THE ECOLOGY AND MANAGEMENT OF KAIKAWAKA (LIBOCEDRUS BIDWILLII) ON BANKS PENINSULA - A PROGRESS REPORT

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INTRODUCTION

Seven indigenous conifer species occur naturally on Banks Peninsula of which two (lowland totara Podocarpus totara and mountain totara Podocarpus hallii) are common, two (kahikatea Dacrycarpus dacrydioides and matai Prumnopitys taxifolia) rather less common, and three (kaikawaka Libocedrus bidwillii, miro Prumnopitys ferruginea and rimu Dacrydium cupressinum) rare. Only two rimu, both male trees, and five adult miro are known while about 150 kaikawaka plants remain alive.

Botanists such as Laing and Cockayne who visited Banks Peninsula at the turn of the century noted that kaikawaka was a distinctive and common species in the uppermost forests, usually growing in association with mountain totara. However, by the time Kelly surveyed the Banks Peninsula scenic reserves in the late 1960's, kaikawaka was all but extinct. Widespread mortality appears to have occurred amongst adult trees in the 1950's with only one live adult and small areas of regenerating saplings present today. A further set-back occurred in June 1984, when a gorse fire on the Akaroa side of Flag Peak was swept out of control by gusty north-west winds over the top of Flag Peak and down into the Armstrong Scenic Reserve. About 400 kaikawaka saplings were killed by the fire representing a 75% reduction in the number of kaikawaka on Banks Peninsula. This area had, until then, been considered as offering the best chance for the long-term survival of this species on Banks Peninsula.

In this article we want briefly to outline the progress made in our research into kaikawaka ecology on Banks Peninsula, looking in particular at the present distribution and then suggesting future management considerations. The research that this work is based on is far from finished and our comments in this article can only be considered preliminary.

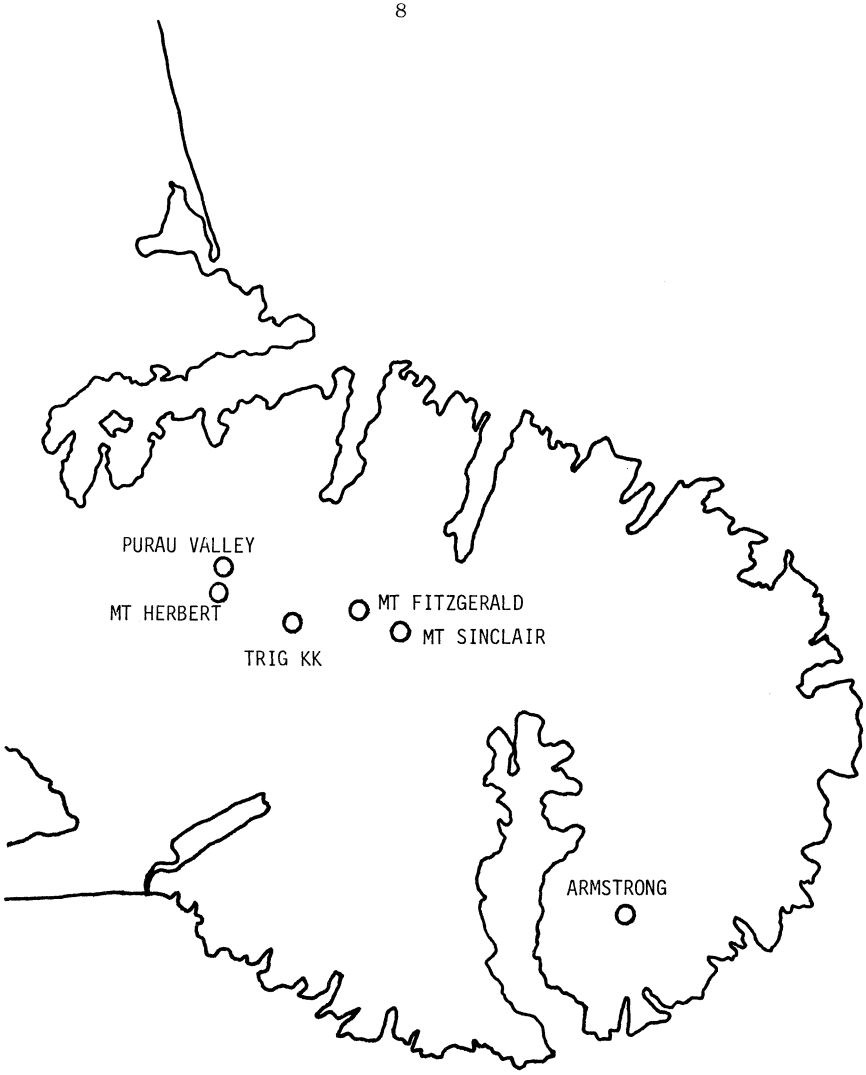


FIGURE 1: LOCATION OF SITES WITH LIVE KAIKAWAKA AS AT MARCH 1986, BANKS PENINSULA.

DISTRIBUTION

Kaikawaka is presently known from six sites on Banks Peninsula (Figure 1):

(i) Armstrong Scenic Reserve. About 75 saplings are present on the northeast side of the reserve and appear to be in good health.

(ii) Mt. Sinclair Scenic Reserve. Only two saplings were seen here in 1985, although it is possible that a few more may still be present. The two saplings are both showing pronounced foliage dieback.

(iii) Mt. Fitzgerald Scenic Reserve. Six young kaikawaka have been seen here and some appear quite healthy.

(iv) Trig. KK. The only known live adult kaikawaka on Banks Peninsula is present at the edge of a small stand of mountain totara. Based on growth ring counts, this tree is about 300 years old.

(v) Mt. Herbert Scenic Reserve. Two small groups of kaikawaka saplings occur under Trig ZZ and comprise about 35 plants in total. A further plant has been recorded from the west side of the reserve. The majority of these plants do not appear to be growing well and have suffered considerable foliage dieback over the last few years.

(vi) Upper Purau Valley (northeast side of Mt Herbert). 14 kaikawaka saplings, including the largest plants after the Trig KK tree, occur here. Most plants are growing well.

Several other sites have been searched for kaikawaka, but with no success. However, some places still need a careful examination and include Mt. Bradley (Packhorse Scenic Reserve), Duvauchelle Peak, Mt. Pearce, View Hill and Lavericks Peak. We would be very pleased to hear from anyone who has found, or thinks that they have found, kaikawaka at sites from which we have not yet recorded it.

KAIKAWAKA ECOLOGY

From our work to date, a number of general points about the ecology of kaikawaka can be deduced. Firstly, kaikawaka occurs only on the highest peaks of Banks Peninsula. Nowhere have either dead or live kaikawaka been seen below 600 m elevation and at all the sites in which kaikawaka occurs today, with the exception of Trig KK, the highest peak within one kilometre of the site is over 800 m elevation. A related observation is the consistent occurrence of the mountain cabbage tree (Cordyline indivisa) with kaikawaka. Elsewhere in the South Island, both of these species occur in areas with comparatively high rainfall, usually over 2000 mm per annum. We would suggest that rainfall, often associated with a mantle of low cloud, is also the major factor influencing the broad distribution of kaikawaka on Banks Peninsula. Based on the limited rainfall data we have, it would seem likely that rainfall around the highest peaks (i.e. those over 800 m) could well be in excess of 2000 mm per annum. We hope to install a series of raingauges on Banks Peninsula this year to test this.
If the broad distribution of kaikawaka is so closely tied to rainfall, then it is quite likely that drought may have been a significant factor in the mortality of this species in the 1950's. However, it is also likely that other factors (e.g. soil compaction by stock) may also have been involved. We are presently investigating this mortality using dendrochronological (tree-ring analysis) techniques and by examination of rainfall records.

The survival and vigour of sapling kaikawaka would appear to be related to their exposure to the south. Foliage dieback is most pronounced on plants in Mt Herbert and Mt Sinclair Scenic Reserves, and least in the Armstrong Scenic Reserve and Upper Purau Valley. These latter two sites, are sheltered from the south, while the former two sites are exposed to the south. Cold southerly winds may be an important factor in this dieback.

At all the sites in which young kaikawaka occur, dead adult trees are found in close proximity (usually within 200m). Although the seed has a thin membranous wing, it would appear that it is not normally dispersed far. The dead adult kaikawaka usually occur in

small groups of up to 20 trees in mountain totara forest while all the regenerating kaikawaka (with a few exceptions) occur outside the forest amongst tussocks and shrubs. This preference of kaikawaka regeneration for open sites has also been observed in other studies of this species elsewhere in New Zealand. The areas, where kaikawaka is regenerating today, have had their forest cover removed at some stage in the past by fire. These fires have almost certainly resulted from human activities. It is possible that many of the now dead, adult kaikawaka trees may also have established, after earlier burning as fires resulting from man's activities, would appear to date back nearly 1000 years on Banks Peninsula. If fire has had such a significant impact on the distribution of kaikawaka stands, then it is very difficult to evaluate the role of kaikawaka in the Banks Peninsula forests prior to the arrival of humans.

KAIKAWAKA MANAGEMENT

Kaikawaka is an endangered species on Banks Peninsula, but unlike rimu enough plants are still present to offer perhaps some hope for its continued survival. However, simply fencing reserves may not be enough to prevent its local extinction - fencing certainty didn't stop the 1984 fire and, if it had been present, may not have prevented the 1950's mortality. We would like to finish this article by briefly considering the future management of kaikawaka on Banks Peninsula.

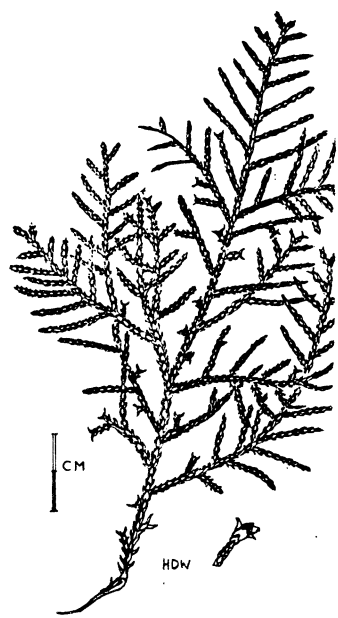
It is important initially to identify the role of reserves, in our case the forest reserves on Banks Peninsula. As John Herbert has recently pointed out (N.Z. Journal of Ecology 8, 1985, p. 148) there are two fundamentally-opposed approaches to the management of reserves. The first approach assumes that all species and communities in the reserve are of equal value and therefore intrinsic ecosystem processes must be permitted to occur free from human intervention. The second approach recognises the special importance of specific species or communities and therefore requires active intervention to maintain these special features. We would suggest that small forest reserves such as those on Banks Peninsula fall into the second category.

Before active management can take place it is, however, essential that a detailed knowledge of both the ecology of the species or community of interest, and of the areas to be managed, is available. After all, there is no point in planting a tree in a site where it is unlikely to grow. Based on this knowledge management should attempt to achieve a certain set of goals. Active management can include monitoring of plant numbers, control of unwanted plants, protection of plants, release thinning, planting, fertiliser applications etc.

In the case of kaikawaka, the main management action presently needed is monitoring of existing plants and establishment of new ones. Based on present plant vigour, the Armstrong Scenic Reserve would appear to offer the most potential for the successful re-establishment of kaikawaka. A monitoring programme has been started and people finding tagged plants are asked not to interfere with them. Planting is still several years away as suitable young plants need to be raised in the nursery first. We are presently looking at propagation from both local seed and cuttings, but consideration will need to be given to genetic factors before any planting is undertaken.

CONCLUSION

We feel that although kaikawaka numbers are low on Banks Peninsula, it should be possible to maintain this species, and the associated uppermost forest communities, by careful mangement and appropriate enrichment of the remaining forest remnants.



LIBOCEDRUS BIDWILLII