Winter flocking of New Zealand dabchicks on the Rotorua lakes

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Abstract

New Zealand dabchicks in the Rotorua lakes area form large winter flocks on thermal bays of Lake Rotorua and, to a lesser extent, Lake Rotoehu. Monthly counts during November 1988 to July 1990 showed that flocks increased during February, March or April, and declined by October. The flock count in Sulphur Bay, Lake Rotorua, peaked at 78 birds in May 1990. Flocks did not contain actively breeding birds. Simultaneous monthly counts on Lake Okareka and part of Lake Rotoiti, where dabchicks breed, showed consecutive counts there often varied greatly, although with no seasonal pattern. These data do not support the hypothesis that winter flocks consist mainly of adults dispersing from breeding areas on other lakes. However, the timing of chick production on breeding lakes suggests that winter flocks consist of young of the year, which spend the winter together before pairing and dispersing to breed. Observations of plumage are unlikely to clarify this issue, since adult eclipse plumage is probably indistinguishable from that of subadults. Key research now is to mark dabchick adults and chicks, to prove that winter flocks consist of dispersing young of the year; to explore why some consecutive monthly counts on breeding lakes vary so much, and to clarify moult patterns in this species. We recommend that future management continues the 5-yearly counts started in 1985, registers key dabchick sites as having special significance, encourages the enforcement of existing boat speed law, and maintains known quality habitat for this species.

1. Introduction

NZ dabchick *(Poliocephalus rufopectus)* is a protected endemic New Zealand grebe that is probably extinct in the South Island, and now confined to the North Island mainland. The total population is estimated at 1200-1500 birds, of which about 400 live on Rotorua lakes (Marchant & Higgins 1990).

This report fulfils the three tasks posed by staff of the Bay of Plenty Conservancy of the Department of Conservation (DOC):

1. Determine the relationship between key breeding and flocking dabchick sites at Lakes Okareka, Rotoiti, Rotoehu and Rotorua.

2. Map the typical distribution patterns of dabchick at these sites, on an annual basis, over this period.

3. Provide recommendations for future research and management of dabchick populations on the Rotorua lakes.

Whole-lake surveys undertaken by the Ornithological Society of New Zealand, by DOC, and by the Eastern Region Fish and Game Council in 1985, 1991 and 1996 showed that dabchicks were the third most widely distributed

waterbird species on these lakes. In order of abundance, most dabchicks occur on Lakes Rotoiti, Tarawera, Okareka, Rotorua, Rotoehu, Rerewhakaaitu and Rotokakahi. About half of all the dabchicks on Rotorua lakes live and breed on Lakes Rotoiti (mean 1985-1996 count 142 adults) and Okareka (mean 1985-1996 count 56 adults; Innes et al. 1999). The whole-lake surveys also suggested that the total number of dabchicks on Rotorua lakes varied only a little from 1985 to 1996.

Post-breeding flocking of dabchicks in the autumn and winter has been known for many years in the southern North Island (Stidolph & Heather 1978), with birds appearing during April on sewage treatment ponds and some natural lakes and remaining until about July. Stidolph and Heather (1978) noted that: some breeding pairs remained on breeding lakes during this period; flocks sometimes contained juveniles; and some birds formed pairs before the flocks broke up in the spring.

In the central North Island, major flocking sites are in thermal bays of Lakes Taupo, Rotorua and Rotoehu, at Tokaanu, Sulphur Bay, and Te Wairoa Bay, respectively. If the winter flocks on Rotorua and Rotoehu consist of adults moving from nearby breeding lakes in the non-breeding season, adult counts on those lakes should go down as the winter flocks increase. On the other hand, if the winter flocks consist of dispersing young, the flocks should increase as young dabchicks leave breeding territories; adult counts should not decline on breeding lakes, and the size of flocks should approximate the number of young likely to be produced on all Rotorua lakes.

2. Methods

Ornithological Society members counted all dabchicks each month from November 1988 to July 1990 at the same locations on the following sites (in order of total lake size):

1. Sulphur Bay of L. Rotorua (Ray Jackson). Counted by telescope from various places on the western shore of Sulphur Bay, depending on the location of the flock on the day.

2. The shoreline of L. Rotoiti from Otaramarae anticlockwise to Okere Falls (Willie Shaw). Counted by travelling 30-100 m from the shore, mostly by canoe and occasionally by small motorboat.

3. Te Wairoa Bay of L. Rotoehu (Martin Day). Counted by telescope from adjacent to the bay.

4. Entire shoreline of L. Okareka (John Innes, Laurie Durand). Counted by travelling 30-200 m from shore by canoe or by motorboat travelling at c. 5 knots.

Counts were not undertaken in rain or strong winds, both of which would obscure dabchicks and reduce counts. Eight counts were missed for various reasons at L. Rotoiti.

No other grebes with which dabchicks could be confused were present on the lakes. Dabchicks are readily distinguished from NZ scaup *(Aythya novaeseelandiae),* Australian coots *(Fulica atra)* and other waterfowl by experienced observers.

Dabchicks are not easy species to count accurately because they dive to feed, and they move rapidly away from approaching boats (Montgomery 1991; Reynolds 1997). Flock sizes were determined by re-counting birds repeatedly until a definite number was obtained. On lakes surveyed by boat, we learned to look well ahead to catch views of dabchicks swimming or diving towards the shore. They appeared to react more negatively to the sight of kayak paddles than to small motor boats.

All dabchicks were classed as adult or juvenile. Criteria for juvenile (young of the year) classification were: sitting on a parent's back, or a striped face, or pale (not rufous) neck and chest, or smaller size. Downy young are not exclusively fed by their parents, and also dive for their own food.

3. Results

3.1 ANNUAL CHANGES IN DABCHICK NUMBERS ON WINTER FLOCKING LAKES

Dabchick numbers in winter flocks increased during February, March or April, and declined by October on Lakes Rotorua and Rotoehu (Appendix 1A). This pattern was clearer, and the flock size larger, in Sulphur Bay, L. Rotorua, than in Te Wairoa Bay, L. Rotoehu, in the count period. The flock count on L. Rotorua peaked in July in 1988 (73 dabchicks) and 1989 (67), and in May 1990 (78).

Usual locations of the flocks are mapped in Appendix 2.

In both locations, flocks consisted of feeding birds. No breeding dabchicks were noted in these areas during the whole count period, although dabchicks do breed in small numbers elsewhere on L. Rotorua (at the boat-launching ramp on Motutara Point) and L. Rotoehu (at the ends of the lake arms). Courtship and pair-bond establishment occurred in the L. Rotoehu flock before the oncoming breeding season, but we have no information on this from the L. Rotorua flock.

3.2 ANNUAL CHANGES IN ADULT DABCHICK NUMBERS ON BREEDING LAKES

The numbers of breeding adult dabchicks on L. Rotoiti and L. Okareka fluctuated greatly from month to month, but generally declined during the count period (Appendix 3). However, there was no obvious seasonal pattern to support the hypothesis that winter flocks on L. Rotorua and L. Rotoehu consist mainly of adults dispersing from breeding areas on other lakes.

3.3 PRODUCTION OF YOUNG ON LAKES OKAREKA AND ROTOITI

Dabchick young were present with adults between November and July on L. Okareka and L. Rotoiti. Chick numbers peaked during January to April in the three years of counts (Appendix 1B; shown here to allow comparison of the timing of chick production with that of winter flocks).

Examples of the distributions of dabchicks in and out of the breeding season are shown for L. Okareka and part L. Rotoiti in Appendices 4 and 5 respectively.

4. Discussion

The sequential timing of chick production on Lakes Okareka and Rotoiti and the growth of winter flocks on Lakes Rotorua and Rotoehu suggest that winter flocks consist of young of the year, which spend the winter together and then disperse before the next breeding season. Chicks were usually first counted on breeding lakes in November, and numbers peaked during January to April. If young leave their natal territory after c. 70 days (Marchant & Higgins 1990) to aggregate in flocks, these flocks should start in February and increase rapidly between April and July, as they in fact do.The mid-winter peak is explainable by young accumulating before dispersing.

Conversely, there is no apparent seasonal pattern in adult counts on Lakes Rotoiti and Okareka to suggest that winter flocks on Lakes Rotorua and Rotoehu consist of territorial adults leaving their breeding sites. However, the substantial changes in numbers between some consecutive counts on both L. Rotoiti and L. Okareka still beg an explanation. These changes may be due to changes in conspicuousness between particular count days, or to so far undetected movements of dabchick adults away from the count lakes. There do not seem to be group movements within lakes, because the patterns of distribution on both L. Rotoiti and L. Okareka were generally stable from month to month. Our counts cannot exclude the possibility that some adults leave breeding lakes to join winter flocks, but the data suggest that, if so, their numbers are too small to account for most birds in the flock. The territoriality and movement of individual dabchicks is unknown because none have been individually marked. The impression given by repeated monthly sur-

veys is that particular pairs of dabchick tend to occupy the same piece of lake for months or years.

Graeme Taylor (OSNZ, unpubl. data) counted dabchicks monthly in Sulphur Bay from May 1982 to August 1983. His count peaked at 95 in June 1982, and at 73 in April 1983. Taken together, his counts and ours suggest that flocks may peak at 65 to 95 birds during April to July in any year.

Presumably, flocks occur in thermal bays to exploit a reliable winter food source. This may be chironomid larvae and adults that are abundant there despite low oxygen levels and fine substrate, factors related to a strong geothermal influence on this part of the lake.

The development of adult plumage in dabchicks is neither understood nor documented. Juveniles may moult directly into adult plumage. Furthermore, adult non-breeding (eclipse) plumage may be indistinguishable from that of subadults (Marchant & Higgins 1990). It is difficult to get close enough to the flocking birds with good light to see their plumage details clearly, but it is unlikely that observations of plumage can resolve whether flocks consist of newly dispersed subadults or non-breeding adults.

5. Conclusions

Dabchicks rank only as Category C species (third priority for action;Tisdall 1994) according to DOC, but as Endangered (defined as having a 20% chance of extinction in 20 years) by the International Union for the Conservation of Nature (IUCN; Collar et al. 1994). Because no population exceeds 250 individuals, the IUCN applies the more concerned classification despite the apparently stable numbers of dabchicks in the North Island. There is little or no current conservation concern for dabchicks in New Zealand because their North Island population is apparently stable; because their preferred habitat (lakes) is generally not vulnerable to loss; and because they can apparently co-exist successfully with humans (Lusk & Lusk 1981).

In fact, Reynolds (1997) found that dabchick density on L. Rotoiti was correlated to, among other things, the number of human structures such as boat sheds. There is also some evidence that dabchicks habituate to human disturbance. He showed that, after experimental disturbance, they spent less time hiding in sites with high human use than in low (cf. Montgomery 1991). However, Reynolds still noted that the effect of a single boat pass on dabchicks on L. Rotoiti was detectable in the birds' behaviour for up to 15 minutes after the event, showing that habituation is by no means complete. The importance of these behaviour changes is unknown, but further research to answer this question is probably not justified unless overall dabchick numbers start falling.

In his review of visitor impacts on freshwater avifauna in New Zealand,Walls (1999; p. 51) said that there should be a "...review of the current status, popu-

lation trends and biology of NZ Dabchick, a bird that may be rarer than the North Island kokako". However, he was probably unaware of most of the then unpublished data on this species. The 5-yearly counts conducted in 1985, 1991, and 1996 on Rotorua lakes (Innes et al. 1999) suggest that there is no overall trend to decline in this species, quite unlike the North Island kokako.

5.1 MONITORING

The 5-yearly counts previously conducted three times by OSNZ, DOC and the Eastern Region Fish and Game Council should continue, as recommended by Innes et al. (1999).

Perhaps the most important single objective of these counts is to monitor the numbers of dabchicks, especially given that the reason(s) for dabchick disappearance from the South Island remains unknown (Heather 1988). The Rotorua counts monitor 25-33% of all North Island dabchicks, and some other smaller populations elsewhere in the North Island are counted annually by OSNZ members. A serious threat to dabchicks could arise inside the 5-year time span, and a regular count on one Rotorua lake at a smaller time scale could help detect this.

5.2 LEGAL PROTECTION OF HABITATS

Particular sites important for dabchicks should be registered as Sites of Significant Conservation Value or Special Wildlife Importance, or their equivalent, in DOC regional planning documents, and then protected by active advocacy to the public and relevant statutory planning processes such as regional and district plans.

These sites include Sulphur Bay (L. Rotorua) and Te Wairoa Bay (L. Rotoehu) where winter flocks occur; the L. Rotoiti shoreline from Otaramarae anticlockwise to Te Weta Bay, which probably has the highest density of breeding dabchicks in the world, and bays with dense populations in the south-west of L. Okareka and the north-west of L.Tarawera.

5.3 MANAGEMENT

Existing laws limiting boat speed on lakes should continue to be enforced actively, to reduce damage to dabchick nests.

Current enforcement of boat speed regulations is undoubtedly related more to human safety than wildlife wellbeing. Dabchick nest at the water line on decomposing plant material, and are vulnerable to disturbance from boat wakes (Marchant & Higgins 1990; M. Day, unpubl. data). Also, jet- and water-skiers continue to operate too close to high-value lake margins when wind conditions suit their use of these areas.

Attributes of quality habitat known to be important for dabchick, such as clear water (Reynolds 1997), should be maintained.

This is currently an important issue on L. Rotoiti. Blooms of blue-green algae are virtually an annual phenomenon on L. Rotorua and on the western end of L. Rotoiti. These result in a deterioration of water clarity and quality from west to east in L. Rotoiti, affecting the part of the lake with the highest dabchick density.

There must be continual vigilance to prevent the arrival and establishment of introduced plants or animals that could spread to all lakes with dabchicks and disrupt the biological community on which this species depends.

This will require monitoring of various types, including border control to prevent the introduction of potentially invasive new freshwater species.

5.4 RESEARCH

Chicks and adult birds should be marked, to prove that winter flocks consist of dispersing young of the year, and to explore why some consecutive dabchick counts vary so much.

A safe capture technique is required before dabchicks can be marked. Various techniques have been suggested, but field trials are necessary. One possibility is to use an underwater diver and a hand net, or simply to catch birds by hand. Leg-banding is unlikely to be useful because few dead dabchick are ever recovered, and because the bands will rarely be seen by an observer. Dyeing of feathers, or coloured plastic wing or neck markers, seem the most promising techniques. Radio transmitters could also help these research objectives if a package of necessary weight could be safely attached.

Marking dabchicks will also resolve badly needed details of adult and juvenile plumage changes, especially if individual rather than group colours/marks are possible.

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7. Acknowledgements

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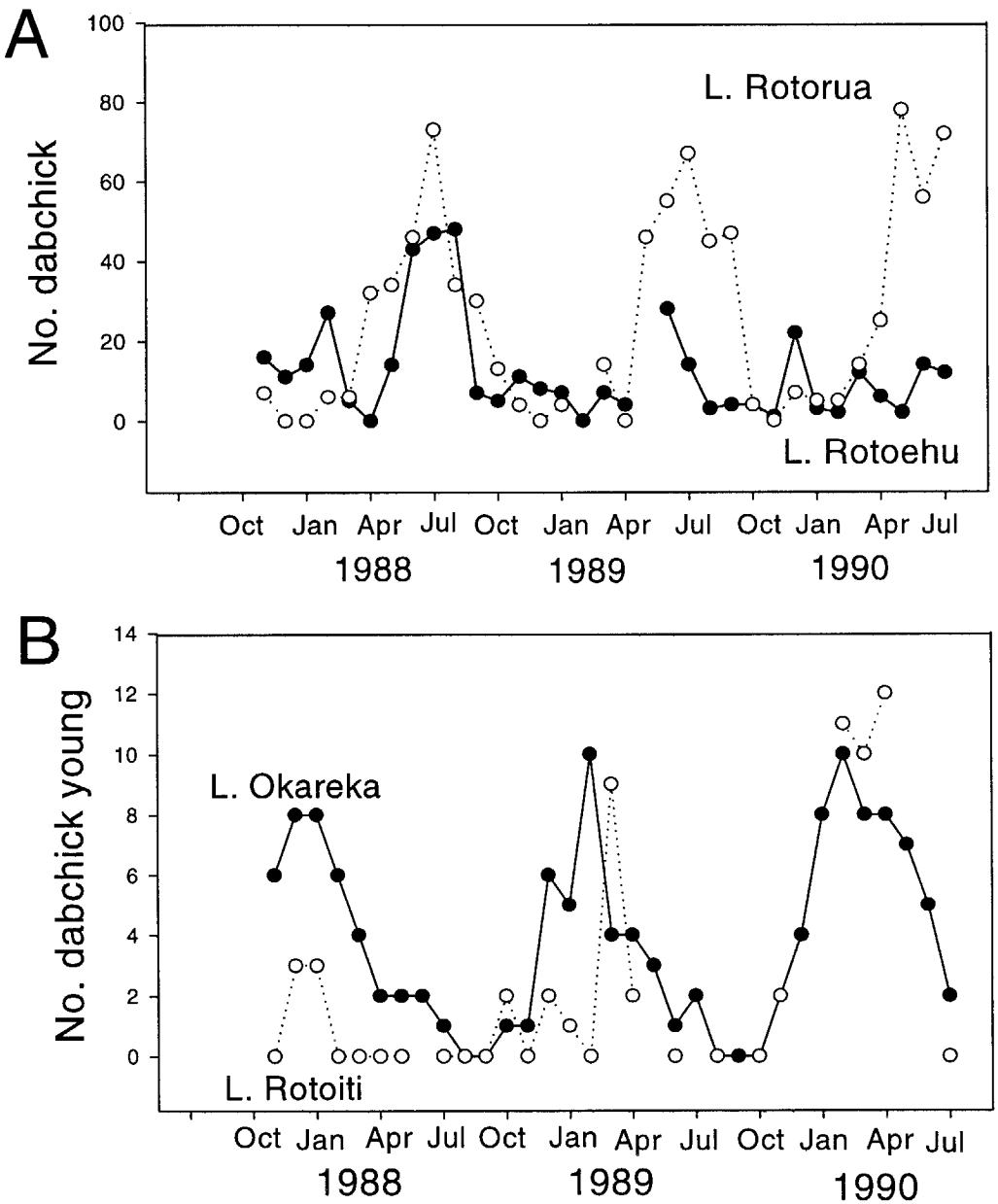
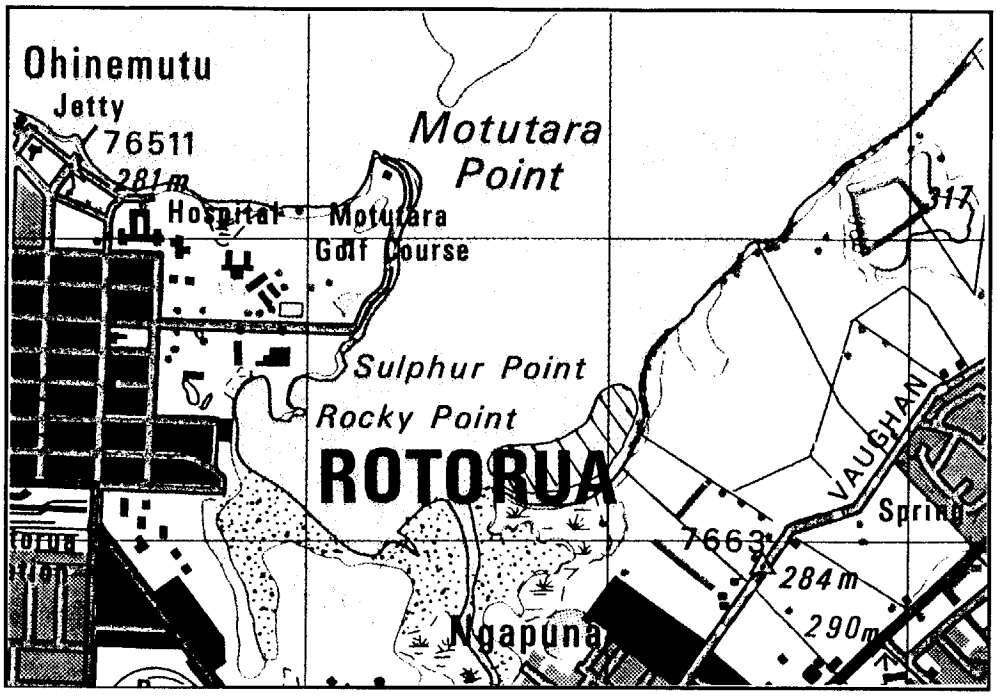
Appendix 1 A. Numbers of dabchicks at winter flocking sites on Lakes Rotorua and Rotoehu from monthly counts, November 1988 to July 1990.

Appendix 1B. Numbers of dabchick young on Lakes Okareka and Rotoiti, from monthly counts, November 1988 to July 1990.

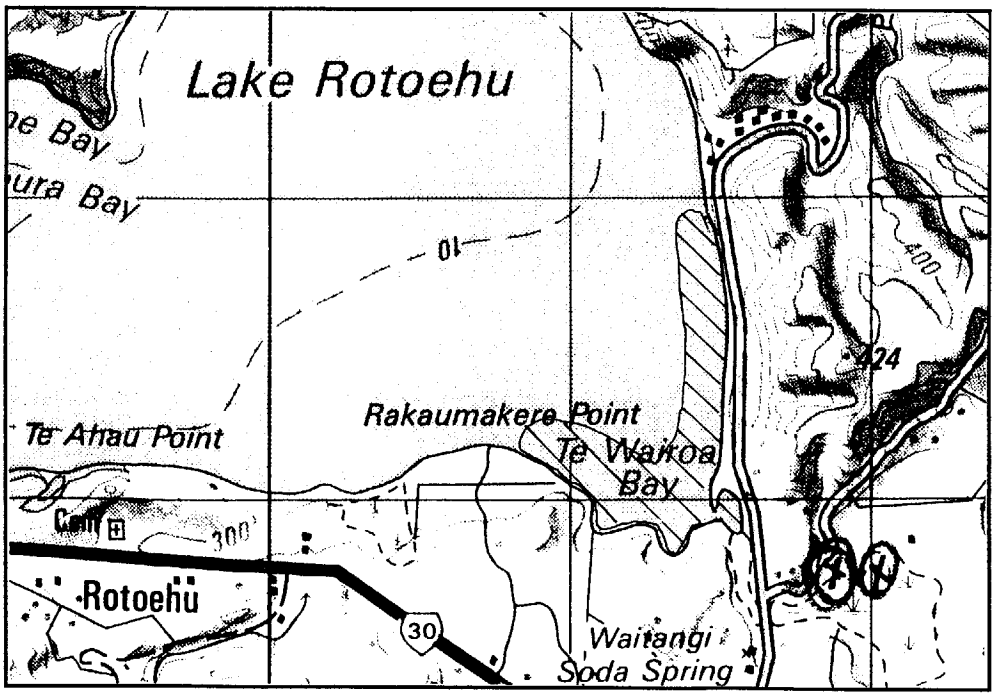


Appendix 2. Usual locations of winter flocks in (A) Sulphur Bay, Lake Rotorua (NZMS 260 U16), and (B) Te Wairoa Bay, Lake Rotoehu (NZMS 260, V15). Flocks are marked by diagonal shading.

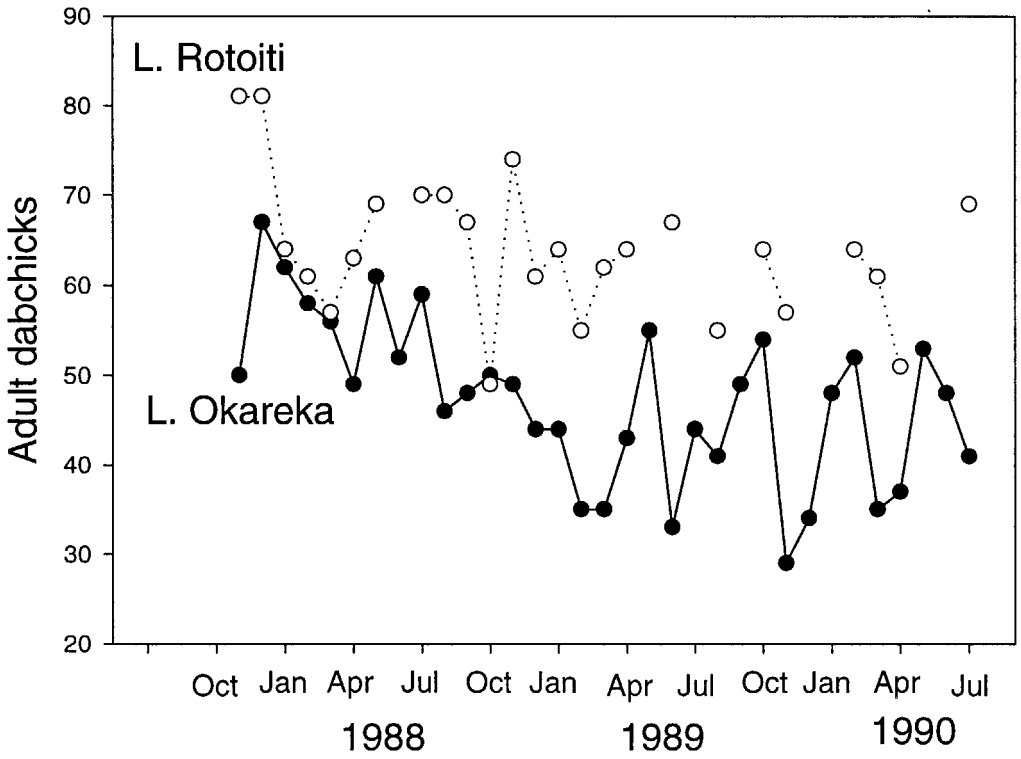
A



B



Appendix 3. Numbers of adult dabchick on part of Lake Rotoiti and all of Lake Okareka, from monthly counts during November 1988 to July 1990.



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