

VARIATIONS IN DUCK NUMBERS AT CHRISTCHURCH DURING THE 1967 NEW ZEALAND SHOOTING SEASON

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ABSTRACT

Counts of Grey (*Anas superciliosa*), Mallard (*A. platyrhynchos*) and hybrid ducks were made on 500 yards of the Avon River and Lakes Victoria and Albert between 16 April and 18 July 1967. During the pre-shooting season (16 April to 5 May) duck numbers rose steadily from about 1150 to 1800. Numbers continued to rise about the same rate during the first five days of the shooting season (6 May to 11 May). During the remainder of the season (12 May to 5 June) the numbers remained about 2200. During the post-shooting season (6 June to 5 July) the numbers declined during the first 14 days to about 1300 and then remained about this level. The increase in numbers during the shooting season was significantly different from both the pre-shooting and post-shooting numbers. The latter were not significantly different from each other. Flight patterns, feeding habits and behaviour during the shooting season are discussed.

INTRODUCTION

Grey and Mallard ducks (*Anas superciliosa* and *A. platyrhynchos*) and their hybrids tend to congregate in protected areas throughout the country during the shooting season. This habit may have a distinct selective advantage, as shooting losses account for a large proportion of deaths in these birds (Balham & Miers 1959).

Assuming the number of ducks on protected Christchurch city waters to be relatively stable, comparisons of pre-season, during-season, and post-season numbers will determine whether or not there is any significant increase in numbers during the shooting season. If an increase does take place, then the rate of drop-off in numbers at the end of the season should indicate whether or not the higher density is stable.

The localities chosen for this study were a stretch of the Avon River 500 yards long running around three sides of the Christchurch Botanical Gardens, some nearby ponds, and two lakes about 80 yards from the river. One of these, Lake Victoria, was relatively large (23120 square yards); the other, Lake Albert, was much smaller. The study areas were in Hagley Park and undisturbed by motor traffic. The ducks were predominantly Mallard-Grey hybrids, and the nearest major shooting area was Lake Ellesmere, 16 miles south by direct flight.

The 1967 duck-shooting season ran from 6 May until 5 June inclusive. The claiming and use of shooting shelters ("maimais") was permitted from 16 April. The study ran from 16 April to 8 July. Counts were made daily from 16 April until 15 May, and following this date every three days. The last two counts were made

six days apart. All ducks seen within 50 yards of the water in the study areas were counted. I walked over the same route each time at a steady pace to standardise errors due to movement of individual ducks. The counts started at 8.00 a.m. before too many people disturbed the birds. Most ducks present were probably counted because the river and lake borders were grassy with little cover.

RESULTS

The total counts for all the study areas are given in Figure 1, which shows that numbers in the study area increased steadily from the first count on 16 April until 5 May, with a somewhat faster rate of increase from then until 11 May. The numbers remained at this level until 2 June, after which they fell away to reach a low, fairly constant level from 14 June onwards.

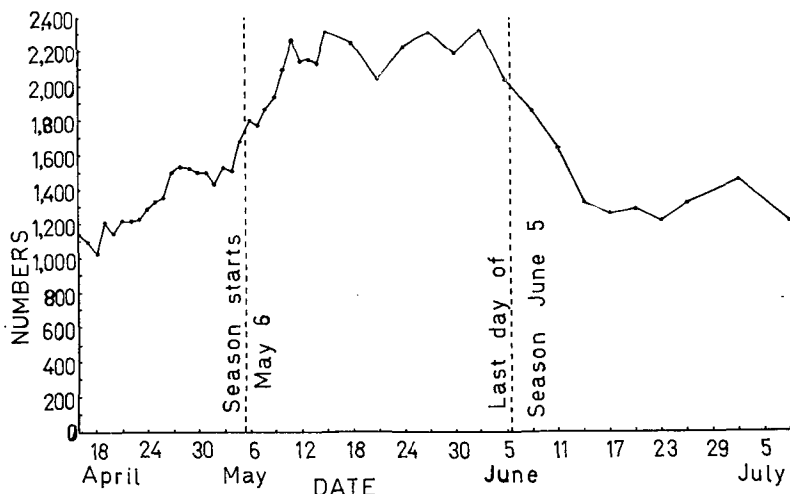


FIG. 1. DUCK NUMBERS IN STUDY AREA PLOTTED AGAINST TIME.

The data were then divided into three main groups for comparison. Sample I contained the results from 16 April to 4 May, Sample II contained the results from 12 May to 2 June, and Sample III contained the results from 14 June to 8 July (all dates inclusive). These three samples correspond to the pre-season, during-season, and post-season periods respectively. Data taken from 5 May to 11 May and from 3 June to 13 June were considered as transition periods when the numbers were changing rapidly.

T-tests were used to test if there was any significant increase between periods I and II, or significant decrease between periods II and III, and if periods I and III differed significantly.

Table 1 shows that there was a significant increase in numbers during the season, and that post-season numbers dropped to a level not greatly different from those prior to the season.

Table 1. Comparisons of pre-season, during-season, and post-shooting season duck numbers.

Sample	I	II	III
Dates	16-4-67 to 4-5-67	12-5-67 to 2-6-67	14-6-67 to 8-7-67
Description	Pre-May 6 level	May-season level	Post-May standing level
x	25394	22181	9100
x ²	34468220	49277067	11871486
N (no. in sample)	19	10	7
Mean	1336.5	2218.1	1300.0
Variance (SD ²)	113.42	7739.1	5296.6
T-tests	I/II	II/III	I/III
Deg. freedom	27	15	24
	1 tail	1 tail	2 tail
t	4.382	22.251	0.209
Null hypothesis	rejected (significantly different)	rejected (significantly different)	accepted (not significantly different)
I/II and II/III are testing if one is bigger than the other.			
I/III is testing if one is bigger or smaller than the other.			
Both Grey and Mallard ducks are fairly wide-ranging, Grey ducks banded in New Zealand having even been recorded from the Chatham Islands and Australia. Balham & Miers (1959) gave figures for percentage recoveries of banded birds:—			
Species	Percentage recorded at distances greater than 25 miles from banding site	Percentage recorded more than 100 miles from banding site	
Mallard	20.1	4.0	
Grey	51.4	24.6	

In the Christchurch area, radar evidence from Christchurch City Airport suggests movements after sunset of large birds, thought to be either ducks or swans, within the city and between the city and Lake Ellesmere (Dr. Bernard Stonehouse, *pers. comm.*). Also, I have frequently heard ducks flying overhead shortly after dusk

in the city area. Williams (1969) noted: "During the shooting season in May large rafts of mallards are frequently reported at sea or on Lake Ellesmere, during the day. Apparently these birds come in to feed at night and then make for the safety of the open water again at daylight."

Some observations were made on flight patterns, feeding habits, and behaviour during the high density period. I observed that ducks were using the larger, open lake as a landing and taking-off place when moving in and out of the Hagley Park area. Landings and takeoffs on the river tended to be associated with short-distance flights, although no quantitative data were taken. Long-distance flights were usually in a straight line well clear of the tree-tops, usually about 100 feet up, whereas short-distance flights were at a much lower level. The number of birds apparently making long-distance flights either to or from the lake increased greatly during the shooting season, but it is not known to what extent this includes long flights within the city.

The proportion of feeding birds was much higher on the river and river banks than on either of the lakes. Feeding fell into the following patterns:— searching through the grass when it was wet from rain or dew; current-filtering, where the duck faces upstream with its lower bill just under the water so that floating material is sifted out; and duck-diving in which the bird looks for submerged material. Of the last two, current filtering was not possible on the lake, and duck-diving was considerably less frequent than on the river.

Figure 2 shows that densities on the lake were usually much

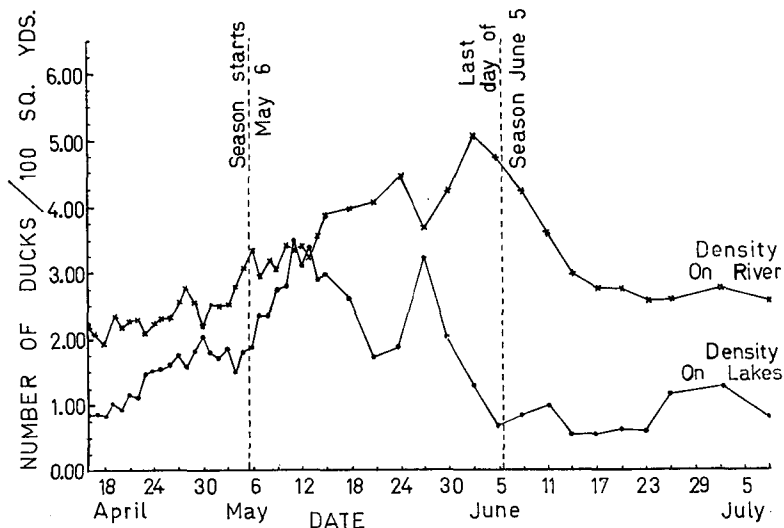


FIG. 2. DENSITIES OF DUCKS ON LAKES AND RIVER, PLOTTED AGAINST TIME.

lower than those on the river; densities on the ponds were not plotted, as pond numbers comprised a very small percentage of the total.

Stress appeared to affect the ducks in the high density periods during the shooting season in two ways: Firstly, they became more wary of people, would not let them approach closely and were more easily scared off the water by loud noises. Consequently large numbers of birds were in the air at any one time, mostly making short, low-level flights of 40 to 50 yards along the river. Secondly, squabbling and fighting among the birds became much more frequent.

DISCUSSION

The results suggest that ducks move into protected waters during the period of disturbance before and during the shooting season. At the time the study was initiated, on 16 April, the number of birds in the city study area was increasing steadily, coincident with disturbance at Lake Ellesmere as shooters claimed stands and erected shooting shelters from 16 April onwards. The first week-end of shooting increased the numbers still further, reaching a significantly higher level about 11 May. At the end of the season, the numbers fell away over a period of 12 days to a level not significantly different from the pre-season level.

The rapid fall-away of numbers could indicate that the high-level density was unstable. Several observations support this. Firstly, the small number of birds observed feeding on the lakes compared with birds on the river, correlated with the consistently lower densities on the lakes, suggests that food availability may become critical at the higher density level. Secondly, the squabbling and fighting among the high density birds suggests overcrowding. Their wariness of people at this period is probably due to gun-fright and may be infectious, spreading from Lake Ellesmere birds to birds normally resident in city waters. However, the adverse reaction of the birds to each other implies that some at least of the stress is due to overcrowding.

The ducks may use the Hagley Park lakes, especially the larger one, as land-marks in navigation. Ducks coming in or taking off on high-level and presumably long-distance flights use the lakes, rather than the river, where most flying is low-level and short-distance. Long-distance flying occurs at dusk or during the night and the lakes would be visible as reflecting bodies during either the day or the night. Once the lake is located, incoming ducks can move to the nearby river, which is surrounded by trees and may not be visible from high in the air. Lake Ellesmere is very large and ducks flying to it in clear weather should be able to recognise it from many miles away. Young ducks presumably learn the approximate direction to fly from older ducks.

Changes in the numbers of Lake Ellesmere and city birds could occur in two ways. The first postulates two sedentary populations, one at Lake Ellesmere and one in the city. With the onset of

disturbance at Lake Ellesmere, birds are forced off the lake and retreat to the city, forming a mixed-population group with the city birds. When the season closes, they move back to their home ground. The second explanation postulates that the two populations are not wholly separate entities, and that there is a small two-way exchange of birds throughout the year. Changes in the number of birds flying in either direction result in the phenomena recorded in the study. The first postulate requires that the birds confined to the city throughout the shooting season know when the season closes, and does not explain the night movements of ducks at other times of the year.

The second explanation is more satisfactory. The birds are wide-ranging and undergo long-distance flights throughout the year and an increase in ducks both landing on and taking off from the Hagley Park lakes during the shooting season has been noticed in the present study.

It seems feasible that throughout the year a small two-way traffic occurs between the two areas. The ducks, although appearing to anticipate the shooting season, come into the city during and following the first disturbance at Lake Ellesmere, the shelter-building. The incoming traffic to the city is thus suddenly augmented, and this continues when shooting begins. As the density in the city area builds up, food and overcrowding may become critical. The incoming traffic is still large, so that an unstable high level of numbers is maintained in the city by the increased inflow of birds. At the end of the season, when disturbance at Lake Ellesmere ceases, the incoming traffic drops considerably. Because the out-going traffic is still large, there is a rapid drop-off in city numbers. As the food and overcrowding situations are alleviated, the outward traffic also decreases, until fairly soon after the end of shooting, the city population is back to pre-season density, and the two-way traffic is small in both directions.

As the study was not initiated until 16 April, the date that disturbance started at Lake Ellesmere, it was not possible to ascertain if there was a pre-season stable level. Hence pre- and post-season numbers could not be compared to estimate total mortality during the shooting season.

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