

Dear Stephen,

Bumble bees in New Zealand are regarded as being entirely beneficial (apart from an odd sting to a person), and indeed are considered to be replacement pollinators for some of our native flowers that were formerly pollinated by species of birds now extinct, or few in numbers. Bumble bees are so valuable as managed pollinators that two companies raise colonies full-time, primarily for pollination of glasshouse tomatoes, and at least one other small-time rearer provides colonies for out-door pollination of cherries, and caged clovers and a few other small specialty crops. Because bumble bees will fly at temperatures below 10 degrees C which confine honey bees to their hives, bumble bees are valuable pollinators particularly in spring when honey bees cannot get to for example fruit flowers such as peaches, plums apples, black currants and kiwifruit etc. Many of these flower will not be visited by species of bees native to Australia.

Bumble bees are not regarded as pollinators of weeds in New Zealand to the extent that they cause problems. This is because not even honey bees are considered to magnify weed problems through pollination, because the most of the major problem weeds such as gorse and broom set seed without the need for pollination. In any case the ubiquitous honey bee vastly outnumbers bumble bees on weed flowers. Also, some weeds such as ragwort and hawkweeds are visited by much greater numbers of native bees than bumble bees. With many more species of native bees in Australia, nearly certainly bumble bees would be a very minor component of the guild of visitors to weed flowers.

New Zealand's 28 species of native bees are derived from incursions of bees from Australia. My 1980 study of the interactions of the native and introduced species of bees showed that native bee numbers were regulated primarily by the availability of soil-based nesting sites. Since human colonisation there has been a great increase in availability of nest sites through earthworks such as roadside cuttings etc., and coupled with greater supplies of pollen and nectar from introduced flowering plants, the populations of native bees are probably greater than ever. The indications are that native bees are enjoying competitive advantages over introduced honey and bumble bees on native flowers with which they co-evolved, but also the large numbers of native bees on many introduced flowers such as kiwifruit, onions brassicas, chestnuts etc. (see multiple records in Donovan (2007): Apoidea, 295 pp.) suggest that they are outcompeting introduced bees even on introduced flowers.

There has never been any suggestion that bumble bees should not be in New Zealand. Indeed, because *Bombus subterraneus* is now extinct in England from whence it was imported to New Zealand a century ago, New Zealand is regarded as a survival refuge for our four species of introduced bumble bees. Re-introduction of *B. subterraneus* to England is to be attempted soon.

I stressed that worker bumble bees have never been known to lay diploid eggs, so if only workers were imported for pollination in glasshouses there would be no possibility of queens being produced and escaping. In response to Kerry Smith's comment that workers that escaped from worker-only colonies in glasshouses would pollinate weeds outdoors, I said that the number of workers that might escape wouldn't amount to the number of worker honey bees out there pollinating weeds from just one honey bee colony. Also, escaped workers would live for just a few weeks at most and would not range far from the glasshouse because they would want to return to their colony.

Cheers,
Barry.