

The lowdown on *Pimelea arenaria*

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INTRODUCTION

I have been investigating the threatened species *Pimelea arenaria* for the past 2 years in an attempt to identify the factors that have contributed and are still contributing to its decline. Most of my research has been conducted at three beaches on the Coromandel Peninsula, but I have surveyed 22 populations throughout the North Island, from Spirits Bay to Wellington. Like all research, more questions usually arise and some questions remain unanswered. This research is part of a larger investigation into threatened species being conducted within the BATS (Biodiversity and Threatened Species) programme at Landcare Research.

BACKGROUND

Pimelea arenaria (sand daphne, autetaranga) is an attractive, low growing, endemic shrub that is included in the Thymelaceae family (fig. 1). The genus *Pimelea* is mainly distributed in Australia and New Zealand and comprises about 80 species of shrubs or subshrubs (Allen 1961). *Pimelea* in New Zealand comprises 17 species and a few unnamed taxa.



Fig. 1. *Pimelea arenaria*, Tokerau Beach. Photo: John Smith-Dodsworth.

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Pimelea arenaria was described by Allan Cunningham in 1833 from specimens collected from sandy ridges at the mouth of the Hokianga River, Northland. It has been listed in threatened plant lists since they were first published in 1992. *Pimelea arenaria* sens. str. is classified as 'Gradual decline' in the latest list of threatened and uncommon plants of New Zealand (de Lange *et al.* 2004).

HABITAT

Pimelea arenaria is restricted to coastal sand dunes and dune hollows and is one of a small suite of about 14 native plants of this habitat (fig. 2). It grows in association with the sand binders spinifex (*Spinifex sericeus*) and pingao (*Desmoschoenus spiralis*), and the colourful perennials *Oxalis rubens* and shore bindweed (*Calystegia soldanella*). In the more consolidated sand of dune hollows and back dunes, associated species include sand coprosma (*Coprosma acerosa*), *Carex testacea*, knobby clubrush (*Isolepis nodosa*), tauhinu (*Ozothamnus leptophylla*), and pohuehue (*Meuhlenbeckia complexa*). Allen (1961) described its distribution as throughout, but more recently, concern has been expressed about its decline in some areas. At some beaches where it was previously recorded, it is now locally extinct, e.g., Taipa (Northland), Piha (Auckland), and Lyall Bay, Otaki, Plimmerton, Red Rocks coast, Seatoun, and Waikanae (all in the Wellington region) (John Sawyer *pers. comm.*).



Fig. 2. Typical *Pimelea arenaria* habitat near the mouth of the Whangaehu River. Photo: John Barkla.

Sand dunes are one of the most disturbed and highly modified ecosystems in New Zealand; many converted to pasture, pine plantation, or developed for roads and housing. In addition, a number of exotic plant species have been deliberately planted for dune stabilisation, beautification, and nitrification, e.g., marram, ice plant, gazania, lupin, etc. Maritime pine (*Pinus pinaster*) wildlings are also a problem at some localities.

The coastal habitat of *Pimelea arenaria* is often subject to dynamic changes as a result of sand erosion during storm events, particularly in association with high tides. Both erosion and deposition of sand are natural events concomitant with tidal influence along the coastal fringe. The sand dune habitat is extremely hostile for plants (and often for researchers). The system is intensively fragmented, and plants have to withstand baking heat, strong winds, abrasive wind-blown sand, low nutrient availability, and partial burial. In addition, its dune habitat is constantly used by people seeking access to beaches (feet, bikes, motorbikes, and vehicles).

HABIT

Pimelea arenaria forms large sprawly clumps up to 2 m or more across, often with several plants growing together. The foliage is greyish and leaves and flowers are clothed in fine silvery, protective hairs. Like many *Pimelea* species, it is gynodioecious, with separate female and hermaphrodite plants. It has a relatively long flowering season, November to February, although I have seen flowers throughout the year. The number of flowers in each cluster at the apex of a stem ranges from 4 to 12. Interestingly, there are more flowers in a cluster on plants north of the Waikato. Immediately after flowering, new growth emerges from below the inflorescence, resulting in continuous cyclic pulses of flowering: i.e., flowering, new growth, flowering, etc. A medium sized plant has the potential to produce many hundreds of flowers and fruit each summer. Flowers are small c. 4 × 6 mm across, and the female flower is smaller than the hermaphrodite. Ovule maturation after fertilisation is rapid, approximately one month from flowering to a ripe fruit. The fleshy fruit is single seeded. Fruit colour is variable; mostly purplish/black, but in Northland ripe fruit were white, pink, or red. Unhealthy plants look scrappy and die back in the centre, often having only a ring of foliage around the outer edge.

WHAT IS THE LOW DOWN?

I do not have all the answers, but it appears from the results so far that *Pimelea arenaria* is not pollinator limited and does not appear to be browsed. The most significant cause of its decline in the past has been the result of habitat modification; many dune ecosystems are now roads, houses, pasture, and pine plantations.

At most of the beaches I have visited, *Pimelea arenaria* seems to be holding its own, for the present, but there were few seedlings or juvenile plants. Fruit is being produced but regeneration is rare. In the long term, that means populations will not be able to replace themselves naturally, and active management may be required. At the few beaches where seedlings and juvenile plants were present, the exotic species were less abundant.

I predict that habitat invasion by exotic species, particularly marram, will contribute to native species decline in the long term. Marram forms dense swards that exclude most other species. In comparison, spinifex spreads over dunes in an open manner, allowing co-habitation with other native species. On some beaches in the far north, *Pimelea arenaria* was growing on the crest of foredunes, and sometimes on dune faces. At most sites, however, the habitat was primarily the more consolidated dune hollows behind foredunes. Unfortunately it is these areas that are more likely to be invaded by exotic species. To complicate matters, it would appear that *Pimelea arenaria*, and other dune species, benefit from replenishment by wind-blown sand. This occurs naturally when spinifex and pingao inhabit foredunes. However, when dense marram dominates foredunes, less wind-blown sand travels back into dune hollows.

In summary, I am dismayed by the almost total destruction of sand dune ecosystems, and their associated backdrop of native forest, that I have observed throughout the North Island. At most beaches, the number of exotic species greatly outnumbers natives. At Cook's Beach, on the Coromandel Peninsula, I have seen the dunes used for dumping grass clippings and other garden waste, and I am sure this practice occurs elsewhere. I believe the introduction of marram was unfortunate and suspect it will impact negatively on native sand dune species for decades to come. Control of maritime pine will be necessary at some beaches to retain *Pimelea* habitat. For example, at Matarangi, the dunes are being colonised by this species. Pingao and spinifex planting is underway at many beaches, but for biodiversity's sake, several other native species could also be planted. Like many highly modified ecosystems, active management will be required to restore sand dunes to what they should be.

REFERENCES

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