

# THE MOULTS AND PLUMAGES OF THE MANED DUCK

## *Chenonetta jubata*

# ON THE SOUTHERN TABLELANDS OF N.S.W.

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The moults and plumages of a wild population of Maned Ducks *Chenonetta jubata* were studied. Descriptions of duckling plumage development are presented so that they may be used to identify duckling age in the field. Characteristics of a distinct juvenal plumage are also described. The distribution of body moult shows a peak in moult activity at the beginning of the year and this, combined with the existence of a male "eclipse" plumage late in the year, suggests that there may be two body moults per year.

## INTRODUCTION

The moults and plumages of the Maned Duck *Chenonetta jubata* have been little studied. The duckling plumage, however, has been described by Frith (1982). The purpose of the current study is to present data on the moult and plumage sequence of this species. These data were collected as part of a larger study on the behaviour and ecology of this species. Moult and plumage descriptions are based on data from 507 ducks that were captured during 1982 in the Southern Tablelands of New South Wales.

The moults and plumage sequences of waterfowl are notoriously complicated (Humphrey & Parkes 1964). Determination of the plumage sequence is often difficult because of variability among individuals. The present study presents a quantitative assessment of seasonal moult intensity and describes the patterns of plumage variation as well as the sequence of plumages. Particular importance is given to the description of a distinctive juvenal plumage (as defined by Dwight (1902) and Eisenmann (1965)).

## METHODS

The study took place on the Southern Tablelands of NSW, on agricultural land, 16 km north of Taralga, during 1982 and 1983. As part of a banding programme, Maned Duck were caught in wheat baited traps (McNally & Falconer 1953) on farm dams. A total of 507 ducks were trapped and assessed for body moult, beginning in February 1982 (Table 1).

Birds were sexed and aged cloacally (adult or juvenal). Plumage state was scored, for all trapped birds by a single observer to avoid bias, following methods given by Billard & Humphrey (1972). Each bird was scored for moult in six body regions: breast, belly, flank, dorsal midline, head/neck region, and tail. Each region was scored from 0 to 3, representing no moult (0), light moult (1), moderate moult (2) and heavy moult (3) and the scores from the six regions were added, to form a total for each duck. An aggregate score of 0-2 indicated negligible moult; 3-7 light; 8-12 moderate; 13-18 heavy. A two factor analysis of variance was used to compare

TABLE 1

Number of Maned Ducks examined for body moult in 1982.

	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
<b>Adults</b>												
Males	67	30	5	0	61	22	35	13	4	0	10	247
Females	55	34	6	0	67	22	34	14	0	0	12	244
<b>Juvenals</b>												
Males	5	3	0	0	0	0	0	0	0	0	0	8
Females	6	2	0	0	0	0	0	0	0	0	0	8
	Total											507

the effects of months by the sex of the duck. The square root transformation was first used, since such data have a Poisson distribution and this transformation results in a sample with an underlying normal distribution (Zar 1974). October scores were omitted from the analysis as no females were captured.

Two primary feathers of one wing were notched for all ducks trapped between June 1982 and December 1983. At any subsequent capture, examination of these feathers revealed if wing moult had occurred. Throughout 1983, records were also kept of any males which showed female-like plumage characteristics. Observations were also made on ducklings from 30 broods. The nomenclature follows that of Humphrey and Parkes (1959).

## RESULTS

Table 2 presents plumage changes as ducklings acquire the juvenal plumage collected from field observations. The most noticeable changes occur in the breast and belly, tail and flight feather regions. Juvenals are capable of flight at 57 days old (mean: 57 days  $\pm$  3 (SE)  $n$  = 16). Flying juvenals have still not attained full adult body size. Mean body weights for adults ( $756 \pm 13.9$  g (95% C.I.)  $n$  = 79) and flying juvenals ( $707 \pm 19.9$  g (95% C.I.)  $n$  = 23) captured in February were significantly different ( $t_{100} = 3.62$ ;  $p < < 0.001$ ).

Juvenal plumage is similar to that of the adult female with both age categories possessing superciliary and suborbital lines of white feathers as well as similar body markings. Similarities are

TABLE 2

Juvenal plumage development in ducklings of the Maned Duck.

	<2 Weeks	2-3 Weeks	3 Weeks	4 Weeks	5 Weeks	6 Weeks
<b>Down</b>	initially yellowish, characteristically dark coloured markings on the head and back	Markings less distinct, overall colour fading to light brown	on back, rump and head; as well as interspersed between feathers in other regions	head, back and rump	nape, mantle back and rump	head and back
<b>Scapulars</b>	—	—	evident	fully emerged	feathered	feathered
<b>Breast and Belly</b>	—	first feathers just emerging	some feathers fully emerged	fully feathered	feathered	feathered
<b>Flanks</b>	—	one or two feathers evident	some feathers fully emerged	fully feathered	feathered	feathered
<b>Tail</b>	—	—	first feathers appearing	quills apparent but feather not fully emerged giving characteristic "spiky" tail region	fully emerged	feathered
<b>Flight feathers</b>	—	—	—	first apparent	white of secondary feathers visible, primary feathers half grown	primaries almost fully grown

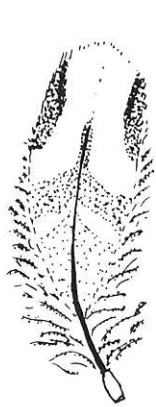
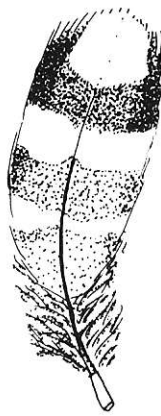
**Juvenal****Female****Male**

Figure 1a. *Breast feathers of juvenal, adult female and adult male Maned Ducks.*

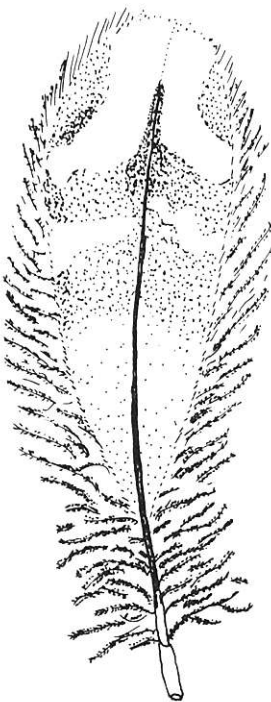
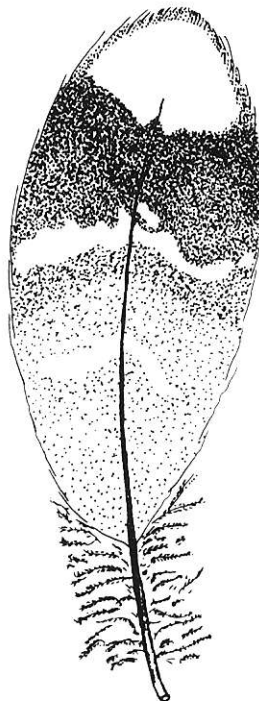
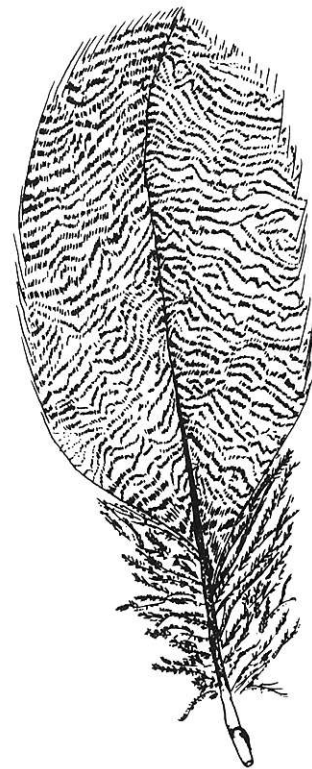
**Juvenal****Female****Male**

Figure 1b. *Flank feathers of juvenal, adult female and adult male Maned Ducks.*

accentuated when a comparison is made with brown-headed males which have distinct markings. Nevertheless differences between juvenals and females do exist. Principally, juvenals are a lighter colour than adult females. Juvenal breast feathers lack the brown bars that cross the top half of the female breast feather. Instead, an inverted white "V" divides the two brown edges; the feather also has a more pronounced downy margin (Figure 1a). Flank feathers of females and juvenals also exhibit similar differences (Figure 1b). However, the differences between adult males and juvenals are more pronounced. The adult male breast feather is similar in markings to the female, except darker in colour (Figure 1a) but the adult male flank feather is quite different (Figure 1b). As well, there are some general differences. Juvenal scapulars differ by having a white edge so that spots can be seen on the juvenal's shoulder when they overlap. The scapulars of adults lack these markings. Finally, tail feathers of juvenals, unlike adults, are characteristically notched. The markings in the breast region of the juvenal produce the most noticeable difference between juvenals and females. The juvenal breast looks streaked, from a distance, in contrast to the mosaic pattern of adult breasts.

The onset of the first prebasic body moult was documented for one brood 88 days after hatching. Ducklings hatched in the spring of 1981 (September-November) had replaced the juvenal plumage with the first basic plumage by March 1982.

Overall adult body moult was similar between sexes (Figure 2), except that moult scores averaged higher in males ( $F_{1,471} = 4.52$ ;  $p < 0.05$ ). There was a discernible difference in the seasonal distribution of moult scores ( $F_{7,471} = 37.97$ ;  $p < 0.001$ ). More ducks were moulting in February, March and April than at any other time of the year ( $p < 0.001$ ). Very few birds were molting in June and July. Molt scores increased again towards the latter part of the year (Figure 2).

Only four birds were consistently caught over a 9 month period and these all showed heavy moult in February and March, little to no moult in June and July and light to moderate moult in August and September. Limited observations throughout 1983 showed a similar seasonal pattern.

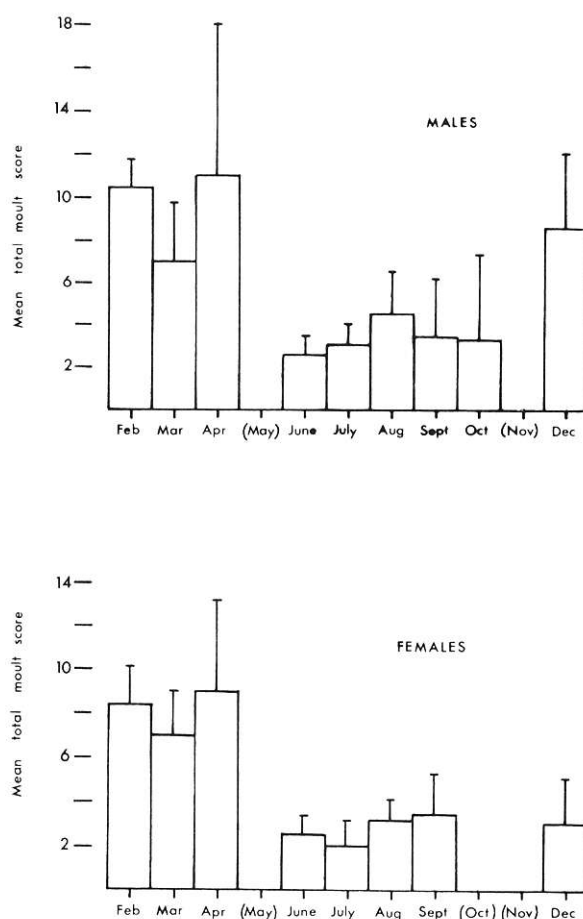


Figure 2. Mean monthly variation in the body moult of male and female Maned Ducks, with 95% confidence. No ducks examined for months in brackets.

A definite male "eclipse" plumage was found. Five of eight males banded in February to March 1983 and recaptured in December, adopted an "eclipse" plumage. This plumage is characterised by a few white feathers in superciliary and suborbital lines, a few female-like flank feathers amongst the distinctive barred ones of the male (Figure 1b) and some white feathers, characteristic of females, amongst the black feathers of the male belly and underbelly region. The brown feathers also appear lighter in the "eclipse" plumage. In one case a male was indistinguish-

able from a female except by cloacal examination. Some males were also seen in an "eclipse" state while caring for their young in November and December.

Wing moult must have occurred in the latter months of 1983, since six out of the seven ducks banded in October 1983 and recaptured later in December that year, had renewed their primaries. Further, of the other 25 ducks captured for the first time in December 1983, all but three had flight feathers which appeared to be new. In 1982 however, the timing of wing moult was not so clear. None of six ducks banded in June 1982 and recaptured in August 1983 (over a year later), had renewed its flight feathers. Others, which had a shorter period between recaptures, also showed the same pattern.

## DISCUSSION

### JUVENAL PLUMAGE

Duckling development in the Maned Duck is similar to that found in the Gadwall *Anas strepera* (Oring 1968). There is early rapid growth of ventral feathering with a later development of the primary flight feathers. The description of duckling plumage development presented here should enable broods to be adequately aged in the field (Table 2). The fledging period observed is possibly inflated as I recorded broods capable of flight only if I saw them fly.

The occurrence of a distinctive juvenal plumage follows the patterns found in other Anatinae (Oring 1968; Lavery 1972). There has however, been some confusion in the literature. Frith (1982) refers to juvenal Maned Duck as immatures, similar to the female, but there are distinct differences, outlined here.

The first prebasic moult into basic plumage follows the juvenal plumage. Frith (1982) found that the first appearance of male flank feathers, presumably marking the first basic plumage, occurs three months after hatching. This study confirms the transitory nature of this plumage, as no ducks in juvenal plumage were captured later than March 1982 (Table 1). It is assumed that the juvenal wing is probably retained until the following moult into basic plumage, as in other waterfowl (Palmer 1972).

### OTHER PLUMAGES

The inability to satisfactorily age ducks after the juvenal stage, obviously handicaps interpretation of subsequent moult patterns. Nevertheless, the occurrence of a distinguishable "eclipse" plumage in males provides evidence for the existence of at least two moults a year.

The "eclipse" plumage, not previously reported in Maned Duck (Johnsgard 1965), is considered to be the basic plumage in northern hemisphere waterfowl (Humphrey and Clarke 1964). Based on this assumption, interpretation of a possible annual sequence of plumages may be attempted. Males had adopted the "eclipse" plumage by December 1983. Therefore, the increased moult activity in males in December 1982 could mark a prebasic moult into basic plumage with some ducks starting this moult earlier during August, September and October. Based on data from wing notching, ducks renewed their flight feathers some time between October and December 1983 which would coincide with moult into basic plumage making this a complete moult as in other waterfowl. However, in 1982 some ducks did not renew their flight feathers for at least 14 months. It is usual for waterfowl to renew their flight feathers at least once a year although some other Anatidae have been known to skip moults (Summers 1983). Climatic conditions may have affected this wing moult as the study area was experiencing a severe drought. It is interesting that no ducks were ever seen in wing moult during the study, lending further support to theories that Maned Duck undertake wing moult on large bodies of water (Frith 1982), which were not present on the study site.

The basic plumage of Anatidae does not last long and is followed by the alternate plumage which occurs much earlier in ducks, during the autumn of the northern hemisphere (Humphrey and Clarke 1964). The high moult scores recorded during February and March may represent a pre-alternate moult. While male and female body moult conformed to a similar pattern, it is difficult to explain why there was more moulting in males. Possibly this was due to bias during moult assessment. Males are darker than females and emerging feathers possibly contrasted more.

This study shows that there is considerable variation in the moult state of individuals but also provides some evidence that this species

conforms to the patterns found in most Anatinae; possessing a distinct juvenal plumage and two body moults a year. Future studies on the moult of known individuals are now necessary in order to determine the full moult sequence.

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