

A Colour-banding Study of Welcome Swallows Breeding in Southern Tasmania

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The breeding of a group of individually colour-banded Welcome Swallows *Hirundo neoxena* was studied at Campania in southern Tasmania over a period of five years during the time between their arrival each spring to their departure in the autumn.

The initial purpose of the study was to examine how long breeding Welcome Swallows stayed together, and if any of the pulli reared in the study area returned to breed. Material was also collected on other aspects of behaviour. This material is to be published in a later paper.

Study Area

The nesting sites in the study area consisted of:

- (1) a steel-framed, iron-roofed, saw-toothed shed, 13 m x 15 m, enclosed with vertical boards 2.5 cm apart, with one window 100 cm x 60 cm permanently open;
 - (2) a house verandah, and
 - (3) a garage,
- all within 200 m of each other.

The buildings were situated on the edge of the small township of Campania, in open undulating farmland in southern Tasmania, 42° 40'S; 147° 25'E. All the swallows nested in the shed, with the exception of one pair which alternated between the verandah and the garage.

Methods

A mist net was used to trap the free-flying birds, except twice when two separate adults were picked off their perches by hand at night, and replaced onto the perch after banding. This could only be done in the shed when the noise of heavy rain on the iron roof obliterated all noise of human movement. The pulli were banded when 8-15 days old, at 8 days the tarsus is long enough to accommodate a band, and up to 15 days the pulli will not leave the nest due to disturbance. The adults were individually identified with a CSIRO* serially-numbered aluminium

alloy band and plastic colour bands, whilst the pulli received CSIRO bands but were collectively colour banded; different colour represented each year except for two seasons.

It was necessary to give careful consideration to the colour combinations because:

- (a) the tarsi of the birds is comparatively short, therefore only one aluminium alloy or colour band per leg could be used; and
- (b) they had to be recognised in poorly lit corners of the buildings.

Colour-banded birds are numbered in this paper in a numerical sequence with the prefix F (Female) and M (Male). Numbering is in order of banding e.g. F1 is the first female colour-banded. This method of numbering is similar to that used by Rowley (1965) in his study of the Superb Fairy-wren *Malurus cyaneus*.

Acetone was used to join the plastic bands. When the adult birds were held in the hand from season to season, it was noted that some of the colours had faded, especially pink, light blue and mauve. This was despite the fact that Welcome Swallows seldom expose their legs to sunlight.

Over the five years many hours were spent watching the birds, mostly from a hide in the shed, and their sex was determined by noting which bird went into the nest to lay the eggs. The nest was checked immediately after the bird had left. During this period the partner would frequently sit near the nest, thus making identification easier. The birds were checked most nights to see who was there and where they were sleeping, especially in the spring and autumn. The trauma of catching and handling the birds did not appear to upset them, because as soon as they were released they were back in the

* Bands used were provided by the Australian Bird-banding Scheme, Division of Wildlife Research, CSIRO.

shed. In fact on quite a few occasions a bird was recaptured in the mist net minutes after being released.

Results

During the two breeding seasons, 1969-70 and 1970-71, prior to the colour-banding of the breeding adults all the pulli with the exception of one brood in October 1970 were banded; these pulli have been included in the study.

Banding Programme

1969-70

The 30 pulli reared were all colour banded, and 9 of these were also CSIRO banded.

1970-71

The 25 pulli reared after October were CSIRO banded but not colour banded.

1971-72

This was the start of the adult banding programme. All the adult birds were caught and individually colour and CSIRO banded. One of these birds was found to have been banded as a pullus which had been reared in the shed during the 1969-70 breeding season, this bird became M2. Pairing of the breeding birds is shown in Figure 1.

Occasionally an adult not breeding in the study area would be caught and banded. One of these birds M8 was seen on five separate occasions during the first ten weeks of the breeding season and then disappeared. He then returned as one of the breeding birds for the following three seasons. The 44 pulli which were reared were banded, (R) CSIRO and (L) black/white stripe.

1972-73

Eleven of the last breeding season's adults plus M8 returned. Including the new birds, Figure 1 shows how they were paired.

The males M5 and M7 and the females F4 and F6 did not return. At this point there were only two new breeding adults in the group — M8 who had been in the study area during the 1971-72 season and an unbanded female who became M4's partner. His 1971-72 season's partner F4 was caught by a cat the day after she was first seen in the study area. This bird was identified and released apparently unharmed, but two days later she was found dead in her 1971-72 season's nest. The unbanded female evaded the mist net on three separate occasions, so remained unbanded during the breeding season. A new

pair M10 and F8 was first seen starting to build a nest in December in an area of the shed not being used by any of the other swallows. When the pulli of M2 and F2's second brood were ten days old, M2* was found dead on the floor of the shed just below their nest. His mate F2 was seen to be sitting near a very aggressive swallow which had been in and out of the shed for the previous few days and appeared to be taking over the territory of M2. This swallow had been attacked by M2, but it always came back and tried to sit near his nest.

F2 continued to feed her five pulli, but the aggressive swallow was never seen to help. In fact, although he flew in and out of the shed with her, he would attack the nestlings when they started to leave and return to the nest. One of these pulli, which had been noticeably smaller than the rest when banded, and had not yet left the shed, was frequently attacked by the aggressive swallow. These attacks may have contributed to its death, because once the aggressive swallow was seen to sit on its back while it clung to a girder, and then viciously to peck its head. Two days later it was found dead with a raw swollen area covering one third of its head. This aggressive bird was banded M9. Twenty-one days after the death of her first mate M2, F2 laid her third clutch. These eggs hatched but the pulli died, possibly of heat exhaustion when one day old, as a thermometer placed near the nest on that day registered a maximum of 50°C. The 32 pulli reared were banded (R) black/white stripe, and (L) CSIRO.

1973-74

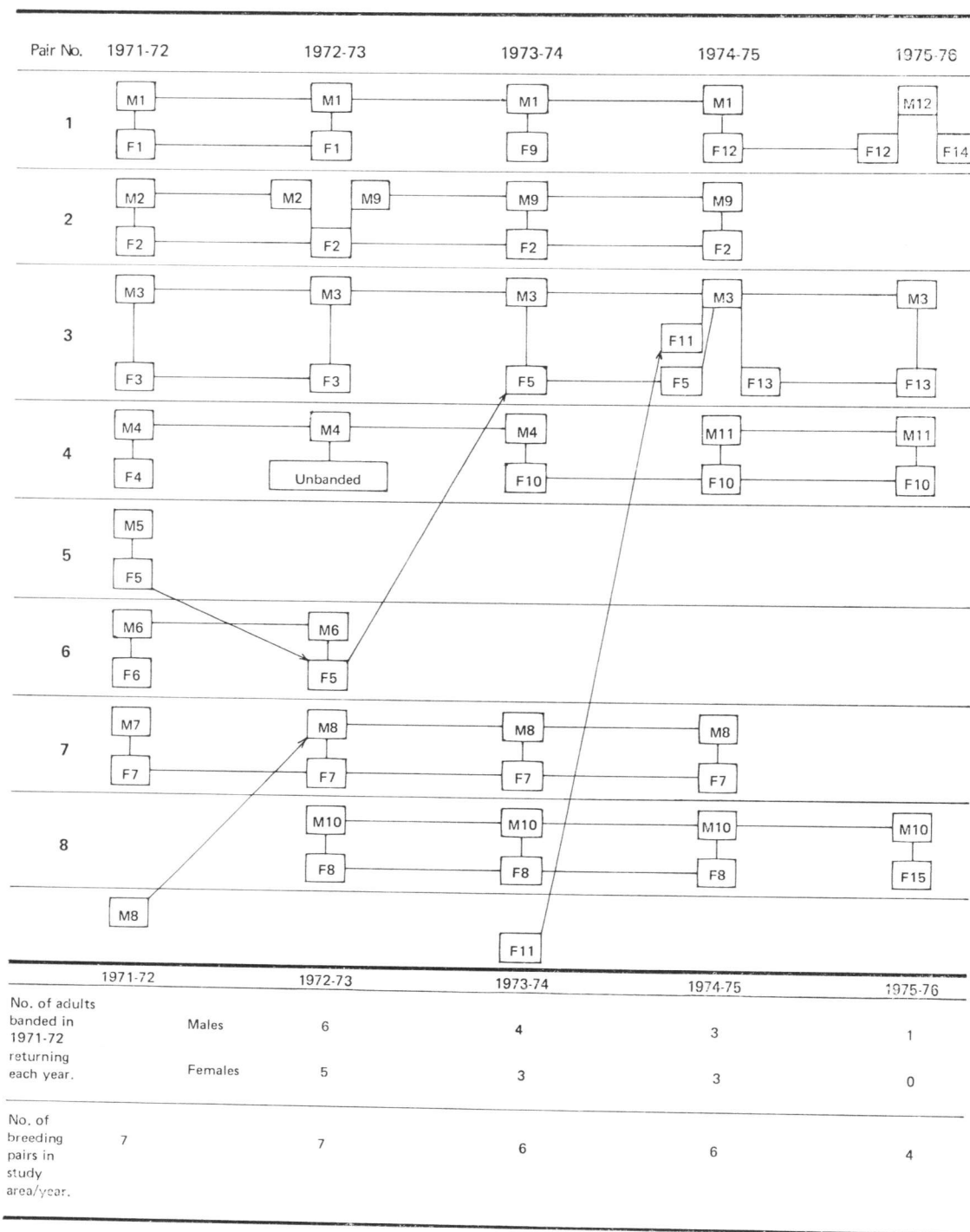
Ten of the colour-banded adults returned, including two new birds. Figure 1 shows how they were paired.

The male M6 and the two females F1 and F3 did not return. F5 paired with M3, so this was her third different partner in three successive breeding seasons. The two new females were F9 and F10. The 46 pulli were banded (R) dark green/light green stripe, and (L) CSIRO.

1974-75

Eleven of the colour-banded adults returned. Figure 1 shows how they were paired. Only two birds did not return M4 and F9, but there were

* An autopsy by D. R. Milledge failed to find a cause of death.



• Figure 1. Pairing of the breeding colour-banded Welcome Swallows over five years.

three new ones M11, F12 and F13. On 1 September M3 was with F11 who had been caught and banded whilst flying around the shed in the previous season. During the following five weeks they began to line one of his old nests with grass, but on 5 October his mate of the previous season F5 was with him, and F11 was not seen again. After seven days of incubating her first clutch, F5 disappeared, and M3 then paired with a new female F13. All this took place over a period of eight weeks. The 17 pulli were banded (L) dark green/light green stripe, and (R) CSIRO.

1975-76

Six of the colour-banded adults returned and were paired, as shown in Figure 1. The three males M1, M8 and M9 and three females F2, F7 and F8 did not return. Two days after F12 returned, another Welcome Swallow with a CSIRO band on its (L) leg was sleeping near her under the verandah. When caught, it was discovered that this bird had been banded as a pullus on 16 January 1975 (023-12186) about 5 kilometres NNW of the study area. It was colour banded M12. He was breeding at eight months, as his mate F12 laid her first egg for the season on 19 September, after they had both added some mud, grass and feathers to an old nest. Four days after F12 started to incubate, the eggs were found on the verandah floor, smashed, and most of the lining of the nest pulled out, done possibly by a Grey Butcherbird *Cracticus torquatus*, which were always in the study area. During the rearing of their second clutch in the garage, F12 flew into a window and was killed when she was frightened by a car. M12 made no attempt to feed the five six-day-old pulli. During the next two and a quarter

hours he did not even fly into the garage, but was vocalising very persistently from the roof of the garage. That night there was an unbanded swallow sleeping within 20 cm of M12. This swallow was caught and banded to become F14. Together they refurbished an old nest and successfully raised a brood of three pulli from four eggs. The 19 pulli were banded CSIRO only.

Discussion

Of the original seven pairs at the beginning of the five-year study, only one male remained M3. If both partners returned, they stayed together as a breeding pair, although in 1974-75 there was a mix-up at the beginning of the season. Three seasons was the longest time that a pair remained together, and out of 213 banded pulli, only one returned to breed in the area. Another bird, which was banded as a pullus outside the study area, was successfully breeding at eight months old within the study area.

Arrivals and Departures

In eight cases, pairs returning from the previous season arrived either on the same day or within five days of each other. Departure was quite different. Sometimes a pair would leave the breeding area together, but usually there were many days between the individual departures. Interestingly, a bird caught in the shed in September 1973 and banded (R) red/white, (L) CSIRO, appeared to be settling with a partner in the shed, but both disappeared within a few days. At the end of that season and the two following seasons this bird spent a few nights in the shed, possibly before migrating north. The period of arrival and departure of breeding birds is shown in Table 1.

TABLE 1

Periods of arrival and departure for four seasons of breeding Welcome Swallows at Campania in southern Tasmania.

Season	Period of arrival			Period of departure		
	From	—	To	From	—	To
1972-73	26.8.72	5.9.72	— 11 days	24.2.73	16.3.73	— 21 days
1973-74	20.8.73	11.9.73	— 23 days	2.2.74	24.3.74	— 51 days
1974-75	28.8.74*	4.9.74	— 8 days	2.2.75	16.3.75	— 43 days
1975-76	2.9.75	12.9.75	— 11 days	2.2.76	17.2.76	— 16 days

* F5 not seen until 6.10.74.

1971-72 not included, because the birds were not colour-banded until 17.10.71.

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Reference

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Mixed Species Flocks in a Dry Sclerophyll Forest in Autumn and Winter

NEIL HERMES

Mixed species feeding flocks were studied in dry sclerophyll forest at Black Mountain Nature Reserve, Australian Capital Territory. Twenty-three species were observed in mixed flocks. Species are grouped according to foraging pattern and details of the composition of the flocks is given.

Mixed species flocks have been studied in many parts of the world e.g. Ceylon (Partridge and Ashcroft 1976), Sarawak (Croxall 1976), Kashmir (Macdonald and Henderson 1977), Patagonia (Vuilleumier 1967), Brazil (Davis 1946), Peru (Munn and Terborgh 1979) and Arizona (Austin and Linwood Smith 1972) and shown to occur in a wide range of habitats and to vary in the numbers, species and foraging behaviour of birds present. Macdonald and Henderson (1977) stated that this variation makes it difficult to devise a general hypothesis to explain the existence of mixed species flocks. Morse (1970) suggested that certain species within mixed species flocks reduce competition by feeding in different sites to the ones used by other species in the flock. Krebs, MacRoberts and

Cullen (1972) have shown in experimental studies that mixed species flocking may increase the amount of interspecific learning of potential food sources. Lack (1968) and Goss-Custard (1970) suggested an antipredator advantage to mixed species flocking behaviour.

In this study the aim was to determine the extent to which mixed species flocking occurred in Australian birds in a dry sclerophyll forest outside the breeding season. Also, it was hoped the study would indicate which species formed mixed species flocks and how these flocks were structured. There are few published records of this behaviour in Australian birds (Gannon 1934, Sedgwick 1949). Bell (in press) has examined mixed species flocking in the same location as this study.