

## What limits a rare alpine plant? Demography of *Myosotis oreophila* (Boraginaceae) in relation to two more common *Myosotis* species in New Zealand.

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Plants may be rare through natural causes or habitat modification. An insight into the natural rarity of the extremely localised (c. 0.5ha) *Myosotis oreophila* has been assessed with an ongoing 8-year study in relation to the widespread *M. pulvinaris*, where their ranges overlap (Stanley *et al.* 1998; Arct. Alp.Res.), plus the localised *M. cheesemanii*, on the northern Dunstan Mountains, south-central South Island, New Zealand. This study confirms widely fluctuating populations in the first two species, as well as indicating significant differences in the demography of all three endemic, high-alpine species. Three permanent plots totalling 290m<sup>2</sup> (6.4% of the total population area of *M. oreophila*) are located near the centre and on two margins of the area. Two years of high recruitment, one of high mortality and four of general stability, have occurred while high turnover (Stanley *et al.* 1998) has continued, though 23% of the 612 plants recruited in 1993-4 have persisted for all seven years of the monitoring. Over five years, cumulative survival was 14-21% for *M. oreophila* but 47% for *M. cheesemanii* and only 3.6% for *M. pulvinaris*. Low adult survival is therefore unlikely to be the cause of rarity in *M. oreophila*. Its failure to spread beyond the current limits of its dense population (estimated at 13000 – 21800 plants over the eight years) does not appear to relate to lack of seed dispersal or poor seed production in the sparse marginal plants. These fringe plants had as many rosettes per plant and inflorescences per rosette, and had more recruits per inflorescence, than plants near the centre of the population, but these recruits had lower survival in their first year. Thus, despite high plant turnover, the *M. oreophila* population appears to be relatively stable. Its confinement, i.e. inability to spread, appears to be related to limited survival of new recruits along the margin. This is despite the presence of healthy *M. pulvinaris* populations beyond the margin of the *M. oreophila* patch. Some environmental factor, as yet unknown, appears to be determining the population pattern and demography of the rare *M. oreophila*

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### *Sphaerophorus stereocauloides*

A lichen endemic to New Zealand.

Found in *Nothofagus* forests at higher altitudes

This specimen from Borland Saddle, Fiordland.

