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AN ASSESSMENT OF THE CURRENT STATUS OF KAMAHI FOREST IN THE KAITAKE RANGE, EGMONT NATIONAL PARK

(Short Answers in Conservation Science)

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AN ASSESSMENT OF THE CURRENT STATUS OF KAMAHI FOREST IN THE KAITAKE RANGE, EGMONT NATIONAL PARK

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ABSTRACT

Results of a two-day reconnaissance survey of kamahi (*Weinmannia racemosa*) dieback on the Kaitake Range, Egmont National Park are reported using an earlier survey conducted in 1978 and 1979 as the baseline.

Keywords kamahi; *Weinmannia racemosa*; dieback; Kaitake Range; Egmont National Park.

1. INTRODUCTION

On 22 and 23 September, 1992, I inspected parts of the Kaitake Range with J. Barkla, B. Fleury and C. Ogle (all DoC Wanganui Regional Conservancy) and R. Tetteroo (22nd only; DoC Stratford Field Centre Manager).

The purpose of the inspection was to provide comment to DoC as requested "on the current status of kamahi in the Kaitake Range, Egmont National Park, as compared with its status as reported, e.g. by Clarkson (1985, 1986) including:

a) magnitude of any changes
b) likely causal agents and risk to kamahi in other parts of ENP
c) likely recovery/regeneration sequences and impacts of goats and possums on these sequences."

2. BACKGROUND

As part of my D. Phil. research I measured some 41 forest plots on the Kaitake Range, mostly of 400 m^2, and described the vegetation at a further 15 sites representing minor vegetation types such as early successional scrub, exotic plantations, cliff face, rock outcrops and pa sites (Clarkson 1982, 1985, 1986). The data were collected during the summers of 1978 and 1979 and mainly consisted of semi-quantitative estimates of species composition with notes describing canopy condition etc. The data for one altitudinal sequence, that of Manders Spur Track Ridge, were fully quantitative and in particular recorded dbh of all live and dead stems within seven plots. None of the 41 plots was permanently marked but location notes and altitude (+/- 3m), aspect and slope were recorded to enable approximate relocation of plots. At the time of this survey, only one plot out of twelve kamahi forest plots had a significant number of trees dead or in severe dieback. This was a plot at 427 m asl, on the Manders Spur Track Ridge, in forest dominated by hinau which was transitional between the upper altitude kamahi forest type and lower altitude forest dominated by tawa. Of the 14 main kamahi stems measured in this plot, 10 were dead.

3. RESULTS

On 22 September 1992 we inspected the altitudinal sequence from Lucys Gully to Patuha, the highest point in the Kaitake Range. From the lower limit of the kamahi forest type, as mapped in Clarkson (1985), to the summit, dead kamahi trees and trees in severe dieback were widespread and abundant. We also traversed the ridge from Patuha down to Patuha Pa. Again, most kamahi were dead or in severe dieback condition. Four plots were relocated within the level of accuracy allowed by the methodology. In all four plots, significant proportions of kamahi were dead, and the remaining individuals in various stages of dieback (Appendix 1).

Severe possum browse was noted on many species including kamahi, hinau, toro and mahoe.

Although the forest canopy along the route travelled was in poor condition, the understorey, shrub and ground cover layers were generally in excellent condition as a result of the significant reduction of goat numbers in recent years. This was best illustrated at Patuha Pa site. At the time of my earlier survey, banks dominated by exotic grasses were eroding as a result of heavy goat use, the forest surrounding the pa site had little or no shrub layer and the ground cover was a grassy sward of *Microlaena avenacea* and *Uncinia* spp. Now, ferns and shrubs, especially *Blechnum* "blackspot" and *Sticherus cunninghamii,* drape several banks which were eroding in 1978 and a dense shrub layer in which *Pseudowintera axillaris, P. colorata* and *Gahnia pauciflora* are prominent has developed in an area which in 1978 had no shrub layer. The increase in several formerly restricted species was also noted. Eight individuals of the shrub *Cassinia vauvilliersii* were scattered through the exotic grassland in 1978. At least 35 individuals are now present.

A single *Cordyline indivisa* was known on the Sefton Ridge Track (600 m) in 1978. This was windthrown in c. 1980 and consequently heavily browsed by goats. By 1986 it was dead. During the present survey, several juvenile *Cordyline indivisa* were noted on the Patuha summit and along the upper reaches of the Sefton Ridge Track.

On 23rd September, we inspected the altitudinal sequence from Manders Spur track entrance to Kaitake summit. The condition of kamahi was more variable in this sector of the range with substantial areas of the kamahi forest type, as mapped by Clarkson (1985), dead or in severe dieback but small pockets of trees in good condition and others with minor crown dieback and vigorous resprouting. A healthy pocket of kamahi was noted just below Goat Rock. Initial observations suggested soil depth may have been a significant factor with healthy trees being confined to saddles or other sites with deeper soils, but no consistent pattern was detected following the two days of reconnaissance. Two plots were relocated within the level of accuracy allowed by the methodology (Appendix 2). The recovery of the shrub and ground cover layers was again notable especially the lower reaches of the Manders Spur Track where juvenile nikau and a wide variety of broadleaved shrubs and small trees comprise a well developed shrub layer. Several juvenile *Cordyline indivisa* were noted en route to Kaitake summit. This species was not recorded in this sector of the range during my earlier survey. *Coprosma tenuifolia* is another species which has become more common since my first survey.

4. DISCUSSION

4.1 Magnitude of any changes

Gross changes in the condition and structure of the kamahi forest (as mapped by Clarkson 1985) have occurred within the last two years and are still underway. Prior to 1980, some 100 of the kamahi forest type could have been categorised as in extremely poor condition. Presently more than 75% of the type could be so categorised.

4.2 Likely causal agents and risk to kamahi in other parts of ENP

Causes of death and dieback of forest trees are the subject of much debate worldwide. Manion (1981) remarks that "one characteristic common to all declines is the lack of agreement among various researchers on the cause and importance of the specific factors implicated in declines". In the present case, a major difficulty is the fact that the level and frequency of monitoring required to make an accurate assessment of causal agents has not been carried out. Identifying causes of death after the event is difficult. However, given these reservations, several potentially significant predisposing and/or trigger factors can be identified for the Kaitake Range kamahi forest.

First, much of the range top forest has developed following disturbance associated with Maori occupation sites. Other areas have developed following natural disturbance regimes associated with slipping or windthrow. The kamahi forest which develops following this type of gross disturbance is often predisposed to major dieback as it comprises cohorts of trees at a similar age/life stage.

Second, portions of the kamahi forest were badly damaged by Cyclone Bernie in 1982 and even more so by Cyclone Bola in 1988. Trees were stripped of foliage and branches and branchlets also damaged. Kamahi has an innate capacity to recover from this type of damage by epicormic resprouting. However, trees which are of low vigour because they grow on severely stressed sites or because they are old and senescent show reduced capacity to recover from such damage.

Third, possum numbers in the Kaitake Range have been high for many years and numbers destroyed post-Bola have been very low (<300 per year for a forest tract of 2400ha) due mainly to low skin prices (Matthews 1992). Possums find kamahi palatable and epicormic resprouts are likely to have been targeted by possums as a preferred food. Browsing of epicormic resprouts would further reduce the capacity of trees to recover from initial damage.

Fourth, kamahi is also known to be susceptible to fungal (*Sporothrix*) induced mortality after attack by pinhole borer (*Platypus* spp.) (Payton 1989). Damage caused to mature trees by Cyclone Bola could increase the potential for Platypus attack. However, widespread mortality from this cause is characteristically a feature of forests that are already in decline (Payton 1989).

The death and dieback of kamahi presently occurring is most likely caused by a combination of the factors outlined above. The most significant in my opinion are the effects of high levels of possum browsing on trees recovering from the damage caused by Cyclone Bola.

The decline of kamahi forest on the Kaitake Range is similar to that occurring in many other locations in New Zealand (for example, Brockie 1992, Rose *et al*. 1992). It can be expected that similar declines will occur in many other areas of Egmont National Park because of the overwhelming dominance of kamahi in these forests, their strongly cohort nature, and the presence of substantial possum populations. The extreme dominance of kamahi in many of the park's montane forests could possibly result in decline on a scale even greater than that presently occurring in the Kaitake Range. The death and dieback of kamahi on the Kaitake Range is not the only cause for concern; several other species in the upper altitude forests are being severely browsed, for example, toro, hinau and mahoe. Fundamental changes in composition and structure are being caused by possum browsing. While there is presently no research to show what levels of possum browsing would be tolerable in this vegetation type, it is abundantly clear that current possum densities are too high.

4.3 Likely recovery/regeneration sequences and impacts of goats and possums on these sequences

The likely recovery/regeneration sequences following the collapse of the kamahi forest are indicated by the present composition of the understorey/shrub layers and by historical accounts of similar events at other North

Island localities, for example, Orongorongo (Brockie 1992). As has already been noted, the condition of most shrub and understorey layers is good because of the low numbers of goats present. However, the dominance of small trees such as *Pseudowintera* suggests that the most likely outcome is a low stature shrub-forest comprising mainly unpalatable species. Kamahi mass regeneration normally occurs on open sites and the dense growth of shrubs etc. will probably restrict kamahi regeneration to epiphytic situations, e.g. on tree ferns or perhaps on logs of fallen kamahi. Therefore kamahi is unlikely to regain dominance. However, some tall tree species unpalatable to possums may be released following the collapse of the kamahi trees and become more abundant canopy components. Podocarps such as miro, rimu and Hall's totara are likely to be favoured by this scenario, although in the latter case, this might be a temporary increase as Hall's totara is palatable to possums. Replacement of forest with large components of kamahi by low shrub-forests and even mosaics of shrubland and grassland has occurred in several other North Island localities, for example, Ruahine Range and Rimutaka Range and in these kamahi has remained uncommon. As kamahi becomes more uncommon, it can be expected that possums will select other species currently not preferred foods.

If control measures such as 1080 poisoning were introduced it is likely that some of the kamahi with minor crown dieback will recover. However, it is unlikely that the successional direction of the badly affected areas, i.e., towards a low stature shrub-forest dominated by *Pseudowintera,* would change. But continued high numbers of possums will limit the potential for this type to be replaced by palatable tall forest species.

In future, when severe disturbance events like Cyclone Bola affect large areas of forest in the park, consideration should be given to reducing or holding possum numbers at a low level over the critical period (several years) following the event, This may enable a greater proportion of kamahi and similar species the opportunity to resprout and successfully recover from the disturbance.

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APPENDIX 1

1979	1992
Plot No. 41 Patuha 673 m **kamahi-toro-pigeonwood forest** no kamahi dieback intact canopy >80% cover	total canopy cover 30% kamahi crowns 60-70% dead kamahi individuals 90% alive mahoe browsed toro browsed pigeonwood browsed composition of understorey/shrub/ground cover layers as before
Plot No. 39 Patuha 664 m **miro/kamahi-toro forest** no kamahi dieback	total canopy cover 10-15% kamahi crowns 80% dead kamahi individuals 20-30% dead toro browsed miro healthy composition of understorey/shrub/ground cover layers as before
Plot No. 36 Patuha 603 m **kamahi-pigeonwood-mahoe forest** no kamahi dieback intact canopy >70% cover	total canopy cover 50% kamahi crowns 30% dead kamahi individuals 10% dead mahoe browsed pigeonwood browsed composition of understorey/shrub/ground cover layers as before
Plot No. 30 Patuha 542 m **mahoe-kamahi-rewarewa forest** no kamahi dieback intact canopy >80% cover	total canopy cover >80% kamahi crowns 50-100% dead kamahi individuals >50% dead

APPENDIX 2

1979	1992
Plot No. 37 Nanders 646 m **kamahi-*Cyathea smithii*-pigeonwood forest**	total canopy cover <50%
3 dead kamahi stems out of 20 intact canopy >90% cover	kamahi crowns 60-90% dead kamahi individuals 40% dead several stems of kamahi have vigorous resprouts toro browsed mahoe browsed composition of understorey/ shrub/ground cover layers as before
Goat Rock	
no kamahi dieback hedge-like kamahi	kamahi crowns >90% dead kamahi individuals >80% dead