



# Possums ...

## Their Effects on Native Vegetation

### Introduction

Possums are a serious conservation pest not just because they can decimate localised stands of trees such as the spectacular, red flowering pohutukawas trees on Rangiototo Island, but more importantly because they change the overall structure and composition of native forests and other ecosystems.

### Overall impacts

Possums eat about 21,000 tonnes of vegetation per day (300 g wet weight per possum x 70 million possums). This oft-quoted figure is frequently used to depict possum as a rapacious consumer of all things green, but that implication ignores the daily foliage production of perhaps 300,000 tonnes for forests alone (7.5 million ha x 15 tonnes wet weight of foliage/ha/yr). These rough calculations are backed up by a study at Waihaha, West Taupo, that showed possums there ate only a small percentage (<15% by weight) of the annual foliage production of any of the 15 most common plants. Possoms do not, therefore, threaten total deforestation on a national scale—in most forests, the process is one of compositional rather than structural change.

### How do forests change?

There are three broad processes at work:

**Catastrophic dieback of forest:** the change with the highest public profile is undoubtedly where possums cause all or most of a forest canopy to dieback over a short period. Although much effort has been directed at understanding and ameliorating this process, it only affects a relatively small proportion of our native forest—those dominated by just a few possum-preferred species such as the rata or kamahi. Historically, the relationship between dieback and the timing of possum invasion has been subject to much debate, but it is now widely accepted that catastrophic dieback is typically (but not always) caused by possums about 15–25 years after they colonise an area, which is about when their numbers reach an unsustainably high peak before dropping to lower levels. Susceptibility to catastrophic dieback varies between areas, depending on factors such as stand history, age, diversity, substrate type, and landform.

**Gradual depletion:** In more diverse communities which have a greater mix of palatable and unpalatable species the main initial impact process is one of gradual, possibly episodic, depletion. Possums selectively remove some species over many decades, resulting in compositional shifts. The greatest shifts are likely in mixed broadleaf forests in which species preferred by possums are abundant. However, even in the least susceptible forest types some minor species disappear (eg; mistletoes in beech forest). Gradual depletion is also likely to continue in areas where catastrophic dieback has occurred, but which still contain preferred species in canopy remnants.

The key question in our research is whether the process continues indefinitely until all possum-preferred species are completely eliminated, or whether some equilibrium is reached in which at least some possum-preferred species remain as a substantial component of the forest. Obviously possums can only persist if adequate forage is available. However possums do not use all available forage uniformly, even within species—an individual rata tree can be completely defoliated, but its neighbour left untouched until later. The forest as a whole might withstand possum browsing if it was spread evenly across all species. In reality, depletion continues because individuals within species are selectively targeted. In addition, possums can rely heavily on fruit and flowers which may sustain a possum population even when the preferred-foliage species have been depleted.

**Inhibition of regeneration:** Ultimately, the recovery of forest from possum damage must depend on providing adequate protection of regenerating seedlings. The impacts of possums on regeneration are poorly understood—on Kapiti Island, possums killed seedlings of northern rata, tawa, and fuchsia seedlings, although typically a few specimens of each persisted. Researchers and managers have focused on the much more immediate and obvious changes in canopy condition, but also because possum effect on regeneration are not easily separated from the impacts of deer and goats. If, as is usual, deer and/or goats ungulates are present in moderate numbers regeneration of most possum preferred species is suppressed, but many such as kamahi can regenerate profusely after dieback if ungulates are absent. For the few possum-preferred species that are not palatable to deer or goats, such as totara, possums do not appear to affect the growth of young seedlings.

## **Susceptibility to damage by possums**

**Differences between communities:** On the whole, the relative susceptibility of various forest types has become obvious over time. At one extreme, possums have little effect on simple beech forest with few preferred species. At the other extreme, possums cause catastrophic dieback or major compositional shifts in rata, pohutukawa, or kamahi dominated types. The only major uncertainty is perhaps the susceptibility of the diverse and unique forests in Northland (where possums have only recently colonised). For the most severely affected communities, the key issue is whether the change is reversible (i.e., whether possum removal would result in the forest returning to the original type or continue to develop into some alternative type).

**Differences between species:** The species most threatened by possums fall into two main groups: (i) common species that are major stand components and loss of which fundamentally changes the nature of the stand or community (eg., kamahi, rata, pohutukawa, tree fuchsia, totara, kaikawaka); and (ii) species that are rare and could be driven to local or national extinction by possums, such as some mistletoe species and the wood rose.

For some commonly browsed species, the impact of possums is not yet clear. Possums are implicated in the dieback of totara, but totara in areas without possums are often in poor health. Possums do not appear to affect totara seedlings.

**Differences within species:** Some species vary widely between areas in their ability to tolerate possum browse - tree fuchsia in the eastern South Island races appears far less palatable to possums than tree fuchsia elsewhere. It is not clear whether this variation has a genetic basis, but if it does then concern for the long-term survival of tree fuchsia is lessened.

## **Research**

Landcare Research has teams of scientists working on all of the issues and questions discussed here. The work is funded largely by the Foundation for Research, Science and Technology, and by the Department of Conservation.

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