PATTERNS TO THE DISTRIBUTION AND ABUNDANCE OF MALLARDS, PACIFIC BLACK DUCKS AND THEIR HYBRIDS IN SOUTH AUSTRALIA IN 1987

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SUMMARY

Mallards, Pacific Black Ducks and hybrids (M × P) were counted on 484 wetlands over the southern half of South Australia during 1987. Pacific Black Ducks occurred without Mallards and M × P hybrids on 184 wetlands; while Mallards and M × P hybrids occurred without Pacific Black Ducks on 37 wetlands. Pacific Black Ducks and Mallards and/or hybrids co-occurred at 74 wetlands. A total of 3165 Pacific Black Ducks were counted on wetlands. This compares with 1422 Mallards and M × P hybrids and 684 feral ducks of other domesticated varieties. Most of the Mallards and M × P hybrids occurred on wetlands associated with metropolitan Adelaide.

INTRODUCTION

Mallards *Anas platyrhynchos* are native to the Northern Hemisphere where they use a variety of wetland habitats, including those modified by man. Few other ducks are as tolerant of humans as the Mallard.

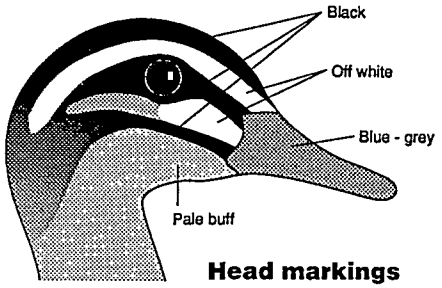
Most domestic ducks are derived from Mallards, including the Rowan, Aylesbury, Kahki Campbell and Indian Runner. All of these domestic lines interbreed readily with Mallards (Delacour 1964). However, this interbreeding is not confined to Mallard derivatives, and interbreeding between Mallards and many other species of *Anas* occurs both in captivity and in the wild (Milstein and Osterhoff 1975). Furthermore, Mallard drakes are highly aggressive and may exclude drakes of congeneric species from some wetlands or deny them access to females (Ankey *et al.* 1978; Brodsky *et al.* 1988). This ability to use man-made wetlands, tolerate humans, interbreed with other *Anas*, and aggressively exclude other drakes, has allowed Mallards to swamp other populations of *Anas* and destroy the integrity of their gene pools. In north-eastern America, man-made changes to wetlands have facilitated the expansion of the Mallard population, such that the distribution of Mallards now overlaps that of the American Black Duck *Anas rubripes* (Ankey *et al.* 1978). As a result, the estimated population size of pure American Black Ducks has been halved due to hybridisation with, and habitat exclusion by Mallards. Similarly Mallards have interbred with the Mexican Duck *Anas diazi*, and now 90% of its wild population may carry genes derived from Mallards (Todd 1979).

Following their introduction by man, Mallards have also hybridised readily with several native species of *Anas* in the Southern Hemisphere. In South Africa, Mallards hybridise with the Yellow-billed Duck *Anas undulata* (Milstein and Osterhoff 1975). 'The Mallard has been the target of an eradication campaign in the Transvaal and Cape because it hybridises with the Yellow-billed Duck *Anas undulata.* The Mallard essentially seems to be commensal with man and has not penetrated less disturbed areas. Nevertheless, the South African Ornithological Society supports the eradication of this species because of its ability to hybridise with the Yellow-billed Duck' (Berruti 1992). In Australia and New Zealand Mallards hybridise with the Pacific Black Duck *A. superciliosa* (known as the Grey Duck in New Zealand) while in many parts of New Zealand the Grey Duck has been replaced by Mallards and hybrids (Todd 1979). Frith (1967) expressed concern that the future integrity of populations of Pacific Black Duck in Australia was threatened by feral populations of Mallards.

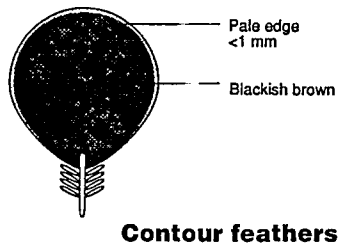
In this paper we document the distribution and abundance of Pacific Black Ducks, feral Mallards, their hybrids and other feral ducks, in wetlands across the southern half of South Australia during 1987. The purpose of this was two fold: first to determine the extent to which Mallards have introgressed with the native Pacific Black Duck; second to provide a baseline from which to monitor any future expansion or reduction in the distribution and abundance of Mallards and their hybrids (M × P).

METHODS

Field data were collected during 1987 by members of the South Australian Ornithological Association. Each contributor was asked to record the name and location of each wetland that they visited, and to count the numbers of 'pure' Mallard, 'pure' Pacific Black Duck and M × P hybrids based on phenotypic appearance. Facial markings, other plumage features and colour of the bill and legs, were used to



Head markings



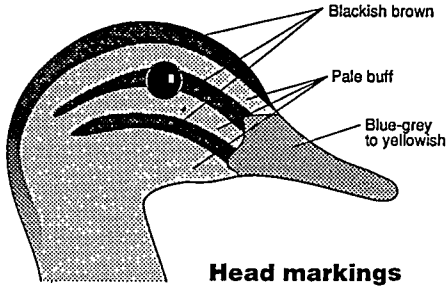
Contour feathers

Wings Green speculum. No white edging.

Tail Dark ± narrow buff edging. Centre tail never curled.

Legs Green brown ± orange tinge.

Pacific Black Duck



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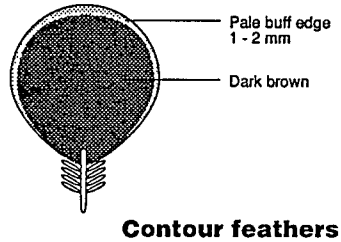


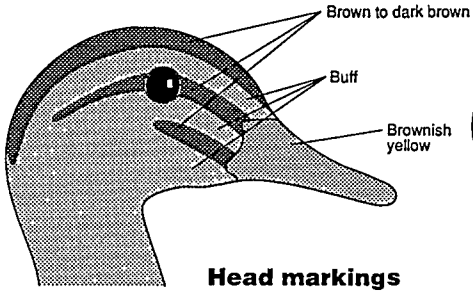
Contour feathers

Wings Usually bluish purple, edged white of variable width.

Tail Pale edging. Centre tail rarely curled in male.

Legs Usually orange or with orange wash.

Hybrid near Black Duck



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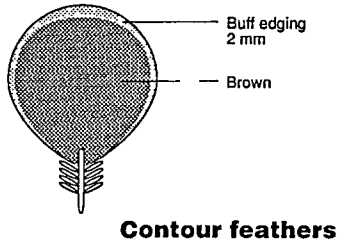


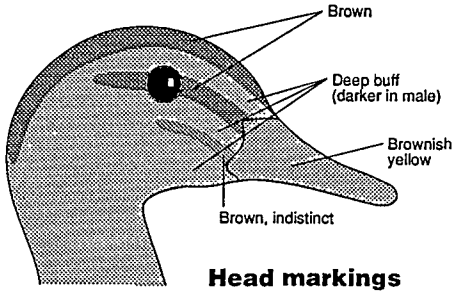
Contour feathers

Wings Purple-blue speculum; edged white;

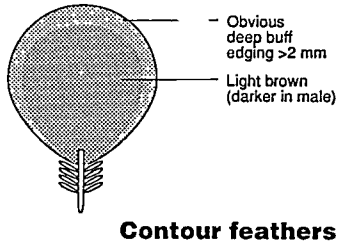
Tail Obvious white to buff edge. Centre tail usually curled in males.

Legs Orange

Hybrid near Mallard



Head markings



Contour feathers

Wings Purple-blue speculum; broadly edged white; obvious in flight.

Tail Obvious whitish edging. Centre tail black and curled in males.

Legs Orange

Mallard female and eclipse male

Figure 1. Phenotype characteristics of Pacific Black Ducks, Mallards and hybrids. Typical heads and contour feathers are drawn, while wings, tail and legs are described.

distinguish hybrids from 'pure' strains (Fig. 1). Hybrids were divided into three groups; those that resembled Pacific Black Ducks most closely, those that resembled Mallards most closely, and those with intermediate features. A key and photos were provided to each contributor to assist in categorising 'pure' and 'hybrid' strains (copy held by the Wildlife Section of the South Australian National Parks and Wildlife Service). When a wetland was visited more than once the average number of ducks seen was used.

Other feral ducks were also counted. These were usually Khaki Campbell, Indian Runner or Muscovy Ducks and are referred to as feral farm ducks.

RESULTS

In all, 484 wetlands were visited at least once during 1987. These sites have been divided into regions based on the 1:250,000 series of maps (Fig. 2). In metropolitan Adelaide 1:50,000 maps were used. Where less than ten wetlands were visited

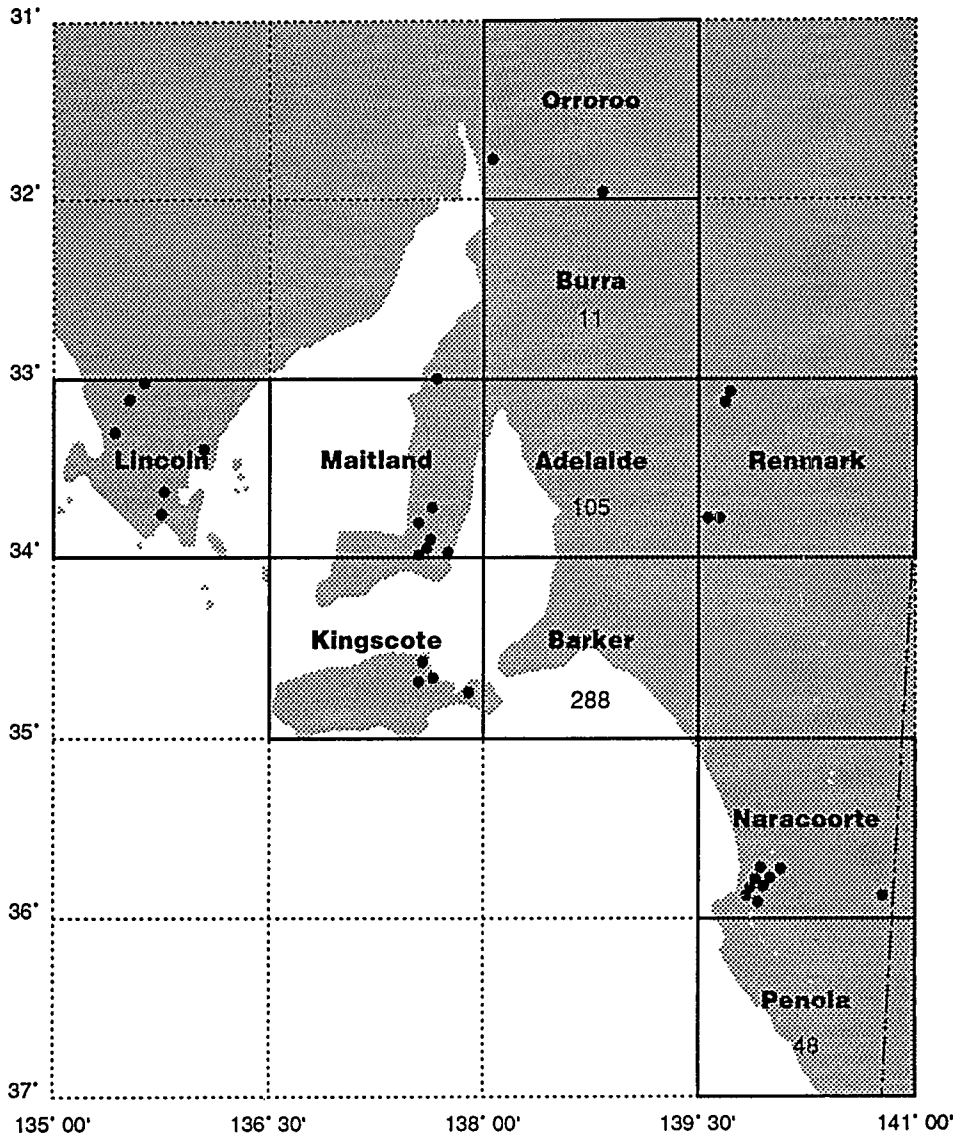


Figure 2. Regions of South Australia surveyed for Mallards, Pacific Black Duck and M × P hybrids in 1987, showing sites visited if less than 10, or number of sites visited per region.

within a region, these sites are plotted on Figure 2. If more than ten the total number of sites visited is shown. Most of the wetlands occurred in the Adelaide and Barker regions.

Table 1 shows the number of wetlands visited within each region and the numbers of sites that contained Mallards, M × P hybrids and Pacific Black Ducks. Mallards and/or M × P hybrids occurred at 111 sites, and Pacific Black Ducks at 258 sites. Neither Pacific Black Ducks, Mallards nor M × P hybrids were seen on 188 wetlands and 74 sites had both Pacific Black Ducks and Mallards and/or M × P hybrids.

Except for the Adelaide and Barker regions, reports of Mallards and/or M × P hybrids were restricted to one or two wetlands in each region (Table 1) and then only to a few individuals (Table 2). More than half of the feral farm ducks and over 80% of all Mallards and M × P hybrids occurred in the Adelaide region (Fig. 3; Table 3). This was the only region where the total number of Mallards and M × P hybrids exceeded those of Pacific Black Ducks. In sections along the River Torrens Valley the total number of Mallards and M × P hybrids was nearly three times that of Pacific Black Ducks (Table 3; Adelaide 1:50,000 map), and some of the Mallards and M × P hybrids but none of the Pacific Black Ducks had dependent ducklings.

Significant numbers of Mallards and M × P hybrids also occurred in the Barker region with

Table 1. Presence of Mallards, Mallard × Pacific Black Duck Hybrids and Pacific Black Duck at wetland sites in regions of South Australia in 1987.

1:250,000 MAP	Wetlands Visited	Wetlands With Target Ducks	Wetlands With Mallards And M × P Hybrids Only	Wetlands With Pacific Black Duck Only	Wetlands With both Mallards/Hybrids & Pacific Black Duck
LINCOLN	6	3	1	2	0
MAITLAND	7	1	0	1	0
ORRORO0	2	1	1	0	0
BURRA	11	6	1	5	0
ADELAIDE	105	96	15	28	53
BARKER	288	155	17	122	16
KINGSCOTE	4	4	0	2	2
RENMARK	4	1	0	1	0
NARACOORTE	9	9	2	5	2
PENOLA	48	19	0	18	1
TOTAL	484	295	37	184	74

Table 2. Counts of Feral Farm Ducks, Mallards, Mallard × Pacific Black Duck Hybrids and Pacific Black Ducks in South Australia 1987.

1:250,000 Maps	Feral Farm Ducks	Mallard	M × P Hybrids near Mallards	M × P Hybrids near Black Duck	Hybrids with Intermediate Features	Total Mallards and Hybrids	Pacific Black Duck
LINCOLN	0	0	0	6	0	6	152
MAITLAND	0	0	0	0	0	0	1
ORRORO0	6	12	0	0	0	12	0
BURRA	80	2	0	1	0	3	144
ADELAIDE	*362	*206	*437	*236	*295	*1174	*974
BARKER	*224	*53	62	77	21	*213	*1534
KINGSCOTE	5	0	0	1	1	2	68
RENMARK	0	0	0	0	0	0	4
NARACOORTE	3	3	1	1	0	5	130
PENOLA	4	7	0	0	0	7	158
TOTAL	684	283	500	322	317	1422	3165

Dependent Ducklings = *

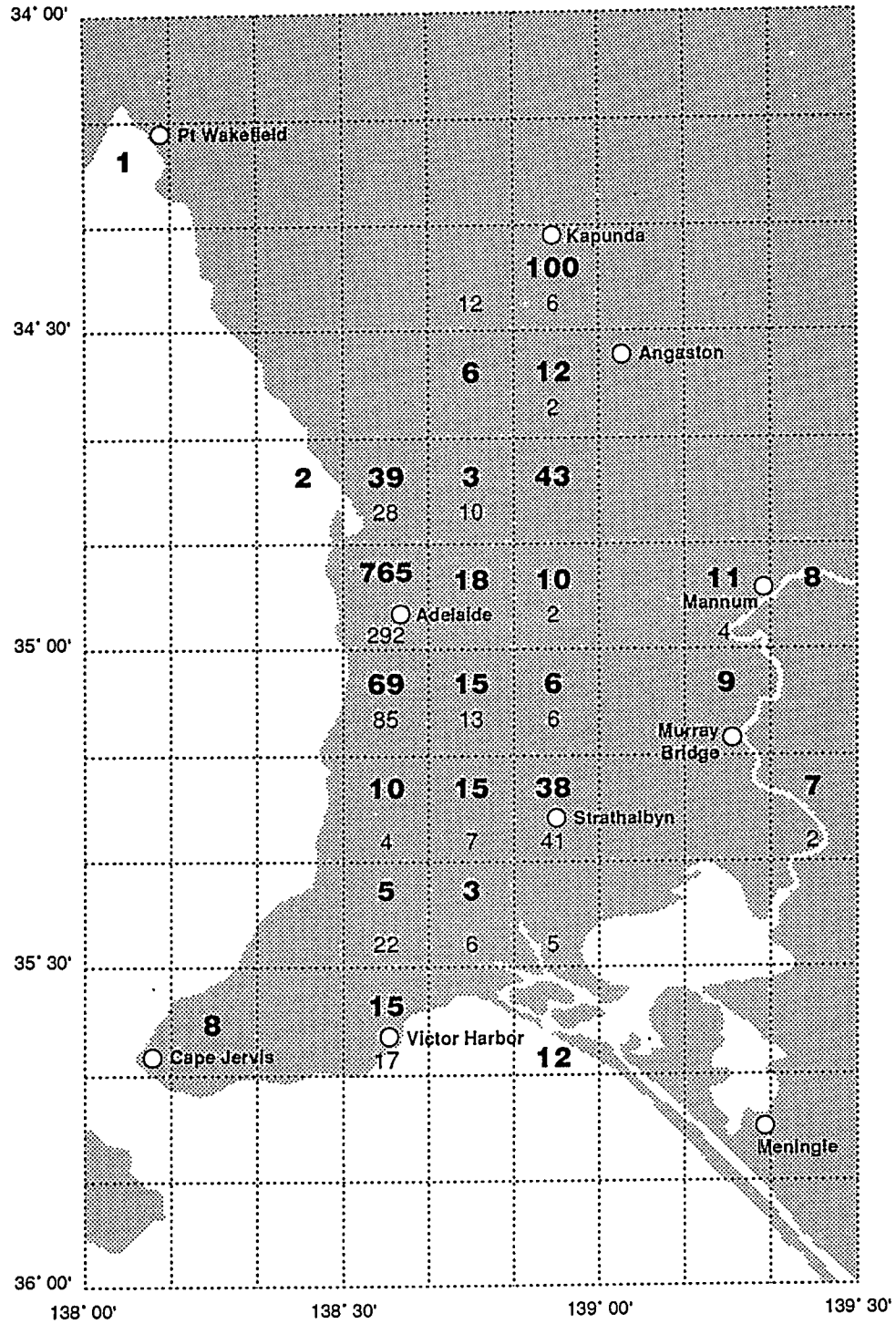


Figure 3. Mallards and their Pacific Black Duck hybrids and feral farm ducks counted per 10 minute block in southern central South Australia. Bold numbers refer to numbers of Mallards and M × P hybrids counted in 10 minute grid squares. Other numbers refer to feral farm ducks and other feral Mallard derivatives.

Table 3. Counts of Feral Farm Ducks, Mallards, Mallard and Pacific Duck Hybrids and Pacific Black Ducks in metropolitan Adelaide in 1987.

1:50,000 Maps	Sites Visited	Feral Farm Ducks	Mallard	M × P Hybrids near Mallard	M × P Hybrids near Black Duck	Hybrids with Intermediate Features	Total Mallard and Hybrids	Pacific Black Duck
ADELAIDE	37	*298	*100	*349	196	*270	915	372
ONKAPARINGA	26	12	7	18	29	22	76	*318
EUCHUNGA	71	29	3	1	18	6	28	452
NOARLUNGA	47	102	9	41	21	5	76	*283
TOTAL	181	441	119	409	264	303	1095	1425
TOTAL FOR STATE	484	684	283	500	322	317	1422	3165

Dependent Ducklings = *

major concentrations at Flinders University, Playford Lake (Belair National Park), Wittunga Botanic Gardens, Fountain Lake near Reynella, and Strathalbyn (Fig. 3 and Table 3; Echunga and Noarlunga 1:50,000 maps).

As with Mallards, most the feral farm ducks were along the River Torrens Valley (Table 3). Another 224 were counted in the area covered by the Barker map. The only other areas with a significant number of feral farm ducks were the country towns of Clare (25), Jamestown (34) and Burra (22), all in the mid-north (Burra map).

DISCUSSION

From time to time there has been concern that the genetic integrity of Pacific Black Ducks in Australia is at risk because of feral populations of Mallards (Frith 1967; Parker *et al.* 1985) and there have been calls for the eradication of feral Mallards. Before 1950 there were few records of Mallards outside the capital cities, including Adelaide (Blakers *et al.* 1984). Braithwaite and Miller (1975) estimated that less than 100 Mallards each were in the vicinity of Adelaide and Mt Gambier in January 1972 and noted a few isolated sightings along the Murray River.

A Bird Atlas of the Adelaide Region (SAOA 1977), covering the Adelaide and Barker maps for 1974-75, showed most records of Mallards and M × P hybrids occurred in metropolitan Adelaide and extended no further north than Gawler and Eden Valley. The Second Bird Atlas of the Adelaide Region (SAOA in prep.), covering the same area during 1984-85, includes records from Port Wakefield, Kapunda, Point Pass, Saddleworth, Riverton, the Barossa area, and Mannum on the Murray River. Previous records in the Mannum area were in 1969-71 (Parker *et al.* 1985), but none were recorded there during fieldwork for the Adelaide Region 1974-75 Atlas. The Atlas of Australian Birds (Blakers *et al.* 1984) contains several records from the Mannum area, including breeding records. In March 1986, J. B. Paton (pers. obs.) saw nine M × P hybrids at Mannum.

Mallards were not recorded from the River Torrens before 1944, according to Whatmough (1978), but some were seen between 1945 and 1968. Between 1968 and 1977 he stated that the Mallards 'are present in great numbers in many kinds of domestic and wild plumages, especially in the city'. Similarly Paton (1976), in a survey of birds of the Botanic Park and Gardens over 1971-74, estimated that there were 16-30 M × P hybrids (but no Mallards) in this area on a more or less permanent basis, whereas only 1-5 Pacific Black Ducks were seen at any one time.

The Bird Atlas of the Adelaide Region 1974-75 (SAOA 1977) showed no Mallards on Fleurieu Peninsula west of Goolwa, but a scatter of records through the Mt Lofty Ranges, along the Murray River and around Lakes Alexandrina and Albert. Ten years later (Second Bird Atlas of the Adelaide Region, SAOA in prep.), there were records from Hindmarsh Island, Port Elliot, Victor Harbor, Waitpinga, Yankalilla and Aldinga Scrub. In the Victor Harbor area Mallards and their hybrids have been seen regularly since 1983 and were breeding in January 1984 (J. B. Paton pers. obs.). Near Lakes Alexandrina and Albert, the records were from Meningie, McGrath Flat and Waltawa.

Outside the Adelaide and Barker (1:250,000) map sheets there have been few records of Mallards or M × P hybrids in South Australia, with none north of latitude 32° S (Orroroo map) and only one west of longitude 138° E (Lincoln, Maitland, and Kingston maps; Parker *et al.* 1985). Nor,

surprisingly, have there been many records from the Murray River except near towns, (e.g. Mannum and Murray Bridge), covered by the Adelaide and Barker maps. There is only one record (near Waikerie) given in The Atlas of Australian Birds (Blakers *et al.* 1984). Previous records from south of Morgan include a single feral farm duck in Morgan Conservation Park in August 1984 and a Mallard with two partly grown M × P hybrids at Walkers Flat and one M × P hybrid at Murpko Flat in March 1986 (J. B. Paton pers. obs.). In view of the close proximity of a residual population of Mallards at Mannum (on Adelaide map) a more detailed survey of this section of the Murray River should be undertaken.

In the South East of South Australia (Naracoorte and Penola maps) the numbers still remain few and scattered. Braithwaite and Miller (1975) estimated that there were less than 100 Mallards in the Mt Gambier District in January 1972 whereas our total count for the area was seven. The reasons for this apparent decline are not known. The area was well-covered in our survey except for the area near Robe where there have been a few previous records. A M × P hybrid with two ducklings was seen along Drain L near Robe in November 1984 by J. B. Paton and a Mallard was collected 48 km North of Kingston in 1957 (Parker *et al.* 1985). There have been no other published records from the Coorong region. Although this section of the Naracoorte Region was not covered in our survey, we do not believe many Mallards or M × P hybrids were present. However, Mallards and M × P hybrids have been seen near Kingston: 15 M × P hybrids and four Pacific Black Ducks in February 1982 (P. Paton pers. comm.), and three M × P hybrids in November 1986 (J. B. Paton pers. obs.).

Our survey supports the impression that since the 1970s there has been an increase in the number of Mallards and their Pacific Black Duck hybrids in the area covered by the Adelaide and Barker maps and particularly along the River Torrens in metropolitan Adelaide. There has also been an extension of their range. Outside these areas the records are still scattered and the numbers small, particularly of birds showing features of hybridisation, possibly because the Mallards have only recently escaped from domestication.

There is no comparable information about the numbers of feral farm ducks, other than Mallards, in South Australia. Our survey shows that there are significant numbers of feral farm ducks particularly in metropolitan Adelaide and in some country towns. Although these feral farm ducks do not pose the threat of gene flow into the native Pacific Black Duck population that is found with Mallards (Braithwaite and Miller 1975) they will, with Mallards, compete with native species for food, shelter, nesting sites and drought refuges. Furthermore, both the Mallard and Muscovy are appreciably heavier than native species and the drakes are very aggressive. They can inflict serious injuries and even kill birds that they mount. Muscovy drakes have been known to drown geese and Black Swans *Cygnus atratus* (Delacour 1964). In Belair National Park D. Wanke (pers. comm.) has seen pack rape of both female Pacific Black Ducks and Mallards by five or six Mallard drakes on at least six occasions in both 1987 and 1988, resulting in feathers, skin and flesh being torn from the back, neck and top of the head, with the female birds becoming too weak to stand. Despite subsequent care most of these birds died. The attention of these drakes is not necessarily confined to ducks. On one occasion one attempted to mount an Eastern Swamphen *Porphyrio porphyrio* (J. B. Paton pers. obs.).

Although there is no documented evidence to support it, we believe that the increase in Mallards and other feral ducks has been associated with a decline in the numbers of Pacific Black Ducks in wetlands of metropolitan Adelaide, particularly along the River Torrens, and we attribute this largely to competition from, and habitat exclusion by feral birds. However, other factors such as urbanisation of the river banks and flood mitigation schemes may have also contributed to the reduction. We believe that up to the 1970s most Mallards and their hybrids were derived from accidental escapes from domestic flocks or city parks and gardens. Since then there appear to have been some deliberate releases on ponds, lakes and other wetlands as a means of disposing of unwanted domestic ducks particularly drakes. The success of these releases can be attributed in part to the fact that these birds are already used to man and are more aggressive than native ducks. That feral ducks are deliberately released is supported by the presence of feral farm ducks with clipped wings on a council controlled nature reserve at Naracoorte (The Advertiser, 'SA Today', April 20th 1990). A reduction in feral farm ducks on Playford Lake (Belair National Park) has been noted since a charge has been made for vehicle access (D. Wanke pers. comm.).

If the genetic integrity of the Pacific Black Ducks is to be maintained, those Mallards and their hybrids

already in the wild should be removed. It is frequently said that integration has already gone too far and that this would be an impossible task. This is not supported by our results. A count of less than 1,500 Mallards and M × P hybrids for the southern parts of the State is not a large number, and more than 70% were found in a relatively small area around the rivers Torrens and Onkaparinga in metropolitan Adelaide on the western extremity of Mallard distribution in south-eastern Australia. The removal of Mallards and other feral ducks should encourage the return of Pacific Black Ducks and other native waterfowl to the city and urban parks and gardens. Recruitment to the feral populations of waterfowl could be reduced by making everyone aware of their responsibility to ensure that domestic animals including waterfowl do not escape.

There is every reason to believe that, without the aggressive competition of feral birds, native ducks and other waterfowl will become tame enough to be hand fed as is the case in Perth (L. Best pers. obs.). The presence of native ducks in parks and gardens would enhance the urban dwellers' appreciation of the environment as well as being an added attraction for tourists.

We therefore recommend that an effort be made to remove Mallards, their hybrids and other feral waterfowl from South Australian wetlands and that further recruitment to the feral population be reduced by encouraging people to ensure that their domestic animals do not escape.

NOTE

In South Australia under the Animal and Plant Control (Agricultural Protection and Other Purposes) Act 1986, Mallards are included in a class of animals which may not be released Section 44 – Penalty $2,000 or six months imprisonment.

ACKNOWLEDGEMENTS

The success of this project would not have been possible without the dedication of many members of the South Australian Ornithological Association who acted in a voluntary basis, supplying time, equipment and transport. A list of observers is held by the Wildlife Section of the South Australian National Parks and Wildlife Service, Norwood. Also D. Wanke kindly provided observations of feral ducks on Playford Lake, as did T. Dennis for Kangaroo Island. N. Tocher drew Figures 1, 2 & 3. G. Maeder typed the manuscript and D. C. Paton provided helpful comments on drafts of this paper.

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