

## Miro seed dispersal and NZ Pigeon

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Have you ever wondered about the importance of seed dispersal by the New Zealand pigeon (*Hemiphaga novaeseelandiae*) for the regeneration of large-fruited woody plant species such as miro (*Prumnopitys ferruginea*)? Does a decline in pigeons cause a decline in regeneration of miro? Is pigeon presence or absence related to seedling dispersal patterns? Finding the answer to these questions is the focus of my masters thesis supervised by Janice Lord.

Spatial patterns and distances of seed dispersal for indigenous New Zealand woody plant species have not been well quantified (Table 1). There is almost no literature quantifying descriptive statistical measures or non-randomness of distribution.

Birds may disperse large-fruited seeds in non-random patterns and over greater distances than seed dispersal by gravity, wind, rain or stream. This is considered important for effective regeneration for two reasons. First, bird dispersal is more likely to enable seedlings to escape high mortality under the parent tree. Secondly it is more likely to enable seedlings to disperse to favourable sites (Howe and Smallwood 1982).

As the New Zealand pigeon is the only bird with a gape size large enough to disperse the seed of some indigenous large-fruited plant species, the decline of the New Zealand pigeon may result in less effective regeneration of those species (Clout and Hay 1989).

Studies to date (Table 1) have not stated the hypothesis in the form of testable predictions. The studies have not collected enough data to test the components of the hypothesis.

Consequently there is no study that successfully demonstrates an adverse effect on forest and plant regeneration caused by absence of seed dispersal by the New Zealand pigeon.

Table 1. A summary of the existing literature on fruit size and dispersal in selected New Zealand tree species. <sup>1</sup>Clout & Hay 1989, <sup>2</sup>McEwen 1978, <sup>3</sup>Clout & Tilley 1992 (unpub. data)

Plant	Fruit diameter <sup>1</sup>	Pigeon dispersed Observed	Bellbird, tui, other dispersed Observed	Dispersal distance from source	Sample size n Mean x standard deviation <i>sd</i>
Karaka <i>Corynocarpus laevigatus</i>	>14 mm	Y <sup>2</sup>	N <sup>2</sup>	?	?
Puriri <i>Vitex lucens</i>	>14mm	Y <sup>2</sup>	N <sup>2</sup>	?	?
Tawa <i>Beilschmiedia tawa</i>	>10 mm	Y <sup>2</sup>	N <sup>2</sup>	?	?
Tawapou <i>Planchonella costata</i>	>10 mm	Y <sup>2</sup>	N <sup>2</sup>	?	?
Miro <i>Prumnopitys ferruginea</i>	>10 mm	Y <sup>3</sup>	N <sup>3</sup>	35%<10m 40%>10 &<30m	<i>n</i> = 1 pigeon seeds ? <i>n</i> = 1 tree
Maire <i>Syzygium maire</i>	>10 mm	Y <sup>1</sup>	N <sup>1</sup>	?	?
Kohekohe <i>Dysoxylum spectabile</i>	>10 mm	Y <sup>2</sup>	N <sup>2</sup>	?	?

My research question is therefore “Does the absence of New Zealand pigeon result in less effective seed dispersal, seedling recruitment and regeneration of miro?” I have selected miro because of its South Island range and because of the size of the fruit. Only the NZ pigeon can disperse miro seeds (Beveridge 1964; Clout and Hay 1989). In winter miro is a major part of the pigeon’s diet (McEwen 1978). However passage through a pigeon is not crucial to germination (Clout and Tilley 1992).

My approach to the question is to quantify spatial patterns indicating effectiveness of regeneration in sites with pigeons and sites without. The patterns are density and height of seedlings, distance from female adult miro, and canopy composition above seedlings. I will be looking at relationships with canopy species and I will be attempting to derive a cumulative distribution function for the dispersal pattern of seedlings.

I sample for these patterns along transects by looking for patches of miro seedlings in forest fragments. When I find a patch I record the number of seedlings and their height within a 5 by 5 m plot. I record the canopy species present above the plot and which species are dominant. I then measure the distance from the seedling plot to the nearest adult female-tree. That is the minimum distance that the seed must have been dispersed. The prediction is that average distance from seedlings to nearest female adult miro will be greater with pigeon dispersal than without.

My study sites are typically scenic reserves in the Catlins. These usually are lowland kamahi-broadleaf-podocarp forests with good numbers of pigeons. So far I have found one site with miro and without pigeons, in the upper Rakaia River.

### *References:*

- Beveridge, A. E. 1964. Dispersal and destruction of seed in central North Island podocarps forests. *Proceedings of the New Zealand Ecological Society* 11: 48-55.
- Beveridge, A. E. 1973. Regeneration of podocarps in a central North Island forest. *New Zealand Journal of Forestry* 18: 23-35.
- Clout, M. N.; Hay, J. R. 1989. The importance of birds as browsers, pollinators and seed dispersers in New Zealand forests. In Rudge, M. R. (Editor). Moas, mammals and climate in the ecological history of New Zealand. *New Zealand Journal of Ecology* 12 (supplement) 27-33.
- Clout, M. N.; Tilley, A. V. 1992. Germination of miro (*Prumnopitys ferruginea*) seeds after consumption by New Zealand pigeons (*Hemiphaga novaeseelandiae*) *New Zealand Journal of Botany* 30:25-28.
- Howe, H. F.; Smallwood, J. 1982. Ecology of seed dispersal. *Annual Review of Ecology and Systematics* 13:201-228.
- McEwen, W. M. 1978. The food of the New Zealand pigeon (*Hemiphaga novaeseelandiae*). *New Zealand Journal of Ecology* 1: 99-108.