Preliminary observations of behavioural interactions between Takahe (*Porphyrio mantelli*) and Pukeko (*P. porphyrio*) on Mana Island

While the large, flightless Takahe (*Porphyrio mantelli*) remains one of New Zealand's most endangered species, its closest extant relative, the Pukeko (*P. porphyrio*), is common. It is likely that Takahe and Pukeko once coexisted in certain areas, prior to the Takahe's decline and reduction in range (Bunin & Jamieson 1995). Direct interactions between the two species on mainland New Zealand rarely occur today, as their natural ranges no longer overlap. Only with the transfer of Takahe to Mana, Kapiti and Tiritiri Matangi Islands, has it become possible for direct encounters between these close relatives to be observed. These interspecific interactions may have implications for Takahe management, as Pukeko have established populations on three of the four islands to which Takahe have been transferred. Despite the relatively small numbers of Takahe on each of these islands, there have already been reports of aggressive interactions between the two species on Tiritiri Matangi Island, particularly during the breeding season (B. Walters, pers. comm.).

Mana Island, 217 ha in area, lies approximately 21 km north of Wellington and just over 4 km west of Titahi Bay off the North Island's western coast. Exotic pasture dominates the island's vegetation (70 % cover), although an ongoing revegetation programme has resulted in a variety of native trees and shrubs becoming established across the island. The island was declared free of introduced mammals following the removal of cattle in 1986 and the eradication of mice in 1991. These characteristics made it particularly suitable for the establishment of a small population of Takahe in 1988, when it was proposed that island populations of Takahe could save the species from extinction should some unforeseen catastrophe strike the mainland population, restricted to the Murchison Mountains, Fiordland (Crouchley 1994). Originally, three pairs of Takahe were transferred to Mana Island. After six years, and numerous transfers, deaths and hatchings, there are six pairs and one "trio" (a group of three birds) living on the island. As of March, 1995, two of these pairs and the trio had their juveniles from the 1994-5 breeding season associating with them as well. The Takahe on Mana Island tend to nest in areas where dense herbaceous vegetation grows in close proximity to fresh water.

While Pukeko were only rarely seen in the mid-1980s (P. Todd, pers. comm.), the population on Mana Island had grown to approximately 300 birds by the 1994-5 breeding season. They nest all across the island, from the swamps of the alluvial fan near sea-level, to the sides of steep hills that climb to over 120 m in height and the top of the plateau that makes up 70% of the island's topography.

Given the small size of the island and the overlap in habitat use between the two species, it is not surprising that encounters between Takahe and Pukeko regularly occur on Mana Island. While both species are highly territorial (pers. obs.), incidences of interspecific aggression were relatively rare. Pukeko were the apparent instigators in three of the five aggressive encounters that I witnessed while carrying out observations between

September 1993 and February 1994; in the other two, there was no clear aggressor. Takahe were the victors in three of the four encounters in which there was a clear 'winner'. In two cases direct physical contact occurred; in one instance Takahe were on the receiving end. No serious physical damage was apparent in either of these encounters. These aggressive interactions are described below in greater detail:

17 September - Two Takahe, Tussock (male) and Betty (female), were feeding together when they were approached by a lone Pukeko. The Takahe made no overt response to the Pukeko's presence until it came within two metres of the feeding birds. At that point, both birds ran at the Pukeko which fled from the area.

28 September - A single male Takahe (Tussock) was crossing through the territory of a group of five adult Pukeko when he was threatened by one of them. This Pukeko carried out the typical territorial display normally directed towards an encroaching conspecific, which includes an elaborate display of the white rump feathers (see Craig 1977). The Pukeko continued circling the Takahe at a distance of approximately three metres and displaying vigorously for about 30 seconds. The Takahe slowly turned to display his white rump feathers. He then jumped at the Pukeko and, in a single motion, grabbed the Pukeko around the neck region with his bill and proceeded to swing the smaller bird violently above his head. The Pukeko fled into the nearby bushes, while the Takahe resumed feeding.

2 October - A single male Takahe (EB) was feeding in its territory when a lone adult Pukeko repeatedly displayed and ran at him. The Takahe made no observable response to the Pukeko's aggression and continued feeding until the Pukeko stopped displaying (approximately two minutes).

6 November - A single male Takahe (Tussock) aggressively chased a Pukeko off his territory, running at the intruder at full speed. The birds were about ten metres apart when this response was initiated.

7 December - A pair of Takahe, Vic (female) and EB (male), encroached on the territory of two Pukeko which were raising a cross-fostered Takahe chick (one week old). The Pukeko responded with loud calling and the typical intraspecific territorial display (described above). When this failed to elicit any response from the Takahe, one of the Pukeko flew at the Takahe, seemingly grazing the head of the nearest Takahe with its long, sharply clawed toes. Both Takahe stood their ground for approximately one minute before retreating from the Pukeko's territory.

In addition to these infrequent, brief, and aggressive interactions, there was a lengthy association of a different kind between one of the Takahe (Robin) and a group of Pukeko. The Takahe was transferred from Kapiti Island as a single male yearling in September 1993 in order to mate with an unpaired, available female. However, the untimely death of one of the females on Mana Island, from serious injuries incurred during an intraspecific territorial dispute, left him without a mate.

His first observed interaction with Pukeko occurred on 21 September, 1993. The interaction was aggressive and involved several Pukeko. However, it is not clear who was the aggressor nor which territory was being defended.

The next time he was observed with Pukeko, on 17 November, the Takahe was feeding in this same territory alongside two Pukeko chicks that were approximately six weeks old. The Takahe was regularly seen associating with this group of Pukeko and their chicks for the remainder of the breeding season. Some noteworthy observations are as follows:

19 November - The Takahe was with two adults and three chicks in his 'adopted' family group. He was feeding the Pukeko chicks in typical Takahe / Pukeko style; pulling up grass stems, snipping off the basal meristems and passing these to the chicks.

25 November - The Takahe was again seen alongside two Pukeko adults and three chicks. He was feeding and associating with one chick predominantly. There was also a brief territorial dispute with a neighbouring group of Pukeko, during which one of these birds chased the Takahe for three to four metres. Then the Takahe stopped and turned to face the Pukeko, which quickly backed away.

7 December and 13 December - The Takahe picked up food pellets that had been tossed to him and carried them to the Pukeko chicks.

During this time of association with the Pukeko group, the Takahe seemed to acquire certain elements of typical Pukeko behaviour. For example, he would call with a high pitched 'squeak' that resembled the contact call of a Pukeko much more than the normal low 'oomph' which is characteristic of Takahe. He was also observed roosting in low manuka (*Leptospermum scoparium*) bushes, which is typical for Pukeko but has not, to my knowledge, been recorded for Takahe. Furthermore, he seemed to adopt the typical Pukeko alert posture (neck completely extended) and higher rate of tail-flicking when alarmed.

This association with Pukeko lasted until June 1994, when the Takahe was transferred to Maud Island in order to be paired with a lone female Takahe. On his arrival there, he was penned with this female and quickly formed a pair-bond that remained intact as of March 1995. During the 1994-5 breeding season, these Takahe produced a single egg that failed to hatch and, subsequently, raised a chick that was fostered to them from another pair of Takahe. Thus, it does not appear that Robin's extended association with a group of Pukeko on Mana Island has impaired his ability to mate with a conspecific female, or successfully rear a chick.

The response of both Takahe and Pukeko to the presence of a member of the other congeneric species on their territory was stronger than their response to the presence of any other bird species residing on Mana Island, which supports populations of ducks, shags, gulls and numerous passerines (pers. obs.). However, aggressive interactions, especially those involving physical contact, were relatively infrequent. This indicates that Pukeko probably do not pose a significant threat to Takahe in terms of direct physical damage in territorial disputes. Moreover, in my observations, Takahe won the majority of these altercations. If habitat, food, and/or water become limiting resources, indirect (exploitative) competition could occur because Takahe and Pukeko's diet and habitat overlap on this small island (pers. obs.).

This remains unlikely as long as Department of Conservation staff residing on Mana Island continue providing supplementary food and water to Takahe. The situation may have to be re-evaluated if the Pukeko population continues to grow unchecked and/or supplementary feeding is discontinued.

No courtship behaviour was observed between Takahe and Pukeko, and interbreeding remains unlikely. In Robin's case, where he was apparently accepted into a group of Pukeko, no attempts at courtship were witnessed. It should be emphasised that there were no conspecific partners available for Robin on Mana Island at the time he joined the group of Pukeko, as all the other Takahe had already established pair bonds.

It is apparent from this case of 'natural' interspecific adoption that the Takahe's behavioural repertoire is similar enough to that of Pukeko to elicit appropriate responses from Pukeko adults and chicks. It would also seem that Takahe behaviour is flexible and can be influenced by the behaviour of those birds with which they associate. These observations are encouraging for ongoing cross-fostering work between Takahe and Pukeko. The extreme similarity between Takahe and Pukeko behaviour should facilitate acceptance of a Takahe chick by Pukeko foster parents. Furthermore, the apparent flexibility in the Takahe's behavioural repertoire suggests that a cross-fostered Takahe chick may be able to learn adaptive predator recognition and defensive behaviours from its Pukeko foster parents (see Bunin & Jamieson (1995) for more details on this potential management technique).

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JUDAH S. BUNIN, *Zoology Department, University of Otago, P.O. Box 56, Dunedin, New Zealand*

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