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SHORT NOTE

Red-billed gulls (*Larus novaehollandiae scopulinus*) feeding on seeds in a debris slick, Great Island, Three Kings, northern New Zealand

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During a visit in February 2001 to Great Is of the Three Kings group, several thousand seeds were found deposited on shoreline rocks in North West Bay. All seed deposits were associated exclusively with red-billed gull (*Larus novaehollandiae scopulinus*) resting, roosting, and nesting sites, and were predominantly concentrated on flat areas and crevices of rocks. Seed also formed the bulk of all fresh red-billed gull droppings examined ($n = 75$).

Species composition of samples from the seed deposits was identified using field notes and Webb & Simpson (2001). About 90% ($n = 179$) were puka (*Meryta sinclairii*), intermixed with c. 10% *Coprosma macrocarpa* sensu stricto, and <1% of ngaio (*Myoporum laetum*, probably var. *decumbens*) and taupata (*Coprosma repens*).

Both puka and *Coprosma macrocarpa* s.s. are endemic to the Three Kings Is (Eagle 1986; Cameron & de Lange 2000) and are moderately common on all of the islands (pers. obs). Puka is the dominant canopy species on South-West Is and

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to a lesser extent on North-East Is and West Is (Baylis 1958). Ngaio (var. *decumbens*) has a coastal northeastern New Zealand distribution from the Three Kings Is to the Coromandel Peninsula (de Lange & Cameron 1999) and is common on islands of the Three Kings group. Taupata is a common coastal species widely distributed from the Kermadec Is to c. 41° 30'S in the South Is (Allan 1961) and is the dominant species of the coastal vegetation fringe on islands of the Three Kings group.

The colonies of red-billed gulls on the Three Kings Is are amongst the largest in New Zealand, numbering 5000+ breeding pairs (Heather & Robertson 1996). The colony at North West Bay currently numbers c. 500 individuals (pers. obs.).

How red-billed gulls had access to such a quantity of seed was not readily apparent. Many more puka and *C. macrocarpa* seeds were present than would have been expected if red-billed gulls had been feeding only on ripe fruit from trees. At the time, ripe fruit of puka were not conspicuous, with some ripe fruit mixed with many green fruit in drupes. Ripe fruit of *C. macrocarpa* was rare. Furthermore, fresh droppings of birds that have been feeding on ripe puka fruit are tinged purple (pers. obs.), but the red-billed gull droppings were tinged red, which indicated consumption of crustaceans, and that the seeds were probably ingested at sea.

Uneaten fruit, fallen from trees, accumulates on the ground, and is probably washed from the island during heavy rain. Depending on weather conditions and tides, the seed could then form part of marine debris slicks. Red-billed gulls may opportunistically feed on this sporadically abundant food source, and then deposit the seeds on their return to their resting sites. A debris slick was offshore in North West Bay during the visit, but its composition could not be determined. Red-billed gulls were frequently seen feeding amongst this debris slick over several days.

It is possible that seeds of these species are regular components of debris slicks. Puka seed, despite its apparent density, floats well, and cleaned seed can float for >7 days ($n = 32$). Cleaned and dry *C. macrocarpa* seed ($n = 28$) floats, before becoming waterlogged after 1-3 days and sinking, and seed with dried flesh attached floats for longer (>7 days) (unpubl. data.).

The nutritional benefit for red-billed gulls from this food source is unknown. The seed's testae were intact, so the kernel was not used. Scraps of flesh adhering to the seed may be digested. The sheer number of seeds in the deposits and droppings would indicate that the seeds were not ingested accidentally while the birds were feeding on other foods.

As no other red-billed gull colonies on Great Is were visited, it is not known whether other birds were also feeding on the seeds. However, scattered seeds were also found on Simpson Rock, a large isolated boulder near the summit of the island occasionally used by red-billed gulls as a resting point.

Seed of puka and ngaio have been recorded previously in red-billed gull droppings on inland rocks on Great Is (Turbott 1951). Red-billed gulls have also been observed feeding on ripe puka and ngaio fruit at the Three Kings Is (G. A. Buddle, in Baylis 1948; Anderson 1983; McCallum *et al.* 1985), on unripe ngaio fruit at the Mokohinau Islands (Hemmings 1988) and floating willow leaves (*Salix* sp.) (Jackson & Palliser 1979).

Though most seed ingested by red-billed gulls would be deposited next to coastal nesting and roosting areas, some seed is likely to be deposited while flying over the island, or during hawking for insects (e.g., Turbott 1951). Red-billed gulls feeding on ripe fruit may have contributed to the re-establishment of puka on the island after goats were eradicated (Baylis 1948, 1951; Turbott 1951). Episodic dispersal of seed from debris slicks by red-billed gulls may be another explanation for the colonisation or re-establishment of some plant species on offshore islands.

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