

Monitoring the Rufous Scrub-bird in the Barrington Tops and Gloucester Tops IBA – a pilot study

Mike Newman¹ and Alan Stuart²

¹7 Glenurie Close, Woodville, NSW 2321, Australia omgnewman@bigpond.com

²81 Queens Road, New Lambton, NSW 2337, Australia almarosa@bigpond.com

The Rufous Scrub-bird *Atrichornis rufescens* is a skulking, cryptically plumaged species which is seldom seen. Fortunately territorial males have loud characteristic calls which were used to locate territories during surveys between August 2010 and January 2011 in the Gloucester Tops area of the Barrington Tops and Gloucester Tops Important Bird Area (IBA).

Twenty-two territories were confirmed based on repeat records at least 3 weeks apart during surveys along 20 km of track. A further 5 probable territories were located based on multiple records less than 3 weeks apart. Assuming territories are located within 150 m either side of the track the estimated density of breeding pairs is in the range 3.6 to 4.5 territories/km². This range is considered to be conservative because there were a number of possible additional territories based on single records.

In 1980/81 Ferrier found 21 territories in 18 km of transects with an implied density of 3.8/km². As the surveys in this study covered approximately 80% of the same transects as Ferrier it is concluded that the Rufous Scrub-bird population has not declined in its core habitat at altitudes >1,150m during the past 30 years, although its size may have fluctuated during that time.

In both studies, the territories were predominantly in eucalypt forest with dense ground cover, mostly adjacent to Antarctic Beech *Nothofagus moorei* forest.

INTRODUCTION

The Rufous Scrub-bird *Atrichornis rufescens* is classified as Vulnerable under the New South Wales *Threatened Species Conservation Act 1995*. Since European settlement its distribution has contracted and is currently restricted to five locations, all at high altitude, extending from the Queensland/New South Wales Border Ranges south to the Barrington/Gloucester Tops area. The Rufous Scrub-bird has disappeared from lowland areas of its former range and it is now either extinct or very rare at altitudes below 600m (Ferrier 1984).

Two sub-species of the Rufous Scrub-bird are recognised; the southern sub-species *A. r. ferrieri* is confined to Werrikimbe, Carrai, Oxley Wild Rivers, New England, and Barrington Tops National Parks (particularly Gloucester Tops at the latter location) although in the past it was more widespread (Gole & Newman 2010).

The Rufous Scrub-bird was the trigger species for the nomination of the Barrington Tops and

Gloucester Tops Important Bird Area (IBA) (Dutson *et al.* 2009; Newman & Stuart 2011). It is a requirement of the IBA process that the trigger and other supporting species (namely, for this IBA, Australian Logrunner *Orthonyx temminckii*, Green Catbird *Ailuroedus crassirostris*, Regent Bowerbird *Sericulus chrysocephalus*, Flame Robin *Petroica phoenicea*, Pale-yellow Robin *Tregellasia capito*, Paradise Riflebird *Ptiloris paradiseus*) are monitored to determine trends in their status.

In this paper, we summarise the results of a pilot scheme for sustainable monitoring of Rufous Scrub-birds using volunteers, that potentially can be used in all five IBAs for which the Rufous Scrub-bird is the trigger species.

The Rufous Scrub-bird is a cryptically marked skulking species, which is seldom seen. Fortunately male Rufous Scrub-birds have loud penetrating calls which are used to advertise and defend territories, particularly during the breeding season. This attribute has been used in two previous studies of the Rufous Scrub-bird in the Barrington Tops and Gloucester Tops area (Ferrier 1984; Ekert 2002).

The approach taken in the earlier of these studies by Simon Ferrier in 1980/81 in his PhD study (Ferrier 1984) was to conduct surveys along 18 km of transects in the Gloucester Tops area. Transects were established in habitat known from pilot surveys to contain Rufous Scrub-birds. Ferrier made 18 surveys along these transects throughout the year determining the location of calling scrub-birds. Birds heard on multiple occasions spanning a breeding season were assumed to be territorial males. Calling birds were most easily detected between September and December under conditions of high humidity, low wind and low mist. Time of day did not appear to be a critical parameter. Ferrier estimated there to be 20.29 (SD 1.11) singing males within an area 150m either side of his transects at Barrington Tops & Gloucester Tops, which corresponds to a density of 3.8 territories/km². However, under optimal conditions, Ferrier suggested this density may be as high as 6 male territories/km² (Ferrier 1985).

In Ferrier's work in the Gloucester Tops area, most Rufous Scrub-bird territories were found in eucalypt forest with dense understorey adjacent to Antarctic Beech *Nothofagus moorei* forest. Territories were on average 1.13 ha in area, often circular in shape, with the male predominantly singing from an area of approximately 50m diameter. On occasions when clusters of calling birds were encountered it was possible to assign territories to individual males.

A more recent study conducted by Birds Australia (BA) using volunteers (Ekert 2002) also involved monitoring calling males during the breeding season. In this case a number of fixed point locations were established which were monitored annually using a standard protocol to determine the presence or absence of calling scrub-birds. The intent was to use annual variations in the reporting rates of scrub-birds to determine trends in their relative abundance. The BA study sampled a larger area of potential habitat, particularly areas at lower altitude than those surveyed by Ferrier, which were above 1,150m.

The possibility of using call playback to stimulate scrub-birds to call was investigated in both of the above studies, but in each case was found to be ineffective and its use was discontinued.

For the present study we elected to use transect surveys similar to those conducted by Ferrier, allowing a comparison with his baseline data of scrub-bird territory densities. The choice of method also fitted well with our intent to conduct

an intensive set of BA Atlas surveys for all bird species, including all species listed to support the IBA nomination. In both Ferrier's and our studies, the results were broken down and reported against transect segments involving 1km linear lengths of track (i.e. taking into account curves and undulations).

The 2010 surveys described in this report were viewed as a pilot study to test the suitability of the transect approach using volunteers to identify scrub-bird territories and fine tune the approach. Four other IBAs involving the Rufous Scrub-bird as the trigger species have also been nominated. Ideally similar approaches to monitoring Rufous Scrub-birds should be used across the five IBAs.

The pilot study was conducted at altitudes above 1,150m in the Gloucester Tops, which were expected to remain core habitat for the Rufous Scrub-bird following any contraction in range. Ferrier had surveyed much of the same area that was selected, and therefore baseline data existed which would allow comparisons to be drawn between the two studies.

METHODS

Survey Transects

Transects were established along roads and walking tracks in the Gloucester Tops area of the Barrington Tops and Gloucester Tops IBA as show in **Figure 1** (the general location is S32° 5±2', E151° 35±2'). One kilometre segments were measured, either by odometer readings where car access was possible (transects along Gloucester Tops Road, Kerripit Road extended), or by measurement on Google maps to determine end-point map coordinates (transects along Careys Peak Track, Mt Nelson Track, Glowang Track). These points were found using GPS units set to WGS84 coordinate system. All transect segments were marked at their extremities using yellow tape. The selected transects corresponded with approximately 80% of the area surveyed by Ferrier and also coincided with a number of the fixed survey sites used in the previous BA study. The impenetrable nature of the bush made it impractical to conduct surveys away from existing tracks.

Detection of Rufous Scrub-birds

The ability to reliably recognise calling Rufous Scrub-birds is central to locating their territories. Fortunately, in the breeding season from September to December the probability of detecting males having territories within 150m of a track usually exceeds 50% and can be as high as 80% for an experienced surveyor (Ferrier 1984). This previous study found detectability to peak between October and November. High humidity, low wind and low mist conditions enhanced detection rates.

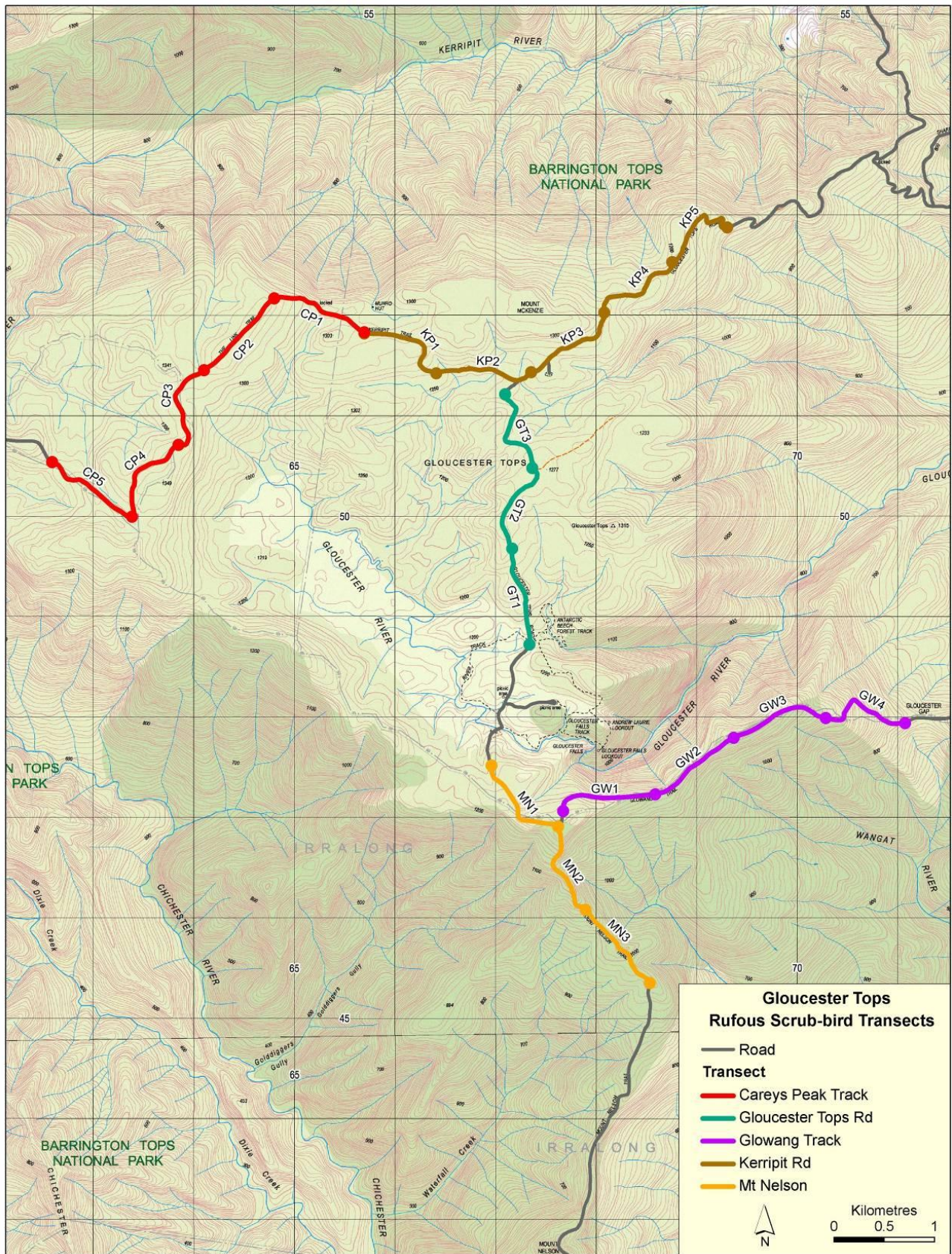


Figure 1. Survey transects at Gloucester Tops.

The main song of the Rufous Scrub-birds has been described as a “chipping” call. It consists of repeated phrases, each involving severable syllables. Males often sing persistently, as exemplified by the bird used for training purposes. Once heard in the field the call is readily recognised, having a resonant metallic quality, easily distinguished from other species by experienced surveyors. Consequently, a high reliability was placed on any records by trained surveyors involving scrub-birds persistently using the chipping call.

Rufous Scrub-birds have a wide repertoire of calls and are renowned mimics. Less reliance was placed on records where the “chipping” call was not heard and particularly when only one or two contact calls were reported. Over 95% of the records were based on the detection of calls and the bird was seldom seen.

Data Collection and Management

Most of the survey work was conducted around two camps, each of 3 days duration, held in September and October 2010. Each camp involved nine volunteers, with five people attending on both occasions. The first day of each camp was used to train the survey team. This involved ensuring that all participants could recognise the calls of Rufous Scrub-birds. After playing tapes of scrub-bird calls, participants were taken to a known Rufous Scrub-bird territory where the resident male bird called persistently, mostly using its chipping song. Volunteers were asked to determine the point on the track nearest to the calling bird and estimate the distance of the calling bird, this being the approach used to identify the location of territories in subsequent surveys. In-the-field training was very important because the taped calls involved the northern sub-species of the Rufous Scrub-bird, which has a slightly different repertoire of songs and calls to the southern sub-species found at Gloucester Tops.

Five teams were established involving at least one person previously experienced in locating Rufous Scrub-birds and familiar with the survey techniques. Each team was asked to survey between three and five transect segments, each 1 km in length. The following information was recorded:

1. GPS coordinates, side and distance from track of any Rufous Scrub-birds, either heard or seen.
2. Type and duration of calls heard.
3. Information relating to the detectability of scrub-birds (e.g. humidity, wind strength, cloud cover, time of day).
4. An indication of the habitat type where scrub-birds were calling (e.g. eucalypt forest with dense understorey or beech forest with bare ground).
5. Record all other bird species observed during the survey.

Weather conditions on the Gloucester Tops are unpredictable. An added complication was the need to cross the Gloucester River to reach some of the survey transects. Because of high river levels, the Glowang and Mt Nelson Tracks were only surveyed once in October.

Surveys typically commenced about 8.00 am and took between four and six hours to complete. Typically one hour was spent in each 1 km transect segment; the actual amount of time varied, depending on whether any scrub-birds were located. When scrub-birds were found, up to 10 minutes additional time was spent at the location to determine the types of calls used and the duration of calling. In instances where clusters of calling birds occurred it was necessary to spend extra time, ideally establishing that more than one bird was calling simultaneously. It was considered more important to be certain that scrub-birds had been correctly identified and assigned as precisely as possible to accurately measure territory locations, than to standardise the time spent surveying each transect segment. In instances where observers had to return along a walking track through a set of transect segments they were asked to record all scrub-birds on both the outward and inward walk, because this provided confirmation of records, and additional information on the size of territories and the persistence with which scrub-birds call. Observers were encouraged to spend more time surveying on the outward journey, when the birds were more active and to return more rapidly unless scrub-birds were heard or seen. Observers were discouraged from attempting to attract scrub-birds by call playback or “pishing” and leaving the track to seek out calling birds.

Surveyors were asked to record all species within each 1km transect, and the resulting data were submitted to the BA Atlas as 500m radius area surveys and also recorded in a database established specifically for the pilot study. The overall results of these surveys including the occurrence of the other species listed in the IBA nomination will be presented in a future paper.

Territories and Calling Sites

Rufous Scrub-bird observations were deemed to involve a confirmed territory when two records were obtained at the same location (to within approximately $\pm 100\text{m}$) separated by an interval of at least three weeks. This definition was used to indicate permanent occupation of a Rufous Scrub-bird territory. It is a less stringent criterion than that used by Ferrier which deemed a territory to be confirmed when scrub-birds were recorded before and after the breeding season. The three-week criterion was necessary to enable interpretation of results from the short term 2010 pilot study.

The simplest type of Rufous Scrub-bird territory is approximately 1.0-1.2 ha in size, 100m in diameter and the bird predominantly calls from a core area of about 50m in diameter in the centre of the territory (Ferrier 1984). The territory used for training purposes fitted this description. The GPS coordinates describing the position on the transect track of this, the most measured territory, varied by 2 to 3 seconds of latitude/longitude. Irregularly shaped territories can resemble a lozenge up to 250m long with more than one node used for calling (Ferrier 1984). This type of territory could result in

variations in GPS coordinates as large as 5 to 6 seconds if the territory was aligned parallel to the transect. For this type of territory it might be difficult to determine whether clusters of GPS coordinates involved a single or multiple territories in close proximity. There were few instances where this difficulty arose. Whenever any ambiguity occurred, the conservative position was taken and only one confirmed territory was assigned.

Rufous Scrub-bird records were assigned to three categories as defined below:

1. Confirmed Territories based on at least one repeat record at a location, three weeks or more after the initial record.
2. Calling Sites based on two or more records involving either persistent use of the “chipping” call or a sight observation, but lacking confirmation of continued occupancy over a period of at least three weeks.
3. Tentative Sites involving single records (unless seen) and multiple records which did not involve the “chipping” call.

During the first camp in September, all of the surveys were repeated on consecutive days by different survey teams. Teams on the second day were unaware of the locations of Rufous Scrub-birds recorded on the previous day. During the second camp in October the primary objective was to confirm as many locations as possible so that they could be assigned “territory status”. Survey teams were provided with “mud-maps” identifying the locations of all previous observations to facilitate this objective and were asked to report locations of all scrub-birds on similar sketches. **Figure 2** shows an example of a mud-map in which the transect is shown for convenience as a straight line although in reality each transect trail bends and undulates. This was found to be an effective method of communicating results unambiguously. During follow-up visits we have encouraged members of our core survey team to make opportunistic point surveys at locations where scrub-birds had been reported but not confirmed.

RESULTS

The summary provided in **Table 1** shows the distribution of Rufous Scrub-bird records between the five sets of transects which were surveyed. Rufous Scrub-birds were distributed fairly evenly throughout the study area. There were records from all but one of the 20 transect segments, but not all of these records were confirmed as territories.

22 territories were confirmed in the 20km of core transects, which equates to a density of 3.6 territories/km², assuming that all territories within 150m either side of surveyed transects were detected. This estimate is considered conservative

because it is anticipated that more records may be upgraded to confirmed territory status with further survey effort in 2011. For instance, if all the calling sites involving multiple records were upgraded to confirmed status the number of territories would increase to 27 at a density of 4.5/km². The density of 3.8 territories/km² found by Ferrier in 1981 (Ferrier 1984) lies within the indicative range of 3.6 to 4.5 territories/km² found in this study. On this basis it can be concluded that, in the Gloucester Tops study area, Rufous Scrub-bird numbers have remained reasonably stable over a period of 30 years although population size may have fluctuated during that time.

Rufous Scrub-birds were recorded during 49 of the 91 “500m radius” surveys for the BA Atlas. The reporting rate of 54% is exceptionally high for a rare species, reflecting the extent to which the study area is core Rufous Scrub-bird habitat.

Of the 21 transects surveyed, 18 consisted mainly of eucalypt woodland with dense understorey vegetation, usually bordering beech forest. Rufous Scrub-birds were recorded in all of these transect segments. Vegetation varied considerably between the sites at which Rufous Scrub-birds were found. In all instances there was ground cover with extensive leaf litter. There were considerable variations in the extent of mid-storey vegetation which ranged from one to three metres in height. These observations are consistent with Ferrier’s (1985) description of the preferred habitat of the Rufous Scrub-bird in the Gloucester Tops area. There was a tendency for Rufous Scrub-bird sites to be located near creeks and in dense gullies, but this was not an exclusive requirement. In some areas there was considerable evidence of the regrowth of beech forest as indicated by the presence of many *Nothofagus moorei* saplings. Only two of the 20 transect segments were located in areas dominated by beech forest, habitat characterised by a lack of understorey and ground-cover vegetation. The absence of Rufous Scrub-bird records from one of those transect segments is consistent with Ferrier’s conclusion that, in rainforest, scrub-birds are only found where there is dense ground cover along creek edges and where fallen trees have opened up the forest canopy.

In view of the variability of the habitat along transects and variation in the distance between adjacent territories, the 2010 pilot survey results are consistent with Ferrier’s conclusion that under optimal conditions the density of male territories may be as high as 6/km².

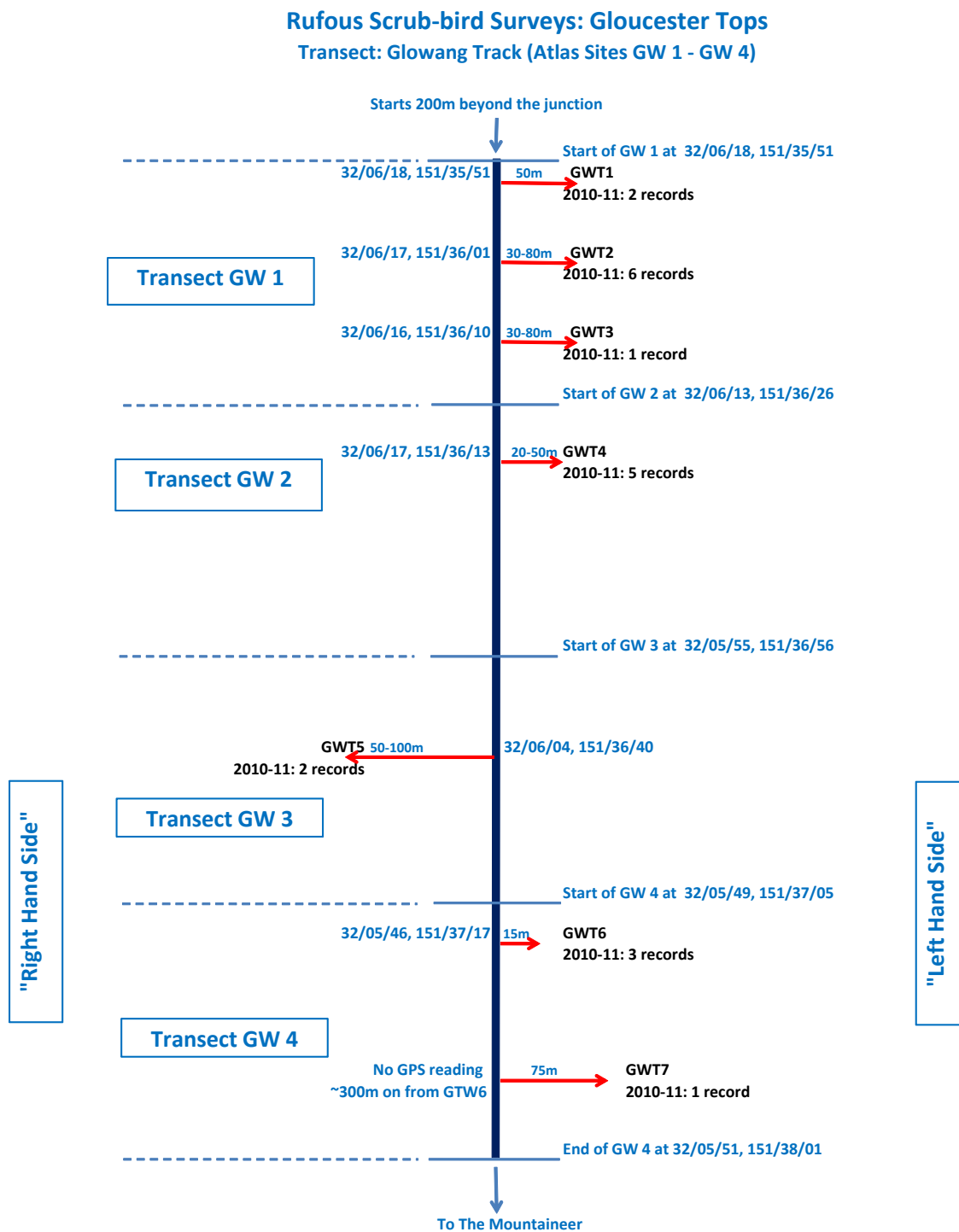


Figure 2. Example of mud-map (linear representation of transects)

Table 1. Summary of Rufous Scrub-bird survey results

Area	Length (km)	Days Surveyed	Confirmed Territories	Calling Sites	Tentative Sites	Sites All Categories
Careys Peak Track	5	5	8	2	2	12
Kerripit Road Extended	5	5	4	0	5	9
Gloucester Tops Road	3	4	3	0	2	5
Mount Nelson Track	3	3	3	2	1	6
Glowang Track	4	3	4	1	2	7
Total For Repeat Surveys	20		22	5	12	39

DISCUSSION

Detectability of Rufous Scrub-birds

An objective of Ferrier's work (1984) was to establish a single survey method which would provide an absolute measure of Rufous Scrub-bird territory densities. This was achieved by establishing a set of detection factors which could be applied to transect survey results. Ferrier's detection factors varied with humidity, wind strength, day of the year and habitat type. They are available as a look-up table for the Gloucester Tops area (Ferrier 1984). Under the most favourable conditions involving high humidity, still conditions and no mist during October and November the probability of detecting a Rufous Scrub-bird calling within 150m either side of a track was found to slightly exceed 80% for an observer walking at 2.5 km/hr.

Preliminary attempts to validate Ferrier's detection factors against our 2010 transect surveys were unsuccessful. For instance, when the number of scrub-birds recorded by observers during our surveys for one transect of 5km length was compared with the total number of birds found throughout 2010 (**Table 1**) for that transect, the numbers detected were lower than predicted by the model. The discrepancy may be associated with difficulties in measuring humidity and the small transect length of 5 km used in the evaluation (Ferrier sampled 18 km/day). Other factors could contribute to this situation, including differences in the field experience of personnel with detecting calling scrub-birds and a lack of prior knowledge of the location of their territories.

In both Ferrier's study and this work, a number of scrub-birds were heard on a single occasion or for a short period of time and could not be assigned territorial status. Possible explanations for these

records include that the birds did not have established territories and were roaming in search of a mate, or that scrub-birds with territories spanning or bordering the 150m detection zone were only able to be heard under the most favourable conditions.

An intriguing possibility is that Rufous Scrub-bird breeding behaviour may vary with climatic conditions and that the spring of 2010 may have been anomalous as it involved above-average rainfall associated with La Nina conditions. Ferrier's studies were conducted during a period of "normal" rainfall and he suggested that climatic conditions could impact on the vocal behaviour of scrub-birds (e.g. by determining the timing of the breeding season when calling is at a peak).

Ferrier's goal of achieving a single survey technique which generates reliable estimates of Rufous Scrub-bird territory densities is compelling and attempts to validate his model will continue.

Variations of Individual Birds in Seasonal Calling Patterns

Ferrier showed that the frequency at which a group of 19 territorial males called increased during the breeding season, which is thought to be between September and December, peaking in October and November. However, it is possible that individual birds show short-term departures from the group behaviour. For instance, Jackson (1920) indicated that the male called less when the female was incubating. This is consistent with Ferrier's findings provided that the timing of breeding is not highly synchronised across all transects.

During the 2010 surveys the scrub-bird used for training purposes was heard on every occasion up to October 12, after which it was heard to call infrequently. It was subsequently heard calling on

several occasions in December and January 2011. These observations are consistent with the hypothesis that it may have bred in October and called less consistently at that time as claimed by Jackson.

Unfortunately very little detail is known about the breeding behaviour of individual Rufous Scrub-birds and its impact on song and their detectability.

During the less comprehensive survey effort in November under difficult conditions (e.g. high wind, showers and the noise of cicadas), Rufous Scrub-birds were calling less frequently than expected. However, in December when some additional surveys were conducted, many of the scrub-birds were calling.

Duetting

Female Rufous Scrub-birds seldom sing. Ferrier (1984) describes 12 instances of the male and female performing a duet. This possibility must be taken into account when assigning records of calling birds to territories. On several occasions in the present study, observers reported the probable presence of two birds based on contact calls as opposed to song. In January 2011 two birds in close proximity (within what has been assigned as a single territory) were performing a song duet. The duetting birds may have been a pair or else an adult and a juvenile male (photographic evidence indicates that the second bird was not an adult male).

Future Directions

The approach used in the 2010 pilot study concentrates on what is thought to be core habitat of the Rufous Scrub-bird in the Barrington Tops and Gloucester Tops IBA. It is the area where the species is expected to be present at its highest density and to be most secure in the short term. Indeed, in the event of climate change and global warming impacting on the species, it has been suggested that the species' range would contract to areas, in essence habitat islands (Watson 2010), adjacent to remnant rainforest at high altitude like the Gloucester Tops, as part of a process termed "altitudinal retreat" (Ferrier 1984). Hence evidence of a long-term decline in the Rufous Scrub-bird in core habitat like the Gloucester Tops would be of serious concern.

In the future monitoring effort, it is intended that surveying of the transects established in 2010 will continue, in order to locate all territories within

150m of the transect lines and thus measure the density and distribution of male territories for that particular breeding season. Ferrier (1984) found that at Gloucester Tops, Rufous Scrub-bird territories were separated by greater than 250m and suggested that this distance reflected the optimal separation of territories, effectively limiting social interaction between neighbouring pairs. A future aim will be to test whether this minimum separation rule continues to apply or whether there has been an increased tendency for the formation of clusters of territories as found by Ferrier (1984 & 1985) in the Wiangarie study area in the Queensland/New South Wales Border Ranges National Park. Ekert (2002) suggested that clustering may be occurring in the Gloucester Tops area and that this could be a consequence of the upward migration of Rufous Scrub-birds as part of the ongoing altitudinal retreat of the species. Possible explanations of any increased clustering of territories at Gloucester Tops include an increase in the Rufous Scrub-bird population and changes in the suitability of the habitat, resulting from forest succession following logging and fires, limiting the amount of suitable habitat adjacent to the transect trails.

Ongoing monitoring will also include establishing an inventory of Rufous Scrub-bird territories and determining the continuity of occupation of these territories. As Rufous Scrub-birds are faithful to territories and are expected to have longevity of the order of 10 years (Ferrier 1984), this measure will provide a valuable indication of both the health of the population and the suitability of the habitat.

Assuming the process of altitudinal retreat is ongoing, any long-term decline in the Rufous Scrub-bird population would be expected to be more apparent at lower altitudes. It is therefore intended to extend the monitoring to lower altitude locations where the species has been recorded recently, for instance in the studies coordinated by Ekert. As resources are expected to be limited for these studies, maintaining an inventory of active territories and determining the continuity of occupation may be the most practical measure of population stability.

CONCLUSIONS

The 2010 pilot studies have established a transect survey method which successfully locates Rufous Scrub-bird territories. The method has been found to be suitable for volunteers undergoing only a small amount of training.

The 2010 surveys suggest that the Rufous Scrub-bird continues to exist in its core habitat on the Gloucester Tops at population levels similar to those found in 1981/82. This is a most important result because it indicates that passive management through reservation of the core habitat has been successful. However, ongoing monitoring is essential to ensure that changes in habitat driven by variations in climatic conditions and forest succession, following changes in forest management, do not result in future decline. In addition, it is important to initiate monitoring at lower altitudes where the impact of population decline through altitudinal retreat will be amplified.

ACKNOWLEDGEMENTS

Paul Baird, Griselda Brown, John Cockerell, Penny Drake-Brockman, Faye Hill, Ann Lindsey, Ray McLean, Lorna Mee, Sharon Mee, Mike Newman, Mike Richardson, Jim Smart, Alan Stuart and Kathy Wilk carried out the surveys. Ian Martin and Jim Smart provided assistance with defining and mapping the transect segments. Adam Fawcett and Peter Beard of the National Parks and Wildlife Service provided advice and support concerning access to the study area. Mick Roderick, Shane Ruming and Andrew McIntyre of the Department of Environment, Climate Change and Water provided direct assistance (e.g. production of maps and CDs) and general advice. Shane Ruming prepared **Figure 1**.

REFERENCES

- Dutson, G., Garnett, S. and Gole, C. (2009). 'Australia's Important Bird Areas, Key sites for bird conservation'. Birds Australia (RAOU) Conservation Statement No. 15.
- Ekert, P.A. (2002). Monitoring of Rufous Scrub-bird (*Atrichornis rufescens*) in North-East NSW. (Report prepared by Ekerlogic Consulting Services for NSW National Parks and Wildlife Service.)
- Ferrier, S. (1984). 'The Status of the Rufous Scrub-bird *Atrichornis rufescens*: Habitat, Geographical Variation and Abundance.' PhD Thesis, University of New England, New South Wales.
- Ferrier, S. (1985). Habitat Requirements of a Rare Species, the Rufous Scrub-bird. In 'Birds of Eucalypt Forests and Woodlands: Ecology, Conservation, Management.' (Eds A. Keast *et al.*) (Surrey Beattie and Sons Pty Limited: Sydney, NSW.)
- Gole, C. and Newman, M. (2010). Master Mockers of the Forest, Rufous Scrub-birds. *Wingspan* **20**: 16-19.
- Jackson, S.W. (1920). Haunts of the Rufous Scrub-bird; discovery of the female on the Macpherson Range, S.E. Queensland. *Emu* **19**: 258-272.
- Newman, M. and Stuart, A. (2011). Monitoring Rufous Scrub-birds in the Barrington Tops and Gloucester Tops IBA in the 2010-2011 Season. HBOC Special Report No. 6, February 2011. (Hunter Bird Observers Club, New Lambton, NSW.)
- Watson, D.M. (2010). Terrestrial Islands, The State of Australia's Birds 2010, Islands and Birds. Supplement to *Wingspan* **20**(4): 6.