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THE SCRUB-TIT Acanthornis magnus - STATUS & ECOLOGY D. G. Thomas

THE Scrub-Tit Acanthornis magnus is one of the least known of the Tasmanian endemic birds. Apart from a paper by Sharland (1954) little has been written about this species, yet several writers recently have made conflicting and erroneous statements about its distribution, status and ecology (Keast 1970, Abbott 1972, MacDonald 1973). Significantly these writers have spent only limited time in Tasmania and have little first-hand knowledge of the bird. The present paper presents new data on distribution, habitat preference, status and foraging ecology. For the sake of completeness, some notes on voice and breeding, based largely on Sharland (1954), are included.

DISTRIBUTION, HABITAT PREFERENCE AND STATUS

BASED on personal observations and others kindly supplied by members of the Bird Observers' Association of Tasmania and others, notably L. E. Wall and B. C. Mollison, augmented by records taken from the literature, it is apparent immediately that the Scrub-Tit is confined virtually to areas having a yearly rainfall greater than 40 inches. The 40 inch isohyet approximately separates cold wet adapted habitats (wet sclerophyll, temperate rain forest, high moors, dwarf mountain shrubbery and wet sedge-land including buttongrass plains) from warm dry adapted habitats (dry sclerophyll, savannah woodland and coastal heath plus cultivated areas), a habitat classification based largely on that of Ridpath and Moreau (1966). Generalised rainfall and habitat maps cannot include small areas where the effective rainfall may be higher than in adjacent areas and in which small pockets of a different kind of habitat exist. Moist shaded areas in the drier eastern part of the State may carry atypical vegetation. Wet gullies, for example, occur throughout dry sclerophyll even at sea level (Jackson 1965). The existence of cold wet adapted habitats in areas having a lower yearly rainfall than 40 inches accounts for most of the records that lie on the lower side of the 40 inch isohyet. For example, wet forest occurs on the eastern side of Mount Dromedary where I have recorded the Scrub-Tit.

Sharland (1954, 1958) quotes few actual localities, the eastern faces of Mount Wellington, Russell Falls, Lake St. Clair and the Franklin River, but he implies that it is common in other areas where dense moist forests exist. This is

confirmed by other observations.

It is interesting that the Scrub-Tit occurs in areas of temperate rain forest in the eastern part of the State that are isolated from the main block of this habitat in the western half of the State. Thus, the Scrub-Tit occurs on the Ben Lomond massif, Mount Elephant, Eaglehawk Neck, the Tasman Peninsular and Mount Mangana on Bruny Island. There is also a small population on King Island (Green and McGarvie 1971) and it may occur on Flinders Island (Green 1969) where it was recorded by Le Soeuf (1902).

Sharland (1954) stresses the dependence on ferns, particularly the tree-fern Dicksonia antarctica, a statement repeated by McGill (1970) in his monograph on the Australian warblers. However, Sharland (1958) extends the range of the Scrub-Tit to include dense scrubs, fern gullies, beech forests and, in summer, low shrubs on highland moors. Ridpath and Moreau (1966) state that the Scrub-Tit is common in temperate rain forest and dwarf mountain shrubberies and has been recorded from wet sclerophyll and sub-alpine forests. I have found the Scrub-Tit is common in temperate rain forest, fern gullies, wet sclerophyll and sub-alpine forests and to occur in thick scrub on moorland. I do not agree with Sharland that it is dependent on ferns. It is common in wet sclerophyll (e.g. between Russell and Lady Barron Falls), temperate rain forest (e.g. along the H. E. C. Nature Trail on the Scotts Peak Road) and sub-alpine forest (e.g. Lake Dobson) where there are few, if any, ferns.

Although Sharland (1958) states that the Scrub-Tit is common in a restricted number of habitats, all adapted to cold wet conditions, Keast (1970), after two short visits to Tasmania, writes "The writer was able to gather little data on the frequency of the habit [trunk feeding and bark probing] in Sericornis [=Acanthornis] magnus because of its rarity." There can be no doubt that the Scrub-Tit is far from being rare in fern gullies, wet sclerophyll, temperate rain forest and sub-alpine forest, habitats that are restricted to areas that receive more than 40 inches of rain a year. This restricted distribution has led Ridpath and Moreau (1966) to suggest that the Scrub-Tit was present in Tasmania at the height of the last glaciation some 18,000 years B. P.

As pointed out by Sharland (1954), the Scrub-Tit invariably occurs in habitats shared by two other members of the Maluridae, the Tasmanian Thornbill Acanthiza ewingi and the Brown Scrub-Wren Sericornis humilis, both of which are common in habitats occupied by the Scrub-Tit. On 1 April, 1974, I measured the foraging methods of all species at Russell Falls. The method used (see below) was the same for all species, so a comparison of the number of observations for each should give a crude idea of their relative abundance, which was :

Tasmanian Thornbill	33
Scrub-Tit	29
Brown Scrub-Wren	29

These figures confirm that the Scrub-Tit is a common bird in this locality and further observations in the Arve Valley, Mount Field National Park and along the Gordon and Scotts Peak roads suggest that the results at Russell Falls are typical for the habitats concerned (wet sclerophyll, temperate rain forest and sub-alpine forest).

The Scrub-Tit is easily overlooked by the casual observer, which accounts for the apparent scarcity of published records. The reason for this are discussed fully by Sharland (1954).

VOICE

THE Scrub-Tit has a range of calls although, when foraging undisturbed, it is largely silent. I have been able to distinguish two calls to which I can ascribe a specific purpose. These are:

1. an alarm call, described as "to-wee-to" by Sharland (1958) but which also may consist of four notes "to-wee-to-wee" or "to-wee-to-to", and
2. a contact call, a soft "peep".

The contact call is very similar to those of the Brown Scrub-Wren and Tasmanian Thornbill. Although Sharland (1954) regards this as "a rather striking example of parallel vocal development" I suspect that vocal mimicry is involved. It is difficult to explain what purpose is served by vocal mimicry in the Scrub-Tit or, even if parallel vocal development is involved, why it should have developed such a wide repertoire of calls. Helpers at the nest occur in the Yellow-rumped Thornbill Acanthiza chrysorhoa (Harrison 1969) and Brown Thornbill (data in R. A. O. U. Nest Record Scheme and pers. obs.) and probably, therefore, in other Acanthiza spp. including Tasmanian Thornbill. Harris and Newman (1974) have shown recently that helpers at the nest occur in the Brown Scrub-Wren. Both the Tasmanian Thornbill and Brown Scrub-Wren occur commonly in small groups and in such species, particularly where they inhabit dense vegetation, a wide range of calls is to be expected. There is no suggestion in the literature that the Scrub-Tit is other than monogamous, is mainly sedentary and does not have helpers at the nest. McGill (1970), for instance, states that it "is either seen singly or in pairs." However, I have April records of groups of four birds in both temperate rain forest and sub-alpine forest. I have also an April record of it occurring with Tasmanian Thornbills and Brown Scrub-Wrens in a mixed foraging flock in sub-alpine forest.

BREEDING

AS far as is known the Scrub-Tit has a simple pair-bond and has not evolved helpers at the nest. In view of its wide range of calls, regardless of whether vocal mimicry is involved, and my observation above, this aspect needs investigating thoroughly.

The display and nest have been described by Sharland (1954). A common nest-site is in the dead fronds of tree-ferns but low scrub is used also. The breeding season is said to be September to January (McGill 1970) and the clutch consists of three to four eggs (Sharland 1958). Eggs are mostly white, blotched red and brown and measure 18 x 14 mm (McGill 1970).

Little else is known about the breeding of the Scrub-Tit.

FEEDING ECOLOGY

KEAST (1970) believes that the Scrub-Tit is steadily being compressed by the Brown Scrub-Wren. This must imply that the Brown Scrub-Wren is replacing the Scrub-Tit because of competitive exclusion. The affinities of the Scrub-Tit are not fully

understood. The name Acanthornis was devised by Legge (1888) who considered it was related to both the thornbills Acanthiza and scrub-wrens Sericornis; Acanthornis is a combination of both names. Some authorities, e. g. Keast (1970), regard the Scrub-Tit as belonging to the genus Sericornis. I prefer to follow Ridpath and Moreau (1966) and the C. S. I. R. O. Checklist (CSIRO 1969) in retaining the Scrub-Tit in the monotypic genus Acanthornis, at least until further evidence as to its affinities is available. Both Keast (1970) and Abbott (1972) consider possible competition between species in Tasmania but restrict their arguments almost entirely to species within the same genus. I believe that this is a very narrow view and that, when considering possible competition, all species having similar morphology or feeding habits should be considered. In the present case this means including the three members of the Maluridae that are common in the cold wet habitats of Tasmania.

Abbott (1972) considers that the foraging zones of the Scrub-Tit are the same as those of the Brown Scrub-Wren and the White-browed Scrub-Wren Sericornis frontalis of the mainland and that all three species spend over 95% of their foraging time on the ground or within six feet of the ground. No supporting data are given. Galbraith and Parker (1969) have shown, from morphological considerations, that both the Brown and White-browed Scrub-Wrens are largely terrestrial and the inference from Abbott's statement is that the Scrub-Tit also is largely terrestrial, as is stated by MacDonald (1973). However, Sharland (1954) makes it abundantly clear that the Scrub-Tit is arboreal, resembling a tree-creeper in its foraging method, a statement that is repeated by Ridpath and Moreau (1966), Keast (1970), McGill (1970). Sharland (1958) modifies his views by stating "Food, insects gathered from ground and shrubs" although still mentioning its tree-creeper like habits.

Morphology

There is considerable evidence that for two species to co-exist without habitat displacement the ratio of some morphological character, normally bill length, for the two species must exceed 1.3 (Hutchinson 1959), MacArthur and Wilson 1967). The measurements, taken from Abbott (1972), of mean bill, tarsus, hallux and wing lengths for the three species concerned are :

	MEAN LENGTH mm				N
	Bill	Tarsus	Hallux	Wing	
Tasmanian Thornbill (♂)	11.8	21.4	7.8	54.6	37
Scrub-Tit (unsexed)	15.3	21.4	9.7	55.9	18
Brown Scrub-Wren (♂)	16.7	24.7	10.5	63.1	43

The only ratios which exceed 1.3 are those for bill length (1.41) and hallux length (1.35) for the Brown Scrub-Wren/Tasmanian Thornbill species pair. The ratio for bill length (1.297) for the Scrub-Tit/Tasmanian Thornbill species pair just fails to reach 1.3. (However, if the Scrub-Tit sample contains females and these are smaller than males, the bill length ratio may be smaller). In other words, for the three species to co-exist as they do they must occupy different parts of the habitat or have different diets.

Food

The three species are insectivorous (Sharland 1958, Cayley 1959, Ridpath and Moreau 1966, McGill 1970). Because birds are largely opportunistic feeders eating each suitable item as it is encountered (MacArthur and Wilson 1967, Cody 1968, Thomas and Dartnall 1971) dietary differences as such can be ruled out as a means of avoiding competition.

Little has been published on the diets of the species concerned. Green and McGarvie (1971) list the stomach contents of four Brown Scrub-Wrens from King Island. B.C. Mollison (unpublished) determined the stomach contents of one Scrub-Tit and four Brown Scrub-Wrens, all collected in the Florentine Valley :

Scrub-Tit; entirely insect remains - legs of spiders, beetles, etc.

Brown Scrub-Wren; craneflies, spiders, beetles, weevils, small seeds (3 out of 4 stomachs) and other plant remains (2 stomachs); small quartz particles (2 stomachs).

Both Green and McGarvie (1971) and Mollison found seeds in the stomachs of six out of eight Brown Scrub-Wrens. It is not known whether seeds are selected items of food or are mistaken for small insects.

Foraging Height

The following table summarises the foraging height distributions for the three species :

FORAGING HEIGHT Feet	PERCENTAGE OF OBSERVATIONS		
	Tasmanian Thornbill	Scrub-Tit	Brown Scrub-Wren
0	0.8	0	43.8
1-5	12.0	49.6	55.2
6-10	11.2	19.8	1.0
11-15	15.0)	17.1	0
16-20	30.1)		
21-30	21.1	9.0	0
30	9.8	4.5	0
Mean Height Ft.	19.5	10.1	1.2
No. of observations	133	111	96

The previous table shows clearly that the three species show a degree of habitat zonation vertically. It confirms the views of Galbraith and Parker (1969) and Abbott (1972) that the Brown Scrub-Wren rarely forages above six feet from the ground. It shows also that Sharland (1954) is correct in stating that the Scrub-Tit is arboreal and that both Abbott (1972) and MacDonald (1973) are wrong in claiming that it is largely or wholly terrestrial.

Observations are included from fern gullies, wet sclerophyll, temperate rain forest and sub-alpine forest. As yet, insufficient data have been accumulated to determine whether foraging heights differ in the various habitats.

Foraging Zones

Foraging zones were determined at the same time as foraging heights on several occasions with a total observation time of 27 hours. The zone occupied by a bird foraging actively was noted. If the bird moved and continued foraging a further note was made, whether or not the bird moved to another foraging zone. To avoid undue bias observations of a particular individual were restricted to five. Again, observations were made in fern gullies, wet sclerophyll, temperate rain forest and sub-alpine forest.

FORAGING ZONE	PERCENTAGE OF OBSERVATIONS		
	Tasmanian Thornbill	Scrub-Tit	Brown Scrub Wren
Ground	< 1	0	32
Debris	0	3	47
Herb/low fern layer	< 1	0	5
Trunks - trees	5	45	< 1
" - ferns	0	9	< 1
Branches	14	23	3
Fern fronds	2	13	2
Twigs	15	6	8
Foliage	62	< 1	< 1
Aerial hawking	< 1	0	0
No of observations	129	115	102

There are very clearly defined differences in foraging zones. The Brown Scrub-Wren forages largely on the ground or among the debris (fallen trees, etc.) lying on the ground (79%). The Scrub-Tit forages mainly on tree trunks and branches and fern trunks and fronds (90%) and the Tasmanian Thornbill forages mainly among the leaves and twigs (77%). Because the three species forage at different heights and in different foraging zones they do not compete directly for the available resources.

In addition to the trunks of tree-ferns, the Scrub-Tit has been seen foraging on the trunks of Sassafras Atherosperma moschata, Musk Olearia argophylla, Antarctic Beech Nothofagus cunninghami, Snow Gum Eucalyptus coccifera,

the smooth trunks of E. urnigera and Horizontal Scrub Anodopetalum biglandosum

CONCLUSION

THE Scrub-Tit is common in a restricted range of habitats - fern gullies, wet sclerophyll, temperate rain forest and sub-alpine forest, which occur mainly in areas where rainfall exceeds 40 inches a year. It co-exists with two other small members of the Maluridae, the Tasmanian Thornbill and the Brown Scrub-Wren. Direct competition between these species is minimised by each foraging at a different height and/or in a different foraging zone. The Scrub-Tit is arboreal, obtaining most of its food from the trunks of trees and ferns and from branches and fern fronds. The Brown Scrub-Wren is mainly terrestrial and the Tasmanian Thornbill obtains most of its food from the outermost twigs and the foliage. There is no evidence, therefore, to support Keast's assertion that the Scrub-Tit is being compressed by the Brown Scrub-Wren. On the contrary, the evidence given in this paper shows clearly how the three members of the Maluridae can co-exist in the same habitats. If the Scrub-Tit was being replaced it would be expected to become extinct first in the small isolated areas of cold wet adapted habitats in eastern Tasmania. This is not the case.

It has been shown that recent statements by Keast (1970), Abbott (1972) and MacDonald (1973) concerning the Scrub-Tit are erroneous. This is a matter of some concern on two grounds. Firstly, while my methods differ widely from Sharland's, my results confirm his general statements (Sharland 1954, 1958) which these authors, whose personal knowledge of the Scrub-Tit can only be slight, have chosen to ignore entirely or in part. Secondly, the question must be raised as to how much credence can be put on other statements by these authors where these are not supported by sound data. Certainly, other erroneous or ambiguous statements, in one case supported by totally inadequate mathematical data, can be found in the works referred to. This is undesirable because the views of other workers may be distorted seriously.

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