Studying Rufous Scrub-birds in the Gloucester Tops

A study of Rufous Scrub-birds in the Gloucester Tops started in 2010. The initial interest was to monitor the status of the local population. Over time, additional avenues of investigation have been introduced. This document summarises the two main programs and the approaches that are being taken in each case. Currently, the Scrub-bird study comprises:

Non-invasive studies

1. Monitoring the status of the local population,
2. Investigating the calling behaviour of individual male birds.

Banding / radio-tracking project

1. Banding and colour marking,
2. Investigating the lifetimes of individual Scrub-birds,
3. Investigating the movement by Scrub-birds within and between territories,
4. Generating DNA and dietary information.

I hope that future investigations will also include a study of breeding behaviour including activities at the nest.

Non-invasive studies

1. Monitoring the status of the Gloucester Tops Scrub-bird population

This is achieved by detecting calling male Scrub-birds in spring when they most actively advertise their territories. An inventory of territories is maintained. Most years involve participation by volunteers from the Hunter Bird Observers Club and elsewhere.

References:

- Newman, M. and Stuart, A. (2011). Monitoring Rufous Scrub-birds in the Barrington Tops and Gloucester Tops IBA in the 2010-2011 Season, Hunter Bird Observers Club Special Report #6.
- Newman, M. and Stuart A. (2011). Monitoring the Rufous Scrub-bird in the Barrington Tops and Gloucester Tops IBA – a pilot study. *The Whistler* **5:** 19-27.
- Newman, M., Stuart, A. and Hill, F. (2014). Rufous Scrub-bird *Atrichornis rufescens* monitoring at the extremities of the species' range in New South Wales (2010–2012). *Australian Field Ornithology* **31:** 77-98.
- Stuart, A. and Newman, M. (2018). Rufous Scrub-bird *Atrichornis rufescens* in the Gloucester Tops of New South Wales: findings from surveys over 2010-2016. *Australian Field Ornithology* **35:** 13-20.

2. Calling behaviour of male Scrub-birds

A multi-year study of seasonal and daily variability is underway, based around placing automated recording units (ARUs) in known Rufous Scrub-bird calling areas and later analysing the recordings. Particular emphasis is placed on detecting the characteristic chipping call (which underpins the population monitoring program). Two ARUs were being deployed; each yielding approximately seven days of recordings per deployment. A third ARU has just been purchased; it is expected to produce ~2 weeks of recordings per usage. A hand-held recording device is also used sometimes, to obtain examples of other types of calls by Scrub-birds including mimicry.

References:

- Stuart, A., Newman, M., Struik, P. and Martin, I. (2012). Development of a non-intrusive method for investigating the calling patterns of Rufous Scrub-birds. *The Whistler* **6:** 24-34.
- Stuart, A. and O'Leary, M. A method for investigating Rufous Scrub-birds using automated recording and rapid data analysis. Submitted to *Corella*

Banding / radio-tracking project

This important part of the overall study is conducted as an Australian Bird & Bat Banding Scheme (ABBBS) approved project called *Rufous Scrub-bird population, movement, biology and community*. Relevant approvals are:

ABBBS approvals: 2951, 2951-CMA. This includes approval to band any by-catch.
ABBBS licenses: 2951 (Rob Kyte), 2899 (Greg Little), 3289 (Judy Little).
NPWS Scientific Licences: SL100632 (Rob Kyte), SL100462 (Greg Little), SL101909 (Judy Little).
NPWS Gloucester office: 20180904151253343.
NSW Animal Care & Ethics Committee: TRIM 18/572.

1. Banding and colour marking

Catching Rufous Scrub-birds will not be straightforward as the species is almost flightless and the habitat where it lives is densely vegetated. The initial approach to be investigated mirrors the method developed for trapping Noisy Scrub-birds in Western Australia. The WA method uses so-called T-nets coupled with a sophisticated call play-back arrangement. We will also investigate other trapping methods. Most nets and traps will be placed inside known Rufous Scrub-bird territories; however, some will be placed elsewhere.

a) Locations for nets and traps

Within territories

Many of the locations for nets and traps will be within known Rufous Scrub-bird territories in the Gloucester Tops. The initial focus will be two territories *c.* 1.5 km apart and which are accessed from Kerripit Rd. When resources permit, additional territories will be included. For example, there are another two territories within *c.* 2 km of the initial ones, and both of them would be able to be reasonably conveniently accessed. There are many more territories in the Gloucester Tops although most of those are less conveniently accessed.

Within a known territory, a preliminary assessment of the Scrub-bird's pattern of movement will be done by identifying some locations where the bird was calling. Based upon that information, appropriate places for nets and traps will be decided. After constructing a net lane, it is left for several weeks before being used, with the aim that the Scrub-bird will have become habituated to the minor habitat modification within its territory.

Between territories

Nets and traps also will be deployed at locations that are either adjacent to or lying between known Scrub-bird territories. The main purpose for these is to trap and band female Scrub-birds and immature / subordinate male birds. Very little is known about where females and non-dominant males occur, hence initially the locations for nets and traps between territories will be selected at random. An aspiration for the project is that eventually such placements will become less random i.e. using knowledge about where such Scrub-birds had been found to guide the future placement of nets and traps.

b) Catching Rufous Scrub-birds

T-Nets

These will be the main method used for attempting captures, especially initially[1]. T-nets are modified mist nets, developed by the Noisy Scrub-bird Recovery Project team in WA. That team, with many decades of experience, was unable to catch Noisy Scrub-birds reliably by other methods, including conventional mist nets. A T-net has a horizontal layer of netting at ground level, connected to a vertical net. It is manually operated – a trained person waiting out of sight near the net pulls a drawstring when the Scrub-bird is standing on the horizontal section of netting. This action raises that section of netting and traps the Scrub-bird between the vertical section and the raised section.

Conventional mist nets

The Noisy Scrub-bird Recovery Project team found that Noisy Scrub-birds did not become entangled in standard gauge mist nets. Since they do not fly, they usually did not contact a conventional net with enough velocity to become entangled. The observed behaviour was that they could see a net and that they would approach it slowly and cautiously, and then walk away. Also, Noisy Scrub-birds have soft plumage and their feathers dislodge easily; these factors make them even less likely to become entangled in a conventional net.

Despite the findings of the Noisy Scrub-bird Recovery Project team, conventional mist nets will be trialled. The Rufous Scrub-bird is a smaller bird and lives in denser terrain. Hence it may be less likely to see a net and more likely to become entangled. Net mesh sizes appropriate to a bird of the size of a Rufous Scrub-bird will also be used. The lowest shelf string of these mist nets will be fixed to the ground so there is no gap under the net. This plan may be modified after the initial trials.

Cage traps

Various cage trap arrangements will be trialled. Some of these will be off-the-shelf traps such as two-ended rat traps (these previously have been effective at trapping Brown Quail for banding) and single-ended cat traps (similar traps have been effective elsewhere for species such as Brush-Turkey and Australasian Bittern). Based on initial experiences, other types of trap may be purchased or manufactured. Permutations involving single-ended traps with a mirrored back end will also be trialled, and the use of drift fences.

c) Call play-back

The Noisy Scrub-bird Recovery Project team found that call play-back was necessary in order to entice birds to come to T-nets. It is planned to do likewise for Rufous Scrub-birds at T-nets, and also for luring them into conventional nets and cage traps. Special twin-speaker call play-back systems have been constructed, modelled on the equipment used by the Noisy Scrub-bird Recovery Project team.

Recordings of birds from the Gloucester Tops population are used, either calls of the bird targeted for trapping or calls from a near neighbour. When recordings eventually are able to be obtained from a female Scrub-bird, these will be trialled for effectiveness in enticing other females into a net or trap. The Noisy Scrub-bird Recovery Project team uses calls by females for trapping females.

[1] *T-nets were used successfully on Rufous Scrub-birds in November- December 2018 field work, which is thought to be in the breeding season. Their performance at other times of the year is yet to be determined.*

d) Banding team

Rob Kyte is the banding team leader, assisted by Greg and Judy Little. A schedule of dates for banding visits is being established. Other experienced banders will be invited to become involved, as we anticipate that will help to more quickly identify the most effective ways to reliably trap Rufous Scrub-birds. Eventually there may also be support roles for less experienced banders. All participants in the banding project field work will be required to possess a current NSW banding licence and to agree to work under Rob Kyte's direction.

e) Banding station and equipment

Given the complexity of the Scrub-bird capture process, an enclosed portable banding station with a sealed floor is used whenever they are processed, to prevent the bird from escaping prematurely. Also, a dedicated set of banding equipment is used.

2. Lifetimes of individual Scrub-birds

Some information about lifetimes is being obtained by monitoring the occupancy of several easily accessed territories. However, such results will always be tentative. A new approach will involve placing metal bands plus coloured bands onto individual birds. Re-trapping, perhaps supplemented by images from photographers, will generate information about lifetimes.

3. Movement by Scrub-birds within and between territories

An ongoing aspect of this area of study is to locate (by GPS) the position of calling male birds within their territory. Trail cameras were trialled in January-March 2018 but proved ineffective. Two new approaches are commencing. One approach will involve placing metal bands plus coloured bands onto individual birds. Re-trapping, perhaps supplemented by images from photographers, will assist to identify the extent of any movement.

<u>Radio tracking</u>

The second approach will be to place VHF radio transmitters onto some Scrub-birds and track their movement for as long as is feasible. The general practices used by the Noisy Scrub-bird Recovery Project team will be adopted. A rubber band[2] will be pre-attached to a VHF transmitter. This creates a harness for quickly attaching the transmitter onto the Scrub-bird's back. Weathering causes the rubber band to weaken over time and eventually the transmitter will fall off. ATS A1055 transmitters have been selected for use; these weigh 1.0 g and have a maximum battery life of 55 days (but are expected will fall off sooner than that).

The body weight of a male Rufous Scrub-bird is 30-32 g (based on preliminary field work on the Rufous Scrub-bird in November-December in the Gloucester Tops; there are no weight data in HANZAB). The total weight of an ATS A1055 transmitter plus harness is ~1.1 g. The maximum acceptable weight for a transmitter is 5% of a bird's body weight (NSW DPI Animal Ethics Radio Tracking guidelines). All Rufous Scrub-birds caught will be weighed; a transmitter will not be attached if the bird weighs less than 22 g. This possibly will preclude the fitting of transmitters to females or young males.

A Regal 2000 VHF receiver and associated antenna will be used to track the Scrub-bird's position. Each transmitter will have a distinct operating frequency in the 150-152 MHz range (so that individual birds can be recognised).

[2] *A size 10 rubber band is used for the Noisy Scrub-bird. Based on preliminary field work on the Rufous Scrub-bird in November-December 2018 in the Gloucester Tops, that is too large.*

References:

- Stuart, A. Sizes of some Rufous Scrub-bird singing areas in the Gloucester Tops. *Australian Field Ornithology* **35:** 107-110.

4. DNA and dietary information

Any feathers shed by a Scrub-bird caught during banding activities will be collected, and likewise any droppings. Arrangements have been made to send some of the feathers to CSIRO's Australian National Wildlife Collection for DNA analysis. Currently there is very little Scrub-bird genetic material available to scientists, and especially in the case of the Rufous Scrub-bird. Advice is being sought regarding scat analyses and about additional options for studying the collected feathers.

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December 2018