

Chapter 5

RED-BROWED TREECREEPER

Red-browed Treecreepers occur usually in pairs or groups of three, rarely four, adults which occupy and defend territories year-round. Previously I (Noske 1979) used the term "home range" in reference to these territories, because few aggressive encounters between groups had been witnessed and there was considerable peripheral overlap. In the absence of evidence to the contrary, this species and other communally-breeding species of treecreepers (see Noske 1980) are assumed to be monogamous.

5.1 Sex Ratios and Population Structure

Males predominated in the breeding population at Wollomombi over the three years of intense study; the sex ratio for all seasons combined was 1♂:0.6♀. The decreasing disparity in sex ratios between the first (1:0.4) and the second (1:0.9) year of the study coincided with a rise in the number of pairs and a corresponding drop in the number of larger groups (Table 5.1). Few data were collected on sex ratios of juveniles as young in their first month were impossible to sex reliably in the field (see Section 3.1.2). Females predominated marginally in the fully sexed broods (5♂♂:7♀♀), as well as the combined total, including broods in which only one member was sexed (8♂♂:10♀♀). Information in ABBS (supplied by D. Purchase) are equivocal: sex ratios favoured females in juveniles (5♂♂:10♀♀) as well as in adults (54♂♂:60♀♀), but a substantial proportion of birds was not sexed (8 juveniles; 33 adults).

Of the 20 group-years, 13 (65%) consisted of more than a simple pair and of these, twelve contained two or more males, and the remaining one, two females (Table 5.1). Thus, with one exception, all auxiliaries were males. Of the nine auxiliaries, three were banded as adults and the remainder as immatures (Figure 5.1). All of the latter served as auxiliaries in their natal territory and at least two of these assisted both their parents, while another bird assisted his father and step-mother. Three of

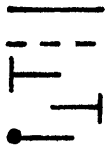
TABLE 5.1: Group composition of Red-browed Treecreepers* at Wollomombi Falls over three years

	$\sigma\sigma$	$\varphi\varphi$	Number of groups				Total
			1977	1978	1979		
Pair	1	1	-	3	4	7	
Trio	2	1	4	3	2	9	
	1	2	-	-	1	1	
Quartet	3	1	2	1	-	3	
<hr/>							
Total individuals	20		19		17	56	
$\sigma\sigma/\varphi\varphi$	14/6		12/7		9/8	35/21	
Number of groups	6		7		7	20	
Fledglings produced	11		5		6	22	

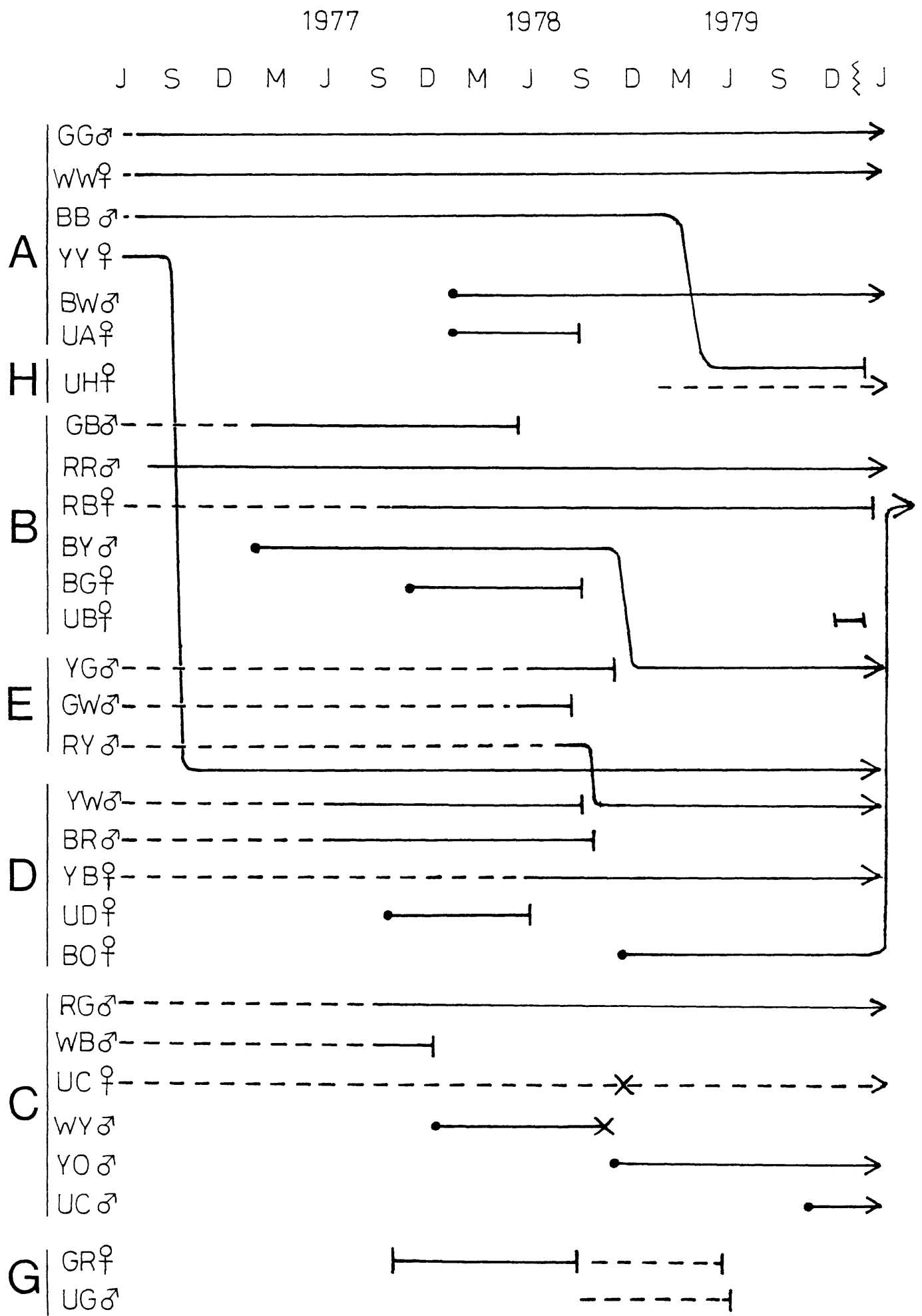
* includes group F, whose territory was situated outside the study site; group consisted of a trio in 1977 and 1978, and a pair in 1979

FIGURE 5.1: *History of individual Red-browed Treecreepers at Wollomombi Falls over the study period*

Large letters refer to group/territory as shown on Figure 5.2


 — banded
 - - - unbanded
 |— date of appearance
 —| date of disappearance
 •— date of fledging

Young which disappeared within 6 months of fledging, excluded



the birds banded as immatures acted as auxiliaries for two years, and the other three (including the female), for one year. Two of the latter subsequently emigrated (BY σ , BO ♀) and the other almost certainly died (BR σ). Of the birds banded as adults, one acted as an auxiliary for at least two years (RR σ) and another, for at least three years (BB σ), including the 1976-77 season.

5.2 Mortality and Dispersal

In contrast to the almost complete disappearance of young White-throated Treecreepers within two months of fledging, only nine (41%) of the 22 known Red-browed fledglings (in Table 5.1) disappeared within that period. However, only six of the remaining 13 "survived" the following winter. Of the 20 birds (14 $\sigma\sigma$:6 ♀♀) banded or re-trapped as adults between June 1976 and June 1980 (excluding GB σ - see Figure 5.1), four (20%) died within twelve months of banding, but eight (40%) survived until the end of 1982; three of which were at least six years old. There was no evidence of differential mortality between the sexes, and deaths occurred in all seasons. Four birds (2 $\sigma\sigma$:2 ♀♀) changed territories within the study site, to become breeders in the new territory.

Apart from the preponderance of males in the breeding population, several lines of evidence suggest that dispersal is greater among females than among males. Of the six young that survived their first winter, four (3 $\sigma\sigma$:1 ♀) became auxiliaries, while the other two (both female) disappeared just prior to the breeding season (Figure 5.1). Another female (YY ♀) which disappeared from her natal territory at the beginning of the 1976 breeding season apparently emigrated. Indeed, the appearance of four immigrant females (GR ♀ and unbanded ♀♀ in territories *B*, *C* and *G*), coincided with the breeding season. As all were in adult plumage, they must have been born during the previous season or earlier. At another site (one kilometre from Wollomombi Falls), where both young in a nest were colour-banded, the male nestling became an auxiliary during the next breeding season, while his sister disappeared less than three months before the breeding season. Moreover, the only Red-browed ever recorded at Stringybark Hill, eight kilometres from the nearest breeding population of this species, was female. However, as this lone, diseased individual was found at the end of the breeding

season, and still possessed juvenile plumage, some post-breeding dispersal must occur.

5.3 Territoriality

The breeding population of Red-browed averaged about one half that of the White-throated over the study period (Table 5.1, excluding territory *F*), yet there was complete spatial overlap. This resulted from the much larger territories of Red-browed, which averaged 9.6 hectares. The boundaries of these territories did not alter appreciably over the study period, despite changes in the number of occupants (Figure 5.2). However, after at least three years as an auxiliary in territory *A*, $BB\sigma$ took a mate (possibly a sibling) and defended a small compartment of his natal territory, where he attempted to breed. In addition, one section of the north-west sector was temporarily occupied by an unbanded pair between September 1978 and May 1979.

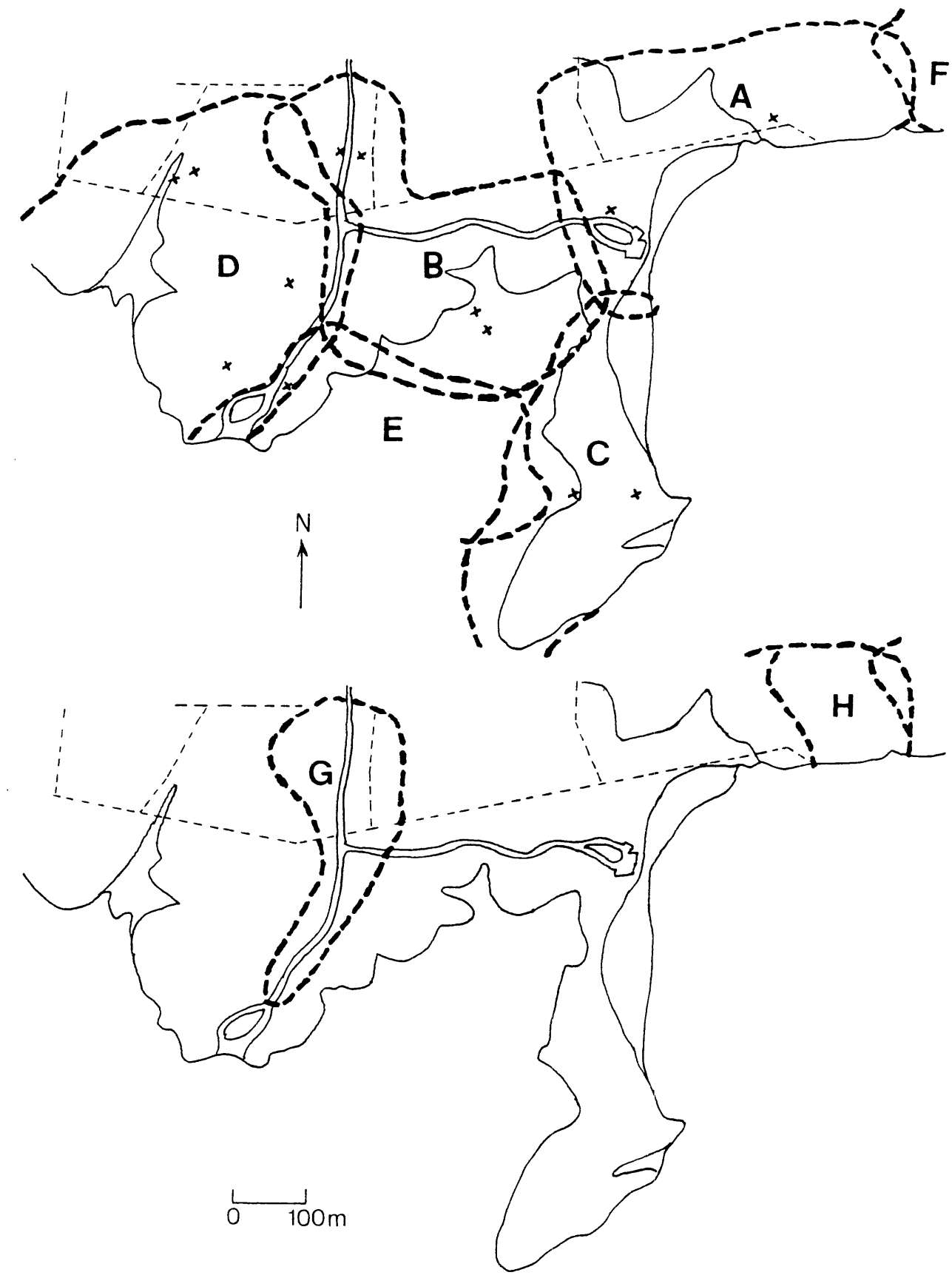
The history of the north-west sector is noteworthy. During 1976, it was usually occupied by a lone bird ($RR\sigma$) who rejoined his presumed natal group (*B*) in October, and shared the combined area with its members. From December 1977 to May 1978 this bird often accompanied an immigrant female ($GR\eta$) who resided in the northern area, though the male was frequently hostile towards her. In May, immediately after the death of the primary male ($GB\sigma$) in group *B*, $RR\sigma$ rejoined that group where he succeeded as the breeder. Meanwhile, $BR\sigma$ from group *D* began to associate with $GR\eta$ in her area, precipitating in a vigorous fight between the former and $RR\sigma$. However, the female soon died and was replaced by an unbanded pair who defended the area against the surrounding groups. Although this pair probably mated, they failed to breed and from January 1979 made frequent excursions south, in the area of overlap between territories *B* and *D*. Finally, $RR\sigma$ reclaimed the area for his group after the unbanded pair disappeared in May-June 1979.

5.4 Social Interactions

Aposematic displays, such as the "clicking" of the White-throated Treecreeper, were absent in the Red-browed. Only eight out of 26 interactions

FIGURE 5.2: *Distribution of group territories of Red-browed Treecreepers at Wollomombi Falls. Upper, 1977 breeding season; lower, territory of group G (in 1978 breeding season) and subterritory H (in 1979 breeding season); other territory boundaries unchanged*

Dark, broken lines, territory boundaries ;
thin, unbroken lines, contours and creeks ;
small crosses, roost-sites
Letters correspond to those on Figure 5.1
(far left)



between two groups involved any physical violence, while in the remainder, supplantings and chasings occurred. Pursued birds commonly displayed submissively, with fully-spread wings and tail while climbing, or with lowered head and partly-raised, fluttering wings when stationary. Some interactions involved only one member from each group, whereas others included all members. During a fierce combat between two adult males (RR σ and BR σ) in the area of overlap between their respective territories, their female companions simply watched. This was the most intense battle witnessed, the males wrestling on the ground with their legs locked for at least nine minutes before one (BR σ) retreated. The latter was never seen again.

Of the 26 interactions between two birds from different groups in which both participants were identified, 13 involved males only, and six, females only. Males won each of the remaining (seven) intersexual conflicts. Within the "family" group, a strict dominance hierarchy occurred (Figure 5.3), where females were always subordinate to males, regardless of age, and younger birds were subordinate to older birds of the same sex. Almost a half of the 70 recorded aggressive interactions within groups occurred between the primary male and female, but such quarrels were short-lived, most consisting of a single displacement.

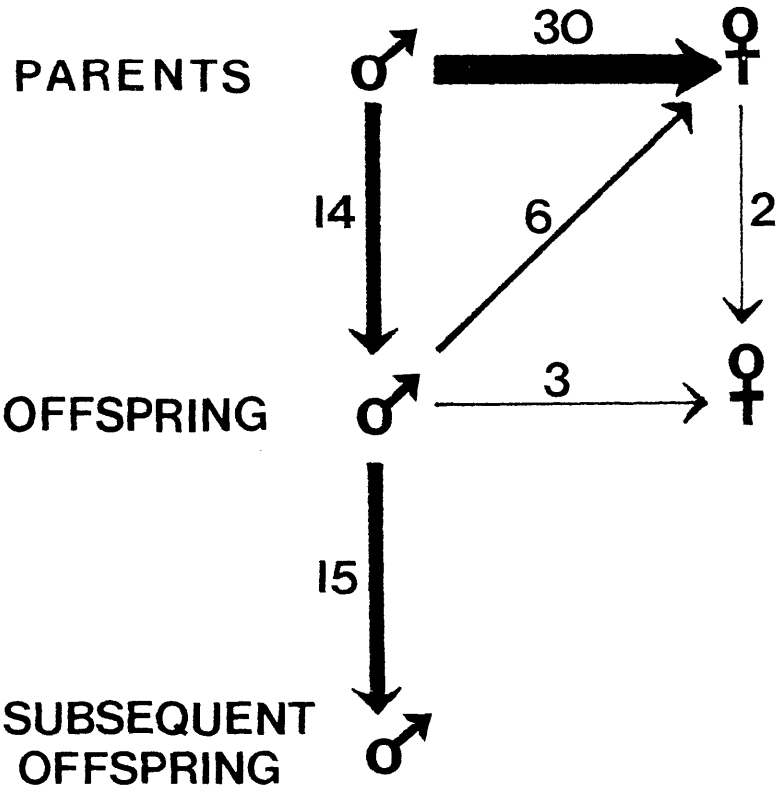
In all but two of the 120 separate interactions (involving 171 displacements) between Red-browed and White-throated, the former was the aggressor. This is consistent with previous findings (Noske 1979). I saw White-throated forage on nest-trees of the Red-browed or inspect their nests on five occasions, but this precipitated in interspecific aggression only once. Thus, neither species vigorously defended their nests against each other.

5.5 Courtship Feeding

As in the White-throated and other treecreepers, the breeding female is fed both prior to and during the incubation period. In the Red-browed, both the primary male and auxiliaries fed the female before laying, though auxiliaries were never observed to copulate. Thus, feeding of the female may not be related to courtship. In contrast to White-throated, feeding of the female was confined to the breeding season (September-January)

FIGURE 5.3: *Dominance hierarchy within Red-browed
Treecreeper groups*

Values represent total number of aggressive
displacements observed



and the month preceding it, with only a few records in July. The provisioning of the female by auxiliaries probably varied with age or experience of the auxiliary, as well as stage of the nesting cycle. Overall, primary males contributed 69% of the 70 feedings where auxiliaries were present. In 60 minutes of observations away from the nest (6 x 10 minute intervals), females were fed 31 times, i.e., the overall feeding rate was 31 per hour.

5.6 Copulation

Copulation was witnessed three times, involving three different pairs. In each case, prior to copulation, the female was perched on a near vertical branch or trunk with the head lowered, tail slightly raised and wings quivering. On two occasions, the male hopped about her with an insect in his bill, while on the other occasion he merely "chattered" softly beside her. Brief coition quickly followed.

5.7 Vocalizations

Four adult calls and one juvenile call were recognized.

1. *Chatter*. The commonest call, consisting of a rapid, slightly descending succession of sibilant notes.
2. *Retort*. A short, disyllabic (occasionally trisyllabic) call, the last syllable lower in pitch; usually delivered immediately after a *chatter*, and frequently followed loud calls of other species.
3. *Grate*. Harsh, low-pitched sound uttered during group interactions and intraspecific or interspecific altercations.
4. *Shrill Call*. A loud, high-pitched upward-inflected note quickly repeated up to four times; infrequently heard, usually during intraspecific conflicts.

5. *Juvenile/Food-begging Call.* A monotonal series of high-pitched, insect-like notes when being fed by adults.

All calls were given by both sexes. The first two calls were typically uttered antiphonally by the primary pair, one member *chattering* and the other, responding with the *retort*. The *grate* was often delivered after this duet, or in unison, by a third member of the group. Such vocal exchanges between group members probably aided group cohesion, or, alternatively, helped to maintain individual space, when birds foraged in the same tree. There did not appear to be any discrete "incubating call" (as in the White-throated), but when receiving food from males, the female sometimes gave a soft, drawn-out version of the *chatter*. A soft hissing sound was also heard twice when the primary male met the female at the nest, and once, prior to and during coition.

5.8 Roosting

The last calls of the day of Red-browed were consistently earlier than those of White-throated; the mean difference (\pm SE) on nine evenings was 17.4 (\pm 1.36) minutes. One Red-browed was seen entering its roost 15 minutes before the last White-throated call was heard. In addition to roosting earlier than the White-throated, the Red-browed probably awoke, or at least became active, later than the White-throated. The first calls of the Red-browed were never heard before those of the White-throated. A Red-browed left its roost-site in the morning 14 minutes after the first White-throated call.

The roost-sites of Red-browed, in contrast to those of the White-throated, were enclosed. All but two of the 15 sites were in the hollow tops of broken tree-trunks (mostly live boxes), or in hollow spouts of dead trees. These sites were significantly higher than those of White-throated at Wollomombi, ranging from 2.5 to 12.0 metres ($\bar{x} \pm$ SE = 6.6 ± 0.76 m). Few roost-trees of Red-browed were situated on the margins of territories, but despite the social nature of this species, the sites used by members of the same group were apparently widely-spaced (Figure 5.2).

5.9 Breeding Season and Brood Frequency

Nest-building commenced in late August and laying peaked in early September and early October (Figure 5.4). Information compiled by M.T. Goddard suggests a similar laying schedule in the Dorrigo region (70 km east of Wollomombi) with young from early nests occurring in late September and early October. At Wollomombi, two late clutches were begun in December, the first (early December) belonging to a group with young that had fledged about 20 days earlier. The owners of the second nest (in late December) had been feeding apparently well-grown nestlings which never fledged, in the previous month.

Two groups raised two broods successfully in one season, both in 1977-78, but second broods were not attempted in other years, despite some early first broods. Both successful second broods were raised in nests different from the first.

5.10 Nest-sites

The nest-sites of Red-browed resembled their roost-sites. In contrast to those of the White-throated, most nests of the Red-browed were situated in hollow dead branches of live trees or entirely dead trees (Table 5.2). Stringybarks were used least frequently. The majority of the nests in trunks concerned dead trees which had lost their branches. Of the 20 nests at Wollomombi, four were used twice and another, three times. The height of the 26 nests (including repeats) ranged from 5.3 to 20.0 metres, though a nest, two kilometres from Wollomombi, was as low as 1.8 metres. Including the latter, Red-browed nests averaged 10.2 ± 0.85 metres (SE), which was significantly higher than White-throated nests at Wollomombi ($t = 2.04$, 50 df, $0.02 < p < 0.05$).

5.11 Building

In this species, both sexes, including auxiliaries, brought building material to the nest though most of the initial construction was probably done by the female. Females carried stringybark in five of the 20 building visits witnessed, but males took only fur or other lining in

FIGURE 5.4: *Estimated laying dates of final eggs (upper) and dates of broods of undetermined age (lower) in Red-browed Treecreepers*

Open bars, Wollomombi Falls; cross-hatched bars, Dorrigo region, M.T. Goddard *in litt.*

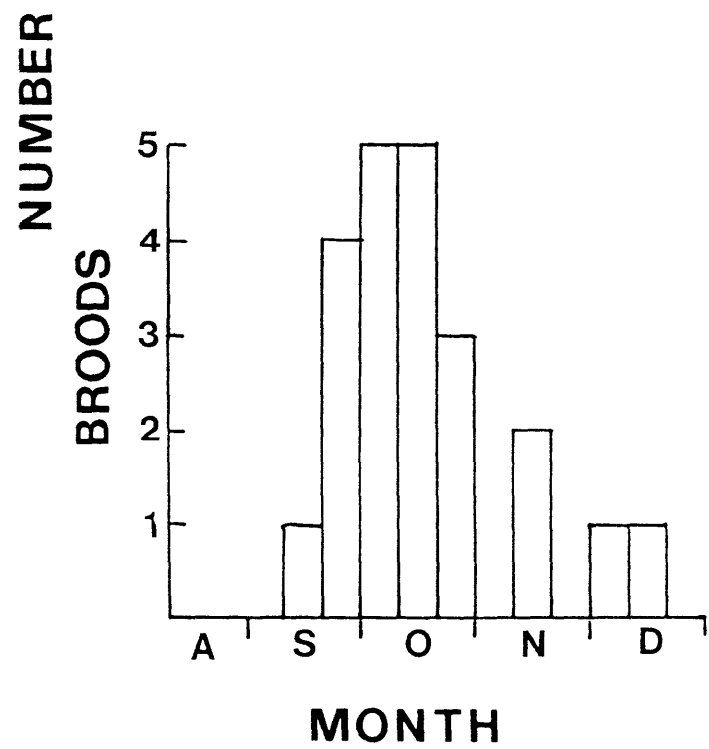
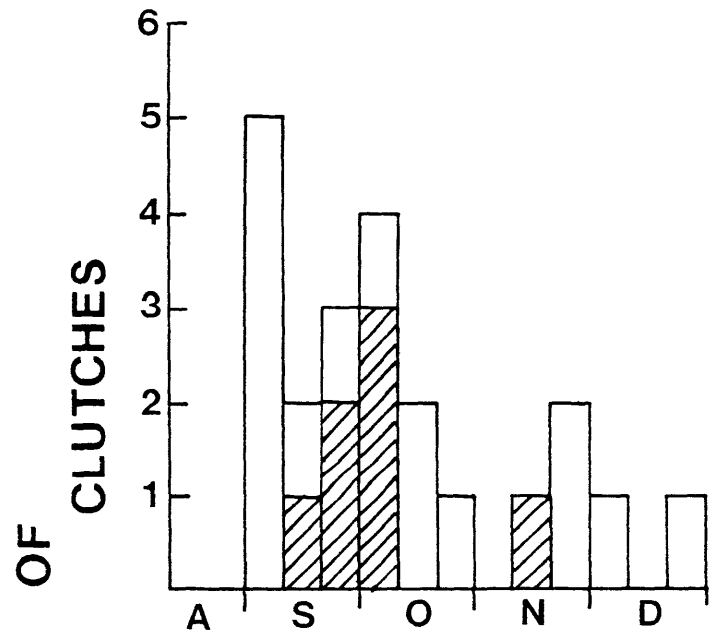


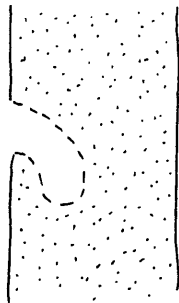
TABLE 5.2: Nest-sites* of Red-browed Treecreepers

Tree	Stringy-bark		Box [†]		Gum		Dead	Total
	H	S	H	S	H	S		
Trunk	-	-	-	1	-	1	5	7
Branch	-	1	3	5	-	5	7	21
TOTAL	-----		-----		-----		-----	28
	1		9		6		12	

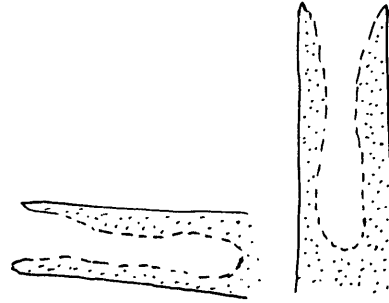
* all from Wollomombi Falls study site; except one (2 km from Wollomombi); includes repeats

† comprises *E. melliodora* (6) and *E. sp. aff. cytellocarpa* (3)

H = hole (live)



S = hollow spout (dead)



six visits. Once a male gave material to the female, who then flew to the nest. Bill-sweeping (see Section 4.11) was performed by both sexes (four times each), mostly before and during the incubation period. One female, however, swept vigorously for over ten minutes, when its nest contained young.

5.12 Clutch Size and Laying Routine

According to most popular texts, the Red-browed Treecreeper lays two or three, occasionally even four, eggs (e.g. Frith 1969; Orenstein 1976; Pizzey 1980; Beruldsen 1980). Despite this claim, I have been unable to locate authentic documentation of any clutch size other than two. M.T. Goddard (*in litt.*) provided details of 29 nests in the Dorrigo area over 24 years, all of which contained either two eggs or two young. All five clutches I examined at Wollomombi were of two eggs, and I never recorded more than two fledglings per brood. Howe (1921) gave the clutch size of Red-browed as two, and described five nests in southern Victoria, each with two eggs. The six complete clutches of this species held by the Australian Museum (Sydney) and National Museum of Victoria are C/2, but the only pertinent information in NRS is of one brood of two nestlings (NRS 1/78).

At the only nest where laying was observed, the second egg was probably laid in the afternoon (13:00 \pm 2.00 hours), at least 44 hours after the first. Incubation probably began before the second egg was laid, as the incubating bird was flushed on three of the six inspections of the nest when only one egg was present, after sitting for at least 15 minutes on one occasion.

5.13 Incubation and Nestlings

The minimum incubation period at two nests was 17 days 6 hours and 17 days 22 hours, but another nest gave a maximum period of 18 days 23 hours. The latter is about four days shorter than the incubation period of the White-throated. The nestling period of the two species however, was probably much the same, two Red-browed nests giving minimum periods of 25 days and 25 days 8 hours. Consistent with other species, only female

Red-browed incubated and brooded on the 72 occasions when the "sitter" was sexed. Brooding continued for at least twelve days after the eggs hatched. Only a few incubating sessions were timed: the maximum was 35 minutes. The duration of 21 brooding sessions ranged from 1.5 to 16 minutes ($\bar{x} \pm SE = 7.6 \pm 1.00$), probably decreasing as the young grew. Attendance apparently dropped gradually during the nestling period (Table 5.3).

All group members fed the nestlings and removed their faecal sacs, even in the group containing two females. On several occasions, auxiliary males presented food to the primary male or female, who transferred it to the young. In 124 observations at nests with auxiliaries, the overall feeding contributions of both primary males (42%) and females (32%) exceeded that of auxiliaries (26%). Feeding rates over three stages of the nestling period varied from 8.1 to 10.7 per hour (Table 5.4) averaging 9.6 per hour for almost 15 hours of observations.

5.14 Fledglings and Reproductive Success

Of five broods observed on their first day or two as fledglings, three were found in hollow dead spouts of trees up to 50 metres from the nest, and the other two, in the open. Juveniles from three different broods were still being fed at 57, 61 and 80 days post-fledging respectively, suggesting that young are still dependent two months or more after leaving the nest. During the 1977-78 breeding season, the three simple pairs raised more fledglings on average than the three larger groups (1.0 versus 0.7) but the reverse occurred in the following season (0 versus 2.0). Nevertheless, overall productivity of trios and quartets was three times greater than that of pairs (1.6 versus 0.5 fledglings per year, over six and 12 seasonal breedings, respectively).

5.15 Conclusions

In sharp contrast to the White-throated, over half of the young produced by Red-browed remained in their natal territory for over two months. This was probably due in part to a longer period of dependency, but a substantial proportion (27%) were tolerated within their families for over six

TABLE 5.3: Attendance of brooding female Red-browed Treecreepers

Age of young (days)*	Obs. time (mins)	% brooding attendance	Complete brooding session (mins) [†]	
			\bar{x}	SE
1	78	50.0	11.3	2.91
5	68	33.8	7.5	3.33
7	98	30.6	9.8	4.32
11	75	25.3	4.7	2.14

* post-hatching; nestling(s) at one and five days pertain to same nest; other two pertain to different nests; all nests with one auxiliary attending

† excludes sessions of less than one minute (as feeding sometimes took this long) and incomplete sessions (i.e., observations begun or terminated during session)

TABLE 5.4: *Feeding rates* during nestling period of Red-browed Treecreepers*

Age of nestlings [†] (days)	Obs. time (mins)	Feeding rate (per hour)
1 - 8	244	8.1
9 - 16	163	10.7
17 - 25	476	10.1
TOTAL	883	9.6

* combined observations from six nests, all observation periods \geq 30 minutes; rates include some visits in which brooding ♀ was fed, but excludes visits in which no food was seen; no adjustments made for number of auxiliaries, or time of day

† nestling period divided into three stages (about 8 days each); age of young at several nests extrapolated from fledging dates

months. As evident from the Stringybark Hill observation, some post-breeding dispersal probably occurs but this may be largely confined to females, as was dispersal of "yearling" birds prior to the next breeding season. The latter point suggests that females are physiologically capable of breeding in their first year, as there would be little advantage in dispersing if they could not. Alternatively, if sexual rivalry occurs among females for breeding status, mothers may not tolerate their daughters when breeding commences, forcing them to disperse. The relative importance of these factors and presumably others awaits resolution.

The recruitment of breeders from territories within the study site and the longevity of many individuals suggests a fairly old and isolated population, consistent with the localized distribution of this species generally (see Figure 2.1). Howe (1982) concluded that Red-browed required large, uninterrupted tracts of forest, since they were almost totally absent from small "islands" of forest in cleared areas nearby. That the territories of Red-browed are much larger than those of the White-throated implies that the former requires more space to obtain sufficient resources. Large territories, inability to colonize new habitats, and prolonged parental care would appear typical attributes of a specialized species. The slow development of adult plumage (see Section 3.1.2) might also be correlated with the protracted period of dependency.