

Mid Pohangina Valley exclosure plots March 1997

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Preamble

The flanks of the southern part of the Ruahine Range look like an ecological disaster area. Their former cloaks of luxuriant kamahi-rata-podocarp forest have collapsed as fast as any forests in the world: almost total collapse occurred under the onslaught of deer and possums between the 1930s and the 1960s. Since then, aerial deer harvest has allowed some forest recovery, but whilst the browsing mammals persist the forests will only be a depleted shadow of the former luxuriance.

On 3-7 March 1997, Rosie Bishop, Grant Craill and I were in the Mid Pohangina Valley, south-western Ruahine Forest Park, among such collapsed forests. We were there to repair the fences of the deer exclosures there, and to measure the vegetation condition both inside and outside the exclosures. Despite a couple of mishaps and wild weather, we managed to achieve those tasks.

The exclosures

There are two exclosures, one just upstream of the Mid Pohangina Hut, the other about two kilometres downstream. They were built in the mid 1960s by NZ Forest Service, prior to the invention of the standard 20 m x 20 m forest monitoring plot. Consequently they are too small to accommodate a full standard plot, so a subset of the standard plot that would fit was marked out and measured inside each. A plot of identical size and shape was set up outside as nearby as possible, and also measured. The results are compared.

1. MID POHANGINA HUT EXCLOSURE (NZMS 260 T23/693237)

This exclosure is about five minutes' walk upstream from the hut, on the true left of the river. It is at the back of a small terrace about 20 m above river level. It was built in 1965 out of netting and wire stapled to trees, in an eccentric rectangle of about 18 m x 13 m. It had last been formally visited and reported on in summer 1982-83, though Euan Nicol (Manaaki Whenua, Christchurch) stumbled on it in 1991 and did some measurements.

The forest here is currently dominated by spreading multi-branched mahoe (*Melicytus ramiflorus*) trees. There are various other broadleaved trees too, and a reasonable density of understorey and ground cover vegetation, but not a trace of kamahi (*Weinmannia racemosa*) or rata (*Metrosideros robusta*). Stark podocarps tower above the canopy here and there to remind what the forest cover was like so few decades ago.

Whilst Rosie and Grant replaced battens and posts and re-tensioned the wire, I set up and measured a vegetation plot 15 m x 10 m in dimension within.

Three days later in the midst of a spectacular electrical storm, I returned and repeated the effort in an identical plot just outside the fence.

Despite superficial appearances there are fundamental differences between the vegetation in the plot inside the enclosure and that in the plot outside. The densities of mahoe trees are much the same, but there are numerous kanono (*Coprosma grandifolia*) and several pate (*Schefflera digitata*) inside, whilst outside there are virtually none of either. By contrast, there are far more trees of horopito (*Pseudowintera colorata*) outside than in. These patterns are duplicated in the sapling tier. In the lower understorey and on the ground, the differences are not so dramatic: there is more climbing rata (*Metrosideros diffusa*) inside the enclosure, and more horopito and bush rice grass (*Microlaena avenacea*) outside.

These measured differences are displayed in the appendices. They are most certainly due to the impact of red deer browsing. Inside the enclosure, the highly palatable kanono, pate and climbing rata have had three decades of relief from deer. They have still been available to possums, though, without which the contrast would be far greater.

2. MID POHANGINA "CABINET" ENCLOSURE (NZMS 260 T23/678233)

This enclosure is about thirty minutes' walk downstream of the hut and high on the hillside above the river on the true right. Built in 1966 by NZ Forest Service of netting and wire fastened to trees, it is a little larger than the other one: about 20 m x 18 m. It was apparently known as the "Cabinet" Enclosure because Cabinet Ministers were flown in to inspect it at a time when resources were being desperately sought to combat the problem of deer damage to New Zealand's native forests.

The podocarps, kamahi and rata have all gone from the area. In the early 1960s the hillslopes would have been running screes. As a result of the deer harvest period that began around then, low forests dominated by spreading mahoe and slender pate have grown up since.

At this site Grant and Rosie worked on the fence whilst I set up and measured a 15m x 15m vegetation plot within the enclosure. Next day I returned and did a repeat effort alongside the enclosure but outside it.

There is little difference between the canopies of the vegetation plots, other than more pate outside the enclosure. A radical difference shows up, though, beneath the canopy. In the sapling tier there is considerably more kanono, hangehange (*Geniostoma rupestre*) and pigeonwood (*Hedycarya arborea*) within the enclosure, whilst there is far more horopito outside. There are no tree ferns within the enclosure, but four in the outside plot. In the lower understorey and on the ground, the differences are just as graphic. Within the enclosure plot are far more tree seedlings, palatable ferns and vines (including climbing rata). Even horopito is better represented.

My interpretation of these comparisons (displayed in the appendices) is that, around the time the exclosure was built, deer numbers were radically reduced in the vicinity. They were kept down long enough for a forest canopy to develop with the palatable pate as a dominant. Some time later, the numbers of deer built back up, sufficient to create the differences now evident beneath the canopy. Meanwhile, at the Mid Pohangina Hut exclosure site, deer numbers were never reduced to the same low levels, perhaps due to the availability of better cover. The initial canopy recruitment was impaired there, except within the exclosure.

Conclusions

1. The two exclosures in the Mid Pohangina Valley are within the zone of massive forest canopy collapse in the southern Ruahine Range. However, they shed no light on that collapse event, since they were built after it happened. They do tell the story of the subsequent recovery process and the effect on that of both red deer and possums.
2. At one exclosure site (Mid Pohangina Hut), deer have been present in sufficient density to influence the composition of every tier in the current forest. The palatable tree species have been prevented from contributing to the canopy, and have been browsed out selectively from all tiers beneath the canopy. Horopito has been the prime beneficiary. Possums have contributed to the impairment of forest regeneration by also selectively eating the more palatable plants.
3. At the other exclosure site ("Cabinet" Exclosure), a brief window of opportunity for less impeded forest regeneration has been afforded. Deer densities were low enough during that period for quite palatable species to make a major contribution to the canopy. Since then, deer densities have built back up enough to adversely affect the composition of all tiers beneath the canopy. Possums have had the same impact as further up-valley.
4. So comprehensively were kamahi and northern rata destroyed during the collapse phase that no living traces remain. There are no seed sources or even seedlings evident in the Mid Pohangina area. We are therefore faced with a future of irreversible change wrought by deer and possums there. The podocarps (rimu *Dacrydium cupressinum*, matai *Prumnopitys taxifolia*, miro *Pferruginea*, totara *Podocarpus totara* and kahikatea *Dacrycarpus dacrydioides*) are only in slightly better condition. There is still a scattering of seed trees left, but year by year they grow fewer. Deer and possum browse is sufficient to be preventing all but a minimal regeneration of these mighty trees.
5. A tree fern phenomenon accompanies forest collapse and recovery in the presence of deer. The plots, small as they are, have shown that the recruitment of tree ferns is favoured where there are deer, probably

because the competition from the wealth of other more palatable plants is less. Possums no doubt foster this effect too. Tree fern trunks are important microsites for the recruitment of many canopy trees via an epiphytic phase in native forests. Deer and possum browse is probably sufficient in the Mid Pohangina to negate the potential benefit to forest recovery of the tree ferns they otherwise encourage.

6. There are still too many deer and possums in the Mid Pohangina Valley to allow the recovery of resilient diverse enduring native forests. Better deer and possum control are needed. Otherwise it is likely that the current forests will in turn collapse, perhaps within 50-100 years, and this time the recovery will be a lot less vigorous.
7. The two exclosures should be maintained. They require annual checks and regular repairs to ensure their security from deer entry. The paired vegetation plots we set up this trip are the means of telling the forest story. They should be remeasured at five-yearly intervals, which would make them next due for remeasurement in 2002. The plot data are to be housed in three places: at Pohangina Field Centre, Napier Conservancy Office, and Manaaki Whenua (Landcare Research) Christchurch (as part of the National Vegetation Survey database).
8. There are numerous other plots, photopoints and transects set up in the Pohangina Valley in the past to monitor vegetation condition and trend. Contact for knowledge of these currently resides with Bill Fleury (Wanganui Conservancy, Department of Conservation), Geoff Rogers (Otago Conservancy, Department of Conservation) and Peter Bellingham (Manaaki Whenua, Christchurch). The reason these plots were established should be kept alive in Department of Conservation. A selection of them should be regularly maintained and remeasured.

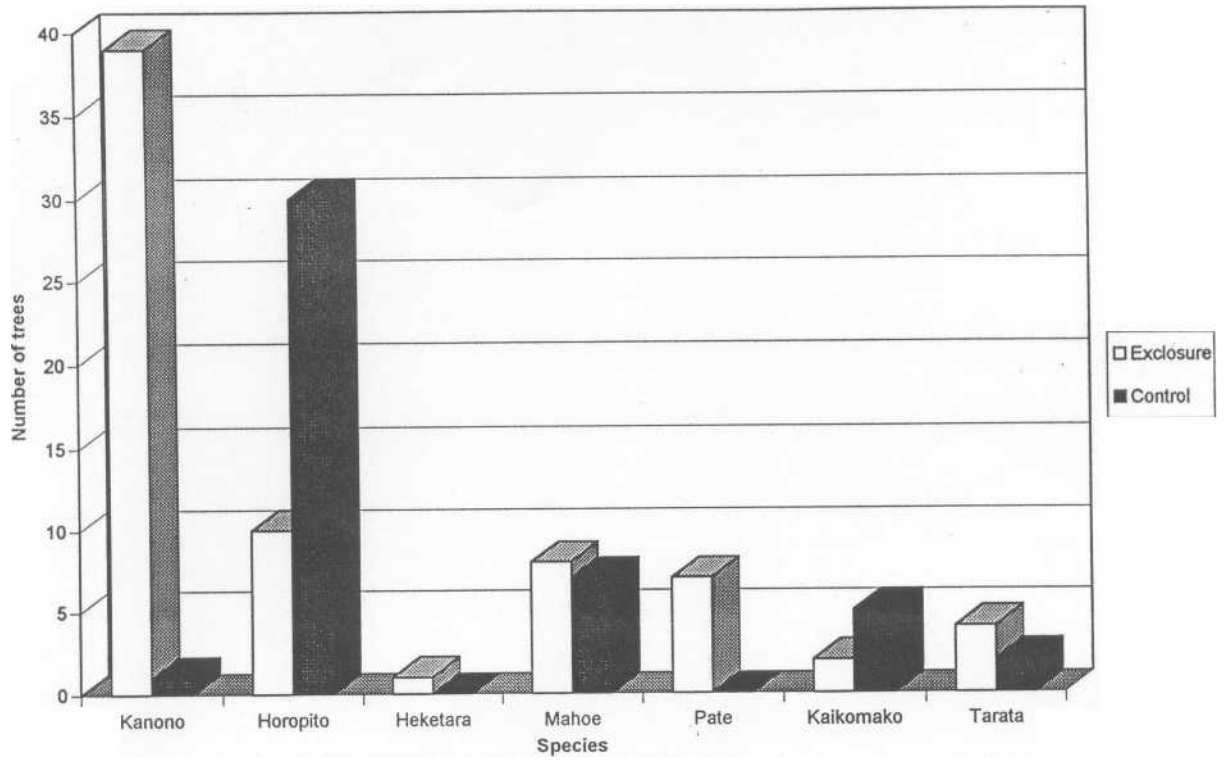


Figure 1. Mid Pohangina hut exclosure, trees.

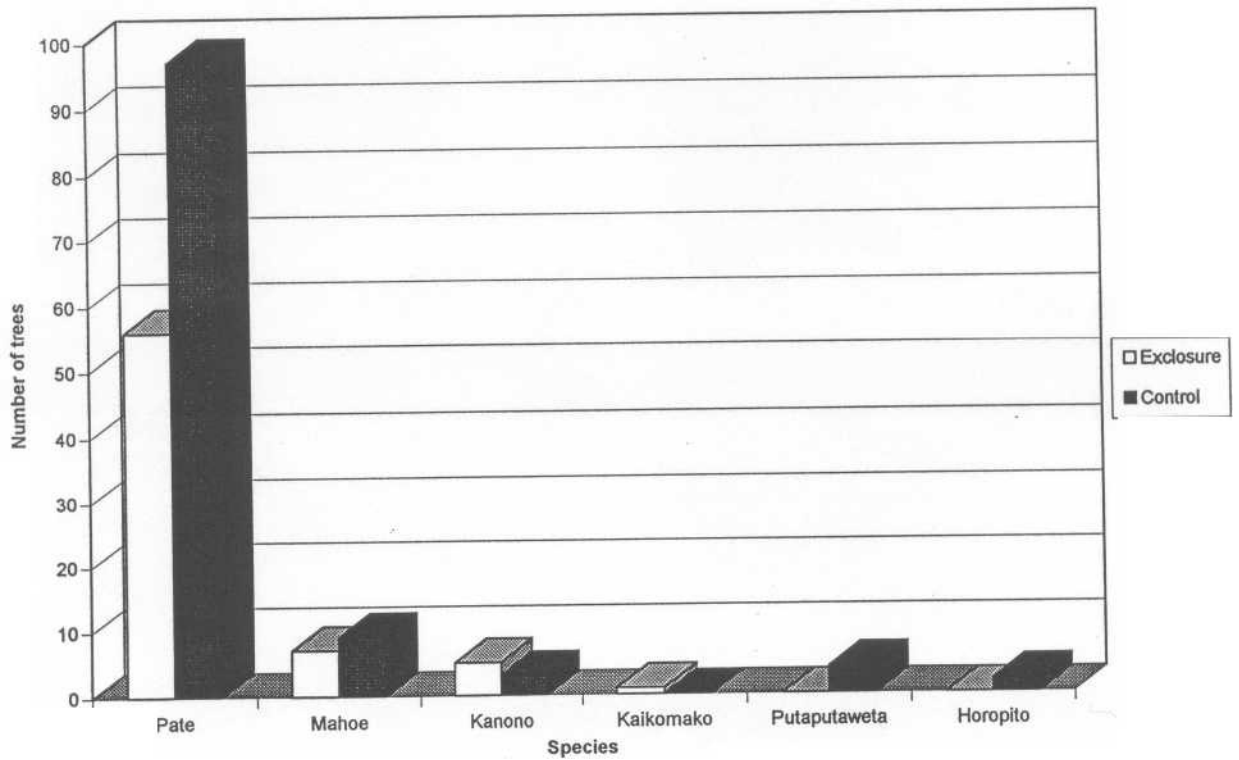


Figure 2. Mid Pohangina "Cabinet" exclosure, trees.

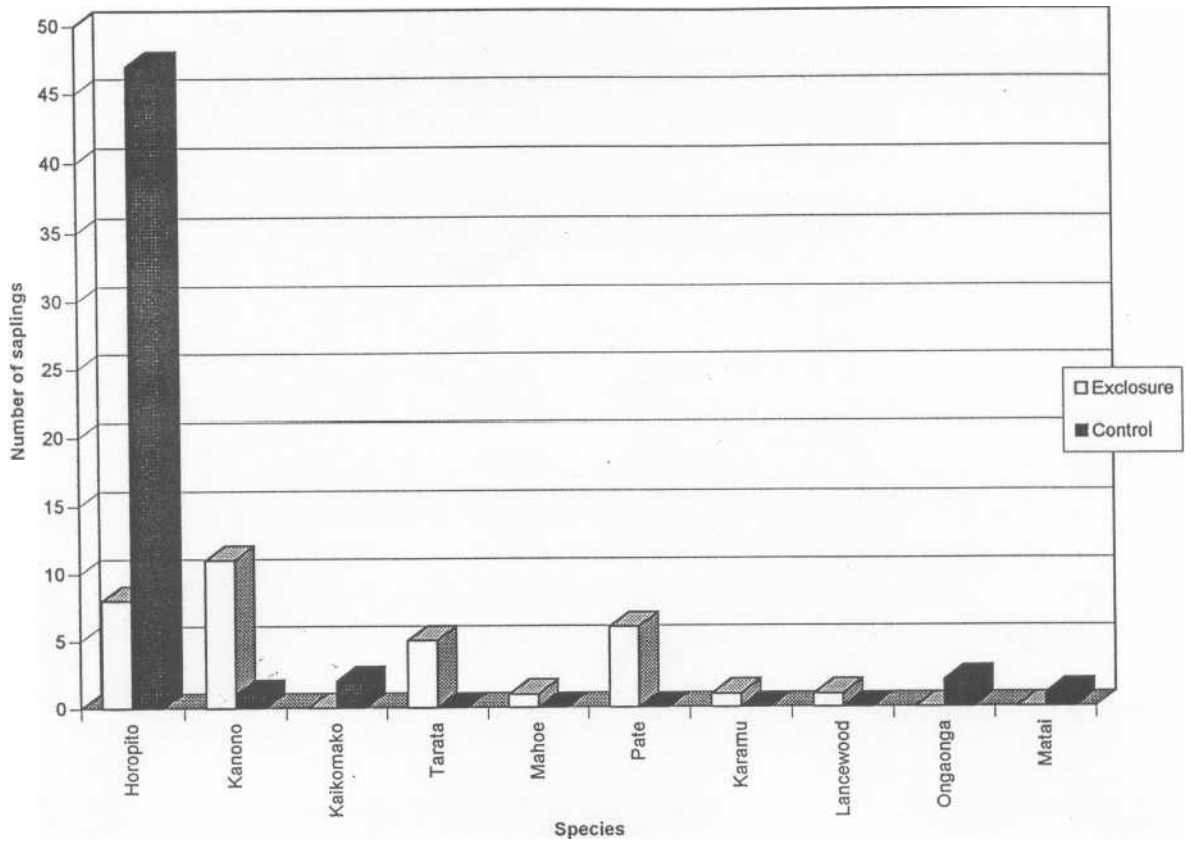


Figure 3. Mid Pohangina hut enclosure, saplings

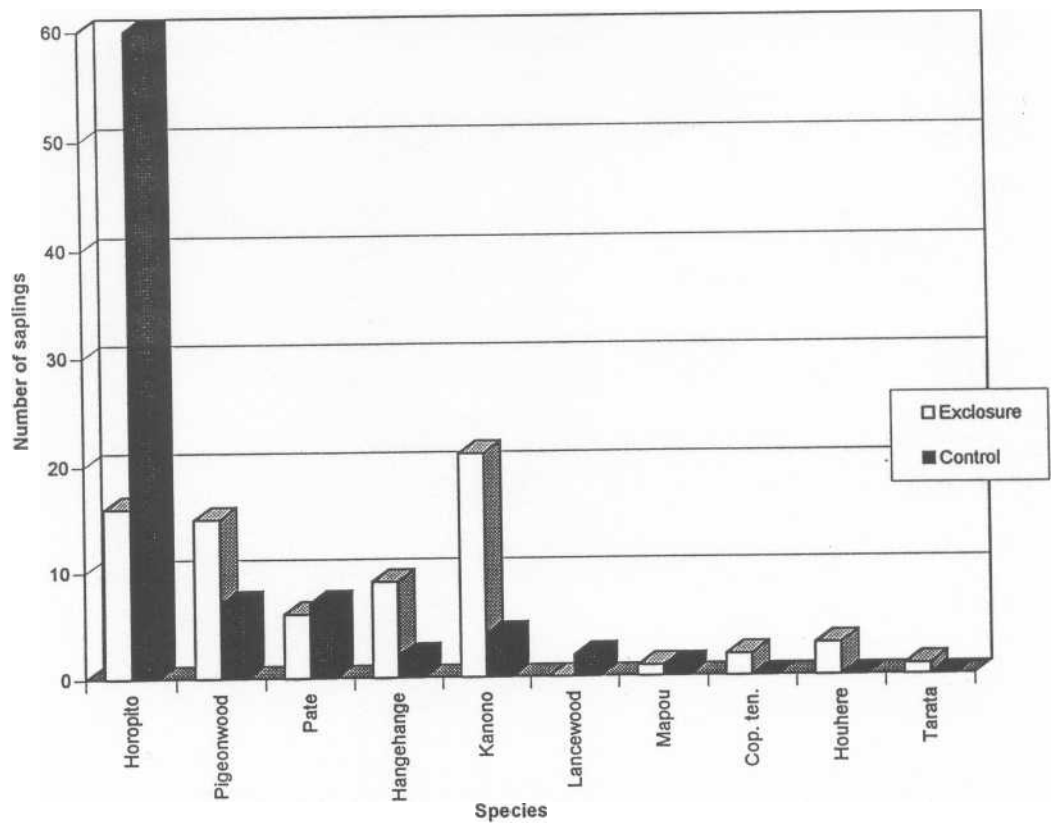


Figure 4. Mid Pohangina "Cabinet" enclosure, saplings.

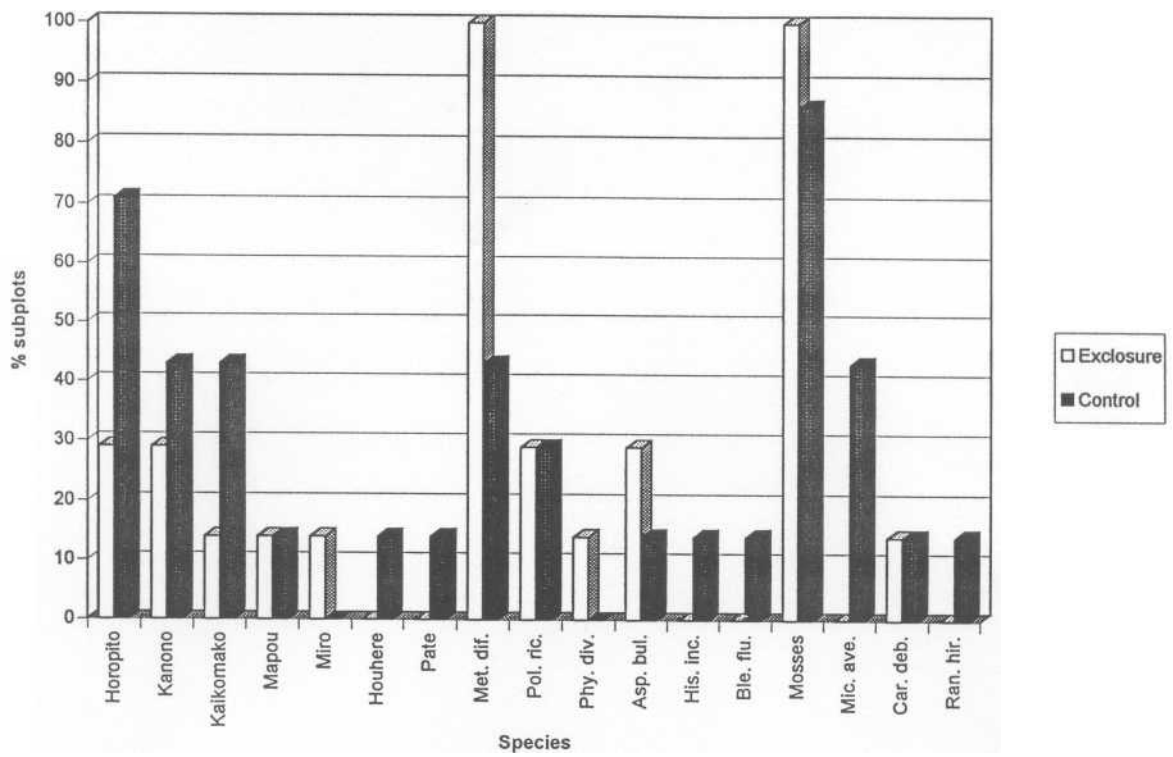


Figure 5. Mid Pohangina hut enclosure, understorey.

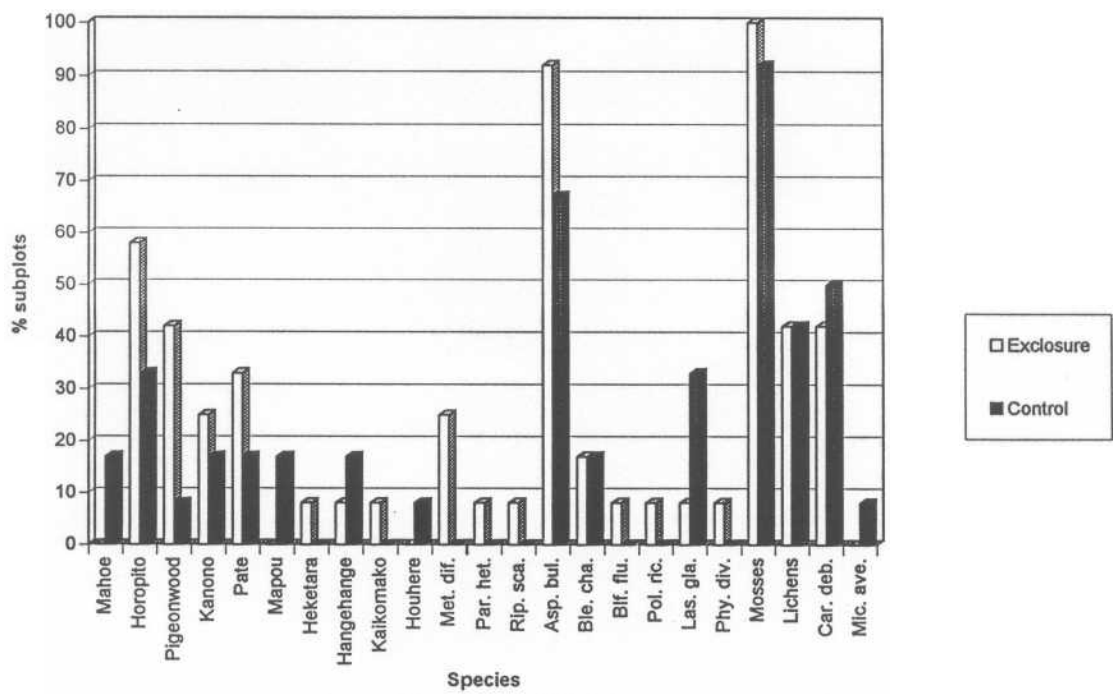


Figure 6. Mid Pohangina "Cabinet" enclosure, understorey.