THE NEW ZEALAND DABCHICK ON LAKE ROTOITI

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ABSTRACT

During December 1980, 121 adult New Zealand Dabchick *(Podiceps rufopectus)* and 14 young were counted on Rotoiti. Their distribution on the lake is discussed in relation to habitat and resources. Nesting habits and the effects of weather and recent habitat changes are also discussed. In spite of high nest failure, the population on Rotoiti appears to be stable.

THE CENSUS

Rotoiti, one of the larger lakes of the Rotorua district, has an area of 37 km^2 (McColl 1974) and a shoreline length of 57 km (F. A. Tercel, Lands and Survey Dept, pers. comm.). It is a mesotrophic (moderately productive) lake with a maximum depth of 93.5 metres (Irwin 1969).

The lake was circumnavigated by canoe, and the counts were made without optical aids. The counts were made during only 4 days (28-31 December 1980) to reduce error resulting from movements of Dabchick around the lake. Each bird was listed as "adult" or "young," the latter category including chicks and juveniles. The distribution of adults only is shown in Fig. 1. 121 adults and 14 young were counted, but these are probably slight underestimates because on about six occasions the behaviour of a solitary adult suggested a mate was hidden nearby on a nest, and we may have missed a few young chicks riding on parents' backs or hidden among vegetation.

DISTRIBUTION IN RELATION TO HABITAT

The distribution of Dabchicks on the lake during the breeding season seems to be explicable in terms of just two major factors — food, and nesting cover and shelter.

1. *Food:* Dabchicks obtain most of their food by diving and so require suitable shallow-water feeding habitat.
2. *Nest sites and shelter:* Potential nesting cover may seem to be available on most of the shoreline of Rotoiti, but, as noted by Buddle (1939), nesting sites that are likely to be successful are not plentiful. Shelter from waves is clearly important for a good nesting site.

The highest numbers of Dabchicks were found in the Motumauri region, where the indented rocky coastline provides sheltered nest sites in caves and crevices. Many birds were found in the shallow narrow

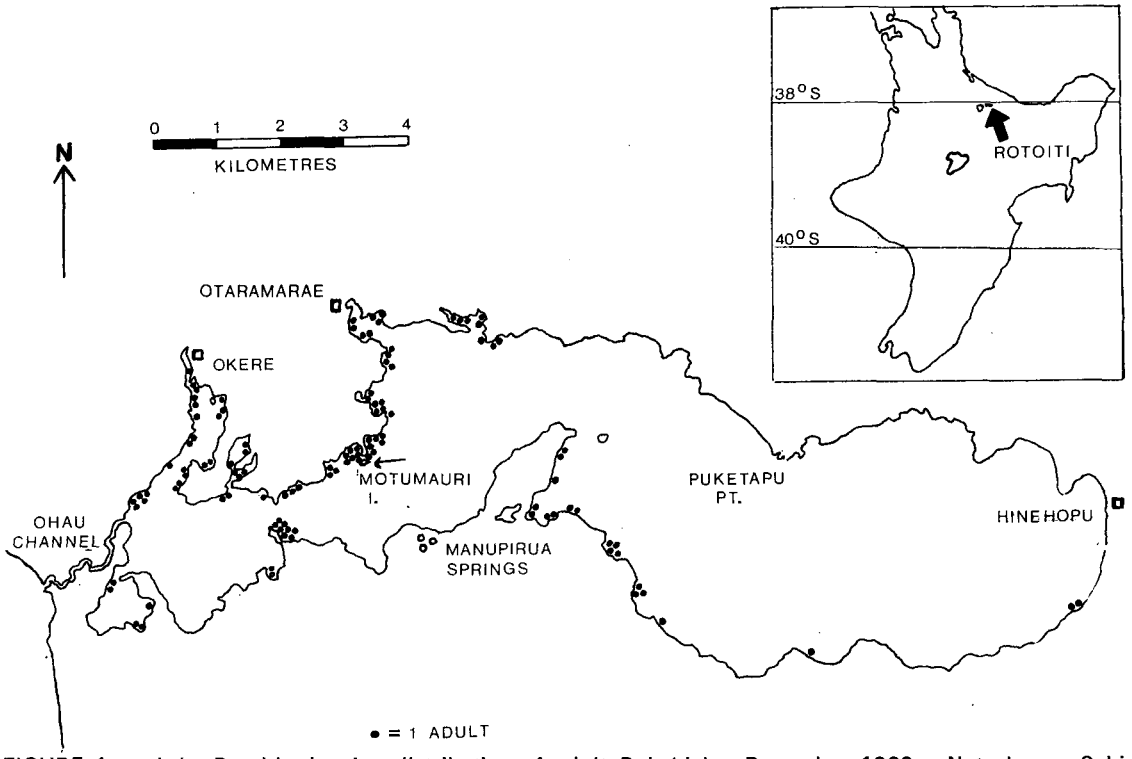

FIGURE 1 — *Lake Rotoiti, showing distribution of adult Dabchicks, December 1980.* Not shown, 8 birds (4 pairs) in Ohau Channel.

arms and sheltered bays of the western end, where willow trees provide nesting cover and beds of the emergents *Typha orientalis* (raupo) and *Scirpus lacustris* (a large leafless sedge) at least partly buffer the shore against waves and powerboat washes. But even the best-sheltered nest is vulnerable to a rise in lake level.

The eastern end of Rotoiti had very few Dabchicks, and from our experience we know of only one successful nesting place in the whole eastern half of the lake — in Korokitewao Bay, near Hinehopu. Here we observed successful nesting in rock crevices twice in 1978, but this bay was not occupied by Dabchicks at the time of the December 1980 census. Some areas clearly lacked nesting sites and/or shallow-water feeding habitat, e.g. from Puketapu Point to Hinehopu, where the forested rocky shore plummets steeply into deep water. But considerable lengths of open shoreline, mainly in the eastern half of the lake, despite the presence of shallows and seemingly suitable nest sites, had few or no Dabchick. This shows the Dabchick's need for shelter and its avoidance of open shores exposed to a large body of water.

Several hot springs feed the lake on the south side of the western half. These thermal areas seem to have no marked effect on the distribution of Dabchicks, at least during the breeding season.

In addition to the main settlements at Hinehopu, Otaramarae, Okere and Mourea (at the Ohau Channel), smaller pockets of settlement are scattered around the lakeshore. Many of the dwellings are holiday cottages rather than permanent residences, and the level of human usage of the lake varies throughout the year. During summer, Rotoiti is very popular for fishing, water-skiing and other recreation. Dabchicks apparently show no strong tendency to avoid settled areas or water-ski lanes, unless these areas lack food, nesting cover or shelter.

NESTING HABITS ON ROTOITI

The following information is extracted from notes and records accumulated since December 1976.

Nest sites and materials: 24 nests were sited as follows.

Seven supported by or anchored to branches (usually willow) trailing in water
Six in caves or rock crevices
Three resting on lake bed, sheltered among emergent vegetation in shallow water
Two resting on lake bed in shallow water, attached to trailing willow branches
Two on land, among herbage at water's edge
Two resting on lake bed in " wet " boatshed
One on concrete wharf pile, just above later level
One attached to the stern of a boat in " wet " boatshed

The last-mentioned nest was curious indeed. It was a large pile of material jammed between the stern board and a small boarding

ladder outside the boat, with the egg bowl about 20 cm above the water. By a " wet " boatshed we mean a shed where the boat floats in the water instead of being raised above the water on a ramp.

In our experience, Dabchick nests seldom are truly floating in the manner of many nests of the Australian Coot *(Fulica atra australis)*. Dabchick nests at Rotoiti are composed mainly of waterlogged and decomposed plant matter and so have very little buoyancy. In addition, the materials have little or no binding, and so the nest may need continual attention from the birds to prevent its disintegrating.

By comparison, Coot nests seem much better suited to surviving bad weather, Coots having a very different nest-building " technology " from Dabchicks. Coot nests at Rotoiti are built mainly of strong buoyant materials (fresh stems of the emergent plants raupo and *Scirpus*), which are woven together to form a robust structure. We noted several occupied nests of Coot and Pukeko *(Porphyrio porphyrio melanotus)* surviving a very destructive storm on 20 January 1981. These nests, loosely moored to the surrounding emergent vegetation, floated with the rising waters and rode the waves, whereas all six Dabchick nests under observation at the time were destroyed.

Eggs: From a sample of ten full clutches, the mean clutch size was 2.2 (range 2-3, S = 0.79). The laying interval appears to be 2 days but may be irregular. Whether or not the bird covers the eggs with weed, as many grebes do, seems to depend on the disposition of the individual bird and the circumstances of its departure from the nest. It seems that the bird covers the eggs more often when it leaves the nest of its own accord than when it is flushed at close range.

During the 1980-81 breeding season, we recorded a likely case of two females laying in the same nest. The nest was in a cave near Motumauri Island. On 28 and 31 December 1980 it contained two eggs, but on 7 January 1981 there were four eggs. On each occasion a bird was sitting, but although the bird leaving the nest always joined another Dabchick outside the nesting cave, we could not be certain of the number of birds attending the nest. Many Dabchicks were in this area, and so several birds were always close to the nest. Although one bird may perhaps have laid all the eggs at irregular intervals, it seems far more likely that two females had each laid two eggs in the nest. Brood parasitism and polygamy have been recorded for a few North American grebe species (Bent 1963), but these are not known as normal grebe habits.

Hatching success: Out of 13 nests followed through to a conclusion (i.e. proven hatching or failure), only 3 (23%) produced chicks. From a total of 29 eggs laid in the 13 nests, 5 (17%) were hatched. Buddle (1939) believed that a pair of Dabchicks on Rotoiti would probably rear one, or rarely two clutches out of five or six laid during each breeding season. Our results confirm his estimate of low productivity.

Nest failures: Of the nine nests followed through to a conclusion during summer 1980-81, none was successful.

Two nests in the Ohau Channel were apparently swamped by boat washes. Unfortunately, the speed restriction sign at the Rotoiti end of the channel is overgrown and not conspicuous to boat users. Natural waves of any size do not develop in this channel, and so before the advent of power boats, this must have been one of the safer parts of the lake for Dabchick nesting.

Six nests (not in the channel) were washed out in a northeasterly storm on 20 January 1981. During this storm the lake level rose at least 10 cm, and the combination of waves, heavy rain and rising waters may have destroyed all the Dabchick nests on the lake at that time.

One nest was apparently deserted shortly before the storm.

DISCUSSION

In 1938, Buddle estimated that about 50 pairs of Dabchick were breeding on Rotoiti. As he had the use of a boat (implied *in* Wilson 1959), his estimate was probably reasonable. Therefore, the species seems to be at least holding its own on this lake (121+ adults in December 1980).

Weather seems to be a major factor controlling the size of the Dabchick population on Rotoiti, mainly by destroying nests. However, intensive human settlement has brought new pressures into the Dabchick's environment; notably motor boats and the water-loving Norway rat *(Rattus norvegicus)*. Indeed, rats were cited by Buddle as a major nest predator. The persistence and perhaps even modest increase of the Dabchick on this lake in spite of these new pressures might suggest that some other modification of the lake environment by European man has actually favoured the Dabchicks. For example:

1. The establishment of willows around much of the lake shore may have improved conditions for nesting, and
2. Enrichment of the lake due to catchment modification may have resulted in an improved food supply for Dabchicks.

Alternatively, European settlement may have had no greater impact on the Rotoiti Dabchick population than the Maori and the Polynesian rat or kiore *(Rattus exulans)*, which had been present for hundreds of years previously. However, this explanation seems unlikely because

1. The Dabchick is not likely to have been of interest to the Maori as food, and indeed is never prominent in middens (P. Milliner, pers. comm.); and
2. *Rattus exulans* is much less aquatic than the more recently introduced *R. norvegicus* (Atkinson 1976) and therefore probably had less influence on Dabchick mortality.

A third possibility is that the population on Rotoiti (and on

other similar lakes) is not actually self-sustaining but is supplemented by post-breeding immigration from small ponds and farm dams, where perhaps nesting is safer (no boats or large waves) but food is limited. The Dabchick is known to be rather mobile after the breeding season, at least in the southern North Island (Stidolph & Heather 1978), but very little is known about its breeding success on smaller bodies of water.

In summary, despite heavy nesting losses, the Dabchick appears to be maintaining its population on Rotoiti. The persistence of breeding Dabchicks around settled areas of the lake shore shows some ability to adapt to a man-modified environment and to tolerate moderate levels of human activity.

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