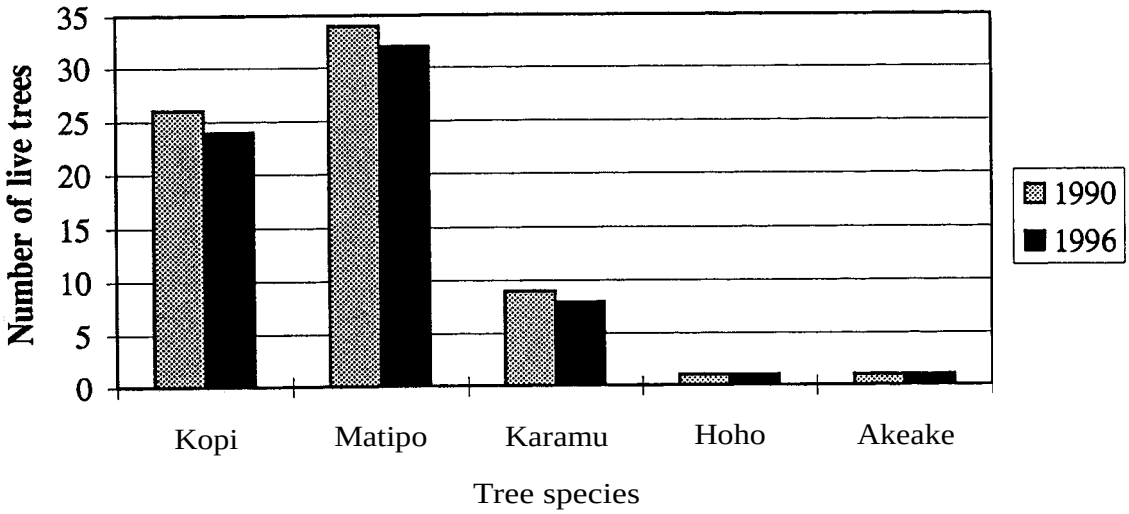

FIGURE 6
Plot 6 - tree composition changes

2.7 PLOT 7: HAPUPU HISTORIC RESERVE, 22/4/96

There is excellent regeneration inside the forest here. Good fence maintenance will ensure it continues.

Protected in 1980, this reserve is the most famous of the Moriori dendroglyph (tree carving) sites. There is an eerie bleakness there, mingled with the unseen presence of the people who carved the trees. It seems something of an intrusion to be poking, probing and measuring, even if it's on the edge of the forest.

The plot straddles the margin where the forest of kopi, matipo and akeake (*Olearia traversii*) [see footnote, p 24] meets rank grassland. Since 1990, 13% of the trees have died - all matipo (of which 19% have died), all small trees (Figure 7). Among the crowns of the large spreading kopi trees that form most of the forest canopy there has been a considerable loss of canopy condition. This was apparently caused by a single event - a severe south-west gale on 31 January 1993 - from which the trees have yet to recover.

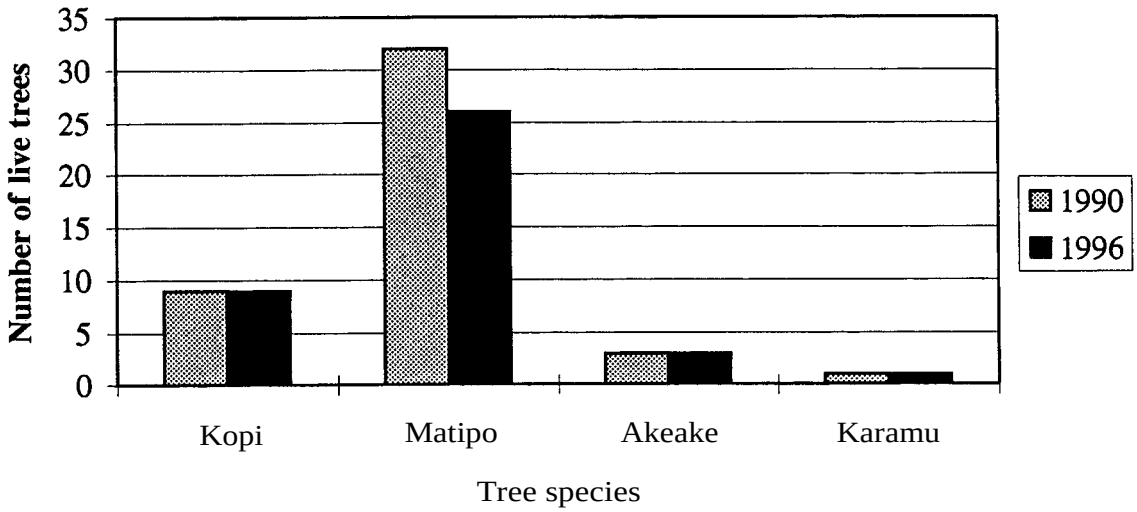

FIGURE 7
Plot 7 - tree composition changes

Beneath the trees, in contrast, is a dense thicket of akeake and mahoe saplings, rapidly grown up from the seedlings that were there in 1990 and now about to enter the tree canopy (>10 cm dbh). There are also masses of kopi seedlings, but they have not grown appreciably in the last six years and have not penetrated the grassland. Perhaps they lack sufficient nutrients, perhaps the sandy soil is too dry for them.

2.8 PLOT 8: SMITHS' RIBBONWOOD FOREST, 27/4/96

Cattle keep getting in from next door, undoing years of forest recovery. Perhaps it is time to consider a more secure management regime in which the owners, the neighbours and Department of Conservation (and/or QE II National Trust) collaborate.

Pat and Wendy Smith have protected their piece of forest, on the south-western shores of Te Whanga Lagoon, since the mid 1980s. It is one of the last strongholds of Chatham Islands ribbonwood (*Plagianthus regius* var. *chathamicus*), mostly wiped out elsewhere because of browsing and ringbarking by domestic stock.

The plot was established in 1990 because of the ribbonwood, and to follow the progress of ribbonwood sapling thickets on a forest edge shattered by gales in about 1978 and formerly browsed. Of the trees alive in 1990, 16% have since died: deaths have been amongst kopi, matipo and ribbonwood, and a huge lone mahoe has also died (Figure 8).

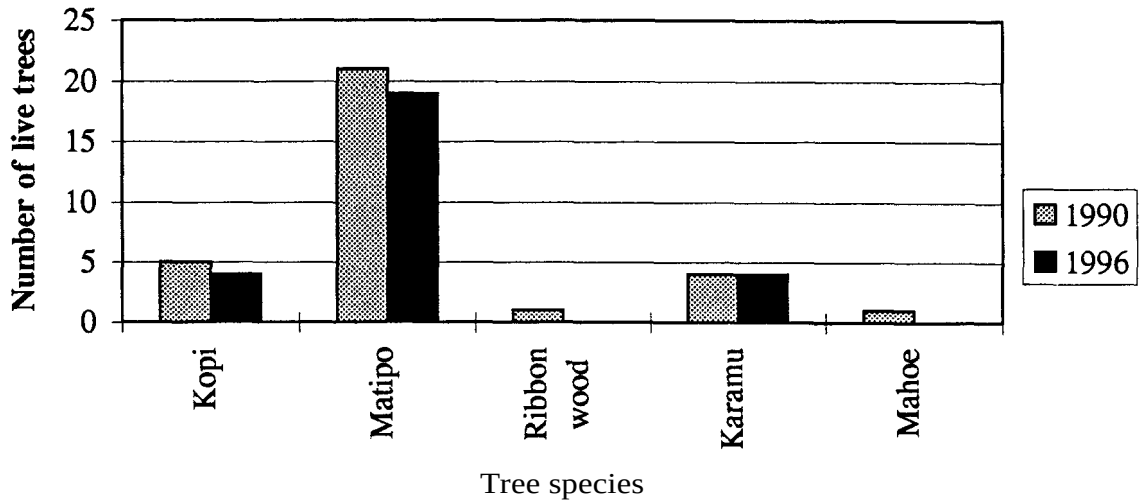

FIGURE 8
Plot 8 - tree composition changes

The deaths of these trees and those snapped off in the gales have not been in vain, because dense thickets of saplings have sprung up to take their place. These saplings, mostly mahoe, ribbonwood and kawakawa, with some karamu, matipo and hoho, were up to 3 m tall in 1990. Now the tallest are 8 m in height - a growth rate of nearly a metre per year. There are many new recruits since 1990, too, of the same species. All these young potential trees are jostling for dominance and beginning to self-thin, the less competitive dying.

Whilst that profusion of regenerated saplings sounds like a total success story, sadly it isn't quite. Cattle persist in entering the bush from neighbouring farmland, despite Pat and Wendy's best efforts to exclude them. Cattle are destructive and clumsy animals in any forest, and here they have smashed, browsed and trampled, undoing years of regeneration and creating gaps in the healing coverage of saplings. Possums have become common too, browsing kopi and matipo canopies, bark-biting saplings and browsing seedlings. However, now a system of bait-stations is up and running, they should fade out as a problem.

The long-term protection of this forest would probably be helped if it, and the piece on neighbouring land contiguous with it, were protected legally and managed as a unit. Some participation in this by the Department of Conservation, whilst not essential, could provide the stability required, and ensure that what Pat and Wendy Smith have started will continue.

2.9 PLOT 9: CANON PEIRCE SCENIC RESERVE, MAUNGANUI, 23/4/96

There has been good regeneration in this reserve over the last decade, but because there are now several breaches in the seaward fence, this recovery is in jeopardy.

At the western end of Maunganui Beach, on consolidated sand dunes, grows a mosaic of broadleaved forest patches and treeland. Nowhere else on Chatham

Island are there so many ngaio (*Myoporum laetum*) trees. This area has formal protection as a scenic reserve, and has been fenced to exclude domestic stock for about a decade. The plot was set up to follow the progress of both the ngaio and its sand-ridge ecosystem.

Of the 30 trees in the plot, five of which are large sprawling ngaio, none have died since 1990 (Figure 9). Where the ngaio trees have branches touching the ground, they have taken root at those points and sent up youthful-looking shoots. It is possible that these trees may be ancient, perpetuating themselves opportunistically in the sandy soil in the way that pingao (*Desmoschoenus spiralis*) does on foredunes. Akeake and matipo show the same ability on the dune ridge, but grow more erect and don't sprawl so far.

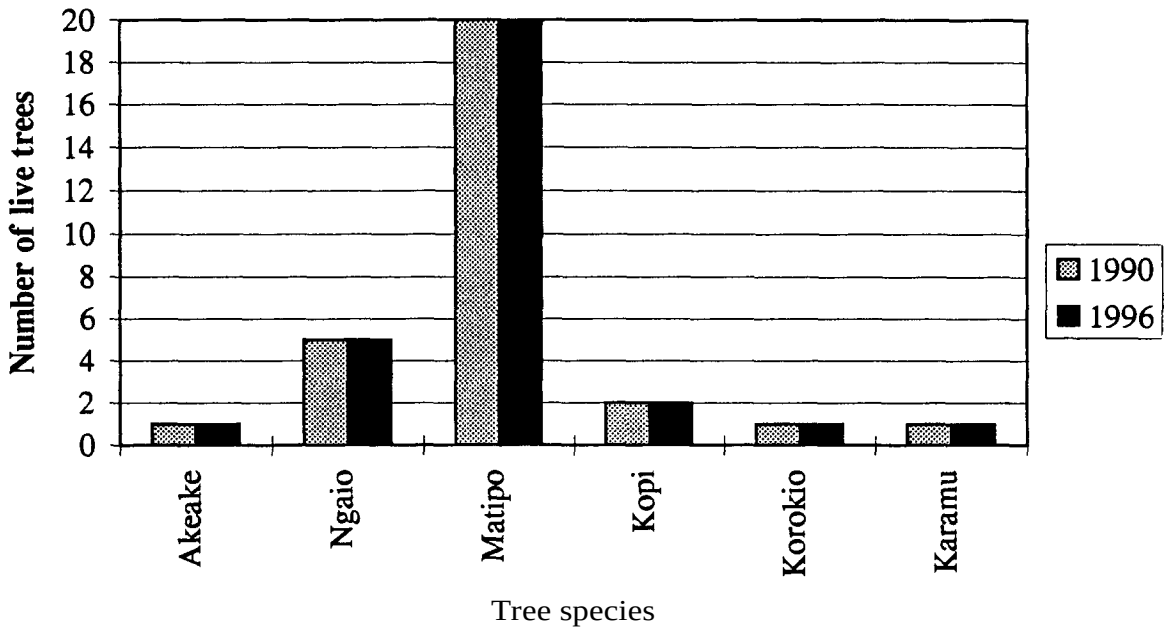

FIGURE 9
Plot 9 - tree composition changes

In 1990 there were many seedlings and saplings of mahoe, akeake, matipo, karamu and kopi, the tallest about 1.5 m tall. Now, many of these have grown up to 4-5 m tall, and have been joined by new ones, including korokio, kawakawa (*Macropiper excelsum*) and ngaio. Some of these saplings and seedlings have appeared in what were dense thickets of bracken (*Pteridium esculentum*) in 1990, and are beginning to break the thickets up. Therefore, the plot shows that stock removal has set these distinctive dune ridges well on the way to recovering their former dense forests.

The kopi trees show a very similar pattern to those at Hapupu (Plot 7). They are producing masses of seedlings beneath them, but few of these are getting taller than 30 cm. This helps support the suspicion that nutrients and/or moisture are lacking in the sandy soils. It may require more years of building of leaf litter and soil humus to galvanise the kopi seedlings into growth.

Seaward of the plot (to the north), there is quite a lot of death and dieback in the akeake and matipo trees. This is compensated for by regeneration inside the reserve, but domestic stock are preventing regeneration outside. Landward of the plot (to the south) is a flat peaty wetland. Inside the reserve is prolific regeneration of akeake, swamp heath (*Dracophyllum paludosum*) and *Styphelia parvifora* (saplings and shrubs up to 1 m tall), not evident in 1990. Outside, the vegetation is browsed to the ground.

The seaward fence of the reserve is no longer effective in excluding domestic stock. Trees have fallen across it, sand has built up around it in places, and elsewhere it has been undermined through sand blow-out (Figure 16). The continued recovery of the forests and wetland vegetation is dependent on the fence being repaired and maintained.

2.10 PLOT 10: HENGA SCENIC RESERVE (DUNES), 19/4/96

One day all this tatty-looking land will be back in forest, if present trends continue. Fence maintenance is the management key.

The north-west portion of Henga Scenic Reserve is made up of high sand ridges thrown up over time by the prevailing westerly winds. Formerly, forests would have covered these ridges entirely, but farming operations have fragmented them. Now there is a vegetation mosaic in which fingers of low wind-shaped forest extend seawards among a patchwork of shrub - grasslands in which the main plants are marram grass (*Ammophila arenaria*), rank pasture grasses and herbs, knobby clubrush (*Isolepis nodosa*) and *Styphelia parviflora*.

The plot is sited to study the interplay of trees (a few large akeake, many small matipo) and the shrub-grassland, with a focus on what is happening with the marram grass.

Since 1990, two trees (one matipo, one karamu) have died and there has been significant storm damage to others. In compensation, two akeake have grown up from saplings into small trees, and one matipo deemed dead in 1990 has since leafed up (Figure 10). In addition, there has been considerable establishment of tree seedlings and saplings (mostly mahoe and karamu, but also matipo and akeake), and dramatic growth in the saplings of akeake and karamu present in 1990.

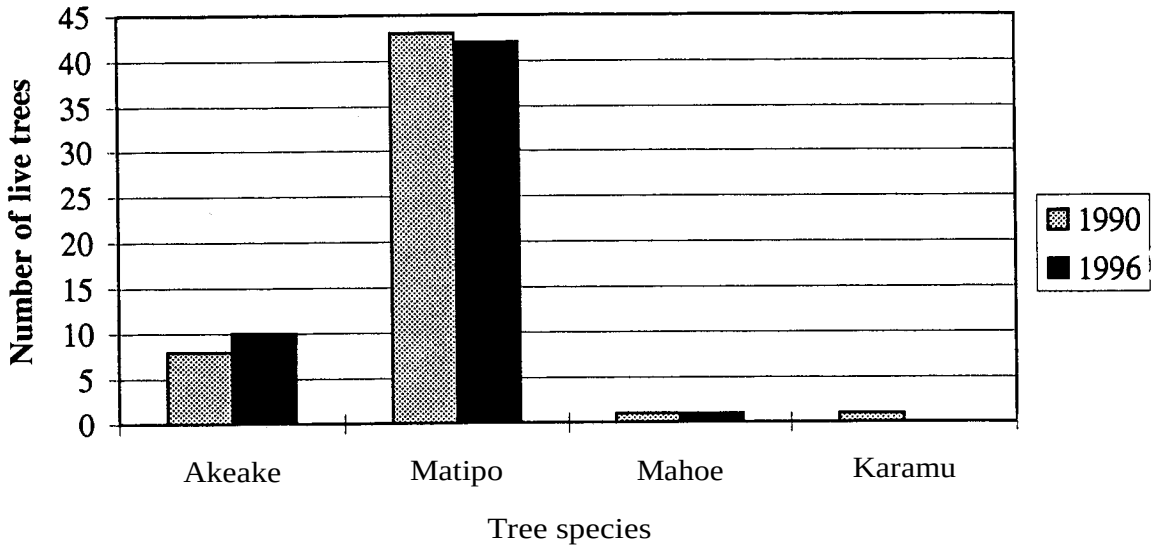

FIGURE 10
Plot 10 - tree composition changes

Marram grass appears to have retreated somewhat in the face of other vegetation: rank exotic grasses and herbs, knobby clubrush, *Styphelia parviflora*, pohuehue (*Muehlenbeckia australis*) and spinach (*Tetragonia trigyna*).

The impact of wind on this site is quite pronounced: young akeake and older matipo in the shelter of the gullies are in better condition and have grown much more in six years than those exposed to the elements on the ridges. Nevertheless, the whole area is quietly being restated to forest.

Although possums are quite evident in this area, it is not essential to forest recovery to control them. What is more critical is to keep domestic stock out of the reserve: ensuring the fences are in good condition is the best method.

2.11 PLOT 11 : TENNANTS LAKE, AKE-RAUTINI FOREST, 18/4/96

It is wonderful to see this area fenced, and the regeneration beginning. Pigs, possums and goats need to be controlled now, so the regeneration is not impeded.

The land on the south-western shore of Tennants Lake is the only place ake-rautini (*Dodonaea viscosa*) [see footnote, p 24] occurs on the Chathams, and here it grows in abundance. It is a small tree with very hard durable wood, treasured because of that in the past and even now. Its localised inland occurrence on the Chathams and the relative youthfulness of the trees there, compared with its widespread distribution around New Zealand and the Pacific, suggest that it has been introduced to the Chathams by people in fairly recent times. Some delving into the historical archives may shed light on the matter, if its arrival has been recorded.

Plot 11 was established in 1990 to follow the fate of the ake-rautini, because concern had been expressed about it. Eric Dix, the landowner, was keen to protect the land then, and has since done so, both legally and with fencing to exclude domestic stock. The fence was erected around 1993-94 and is already bearing fruit in terms of vegetation recovery.

The plot is sited on a high sand ridge, and is forested with trees of matipo (numerically dominant, but mostly quite small), karamu, akeake and korokio, as well as ake-rautini. Since 1990, only three trees (amounting to 2% of the trees in the plot) have died, though several others have suffered substantial dieback. One of the dead trees is a matipo, but significantly the other two are ake-rautini, of which there were 12 in 1990 (Figure 11).

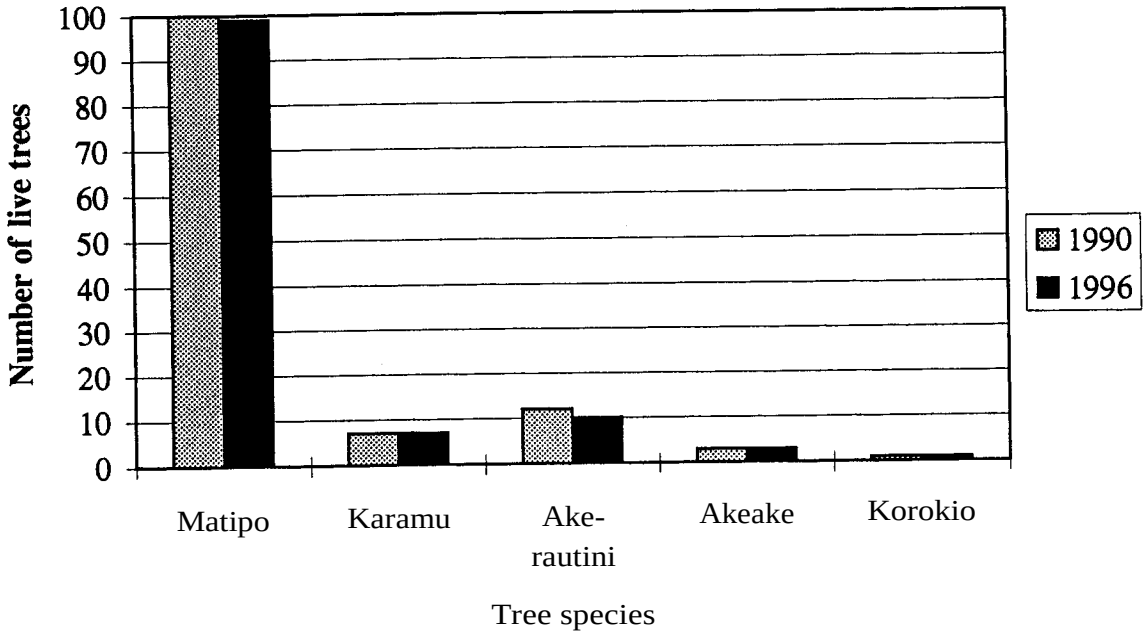

FIGURE 11
Plot 11 - tree composition changes

Without protective fencing, this ake-rautini loss would be alarming. However, many seedlings of ake-rautini, mahoe, karamu and matipo, up to 25cm tall, have appeared on the forest floor. A great carpet of spinach (*Tetragonia trigyna*) has also appeared on the forest floor, and its progress will be fascinating. It may swamp tree seedlings as they grow, it may prevent the establishment of seedlings, or it may help provide stability and nutrients that will enhance tree regeneration.

The area now lacks domestic stock, but it contains enough possums, pigs and goats for the recovery of the forest to be impeded. Control of these animals would certainly help tree regeneration, both beneath the existing canopies and out in the open.

2.12 PLOT 12: BIG BUSH, KOPI FOREST, 28/4/96

In 1990 this forest had no undergrowth. Following fencing, it has responded spectacularly. Ongoing fence maintenance and possum control will ensure this recovery trend continues.

Big Bush is really a historic entity rather than a place. It refers to a time when a great forest of stately trees grew on all the gentle slopes leading down to the western shores of Te Whanga Lagoon. By 1990, all that was left was a small remnant, and one of the owners, Raana Tuuta, was anxious to protect as much of it as she could.

Well, it is a real success story. Raana's bush now has legal and physical protection. It was fenced about two years after the plot was set up, and possum control has since been carried out. Despite the occasional visit from a wandering cattlebeast or sheep, this protective management has stimulated a wonderful burst of forest floor regeneration.

In 1990, the forest in the plot - dominated by magnificent kopi trees, with great gnarled karamu and many spindly matipo - had a dense canopy but was totally bare underneath, browsed out by domestic stock. Since then, about 4% of the trees have died: all small matipo except for one large karamu (Figure 12). The canopy though looks in better condition still, probably as a result of the possum control and lack of cattle trampling on the sensitive surface roots of the kopi.

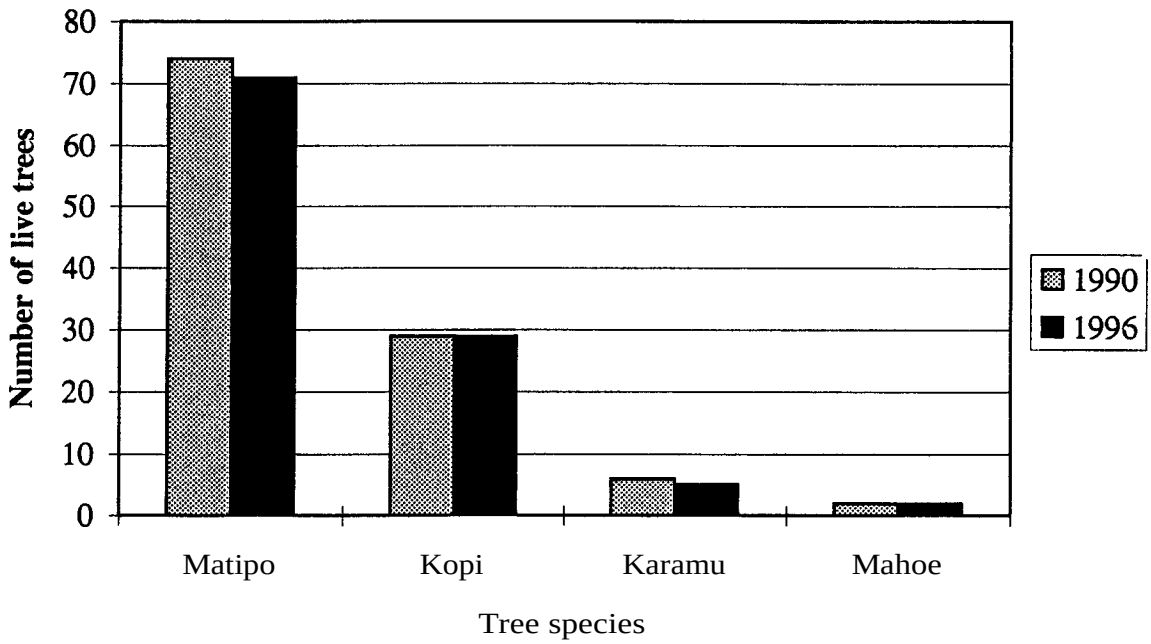

FIGURE 12
Plot 12 - tree composition changes

Beneath the canopy though there has been an astonishingly dramatic change (Figure 18). A mass of saplings, up to 2m tall, has appeared. These are mainly mahoe, but there are also hoho, karamu, kopi, matipo, kawakawa and supplejack

(*Ripogonum scandens*). Many ferns, including the gully fern (*Cyathea cunninghamii*), and epicormic shoots from the bases of the forest trees, have also appeared.

Nearby, especially in canopy gaps, are many ribbonwood saplings and "rafts" of small kopi saplings. At the time of our 1996 visit there was an abundance of fruit of kopi, supplejack and matipo - a real food resource for birds - undoubtedly the result of possum control (Figure 19).

The forest then is rapidly recovering. Continued fence maintenance and possum control will ensure that Big Bush has a bright future.

2.13 PLOTS 13, 14 AND 15: BURNT WETLAND, OCEAN MAIL RESERVE, 29/4/96

Incinerated in late 1994, the vegetation of this great wetland continues to rise from the ashes.

We made a quick inspection of the plots we set up one year previously, to follow the progress of the wetland vegetation that had been severely burnt in the big gale-fanned fire of November 1994 (Walls and Baird 1995b).

Prior to the fire, the wetland was a broad expanse of dense chest-high vegetation: bamboo rush (*Sporadanthus traversii*) the mauve-flowered Chatham Island aster (*Olearia semidentata*) and swamp heath (*Dracophyllum paludosum*). Fringing this was more modified mixed vegetation containing flax (*Phormium tenax*), swamp heath, bracken, jointed rush (*Leptocarpus similis*) and various shrubs and small trees. All went up in flames, leaving a landscape that looked like a black desert.

By March 1995, when we set up the plots, a mass of tiny seedlings of the formerly dominant plants was dusted like a new-sown lawn over each site. As well, some adult plants, such as flax, speargrass (*Aciphylla traversii*), knobby clubrush, umbrella fern (*Gleichenia dicarpa*), bracken, *Coprosma propinqua* and *Cyathodes robusta*, had begun to resprout. This gave us great hope that the wetland vegetation would regenerate, but we were concerned that weeds such as blackberry (*Rubus fruticosus* agg.), exotic grasses and herbs might invade.

We are pleased to report that the regeneration we saw beginning has continued, and that weeds show no sign of creating a problem. Each of the plot sites is now carpeted in a dense vegetation cover, up to 40cm tall (though mostly about half that). This cover is made up of millions of seedlings, along with leaves and fronds resprouted from adult plants (Figure 21).

The only problem we see at present is that domestic stock have unimpeded access to this reserve, because the fences were burnt and have not been replaced. Cattle in particular wander the wetland, and are impacting on the regenerating vegetation and keeping sites open to weed invasion. Replacement of the reserve fences to keep them out is a fundamental and urgent management requirement.

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