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SHORT NOTE

Interspecific competition for nest sites between common starlings (*Sturnus vulgaris*) and orange-fronted parakeets (*Cyanoramphus malherbi*) in the Poulter Valley

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The orange-fronted parakeet (*Cyanoramphus malherbi*) is a critically endangered endemic parakeet with an estimated mainland population of 165 to 300 birds (Kearvell 2003; Birdlife International 2012). The remnant mainland populations are restricted to 3 beech (*Nothofagus* spp.) forest valleys, 2 in Arthur's Pass National Park and 1 in Lake Sumner Forest Park. Along with these populations there are 4 small translocated populations on islands; 1 in Fiordland, 2 in the Marlborough Sounds and 1 in the Eastern Bays.

At all mainland sites there are direct threats from introduced mammalian predators, notably rat (*Rattus* spp.), stoat (*Mustela erminea*) and possum (*Trichosurus vulpecula*), and indirect threats from introduced herbivores and continued habitat degradation. All 3 mainland populations receive integrated pest control designed to protect the orange-fronted parakeet.

The orange-fronted parakeet is a secondary cavity-nesting species that utilises 3 species of beech tree, plus standing dead trees as nest sites (Kearvell 2002). While its naivety against introduced mammalian predators, combined with its cavity nesting behaviours, make this species vulnerable to predation (O'Donnell 1996; Elliott *et al*. 1996), Innes *et al*. (2010) list a variety of other factors that may further restrict their numbers, including climate change, food shortage, disease, inbreeding depression and competition for food or other resources. Kearvell *et al*. (2002) suggested competition for food resources with introduced finches, and competition with the congeneric yellow-crowned parakeet (*C. auriceps*) may also be factors in the decline of orange-fronted parakeets, especially in modified habitat.

The common starling (*Sturnus vulgaris*) is an introduced species that is also a secondary cavity nester. They are common in all 3 of the valleys that contain orange-fronted parakeets. Starling nests have been found from the bush edge to altitudes as high as 900 m, and thus overlap extensively with the habitats used by orange-fronted parakeets.

The aggressive and competitive nature of starlings have often been cited as reasons for its usurping nests of other species, but most research has failed to establish a negative effect upon populations of native birds (Ingold 1994). Koenig (2003) found the effect of introduced starlings on

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native cavity nesters in New York City was less than predicted, with only 1/27 species showing a decline potentially attributable to starlings. Nevertheless, starlings regularly usurp other cavity nesting species and some species of introduced birds can have a severe impact upon native bird populations (Kumschick & Nentwig 2010). Whether the damage caused by starlings is enough to limit native bird populations is not clear and likely depends on the particular species being affected.

There is little data on the possible effects of introduced birds on New Zealand native birds (Forsyth *et al*. 2002). The only recent data comes from a study on Rangatira I, where the greatest cause of nest failure in the black robin (*Petroica traversi*) was attributed to predation by the introduced common starling (Massaro *et al*. 2012). The black robin builds a cup nest in either a tree cavity or in the sub-canopy but only cavity-nesting pairs were disturbed by starlings. In this note, I describe an instance in which a pair of starlings apparently usurped the nest cavity used previously by native parakeets.

I observed orange-fronted parakeets in the Poulter Valley (42° 54.19 S, 171° 51.97 E), Arthur's Pass National Park, South I. This is a site in which parakeet nests have been monitored and protected in an effort to ensure the survival of orange-fronted parakeets. From 2006 to 2013, a nest 12 m high in a red beech (*Nothofagus fusca*) was successfully used by both orange-fronted and yellow-crowned parakeets. At the start of each season, the nest had been attended by competing parakeets of both species. Orange-fronted parakeet were recorded using the nest for each of the 4 seasons from 2007. On 2 occasions, once the orange-fronted parakeets had finished, yellow-crowned parakeets immediately took over the cavity. All nests of both species were successful. The nest cavity was 350 mm deep and accessed through a knothole in the trunk which was 75 mm high and 40 mm wide. This nest tree was at an altitude of 675 m and ~200 m from the bush edge. The tree was located on the edge of a narrow, usually dry, stream.

Due to adverse weather, the first visit to the nest site for the 2011/12 season was not until the morning of 10 Nov, where I recorded starlings repeatedly going to the nest hole with food. It appeared that they had 'taken over' the nest and were feeding nestlings, which were audible from the ground. Parakeets of both species were noted in the top of the nest tree but appeared agitated, perhaps by the presence of the starlings. They approached no closer than ~5 m to the hole, but their attention seemed focused towards the nest hole and both species watched the return of any adult starling. A visit on 14 Nov confirmed starlings were still occupying the nest cavity. However, a male orange-fronted parakeet repeatedly flew to the hole, alighting less than 50 cm away on a small branch. At the return of an adult starling, which made no effort to chase the parakeet, the male parakeet flew into the top of the tree and began emitting loud chatter calls. On one occasion the male parakeet alighted on the lip of the nest hole, but immediately turned and flew back into the top of the tree. No adult starling was present at that time.

The site was not re-visited until early Jan 2012. On 6 Jan there was no activity at the nest. The next visit, on 20 Feb, also recorded no bird activity at the nest. On 17 Apr, while inspecting and climbing orange-fronted parakeet nests, I climbed the nest tree to inspect the starling nest. The cavity was almost full with clean dry grass; there was no obvious nest bowl or indication of recent use. There was no smell that I could detect emitting from the nest hole. There was no parakeet activity near the tree. While there was more than 1 successful orange-fronted parakeet nest within 300 m, I do not know if those birds were former users of this nest cavity.

This is the first record of a New Zealand parakeet having its nest 'taken over' by a starling, and while there is much debate over the impact that starlings have on native avifauna (Koenig 2003), it is undoubtedly a negative impact upon this native parakeet. The population of the orange-fronted parakeet within the Poulter Valley is very small, restricted within the valley and probably declining. They may number only 50 to 75 individuals. Although a total of 9 nests were found in the 2011/12 season and all were successful, even the disruption of a few nests by starlings could have a large impact on such a small parakeet population.

As part of the continuing effort to protect the orange-fronted parakeet, another example of starlings 'taking over' a successful orange-fronted parakeet nest was observed in 2012 (Megan Farley, *pers. comm*.). This parakeet nest was located in the Hawdon Valley, Arthur's Pass National Park in Nov 2012. The nest was in a red beech and the cavity was accessed via a knothole. The hole was 5 m above ground level and the tree was ~ 100 m from the bush edge. A male orange-fronted parakeet was seen near the hole, but as in the nest I observed, this nest was also usurped by a pair of starlings.

Starlings have been shown to breed earlier in New Zealand with higher latitude, the opposite found in the Northern Hemisphere (Bull & Flux 2006). The fact that this nest had audible nestlings by 9 Nov tallies well with a clutch initiation date of early to mid Oct. It is possible that the starling simply started its nest before either parakeet species had started breeding. Both species of parakeet often visit a prospective nest for several weeks before laying commences, and laying does not usually start until Dec in an average year. It is also plausible, however, that the starling forced the parakeets out,

something for which they are well known (Koenig 2003). Starlings are also known to accumulate a large number of faecal sacs in the nest, which results in the nest emitting a strong ammonia-like odour. As suggested by Stanbury (2010) this strong odour may act as a repellent to predators; I suggest that it might also keep parakeets from attempting entry to the nest hole.

With numbers of native cavity-nesting species at low numbers within the valley (*e.g.*, mohua [*Mohoua ochrocephala*] are extinct in the area), it is unlikely that appropriate nest cavities are limiting. It is interesting to note, however, that even if cavities are not limiting, this nest site has been used by both parakeet species, for a number of seasons; this is also the case for some nests in the other valleys containing orange-fronted parakeets (*pers. obs.*). A number of nest sites are regularly used on multiple occassions, and it is not unusual for one species to take up residence after the first has finished. Recent research in sub-tropical moist Atlantic forest suggests that the supply of useable cavities may not be as high as casual inspection might suggest and that competition for suitable cavities can be intense (Cockle *et al*. 2010). This may be a useful line of research in New Zealand moist temperate forests, especially in light of my observations on nests such as the one here described.

Any negative impact upon the successful breeding of a critically endangered species is of concern. While nest usurpation by starlings is unlikely to be of immediate threat to this population, it might, perhaps, be of greater concern to the same species when trying to establish on a small predator-free island. Starlings have been recorded on all 4 islands to which orange-fronted parakeets have been translocated, and are known to breed on 3 of them. Further research on this topic may be warranted, especially in light of the second instance of nest usurpation.

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