

Rufous Scrub-bird studies: an assessment of the feasibility of capturing, colour-banding and resighting scrub-birds

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A method is described for capturing a male Southern Rufous Scrub-bird *Atrichornis rufescens ferrieri* during its breeding season. Three scrub-birds were captured and individually marked by attaching a metal band to one leg and a coloured band to the other. One of those scrub-birds has been resighted twice, while there have been twenty confirmed resightings of another marked individual. To date the longest interval between capture and resighting of an individual scrub-bird has been 22 months. Colour-banding has been shown to be a viable means for identifying individual scrub-birds in the field.

INTRODUCTION

The endangered Rufous Scrub-bird *Atrichornis rufescens* exists as small, isolated populations in northern NSW and southern Queensland (Stuart *et al.* 2021; Stewart *et al.* 2021). The status of most of those populations is monitored by means of annual surveys in spring (G. Maurer pers. comm.). However, relatively little is known about many aspects of the biology of this species. Improving the long-term outlook for the Rufous Scrub-bird should be helped by a better understanding of how individual birds live.

The purpose of the current study was to investigate if it was possible to trap and apply a coloured band to a Rufous Scrub-bird, and to assess how feasible it would be to resight the band during fieldwork. The Rufous Scrub-bird mostly forages at or near ground level in dense vegetation, which suggested that sightings of a coloured band might be problematic. We targeted scrub-birds in the NSW Gloucester Tops, where they are the southern subspecies *ferrieri* (Southern Rufous Scrub-bird), to complement other studies being undertaken in that area (e.g. Stuart 2018; Stuart 2020; O’Leary & Stuart 2021).

Trapping scrub-birds

The Australian Bird and Bat Banding Scheme (ABBBS) had two records of a Rufous Scrub-bird being caught and banded: in 1980 and 1987. The latter record involved an accidental capture.

In his study of the Rufous Scrub-bird in the early 1980s, Simon Ferrier tried many techniques for catching scrub-birds, with almost no success (Ferrier 1984: 64). Only one bird was caught, a male at Mt Banda Banda (in the Hastings Range) in August 1980. A numbered metal band was applied to the bird, and there were two resightings, in October 1980 and October 1981.

Ferrier did not elaborate on the trapping techniques which were trialled. However, he was sometimes assisted by Richard Noske who later commented that mist nets were ineffective because birds did not entangle in the bottom pocket – the successful capture in 1980 involved dropping a butterfly net over a bird (R. Noske pers. comm.).

Despite Noske’s comments, an immature female Rufous Scrub-bird was caught in a mist net at Pappinbarra (west of Port Macquarie, 240 m altitude) in 1987 (Boles & Tynan 1994). The habitat, a disused orchard, was atypical for scrub-birds which possibly improved the effectiveness of the mist net. The location was approximately 20 km from where there is a known population. A numbered metal band was applied to the bird but there were no resightings.

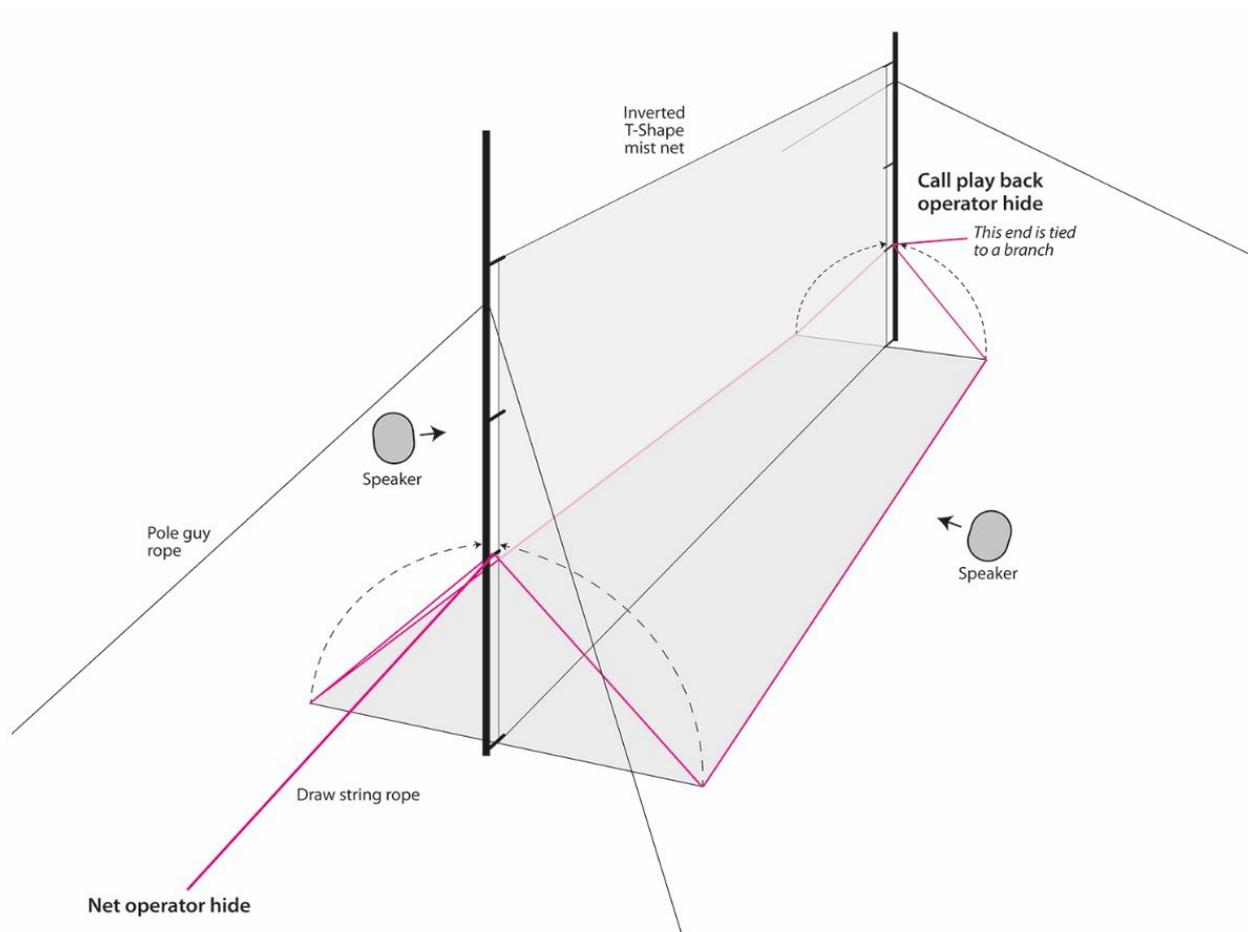
Although the ABBBS had no other records of the banding of a Rufous Scrub-bird, there were many such records for the Noisy Scrub-bird *A. clamosus*, which has been the subject of major studies since its rediscovery in 1961 (Danks 1997; Comer *et al.* 2010). The recovery plan for the Noisy Scrub-bird

includes capture and translocation of birds whenever wildfires destroy isolated populations (Cowen *et al.* 2021). We contacted the Noisy Scrub-bird recovery project team and later visited them for training in the capture method that they recommend. They reported that mist nets had proven ineffective because scrub-birds did not entangle in them, and that many other ideas for capture methods had been trialled without success, until they developed a novel trapping method involving an inverted T-net (Comer *et al.* in prep).

Although the original T-nets were modified mist nets, they are a form of trap. When set up in a scrub-bird territory, a horizontal section of net is stretched out on the ground, connected by drawstrings to the

vertical section (**Figure 1**). Two operators attend the trap. One operator manipulates a call playback system, directing calls to one of two speakers which are placed on either side of the T-net, each about 1m away from it. The aim is to have call playback coming from the speaker on the opposite side of the T-net to where the scrub-bird is known to be (from the operator seeing or hearing it). The intention is to lure the scrub-bird onto the horizontal section of the net. The second operator watches until that happens and then pulls the drawstrings, which bring the horizontal part of the net up against the vertical part of it. The scrub-bird thus becomes caught between two sections of net. The Noisy Scrub-bird team has captured many birds using this method.

Figure 1. Schematic of the T-shaped net used for trapping scrub-birds. The two operators use hides constructed at each end of the net.



An unknown until this study was how well the T-net method would work for Rufous Scrub-birds. Their habitat (at least in the Gloucester Tops) comprises considerably more low-level structure – such as vegetation, fallen timber, leaf litter, rocks, and pot holes - than the habitat of the Noisy Scrub-bird (authors pers. obs.).

METHODS

All of the necessary permits for the trapping/banding project were obtained from the relevant authorities: the Australian Bird and Bat Banding Scheme (approvals 2951, 2951-CMA); NSW Animal Care and Ethics Committee (approval TRIM 18/572); and the NSW National Parks and Wildlife Service (Scientific Licence plus approval from the Gloucester regional office to operate in the Barrington Tops National Park). T-nets were purchased from Ecotone in Poland; the design for those nets being based on the Noisy Scrub-bird project team's innovation. A purpose-built dual-outlet call-playback system was used. In most of the trapping attempts, the pre-recorded territorial song of the targeted scrub-bird was played, and occasionally some other of its vocalisations. Sometimes, towards the end of an unsuccessful trapping attempt, the territorial songs of a neighbouring bird were played but these were ineffective.

At least two net lanes were prepared within a Rufous Scrub-bird territory, removing all vegetation and removing or burying any obstructions such as rocks or roots. Each net lane was 80 cm wide (the horizontal section of the T-net is 40 cm on each side) and 8 m long. Two rudimentary hides were also built, one at each end of the net lane. An interval of at least four weeks was then allowed before any attempt at trapping, to allow time for the scrub-bird to become accustomed to the changes.

Attempts at capturing a scrub-bird involved teams of 3-4 people. The teams listened from outside of the scrub-bird territory until a vocalising bird was heard, and then decided which net lane would be the better one to use. All members of the team assisted in installing the equipment, working as quietly as possible. When the two operators were in position in their hides, the other team members departed from the territory, somewhat noisily so that the bird might think that the intrusion had finished. The operators then waited quietly for about ten minutes. After that, once they had confirmed the bird's current whereabouts, they initiated call playback from the speaker on the opposite side of the net to the scrub-bird. Call playback was only done in short bursts, with intervals of several minutes. If the scrub-bird had not been caught within approximately an hour, the attempt was abandoned.

When captured, the scrub-bird was placed into a clean calico bag and taken to a banding station, located nearby but outside of the bird's territory. The banding station was set up inside a nylon mesh tent, so that it was fully enclosed. Each captured bird was fitted with a uniquely-

identifying metal band on one leg and a coloured band on the opposite leg (ABBBS Schema I – coloured band on left leg – and ABBBS Schema II – coloured band on right leg). Birds were placed into a fresh calico bag after they had been processed, and then returned to their territory for release. The processing time was approximately 30 minutes.

RESULTS

Between November 2018 and December 2020 T-nets were operated at six Rufous Scrub-bird territories in the Gloucester Tops (arbitrarily numbered below as Territories 1-6). Male scrub-birds were captured at three of those territories. In each case, the scrub-bird re-commenced singing within about five minutes of being released after banding and processing, and it sang regularly during the remainder of the day (and when checked on subsequent days).

The successful captures occurred during September-December, which is the supposed breeding season (O'Leary & Stuart 2021). All of the attempts at other times of the year failed, mainly because the non-breeding male approached the T-net cautiously and did not step onto the horizontal section of the T-net. Also, all the attempts in September-December 2019 were unsuccessful.

The first successful Rufous Scrub-bird capture (in Territory 1) was in November 2018. During 2019-2020 there were two confirmed sightings of the bird, when the yellow band was clearly seen (**Figure 2**). The second sighting occurred 22 months after the bird was banded. On four other visits to the territory a scrub-bird was seen briefly but its legs were obscured by vegetation.

A scrub-bird from Territory 2 was captured in December 2018. There were no subsequent sightings of that bird nor of any other scrub-bird in that territory, despite several attempts at tracking down a singing bird. A study of Rufous Scrub-bird singing behaviour, based on automated sound recordings (O'Leary & Stuart 2021), showed that a scrub-bird sang regularly in the territory until at least May 2019, when the recording program was completed. Since then there has never been any indication that a scrub-bird continues to occupy the territory. However, from September 2019 a scrub-bird began to sing regularly from an area 150-200m away from the original territory. We have been unable to establish if it is the same bird, and so the new territory is designated as Territory 2A.

In September 2020, a scrub-bird at Territory 3 was caught. Between November 2020 and March 2022 there were 20 confirmed resightings of the bird (i.e. pink band clearly seen) (**Figure 3**). The most recent of those, in February 2022, was almost 17 months after the bird was banded. All of the resightings in Territory 3 were achieved using trail cameras. In that same period there were at least 40 additional observations of scrub-birds within the territory but with a band not sighted. Those additional sightings were achieved from a combination of field work and trail cameras.

It was the fourth attempt at capturing the bird at Territory 3 using a T-net but only the second attempt during a breeding season. In an attempt in the 2019 breeding season (in mid-October) the bird approached the T-net warily and would not step onto the horizontal section of it.

Table 1 summarises the overall results for captured birds and confirmed resightings. **Figures 2** and **3** show colour-banded Rufous Scrub-birds within their territories.

Table 1. Rufous Scrub-bird capture/resighting results.

Territory	Date banded	Banding outcome	Dates of resightings
Territory 1	17 November 2018	Schema II, yellow band on right leg	14 April 2019, 16 September 2020
Territory 2	3 December 2018	Schema I, yellow band on left leg	Nil
Territory 3	23 September 2020	Schema I, pink band on left leg	20 resightings from November 2020 to February 2022

There was one attempt, in early December 2020, at capturing a scrub-bird in Territory 4 using the T-net. The bird responded aggressively to call playback but avoided capture because it leapt from a log into the vertical section of the T-net and bounced off it, rather than standing upon the horizontal section. After that incident it would not approach the net lane again that day.



Figure 2. A Gloucester Tops Rufous Scrub-bird singing in its territory on 14 April 2019, with yellow band visible on right leg (photo: A. Stuart).

During 2020 there were three unsuccessful attempts to trap a scrub-bird in Territory 5 and one unsuccessful attempt to re-capture the bird in Territory 1. All of the attempts were made within the presumed breeding season. At both territories, the scrub-bird approached cautiously each time in response to call playback and would not step onto the horizontal section of the T-net.

During 2019 there were multiple attempts at capturing scrub-birds in Territory 2A and Territory 6 using the T-net, including several attempts at each territory during the 2019 breeding season.

Various styles of walk-in trap were tried in Territory 3 and Territory 4 during 2019-2020, all without success.



Figure 3. A Gloucester Tops Rufous Scrub-bird within its territory on 7 October 2021, with pink band visible on left leg (photo: A. Stuart using a trail camera).

DISCUSSION

This study has confirmed that the T-net capture method developed for Noisy Scrub-birds is also successful with Rufous Scrub-birds. However, the capture method was only successful in the breeding season, probably because male scrub-birds were prepared to aggressively defend their territory from supposed intruders. At such times they were more likely to rapidly approach the call-playback speaker. However, at two territories, the male scrub-birds behaved cautiously during the breeding season. One of those territories is well-known to birdwatchers as a site for Rufous Scrub-birds, and call playback is often used there. It is possible that the scrub-bird has become habituated to hearing call playback and has learnt to respond more cautiously to it. At the other territory, the scrub-bird reacted aggressively to call playback when it was captured in 2018 but reacted cautiously in 2020. A possible explanation is that it could recall the capture event. However, during 2019-2020 the territory location had become better known to birdwatchers and call playback there had probably become more common.

No scrub-birds were captured in September-December 2019, which was during a prolonged drought. That year's monitoring program produced the lowest-ever count of territories. It is likely that male birds had either abandoned their territories or ceased to advertise them (Stuart 2020). It may have been that the scrub-birds did not breed that season, and thus the males were less interested in defending their territories.

Methods for capturing male scrub-birds outside of the breeding season are yet to be identified, as are any methods for capturing female or young birds. The Noisy Scrub-bird team has been able to catch females because they maintain territories and they have a territorial song which can be used for call playback (Berryman 2007). The calls of female Rufous Scrub-birds are infrequently heard. Ferrier mentioned a soft "tick-tick" call and some instances of soft duetting with male birds (Ferrier 1984: 188). The female's calls appear not to have been recorded until recently (Stuart unpublished).

The Rufous Scrub-bird has powerful legs which makes it a difficult species for a bird bander to hold whilst handling it. Two of the captured birds escaped whilst being handled, justifying the use of a fully-enclosed banding station. The birds were easily re-caught using a fine butterfly net.

Information about topics such as home range and the longevity of scrub-birds rely upon recaptures or resightings. Both of those are difficult to achieve. To date there have been no recaptures of a banded Rufous Scrub-bird. Ferrier had two resightings of the Hastings Range (Mt Banda Banda) bird, because he saw a metal band on both occasions. Unsurprisingly, he was unable to read the band number in the field but at the time it was the only banded Rufous Scrub-bird in existence (Ferrier 1984: 64).

Ferrier's longest resighting record was 14 months after banding. In the Gloucester Tops study reported here, there was a confirmed sighting of the Territory 1 bird 22 months after it was banded. The bird when captured was identified as an adult male bird at least one year old. Therefore, it was at least an almost three-year-old bird at the most recent resighting. Similarly, the bird in Territory 3 was at least two-and-a-half years old at the most recent resighting.

The two resightings of the Territory 1 scrub-bird were achieved by patiently following the bird while it was vocalising, until a view of its right leg was achieved. In four other attempts, the bird stopped calling before the right leg could be seen properly and its whereabouts after that were unknown. A different approach has been trialled for the scrub-bird in Territory 3, with motion-activated cameras ("trail cameras") being placed at some locations within the territory. The preliminary results from that program are encouraging; they include the resightings of the bird's pink band described in this report and they are beginning to yield behavioural information (Stuart in prep.).

CONCLUSIONS

We have shown that it is possible to capture male Rufous Scrub-birds in their breeding season in the Gloucester Tops using a modified mist net (T-shaped net) coupled with call playback. We have also shown that a Rufous Scrub-bird is resilient to the process of being captured and handled, and that the presence of bands (on both legs) does not affect the bird's ability to survive in its environment. Finally, we have shown that coloured bands on a Rufous Scrub-bird can be seen in the field, albeit sometimes with difficulty. The coloured bands provide a means for identifying individual birds without having to recapture them. We expect that the ability to identify individual birds will eventually lead to improved understandings about the biology of the Rufous Scrub-bird.

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