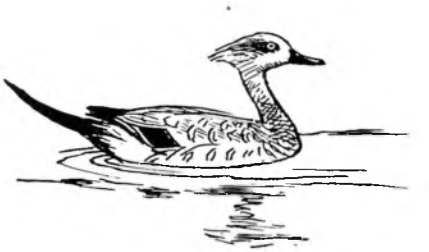
Male parental care of Patagonian Crested Ducks *Anas (Lophonetta) specularioides*



DEBORAH BUITRON and GARY L. NUECHTERLEIN

We observed the behaviour of Crested Ducks accompanying broods on small plateau lakes in southern Argentina. Time-budget data show that although females usually were closest to the brood, males were almost always nearby and spent more time alert than the females. Males were most active in both intraspecific and interspecific aggression. Both pair members took part in intraspecific aggression, and they cooperated closely in leading aggressive Upland Goose males away from their young. Both sexes, but especially males, used distraction displays. Our observations suggest that male Crested Ducks accompany broods to protect the ducklings, and that males play an important role in the care of ducklings from hatching to independence.

Although the males of a number of Southern Hemisphere dabbling ducks (genus *Anas*) are known regularly to accompany females and their broods, few species have been studied sufficiently to determine the actual role of the male, if any, in caring for the ducklings (Kear 1970, Siegfried 1974, Weller 1972, 1975, McKinney 1985, McKinney & Brewer 1989). The Crested Duck *Anas (Lophonetta) specularioides* is one of the species in which males are frequently seen with females and broods (Weller 1975), but little information is available on the extent of paternal care. In this note we describe the behaviour of males and females accompanying seven broods of Crested Ducks that we observed in the Patagonian region of southern Argentina.

Study area and Methods

We made periodic field observations on Crested Ducks from November 1982 to March 1983 inclusive on snow-melt lakes in the foothills of the Andes, near Calafate, Santa Cruz Province, Argentina. These were small lakes in which the dominant submerged vegetation was milfoil *Myriophyllum* spp. and in which there were no emergents or shoreline vegetation other than grasses to provide cover. When possible, we observed broods for 20 minutes using focal-animal sampling techniques (Altmann 1974), never observing the same brood twice during the same day. Adults occasionally reacted to us with a brief period of alertness when we first arrived at a lake, and we avoided this potential bias by delaying observations, usually for at least an hour. Except for one session, which has been discarded, our presence did not thereafter appear to affect the behaviour of the ducks. At 30-second intervals within the 20-minute period we noted the activity of each parent (males are larger and have longer crests), the predominant activity of the ducklings, and the distances between adults and young. In addition, all interspecific aggression involving Crested Ducks was recorded, whether or not the pair involved was the focal pair. Observations were made from shore using binoculars, a 15-60X telescope and an intervalometer that signalled the 30-second intervals. The Wilcoxon signed ranks test (Conover 1980) was used for statistical comparisons between males and females.

Results

Seven Crested Duck broods were observed on four different lakes during 19 sampling sessions, for a total of 348 minutes (Table 1.) These were the only broods seen on the four lakes that were under intensive obser-

Table 1. The brood size, age and time observed for the seven broods of Crested Ducks.

Pair	Lake	Young *n*	Age Class at 1st Session	Sessions *n*	Minutes *n*
1	Encantada	7	Ia	5	68
2	Horseshoe	1	Ia	1	20
3	Boulder	4	Ia	2	40
4	Boulder	2	Ia	1	20
5	Boulder	4	Ia	1	20
6	Ansiedad	6	IIa	4	80
7	Ansiedad	3	IIa	5	100
	Total			19	348

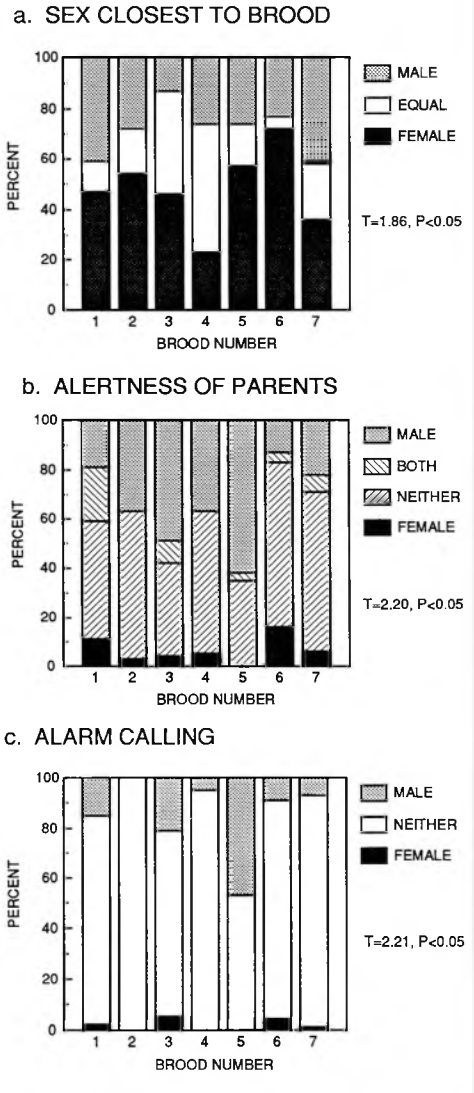


Figure 1. Male and female parental care behaviour in seven Crested Duck broods. Each stacked bar represents all (100%) of the observation sample points available for a given brood. Observation times for each brood are given in Table 1; point samples were taken every 30 s. (a) Percent of observation samples in which male versus female were closer to the brood. (b) Percent of times that male and female were in alert posture. (c) Percent of samples in which male and female were alarm calling. The T-values given are for Wilcoxon signed ranks tests for male versus female differences.

vation as part of another study, although three other broods seen on more distant ponds that we occasionally visited. Ten observation sessions occurred before 11.00 h and seven after 15.00 h. When first observed in early January 1983, the ducklings of five of the broods were aged as Class Ia downy ducklings (Larson & Tarber 1980). The ducklings in the sixth brood were about half the size of the parents with considerable down (Class IIa), while those of the last brood were nearly 3/4 of the adult size, but still with down (Class IIb). Both a male and a female were always in attendance whenever any of these seven focal broods or an additional three broods were seen. When last observed, Families 6 and 7 were completely feathered and flying, yet they continued to be accompanied by both adults, although not so closely as when younger. Although none of the ducks were marked, we were confident of their identity because there were no sudden changes in family location, duckling age, or duckling numbers save that Brood 1 decreased from seven to six young. Each lake was at least 1 km distant from the next closest lake, and we never observed on a particular lake any families other than those which we expected to see.

Male v. female parental care.

Although in most families, females remained closer to the ducklings than did the males ($T = 1.86$, $P<0.05$), males were always nearby. In two of the seven families males were closer for the majority of observations, while in all but one of the remaining five families, males spent 20–40% of the point-observation times closer than the females to the ducklings (Fig. 1a).

Males spent more time than females with their heads held high in an alert posture in six of the seven families ($T = 2.20$, $P<0.05$, Fig. 1b). In all families, one or both parents were alert for 33–65% of the observations. For all six broods in which alarm calls were given, males more often gave alarm calls than females ($T = 2.21$, $P<0.05$, Fig. 1c). These varied from a single call to a long series of repeated calls.

In all the families observed, females spent considerably more time feeding than males (females: 26–69%, males: 0-20%; $T = 2.37$, $P<0.05$; Fig. 2), while males spent more time loafing, swimming, or preening. In six of the seven broods the majority of the ducklings in the brood were feeding actively for over 60% of observation times (Fig. 3). Brood 5 (observed only for one session) spent less time feeding (44%) and far more time swimming than other broods as they followed their parents, and this adult male spent more time than any other adult in the alert posture and giving alarm calls. The cause for concern was not obvious, but did not appear to be our presence. Feeding by ducklings largely consisted of dabbling, up-ending and surface pecking.

The female led the family in 30 of the 49 cases in which an adult initiated a move in a new direction (following order frequencies: female-young-male = 14, female-male-young = 8, female-young = 8), while the male was the leader in 19 cases (male-female-young = 13, male-young-female = 4, male-young = 2). In all but one of the families, both parents were within 3 m of one another for over 60% of the observation times (Fig. 4).

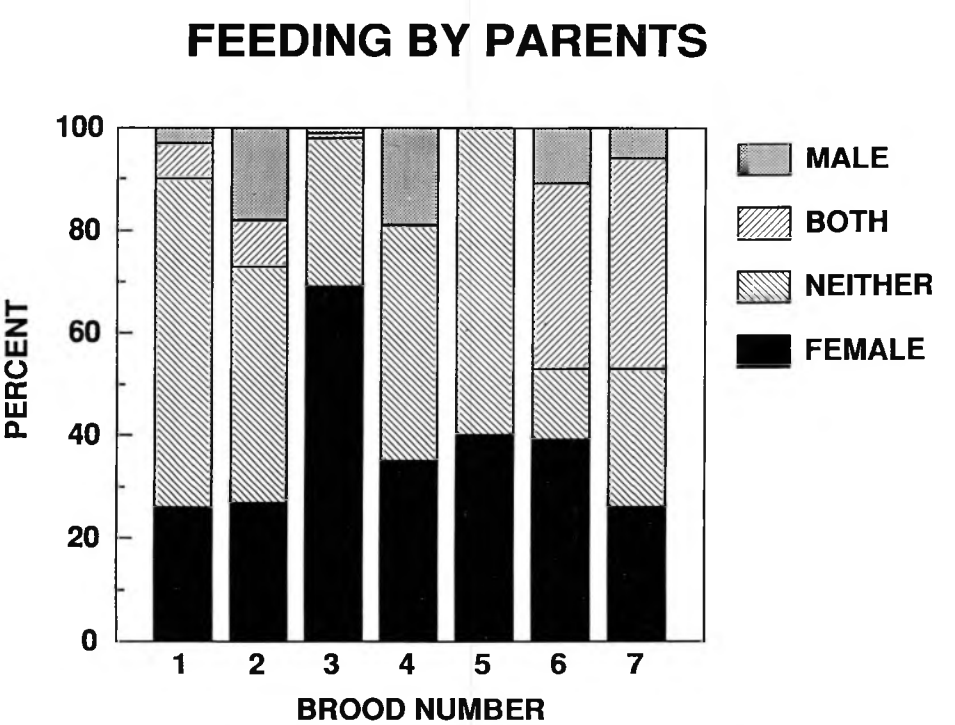


Figure 2. Percent observation times during which male and female were feeding for seven Crested Duck broods. Sample sizes as in Figure 1.

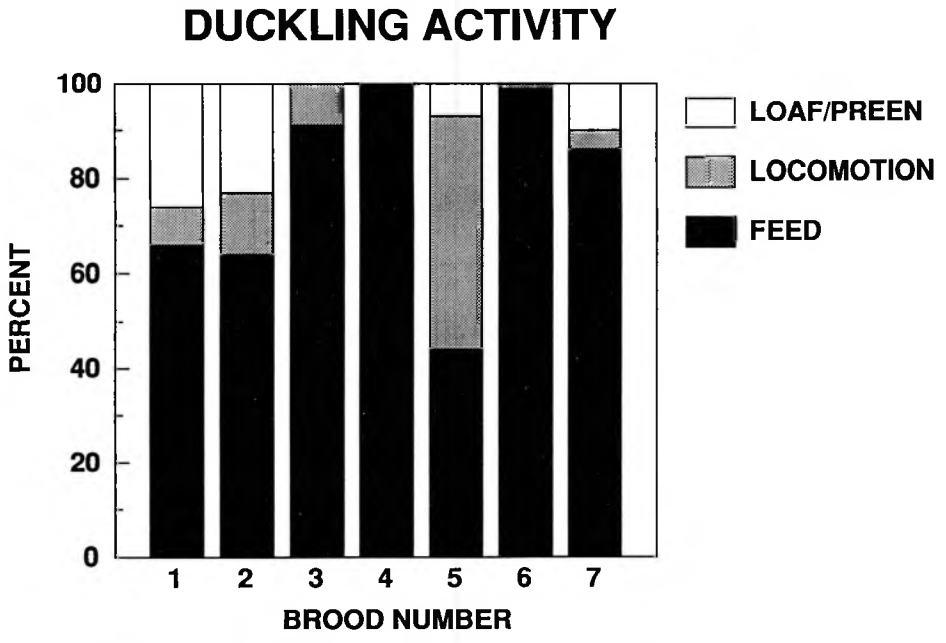


Figure 3. Duckling time budgets for seven Crested Duck broods. Duckling activity was classed as the activity engaged in by the majority of a brood. Sample sizes as in Figure 1.

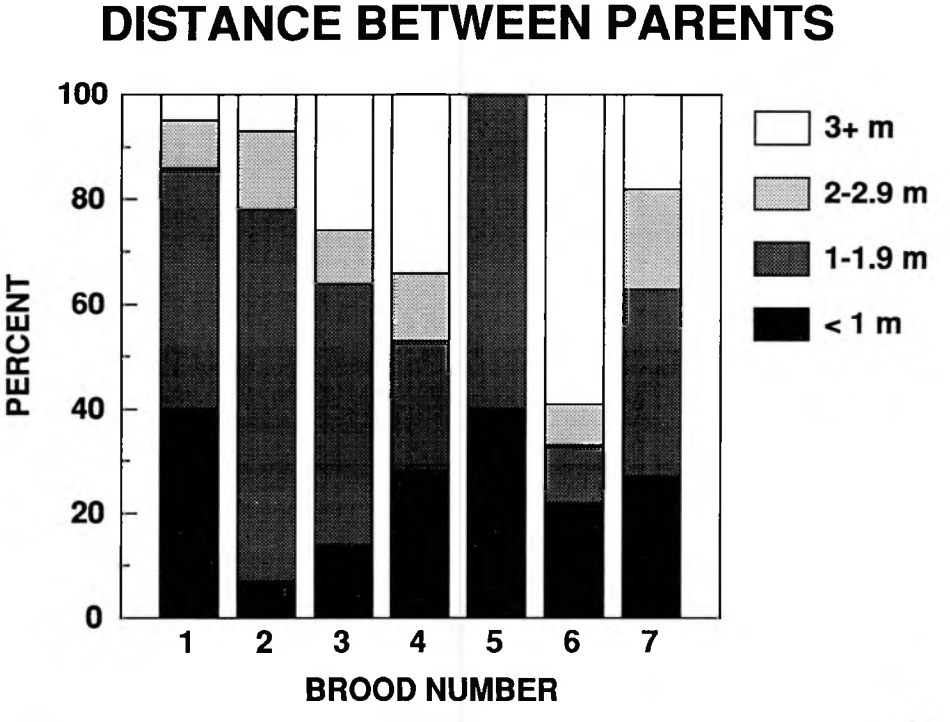


Figure 4. Estimated distance between parents for seven Crested Duck broods. Sample sizes as in Figure 1.

Aggressive Behaviour

Aggressive interactions between two pairs of Crested Ducks were observed 12 times, with 11 of these involving Families 6 and 7 on Lake Ansiedad. Most fights involved only a brief chase and burst of splashing by both adult males, before returning to their broods, which then usually moved further apart. Males initiated and were most active in ten encounters, with all four adults taking part in three of these, only the males in five, a male and a pair in one, and a male and female in one. In two cases only the two females were involved. The target of the aggression appeared to be whichever member of the other family, male, female or duckling, was closest.

We observed 18 interspecific aggressive encounters involving three families of Crested Ducks. Both parents took part in ten of 11 interactions with Upland Geese *Chloephaga pica*, while only males were involved in the four encounters with Chiloe Wigeon *Anas sibilatrix* and the three encounters with Flying Steamer Ducks *Tachyeres patachonicus*. On four separate occasions during one day, a male (Family 3) vigorously flew low over the water surface at one or several members of a courting group of about 20 Chiloe Wigeon. The male chased the wigeon across the water surface for about 100 m before returning to his brood, which was gradually approaching the shoreline where the wigeon were gathered.

We saw the male Crested Duck of Family 1 interact with a pair of Flying Steamer Ducks three times over a 3-week period. Steamer Duck pairs were highly aggressive towards many different species (Nuechterlein & Storer 1985), even when they did not have a brood accompanying them. The first interaction between these two species occurred when Crested Duck Brood 1 (Class 1a downy ducklings) were on shore. As the pair of Steamer Ducks approached to within 4 m of the brood, the male Crested Duck flew directly at the Steamer Ducks, landed beside them, and attacked. After a burst of splashing and possible physical contact, both males flew 30 m away. Following another brief splashing fight, the Crested male returned to his family and remained very alert while the pair of Steamer Ducks swam slowly away.

Three weeks later two more encounters were observed involving the same Crested Duck family. In both cases the Crested Duck male was first seen moving away from his brood, flapping his wings as though giving a distraction display (Stephen 1963), with the Steamer Duck chasing closely. In one case this chasing occurred three times in rapid succession before the Steamer Ducks finally moved away and the male Crested Duck returned to his family. He then joined the female in leading the young along shore to cover among some large boulders.

The most complex of the interspecific interactions that we observed occurred between this same pair of Crested Ducks (Pair 1) with their 1-month-old brood and a single male Upland Goose. On three separate occasions spanning a 2-day period the goose repeatedly attempted to approach to within 4 m of the shore-roosting Crested Duck brood, but vigorous activity by both parents prevented this from occurring. During the first encounter, we first saw the Upland Goose chasing the Crested Duck male, which was flapping irregularly across the surface of the water in a distraction display. After a few minutes the goose turned towards the shore, where the female Crested Duck was leading the brood over ground towards a freshwater spring. Immediately, the Crested Duck male flew to within 1 m of the goose, and again led him away from shore with a distraction display. The male then rejoined his family.

Two similar incidents occurred that evening and the next morning, except that these encounters lasted much longer, over 15 minutes, and the female repeatedly alternated with the male in luring the goose away by flapping across the water, while the lone ducklings quickly moved out of sight along the shore. In these efforts, the pair of Crested Ducks cooperated closely with one another and coordinated their activities skillfully. When the goose approached the male to within 1 m, the male would stop the display and fly out of reach; the female then would approach and start her own distraction display until the goose approached her too closely. Every few minutes the goose would stop following either adult and begin swimming back towards the young. Immediately the Crested Duck pair would fly back to interpose themselves between the goose and their young, then again lure the goose away with flapping wings.

During the first week in February on a

different pond, six very similar interactions were observed between a male Upland Goose and Pair 6, whose six ducklings were nearly full grown. Again, the male and female Crested Ducks cooperated by alternately luring the goose away from their young by using distraction displays. In this pair, one adult frequently attacked from behind while the other flapped in front of the goose, often within 2–3 m. Once the goose flew at a duckling on shore and came to within several metres of it before the female flew in and diverted the goose's attention back to herself and her mate. When the goose had been lured over 40 m from the brood, the female returned to gather the young and lead them further away. In contrast to the attacks on other duck species, Crested Ducks never initiated the attacks on Upland Geese, and these interactions appeared to be only defensive.

Discussion

Our observations of Crested Ducks, though limited, clearly show that males play an important role in the care of ducklings from hatching to independence. As had previously been observed in the wild (Weller 1975), male Crested Ducks, presumably the fathers, almost always accompany broods. That the males are interested in the ducklings and not just in maintaining a bond with the female, as may be the case in Cape Teal *Anas capensis* (Siegfried 1974), is supported in several ways. Firstly, males were the adult closest to the young for a substantial amount of time; in two of the seven pairs, the male was closer to the ducklings more frequently than was the female. In addition, although the female led the family more often, the male was the leader for 38.8% of the 49 moves observed, including several in which the female came last or not at all. Finally, males also were more often alert than females and more often gave alarm calls.

Greater vigilance by males as opposed to females when accompanying broods has been found in a number of waterfowl, particularly geese (Harwood 1977, Lazarus & Inglis 1978, Stroud 1982, Norman & McKinney 1987, McKinney & Brewer 1989). Although it has been suggested that in dichromatic species the brighter plumage of the male may increase his vulnerability to predators and therefore his need to be especially vigilant (Lendrem 1983, Mayhew 1987), this does not explain the greater vigilance of monochromatic ducks or geese. In Crested Ducks at least one parent was alert in 30–65% of the observation time, similar to the rates found in Pink-footed Geese *Anser brachyrhnchus* (Lazarus & Inglis 1978) and Silver Teal *Anas versicolor* (McKinney & Brewer 1989), but not as high as the 70–90% found in Chestnut Teal (Norman & McKinney 1987).

Cooperative parental care and high levels of vigilance may be critical to the survival of ducklings, particularly in open habitats with no emergent or dense vegetation for cover such as was the case for all of the ponds on which we observed Crested Ducks. Although only one Crested duckling disappeared, Kelp Gulls *Larus dominicanus* were seen repeatedly catching Hooded Grebe *Podiceps gallardoi*, Silvery Grebe *P. occipitalis* and Flying Steamer Duck young on nearby lakes. In addition to Kelp Gulls, Peregrine Falcons *Falco peregrinus* and Aplomado Falcons *F. femoralis* made regular passes over these lakes.

The greater role of males in vigilance also may allow females to feed more efficiently during the post-hatch period, as has been found for female Common Eiders *Somateria mollissima* during the laying period (Ashcroft 1976). This would enable females with ducklings to recover the energy reserves that typically are lost during laying and incubation of dabbling ducks (Harris 1970, Krapu 1974, 1981, Ankney & Afton 1988).

Males were more active than females in both intraspecific and interspecific aggression. The aggressiveness of Crested Ducks is well documented (Delacour 1954, Weller 1972), and although males were particularly aggressive towards other male Crested Ducks they also occasionally attacked females. Male Crested Ducks took the initiative in chasing away other species, even though some of these species may well have posed a serious threat to the adults, as well as to the young. Steamer Ducks, for example, are well known for their extreme interspecific aggressiveness, even to the point of killing other waterfowl species (Livezey & Humphrey 1985, Nuechterlein & Storer 1985). Similarly, Upland Geese may pose a serious threat to adult Crested Duck as well as to their young, and both

parents played a critical role in keeping the geese away from the ducklings. Why Upland Geese repeatedly attempted to approach Crested Duck broods on two of the lakes is unclear. Both cases involved lone male geese, and the goose attacks on Brood 6 occurred in areas where that family, and no Upland Geese, had previously been seen.

In our observations, Crested Duck males were more active than females in performing distraction displays. Although males as well as females of several Southern Hemisphere Anatinae have been observed actively persuing potential predators (Kear 1970, Norman & McKinney 1987), only females have been reported to perform distraction displays in most species (Weller 1972, Siegfried 1974, but see Kear 1970 for exceptions). Male Steamer Ducks regularly charge gulls threatening their young, and are often more active in defending the young than the females, who often just lead the brood away (Weller 1972, Weller 1976). Close cooperation between pair members in chasing away predators is typical also of both swans and geese and has been observed in Chestnut Teal *Anas castanea* (Van Tets 1965, Norman & McKinney 1987).

In the two families for which we have long-term information, both parents remained with the brood and continued to provide guidance and protection until the young were flying. Although more intensive studies are necessary, our observations suggest that male Crested Ducks perform a vital and extended role in caring for their offspring. In the population we observed, the open habitat and lack of cover may make paternal care especially critical; it would be valuable to compare male parental care in populations in areas with variable cover and predator pressures.

Andrés Johnson of the Fundacion Vida Silvestre provided essential assistance in the field, and delivered sustenance to us at regular intervals via horseback. Frank McKinney inspired us to watch ducks, and both he and Gwen Brewer gave valuable comments on the manuscript. The National Geographic Society and World Wildlife Fund provided the funding for our fieldwork in Patagonia.

References

Altmann, J. 1974. Observational study of behaviour: sampling methods. *Behaviour* 49:227–267.
Ankney, G.D. & Afton, A.D. 1988. Bioenergetics of breeding Northern Shovelers: diet, nutrient reserves, clutch size, and incubation. *Condor* 90:459–472.
Ashcroft, R.E. 1976. A function of the pairbond in the Common Eider. *Wildfowl* 27:101–105.
Conover, W.J. 1980. Practical nonparametric statistics. Wiley & Sons, N.Y.
Delacour, J. 1954. *The waterfowl of the world*. Balding and Mansell Ltd, London.
Harris, J.H. Jr. 1970. Evidence of stress response in breeding Blue-winged Teal. *J. Wildl. Manage.* 27:280–283.
Harwood, J. 1977. Summer feeding ecology of Lesser Snow Geese. *J. Wildl. Manage* 41:48–53
Kear, J. 1970. The adaptive radiation of parental care in waterfowl. Pp. 357–392 in J.H. Cook (Ed.). *Social behaviour in birds and mammals*. Academic Press, London.
Krapu, G.L. 1974. Feeding ecology of Pintail hens during reproduction. *Auk* 91:278–290.
Krapu, G.L. 1981. The role of nutrient reserves in Mallard reproduction. *Auk* 98:29–38.
Larson, J.S. and Taber, R.D. 1980. Criteria of sex and age. Pp. 143–202 in S.D. Schemnitz (Ed.). *Wildlife Management Techniques Manual*. The Wildlife Society.
Lazarus, J. & Inglis, I.R. 1978. The breeding behaviour of the Pink-footed Goose: parental care and vigilant behaviour during the fledgling period. *Behaviour* 65:62–88.
Lendrem, D.W. 1983. Sleeping and vigilance in birds. I. Field observations of the Mallard. *Anim. Behav.* 31:532–538.
Livezey, B.C. & Humphrey P.S. 1985. Territoriality and interspecific aggression in Steamer Ducks. Condor 87:154–157.
Mayhew, P.W. 1987. Vigilance levels in European Wigeon - sexual differences. *Wildfowl* 38:77–81.
McKinney, F. 1985. Primary and secondary male reproductive strategies of dabbling ducks. Pp. 68–82 in P.A. Gowaty and D.W. Mock (Eds.). Avian Monogamy. *Ornithological Monographs* 37.
McKinney, F. & Brewer, G. 1989. Parental attendance and brood-care in four Argentine dabbling ducks. *Condor* 91.

Norman, F.I. & McKinney, F. 1987. Clutches, broods, and brood care behaviour in Chestnut Teal. *Wildfowl* 38:117–126.
Nuechterlein, G.L. & Storer, R.W. 1985. Aggressive behaviour and interspecific killing by Flying Steamer Ducks in Argentina. *Condor* 87:87–91.
Siegfried, W.R. 1974. Brood care, pair bonds and plumage in southern African Anatini. *Wildfowl* 25:33–40.
Stephen, W.J.D. 1963. Some responses of female Mallards to disturbance by man. *J. Wildl. Manage.* 27:280–283.
Stroud, D.A. 1982. Observations on the incubation and post-hatching behaviour of the Greenland White-fronted Goose. *Wildfowl* 33:63–72.
Van Tets, G.F. 1965. Eastern Swamphen takes a downy from a pair of Chestnut Teal. *Emu* 64:100.
Weller, M.W. 1972. Ecological studies of Falkland Islands' waterfowl. *Wildfowl* 23:25–44.
Weller, M.W. 1975. Habitat selection by waterfowl of Argentine Isla Grande. *Wilson Bull.* 87:83–90.
Weller, M.W. 1976. Ecology and behaviour of Steamer Ducks. *Wildfowl* 27:45:33.

Deborah Buitron and Gary L. Nuechterlein, Zoology Department, Stevens Hall, North Dakota State University, Fargo, North Dakota, USA 55105.