Pacific Black Ducks: insights on their behaviour in an urban backyard

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This report highlights findings from an intensive study of a pair of Pacific Black Ducks *Anas superciliosa*, which regularly visited our suburban backyard in a six-month period from October 2011 to April 2012. Close observations of digital photographs enabled us to identify the duck from the drake non-invasively. This in turn helped us to assign sex differences in their feeding and social behaviour with some confidence. We report on four areas of interest that emerge from over 100 observations of this pair. The first concerns the optimal identification of each sex. The second concerns their social, sexual and agonistic behaviour in a suburban context, since researchers have little previous knowledge outside the nesting environment in natural habitats. The third concerns 'sex-linked' (or at least individual) differences in feeding and general behaviour of this pair, including interaction with other suburban birds. The fourth relates to their social interaction as a pair, and to the drake's behaviour in the absence of the duck.

INTRODUCTION

The Pacific Black Duck (PBD) is not only well known across Australia and neighbouring Pacific island nations but has been carefully studied by biologists in terms of its morphology and breeding characteristics, and the general behaviour of conspecifics in natural habitats like rural waterways and river systems (Marchant & Higgins 1990). This species is also attracting human contact as a 'de facto' pet in domestic and urban locations, as a quick Internet search ('Pacific Black Duck') of photos and video-clips on YouTube shows. Recent research by urban ecologists has focussed on PBDs' newly observed feeding behaviours when given bread by visitors at urban waterways, lakes and public recreation areas in south-eastern Queensland (Chapman & Jones 2012). Such behaviour may be indicative of native species' capacity to survive in close contact with humans in urban environments. To date, research on sex differences in PBDs' feeding and social behaviour are rare – whether away from conspecifics, or in different habitats (Johnsgard 1960) but may add useful insights into their adaptability. One inherent difficulty for researchers is that the PBD is sexually isomorphic; hence the basic challenge to identify the sex of these birds reliably and non-invasively.

METHODS

We reviewed two main data sources on the PBD. One was the comprehensive report in Marchant & Higgins (1990) on its geographical distribution, morphology and behaviour in natural environments. The second was annual bird count data on the PBD in the Hunter Region, summarised in Stuart (1994-2011).

We began observing two PBDs in our suburban backyard in Charlestown (32º 57' 33" S, 151º 04' 09" E), when they made three visits on 20 October 2011. In the period to 1 December, we noted the number and time of day of visits, whether they arrived singly or together, and digitally photographed them feeding from a distance of 3-10m. We related our photos and observations to descriptions given in Marchant & Higgins (1990) in attempts to identify the sex of each bird. This source was useful on most aspects of the PBDs' morphology and behaviour, but their large-scale research summary from Australia and New Zealand had two limitations. First, in the absence of non-invasive methods for determining the sex of PBDs (Marchant & Higgins 1990) observation alone could not accurately identify sex of PBD; their behaviour was also important. Guidelines for invasive (genital) recognition are described by Dunstan (2010), but this method would have been inappropriate here. Second, previous studies related to sexual and social behaviour in natural habitats (i.e. with conspecifics, in open water). Our context was quite different. Consulting other references on bird behaviour and field guides also had limitations, but using 10x42 binoculars, 7.2 megapixel photographs and close observations, we defined key features to help identify their sex.

These waterbirds may have been attracted to our yard initially by bird seed we spread on the lawn for pigeons and parrots. When the PBD visits became regular (in November) we changed to commercial poultry food, with a minimum 15% protein, 2% fat, 7.5% crude fibre and 0.3% salt, from a mix of crushed peas, lupins, sorghum, chaff, maize, black sunflower seeds and various vitamins to supplement oil to feathers and egg production. We spread up to half a cup per half-day visit to replenish this source, in a feed zone 1-2m from a water bowl filled with rainwater.

In the period 3 December 2011 to 30 April 2012 (when visits ceased) a more detailed diary of the PBDs' behaviour was kept, including direction of arrival and departure, duration, number and time of day of visit, sex of duck and its general social and feeding behaviour, plus any relevant incidents. During, and after this period, we made field observations of PBDs at several other public habitats – the main one being Charlestown Golf Club (32º 57' 46" S, 151º 40' 29" E), one km away. Records of these observations enabled us to test working hypotheses from backyard observations.

RESULTS

Our review of PBD observation summaries in this region indicated that it is thriving in the Hunter Region – with reported numbers of at least 50 at up to 20 small to large wetlands since 1993. Detailed records from 2001-11 show peak counts over 300 in less populated and protected waterways around Newcastle (554, Apr 2011 near Morpeth; 308, Feb 2010 in the Hunter Estuary; 350, Sep 2008 near Minmi; and 831, Nov 2008 near Hexham). Counts are also steady or rising on a seasonal monthly basis at various suburban parks and lakes (e.g. 21-100 at Hunter Wetlands Centre 2010-12: Paddy Lightfoot pers. comm.).

In the period from October 2011 to April 2012 we observed PBDs in our yard 117 of 192 days. There were four days when we made no recordings at all; these were not consecutive. As **Table 1** shows, there were substantive periods of daily visits by one or both birds, as well as periods when neither bird appeared (70 days). Visits were typically made twice daily (pre-dawn to 0800h; 1600h to dusk), and always involved feeding. At times their visits seemed sporadic. The birds were observed arriving together on at least 50 visits; but more often they were seen feeding together (113 visits). No intra-specific aggression between the pair was observed when feeding; however some consistent differences were noted in the rate and pattern of each bird's feeding behaviour. Their arrival to and departure from our backyard was either west (towards Charlestown Golf Club) or east (40 m to a neighbour's chlorinated pool).

Table 1. Sequence and numbers of visits by PBDs for given periods

Period (no. of days) Oct 2011-Apr 2012	Days 1 or 2 ducks seen	Arrived together	Fed together
Oct 20-27 (8)	8	NR	17
Oct 28-Nov 5 (9)	0	0	0
Nov 6-11 (6)	6	11	11
Nov 12-30 (19)	0	0	0
Dec 3-Jan 7 (38)	37	9	19
Jan 8-Feb 2 (26)	0	0	0
Feb 3-8 (6)	6	10	11
Feb 9-19 (11)	0	0	0
Feb 20-Apr 6 (46)	46	18#(30 NR)	50
Apr 7-11 (5)	0	0	0
Apr 12-29 (18)	14	2	5
Total (192)	**117**	**50#**	**113**

#Totals are under-estimates; NR indicates Non-Recorded data

Physical features of the PBD, a dabbling duck, are broadly described in Marchant & Higgins (1990, p.1320). Normally it is not possible to visually separate duck and drake PBDs in the field. However, in our context of seeing the pair of birds feeding together, it was possible to discern key features like relative size, feet colour, and subtle differences in plumage and overall colour. The most helpful features we used, which have been determined using invasive examination of captured birds in previous studies, are as follows. The drake's plumage appeared dark brown due to thinner buff margins on the upper wing and back feathers; it had mustard-coloured feet. The duck appeared lighter brown due to broader buff margins on its upper wing and back feathers; it had a distinctive and irregular pattern of brown and buff lines down its back, and it had dark brown feet. Repeated observation of these distinguishing features enabled us to identify their sex reliably, and thus tag their behaviour when they visited singly or together.

It was also noted that the green-purple (iridescent) speculum feathers appear on both duck and drake. Our photographs also showed either sex covering its speculum - on different occasions, standing or swimming.

Social, Sexual and Agonistic Behaviour

Being able to reliably distinguish duck from drake allowed us to identify each bird's visit frequency and behaviour. Of the 117 days either appeared,

the duck was present 87 days (128 visits) compared with the drake's 116 days (178 visits). The duck did not appear for 37 days after 28 December, nor again after 20 April. We did not see them perform any mating rituals, but they usually self-preened beside each other. We also do not know if the duck was laying/incubating or raising a brood (its exclusive role) in the 192-day period – whether at the golf course or nearby. Their non-visit periods do not seem long enough for successful breeding – based on data in Marchant & Higgins (1990, p. 1328). Interestingly, when they arrived separately it was often within (5-30) minutes of each other, and from either west or east. If the duck arrived first, it began feeding rapidly and departed within 15 minutes - if the drake had not yet arrived. Conversely, if the drake arrived first, sometimes it waited 30-60 minutes before feeding and departing. When the birds arrived together, they tended to stay (on average, 10 minutes) longer than either stayed if it arrived alone. In either case the bird(s) then flew to the neighbour's yard, where they would loaf beside the pool; but they also revisited from that location to feed.

We noted the drake's agonistic behaviour (22 February 2012, 0718h) when three PBD arrived in our yard. Two walked down to the feed zone and water bowl; the third remained where it landed several metres away, seeming unsure of the situation. One of the pair (presumably our 'residents') broke away from feeding and confronted the third where it stood, chest to chest. The resident identified as the drake then engaged in wing joint and beak biting for about five seconds before the third bird, also a drake, started to retreat. The resident drake then chased the other round the yard on foot and without either calling for one minute before both flew off in the direction they arrived. Meanwhile the duck continued feeding and drinking; it took no part in the altercation. The resident drake returned several minutes later and the pair resumed feeding before departing. All this happened in five minutes (our photographs confirmed the sex and identity of the three birds).

The duck also exhibited 'exploratory' behaviour in this suburban context, especially after the pair returned from a substantial 'non-visit' period. They would arrive together, move to the familiar feeding zone and resume previous feeding patterns. After feeding, the duck would wander around the yard, or under our verandah – perhaps exploring nesting or resting sites. The drake would follow her into long grass in the yard, but held back when she ventured under the house. Once, after taking off, the duck perched in and briefly inspected the fork of a neighbour's Silky Oak tree (*Grevillea robusta*), a recent nest site of Laughing Kookaburras *Dacelo novaeguineae*. Both birds also perched on our fences, barbeque or shed roof – just observing their surroundings.

Feeding Behaviour

Most striking was the difference in their feeding patterns, recorded over 113 visits together. Soon after the duck landed it would scurry over to the water bowl, sip several times or feed rapidly on the poultry grain mix. It repeated this two-step sequence every few minutes – some 3-5 times per visit. The duck invariably added a third behaviour to its pattern, using its bill to add nearby sand or loose dirt to the water bowl and 'suzzle' the mix, as if filter-feeding at the bottom. A fourth step involved preening its breast and upper wing feathers with the muddy water. By contrast, the drake on arrival would invariably nibble the grain and 'chatter', finish early and then stand still near the duck – seeming more attentive than it to local bird sounds and movement. When the duck had finished its cycles of feeding, drinking, mixing and preening, it walked out to the open lawn, repeated a head-nod signal and took off. The drake quickly followed. The drake was not seen to drink from the bowl when the duck was present (and had made the mud-mix). Neither bird 'competed' for food or water in this context, and typically fed next to each other. As mentioned before, if the duck had not arrived, the drake's feeding pattern reversed – in that it often waited a considerable period before feeding, and then typically flew off to the pool.

On numerous occasions, when feeding singly or together, the PBDs were joined by up to nine Crested Pigeons *Ocyphaps lophotes* and Eastern Rosellas *Platycercus eximius* also seeking the grain. Occasionally we observed mock-nipping from the duck when these birds brushed feathers but no pursuits or defence of its feeding zone. On three occasions an Australian Magpie *Cracticus tibicen* swooped and landed, attempting to intimidate them while feeding. The drake immediately confronted it, head down and neck extended, and the Magpie flew away. On other occasions, both birds seemed alert to calls of roving Laughing Kookaburras, Pied Currawongs *Strepera graculina* and Australian Ravens *Corvus coronoides*.

Interaction with Observer

Two unexpected and remarkable behaviours of the drake occurred in the presence of GF, during the period 21-29 April when the duck had stopped visiting. On the first day post-separation the drake seemed more wary and unsettled when it arrived to feed at 0645h and again at 1655h. It displayed a familiar 'full threat' behaviour pattern seen previously whenever GF walked past both birds on the way down to the feed zone. Similar intra-specific aggressive behaviour has been described of Mallards by Lorenz (1967, pp. 49-50), but in our case the PBD drake's pattern included: (1) head and neck extended low to the ground; (2) bill open as if to bite anything close; and (3) initially walking in the same direction (towards the feed zone) with its head and neck at an angle to its body line, effectively looking over its shoulder. Its path seemed to loop around and behind GF (to the left or right). Once GF had overtaken it, the drake resumed the same natural gait as the duck when the two fed together. A fourth sign of its wariness was to stay back two metres until the grain mix had been spread out and GF withdrew. For the next few days post-separation the drake fed steadily for up to 10 minutes (often surrounded by 5-9 Crested Pigeons), and then rested for 20-30 minutes on open lawn. Its departure pattern was also typical; the drake would suddenly seem alert, give a quark-like call several times and listen, then fly off.

By 24 April, the drake's behaviour changed noticeably. First, its threat pattern dropped in intensity on all four signs above and his general behaviour was more like the duck's, i.e. normal gait despite GF's presence nearby. Second, the drake moved away from the feed zone to the middle of the lawn after feeding. This put him only five metres from GF – sitting quietly under the verandah, wearing a baseball cap; this may be a visual feature the duck used to identify GF. When GF nodded several times to it; the drake lifted its head and neck, as if fully attentive. After a 15-second pause GF nodded again, and the drake paused, turned to face east (the direction of the pool) and flew off. This did not appear to be a fright response. The same scenario presented itself over five more days. Each time the drake finished feeding, it walked to the middle of the lawn. GF waited a minute, and started head nodding when the drake looked his way. Again, the same response from the drake; head erect and slight shuffle of feet, before taking off – just as we had observed previously when the duck gave the same signal.

DISCUSSION

Any short-term intensive study has its limitations, but our records show consistency (i.e. reliability) over many observations (determining sex of duck and drake) and of their observed behaviours. Social and agonistic behaviours reported of the drake in this suburban context match those we have also observed, and have been reported of PBDs, in more natural habitats with conspecifics. Our study also offers new insights into the remarkable adaptability of the drake, and raises the question of how flexible (or vulnerable) are seemingly instinctive behaviours like its response to take-off signals by GF in the last week when the duck was absent. This response was evoked five days in a week. Similar imprinting behaviours have been reported by Lorenz (1967) in captive and tame but wild birds of 'higher intelligence'.

The drake's protective behaviour clearly extended far beyond its nest site in natural habitats; our backyard was a very different, urban setting. GF regularly observed its ritual threat display towards him when the duck was nearby, and its sudden and intense intra-specific aggression towards the stray male PBD. Equally surprising was the progressive decrease in the threat display when the duck was not present. Controlled experimental studies of the kind described by Lorenz (1967) may shed light on this. Other research questions relate to the pair's dietary needs and differences in feeding behaviour. Why did the duck eat the grain mix so rapidly compared to the drake, and why drink so often? Why did it mix dirt into the water and proceed to drink and preen with it? Are these also esoteric (learned) behaviours, or sex-linked, or species-specific, and/or related to her breeding cycle? A plausible hypothesis (such as the duck's need for substantial protein intake related to egg laying and brooding) could be made if the pair was breeding during the period of observation. If not, expert advice or controlled research on the pair's normal metabolism may be helpful.

Our observations and literature reviews add fresh perspectives on the pair's capacity to adapt to (new) urban environments - a process called synurbanisation by Luniak (2004). Few species of Anatidae may have the physiological capability to brood rapidly in either tree- or ground-nesting contexts. Apart from that, the duck's exploratory behaviour in our backyard, its rapid feeding behaviour and its signalling when and where to take off accentuate her stake in their successful breeding – under the watchful, protective behaviour of the drake. The question remains on

whether our observations are generalizable to same-sex or species-specific behaviour, or simply represent individual differences in this pair. Either way, the PBD warrants more research and public education in its growing interface with humans in urban settings.

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