MACQUARIE ISLAND DUCKS – HABITATS AND HYBRIDS

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ABSTRACT

Observations of ducks on Macquarie Island in December 1985 and 1986 are summarised. Although the island has many wetlands, previous records suggest that ducks mainly use those within wet tussock grasslands in the lowland, coastal areas: recent observations confirm this. Reduced primary productivity on plateau wetlands may result in minimal secondary production of foods in a relatively harsh environment, one where nesting cover has been degraded by introduced rabbits and where predatory skuas are prevalent. Ducks, including hybrids between Grey Duck and the alien Mallard, used Square Lake and Duck Lagoon for feeding and resting, although their rate of feeding was higher at Square Lake. Broods were recorded only at Duck Lagoon, where *Poa foliosa* provides extensive cover. Introgression on Macquarie Island has occurred unsupported by local liberations, distant from human activity, and has implications for the gene pool of Grey Duck elsewhere.

INTRODUCTION

Information on the ducks of Macquarie Island (54°30'S, 158°57'E) was reviewed by Norman (1987). Grey Duck (*Anas superciliosa*) were apparently seen on early visits to the island, as were occasional Grey Teal (*A. gibberifrons*), specifically identified in 1957 (Keith & Hines 1958). Mallards (*A. platyrhynchos*) were first reported in 1949 (Gwynn 1953), and hybrids were recorded from 1973 onwards. Grey Duck are present all year and ducks are generally restricted to the coastal, tussock-dominated wetlands.

This note presents further observations on the waterfowl of the island, made on 6–8 December 1985 and 7–10 December 1986.

METHODS

On visits to wetlands (assigned within major vegetation formations outlined by Taylor 1955) in the northern and central areas of Macquarie Island, I noted the waterfowl and assessed the adjacent plant cover as being adequate or inadequate for ground nesting. In 1986, I estimated the area of open water for most wetlands (except larger ones, where previous estimates were accepted) and classed their depths as shallow (< c. 1 m) or deep. The activities of individual ducks (feeding; loafing on land or water; swimming; comfort and body maintenance, and floating, including social behaviour and 'alert' postures) were recorded at 1 min intervals briefly at Duck Lagoon in 1985 and at 30 s intervals for longer periods at Square Lake and Duck Lagoon in 1986. Ducks were identified, whenever possible, by the criteria of Gillespie (1985). I collected invertebrates at Duck Lagoon (1985, 1986) and Square and Green Gorge Lakes (1986), with three sweeps of a dip-net (7.0 × 9.05 cm, mesh-size 350 um) in areas where ducks were feeding. Samples were sorted, counted and identified as far as practicable.

RESULTS

In both visits I examined 186 wetlands, 78 in 1985 and 108 in 1986. Of these, 66 (33.3%) were mainly coastal, wet tussock grasslands dominated by *Poa foliosa*, 93 (83 above the coast) were in herbfield and 27 (all above the coast) in fellfield formations. Fellfield wetlands had no immediate cover, were usually shallow and small (estimated average area of 17 was c.0.65 ha, excluding Prion Lake, some 36 ha, and two which were dry), and had no obvious zooplankton blooms. Potential food and cover were lacking in herbfield wetlands, which varied in size and depth (77% considered shallow, five dry, and the estimated surface area of 52 averaged 0.34 ha; but Square Lake occupied c.9 ha and Tulloch and Little Prion Lakes were also extensive). Tussock wetlands were smaller (c.0.04 ha for 28), but about half were 'deep'. Edges of wetlands, in any formation, varied considerably from small gravel or boulder-strewn shores to steeply sloping peat or rock faces.

During both visits ducks were seen at only 19 wetlands (10.2% of those examined), mostly (15) within tussock grasslands (i.e. 22.7% of those in this category): apart from Square Lake, ducks were not seen on plateau wetlands, including 37 examined in both years. Although I occasionally flushed ducks from deep, densely vegetated creeks and from featherbed wetlands, Duck Lagoon (shallow open coastal wetland, c.0.1 ha, edged by *P. foliosa* and containing tussock clumps and rocks) and Square Lake (shallow) were very important (see Evans 1970 for details of both areas), and Green Gorge Lake and surrounding wetland areas were of lesser note.

At Duck Lagoon in 1985, at least eight ducks (five male, three female) were similar to Mallards in plumage, but by Gillespie's criteria only two were classed as Mallards; three were classed as Grey Ducks and six as hybrids. Another pair of smaller adults (with a brood) were assumed to be complex hybrids of Grey Duck, Mallard and Grey Teal. In 1986 (8 December) at least 10 ducks were present, including two males with green heads and necks. Although these resembled Mallards only one scored enough to be so classified; the other bird was classed as a hybrid. Other ducks present were categorised as Grey Duck but one female, with a brood, had a teal-like body plumage with a dark head and eye-stripe. On 9 December 1986, 13 ducks were examined; of these, three had male Mallard characters and at least two appeared to be hybrids. However, by Gillespie's criteria 10 were Grey Duck, and three resembled Mallards.

Eleven ducks were examined at Square Lake in 1986. None scored enough to be considered Mallard-like and nine were classified as Grey Ducks. Although three males had green heads and necks, one at least showed breast-colouring and four had 'khaki-campbell' body feathers.

Of 58 activities recorded at Duck Lagoon in 1985 (6 December, 1527-1705 h, maximum of four ducks), 30 were of loafing birds, 12 of feeding, 6 of swimming and 10 of comfort movements. In 1986 (8 December, 1720-1805 h, maximum of eight ducks) 43.4% of 325 activities recorded at Duck Lagoon were of birds loafing on rocks or boulders, and relatively few (11.7%) were feeding (mostly dabbling in areas of *Myriophyllum*). On 9 December 601 observations were made (386 at 1135–1248 h, four ducks,

and 215 at 1625–1643 h, seven ducks. Loafing accounted for 29.5 and 27% respectively but feeding increased from 7 to 35.3% while floating (22.3 and 7.9%) and comfort movements (13.7 and 4.2%) declined. During the observation periods ducks moved in and out of the area, some flying towards the coast where, in 1985, others landed in tidal pools or on the sea. At Square Lake (7 December, 11 birds, 1316–1343 h) 49.2% of 254 observations were of feeding (in areas of dense *Myriophyllum*); a few birds loafed on the lake edge where most comfort movements took place.

Reproductive behaviour – head-pumping and inciting – was recorded (outside the main observation periods) at Square Lake and Duck Lagoon and agonistic behaviour at Duck Lagoon. Alert postures were noted only 6 times at Square Lake, whereas at Duck Lagoon they were frequent, associated perhaps with the presence of broods (and consequent social interaction), or prompted by the local Great Skuas (*Stercorarius skua*). On 9 December 1986, skuas crossed the wetland 50 times between 1000 and 1251 h, causing alert postures in the ducks. Dominican Gulls (*Larus dominicanus*) were recorded 4 times, once bathing, in this period, and giant petrels *Macronectes* spp. were present on 76 occasions, causing no alert response; indeed broods and adults moved readily in front of a nesting Southern Giant Petrel (*M. giganteus*).

On 6 December 1985 a brood (six ducklings, mid-size, class II), accompanied by an apparent pair, was seen at Duck Lagoon, but on only 18 of 152 checks (1 min intervals, 1450–1721 h). Otherwise ducklings remained under *Poa foliosa*, emerging for feeding forays and moving extensively through the labryinth of tussock-covered tunnels and runnels. In contrast, at least four broods were present on 8 December 1986 (1652–1904 h), available, individually, for 264 observation intervals. However, brood 1 (3 small ducklings) was seen once, brood 2 (3 full-grown) and brood 3 (4–5 mid-size) twice and brood 4 (size not determined) once. Only one brood (brood 3) was seen again on 9 December during 654 observation intervals (0952–1300 h, 1611–1830 h), appearing on only five (0.8%) occasions. Parental activities of this brood were followed briefly. Whereas the male loafed or slept for 27 of 117 recorded activities and did body maintenance on 45 occasions, the female rested for 10 of 126 records and made only 5 comfort movements. The male was alert on only six occasions, but the female spent a substantial time alert (77).

Water samples for both years were dominated by cladocerans (*Chydorus* and *Macrothrix* spp.) at Square Lake (114 individuals), at Green Gorge Lake (452) and Duck Lagoon (405 in 1985, 3501 in 1986). Copepods (*Pseudoboeckella brevicaudata*) were relatively abundant at Green Gorge Lake (75), Square Lake (68) and Duck Lagoon (153 in 1986, only 11 in 1985), as were oligochaetes at Green Gorge (115) and Duck Lagoon (100) in 1986.

DISCUSSION

These observations confirm, at least for the periods involved, that waterfowl on Macquarie Island are restricted primarily to lowland coastal wetlands, mainly within tussock grassland. However, ducks were seen at Square Lake

and have previously been recorded at Brothers Lake, at Prion Lake, and inland from Red River (Norman 1987). Several factors may influence waterfowl distribution on the island. First, the few limnological studies made on the island suggest that most plateau wetlands are oligotrophic and unproductive. In contrast Square and Brothers Lakes are more alkaline, have higher ionic concentrations than other northern wetlands, and are more nutrient-rich than other plateau wetlands (Evans 1970, Tyler 1972, Buckney & Tyler 1974). Their increased productivity is associated with the presence of *Myriophyllum*, which may stabilise the water column and aid the anaerobic release of phosphorus (Evans 1970, Hughes 1986). Presumably higher primary productivity results in increased biomass of zooplankton, food for the omnivorous, opportunistic ducks; certainly the few indices of zooplankton abundance reported here suggest that low-lying wetlands (e.g. Green Gorge and, particularly, Duck Lagoon) are more productive than plateau wetlands.

The productivity of plateau wetlands may also be reduced by the harsher climate (lower temperatures, stronger winds), which may also increase the thermal loss (and hence energy requirements) of ducklings and of ground-nesting ducks. Energy and protein requirements increase during egg-laying; for Mallards, available protein may limit clutch size and renesting is influenced largely by local food abundance (Krapu 1981). On Macquarie, the ducks tended to feed more in late afternoon at coastal Duck Lagoon (as reported elsewhere, e.g. Norman *et al.* 1979) whereas at Square Lake extensive in the middle of the day, suggesting that food there was relatively scarce. Alternative foods, such as plant seeds, are doubtless taken around coastal areas, where ducks may feed on or near the sea, but such foods may be restricted on the plateau.

Plateau nesting may also be deterred by the numerous Great Skuas. On Macquarie Island skuas take penguin eggs, smaller procellariids (Jones & Skira 1979, Brothers 1984) and ducklings (Norman 1987) and their effect may have increased as rabbits removed plant cover (Copson 1984, Seppelt *et al.* 1984). This influence may be increased while skua numbers are kept high by rabbits and they breed within the period suggested for that of the island's ducks (egg-laying in waterfowl, Sep–Jan or later, Norman 1987; in skuas, eggs Oct, chicks fledge Jan–Feb; Jones & Skira 1979). Skuas also concentrate at some plateau wetlands (e.g. Island Lake) to bathe and roost, and elsewhere (e.g. Duck Lagoon) they apparently patrol frequently, causing alert postures in ducks and presumably keeping broods under cover of *Poa* tussocks which, now mainly in coastal areas, may be important for duck survival.

Norman suggested that Mallards invaded Macquarie Island from New Zealand, the Auckland Islands or Campbell Island. This source may be supported, indirectly, by the distribution of the milfoil *Myriophyllum triphyllum* (previously included in *M. elatinoides*), which is restricted to New Zealand and the Auckland, Campbell and Macquarie Islands (Orchard 1980, 1985). However, Selkirk & Selkirk (1982) recorded fossilised *Myriophyllum* sp. in deposits dated well before Mallards reached New Zealand. Whatever the origin of the pioneering Mallards, it is now clear that introgression into the Grey Duck gene pool is high (higher than suggested from Gillespie's 1985 criteria), and it seems that a hybrid swarm has established, with the

Grey Duck population being reduced by the reproductively more aggressive Mallard. Island populations of Grey Ducks elsewhere have been similarly invaded, for example, on Norfolk Island (Hermes *et al.* 1986). In other, perhaps analogous, circumstances the Mallard and American Black Duck (*A.'rubripes'*) hybridise to the extent that the black duck morph may disappear (Ankney *et al.* 1986), a consequence of increased Mallards and subsequent introgression (particularly during renesting attempts) and/or competitive exclusion (Ankney *et al.* 1987). Even within the Mallard itself multiple parentage of clutches is relatively frequent (Evarts & Williams 1987). On Macquarie Island, any isolating mechanisms which operate may be reduced because courtship patterns of both species are similar (Williams 1969), if not identical (Johnsgard 1965), and courtship between Mallards and Grey Duck occurs, as it does between hybrids (Braithwaite & Miller 1975).

The situation on Macquarie Island, where Mallards have infiltrated the gene pool of a resident native species to produce viable hybrids (including, apparently, a vagrant, third species, the Grey Teal), has arisen without local liberations of Mallards. Hence it should not be assumed that similar events will not overtake the Pacific Black Duck in Australia, where natural habitats have been modified perhaps to the point, in some areas, of favouring the further spread of the Mallard (Braithwaite & Miller 1975).

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