

## ACQUISITION OF NUPTIAL PLUMAGE IN WHITE-WINGED FAIRY-WRENS *Malurus leucopterus*

SONIA C. TIDEMANN

Department of Zoology, Australian National University, Canberra A.C.T.  
Current Address: Conservation Commission of the Northern Territory, P.O. Box 496, Palmerston, N.T. 0831

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### INTRODUCTION AND METHODS

A population of White-winged Fairy-wrens *Malurus leucopterus* was monitored during 1977 to 1982, 18 km north-west of Booligal (33°46'S., 144°44'E.), New South Wales, as part of a broader study.

A study area of about 1 000 m by 750 m was surveyed and pegs placed at 50 m intervals. The vegetation was a chenopod shrub-steppe with a stand of *Atriplex nummularia* separated from a larger stand of *Chenopodium nitrariaceum* by a band of *Eucalyptus largiflorens*. All fairy-wrens within this area were caught with mist nets once or twice every two months from winter through to summer, and banded with a metal band\* and a unique combination of colour bands. Details of plumage, weight and sexual condition were recorded.

Although plumages have been described from skins and aviary data (Schodde 1982), field populations of males appear to provide a different picture.

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\*Bands were provided by the Australian Bird-banding Scheme, Division of Wildlife and Rangelands Research, C.S.I.R.O., Canberra.

### PLUMAGE DESCRIPTIONS

Because young males appear similar to females I shall describe the latter as well.

#### Females

The females are grey-brown with an off-white chin and throat, pale belly, and a pale blue tail. The lores are light brown. In older birds the pink bill darkens at the tip and around the nares, so making older females difficult to distinguish from first-year males. The iris is brown, and legs and feet grey-brown. Body lengths were 111-125 mm (n=12) and weights 6.8-11.0 g (n=34); maximum weight occurred just before an egg was laid in August/September (Fig. 1). The ages of females could not be determined on the basis of plumage, though as females became older, the bill became darker, but never lost the pink completely.

#### Males

A total of 96 weights were taken from 31 adult males. Males were heaviest during September (Fig. 1), the early part of the breeding season (September-December in this study, though *cf.* Tidemann and Marples 1987). During the breeding season all males developed small anterior and large posterior cloacal swellings as seminal sacs became packed with spermatozoa (Tidemann 1983). Testes and seminal sacs were largest during

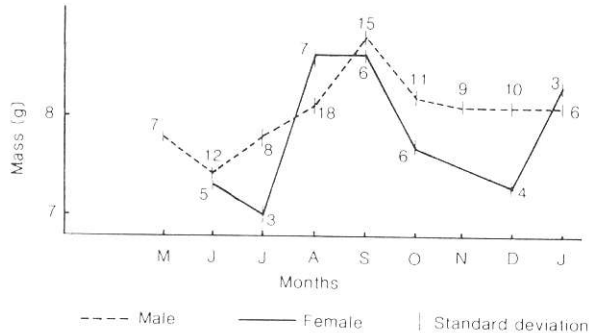


Figure 1. Seasonal changes in body mass (g) of White-winged Fairy-wrens at Booligal, New South Wales, between 1978-1981. Number of birds measured each month is indicated.

the early part of the breeding season. As far as could be ascertained males moulted twice a year. Males could be aged on the basis of plumage as follows. (I define nuptial plumage as the brilliant blue plumage and white patches acquired during the breeding season.)

1. The *first-year* males are all brown dorsally but can be distinguished from females by their brighter blue tails. A male is judged as being sexually mature within a year of hatching because swollen seminal sacs are packed with spermatozoa. The bill is pink but darker at the tip and around the nares.

2. The *second year*, and older, males in part-nuptial plumage have small patches (as few as two feathers) of white on the shoulders. The remainder of the body is brown, or has blue patchily distributed in the crown, face, chin and throat, later extending to the nape and mantle. In a bird that has small white shoulder patches and brown body, the bill is pink with a dark tip, and the nares dark, but this darkens to grey-brown, almost black, in birds that are partly blue. In non-breeding plumage, a male resembles a female except for its darker bill. A bird also spends its third and fourth years in brown or part-nuptial plumage if it is subordinate to a nuptial-coloured male. For example,

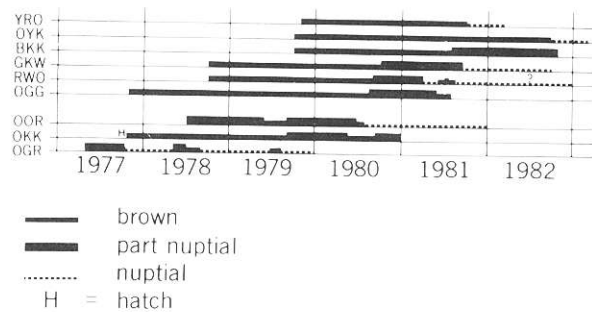


Figure 2. Plumage changes of male White-winged Fairy-wrens at Booligal, New South Wales, between 1977-1982. (Letter triplets indicate colour band combinations of individuals: Y=yellow; R=red; O=orange; K=black; B=blue; G=green; W=white).

individuals OOR and OKK (Fig. 2) were both subordinate to OGR until 1980, when he died and OOR became the dominant bird of the group (Tidemann 1983).

If an individual is in part-nuptial plumage, the blue becomes more extensive each year and the white shoulder patches larger. Males with some blue or white colouring are behaviourally dominant to brown males.

3. The *nuptial* males have a vivid cobalt-blue body, which appears to become duller as feathers become worn during the year. The scapulars, secondary wing coverts and secondaries 3 to 6 (standard counting) make up the white shoulder patch, which can be extended over the back during displays. The primary flight feathers are grey-brown with bluish leading edges, and primary coverts brownish to deep blue. The tail is blue and is about half the total body length, which ranges from 113 to 131 mm. The iris is dark brown, the bill black, and the tarsus and toes grey-brown. Males did not attain nuptial plumage until their third year, sometimes later. Although one year was usually spent in part-nuptial plumage, birds sometimes moulted straight from brown into nuptial hues, but not until their third year (Fig. 2, YRO and OYK). Nuptial males moulted into a non-breeding plumage for a short period during the winter (e.g., OGR, Fig. 2) but

retained a dark bill (*cf.* Schodde 1982). Weights ranged from 7.2 to 10.9 g. Males were heavier during the early part of the breeding season (Fig. 1) when testes and seminal sac sizes were at a maximum. Cloacal swellings were largest in nuptial males. Usually there was only one nuptial-coloured male in a group, and he dominated all other males within the group. During one breeding season two nuptial males were present and, in this case, the older one was dominant behaviourally, being able to displace the younger from a perch or his position if near the female.

### DISCUSSION

This gradual moult of male White-winged Fairy-wrens into nuptial plumage is different from that of the Superb Fairy-wrens in which males can attain their nuptial plumage within a year of hatching (Rowley 1965). It is also different from that described by Schodde (1982), who suggested that the sequence for male White-winged Fairy-wrens is similar to that of Superb Fairy-wrens; that is, young males (brown) moult completely into a nuptial plumage within their first year. He suggested that subordinate males do not colour up consistently for spring, but at Booligal they do, if only partially, the extent depending on their ages. The stimulatory effect of sporadic rainfall (Schodde 1982) was not noted, but is probably only secondary to increasing photoperiod (Tidemann and Marples 1987). The apparent 'halt' in plumage change in young males is probably the pattern of yearly acquisition of increasing amounts of blue and white. The difference between Schodde's descriptions and mine may be due to the fairy-wrens at Booligal being atypical, but is more likely to have resulted from the discrepancies between the aviary situation (the basis

of some data) and the wild. In addition, while skins provide much valuable information, they may represent seasonal changes without a clear indication of the yearly differences. Understandably, Schodde (1982) telescoped into a single year what appears to take a minimum of three years in the wild. The sequence is not always clear cut either, but depends on the hierarchical rank of the males within a group.

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