

Annual survival and breeding success of the Stripe-breasted Tit *Parus fasciiventer* at Ruhija, Bwindi Impenetrable National Park, SW Uganda

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Introduction

The Albertine Rift is considered to be one of the most important areas for conservation in Africa (Plumtre *et al.* 2007) and has recently become the focus of a joint initiative to determine the likely impacts of climate change on its montane forests and endemic species³. One of the project's aims will be to review options for adapting the African IBA network to minimise the impacts of climate change. These aspirations will require reliable data on the distributions and breeding seasonality of the Rift's 36 endemic bird species (Stattersfield *et al.*, 1998) including, for example, the influence of current weather patterns on breeding activity. In most cases, however, such data are sparse or absent, not least because their collection requires sustained field effort over a prolonged period.



Male Stripe-breasted Tit

In 1995, Chris Perrins (Oxford University) and Derek Pomeroy (Makerere University) established a study of the Stripe-breasted Tit *Parus fasciiventer*, at the Institute of Tropical Forest Conservation (ITFC) field station at Ruhija, Bwindi Impenetrable Forest, SW Uganda⁴. The tit is confined to the Albertine Rift mountains Endemic Bird Area and, while its global range has been estimated at 50,000 km², area estimates for the Albertine Rift forests it occupies suggest a global range of less than 20,000 km² (⁵). Since 2000, small numbers of pairs have bred annually in nestboxes provided at Ruhija, enabling ITFC staff to record their laying dates, breeding success and subsequent survival. Meteorological and leaf phenology data are also collected at the site. The project's aims are: to examine the relationship between seasonal weather patterns and breeding activity; to identify constraints on clutch and brood sizes; and to determine whether the species' low annual fecundity is balanced by high adult survival.

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³ Involving the BirdLife Africa Partnership, RSPB, the Wildlife Conservation Society, Durham University and the MacArthur Foundation.

⁴ *Bull. ABC* 10(1): 13, *Bull. ABC* 4(2): 67-68.

⁵ From IBA accounts on <http://www.birdlife.org> (October 2008), Byaruhanga *et al.* (2001) and Fishpool & Evans (2001).

This is, to our knowledge, the only long-term study of an Albertine Rift endemic bird underway. It is hoped that the project will provide the ecological data required to develop a case study illustrating the link between current weather patterns and the timing and success of breeding in one of the Rift's endemics. In addition, this is one of only three studies of African Parids to date (Tarboton 1981, Wiggins 2001). Such studies are valuable, since they enable direct comparisons to be made between the life-histories of closely related tropical, sub-tropical and temperate species, while avoiding the potentially confounding effects of phylogeny. In particular, they help to highlight the tight constraints on productivity operating at tropical latitudes, within a family elsewhere better known for its exceptionally large broods.

Stripe-breasted Tits occur at much lower densities in Bwindi than are typical of their north temperate relatives (Shaw & Shewry 2001, Shaw in press). Preliminary results indicate that most clutches are laid during months of low or declining rainfall, so most broods are in the nest during the driest months of the year. This suggests that increased rainfall, particularly during the two annual dry seasons, could lower the species' annual productivity. Although brood sizes are small, adult provisioning and nestling growth rates are low, despite the presence of helpers at some nests (Shaw 2003, Yatuha 2005).

Throughout the study, the number of nests monitored annually has remained small; typically 5-6 nests by 3-4 pairs per annum. Consequently, in an effort to raise sample sizes, additional nestboxes were provided in 2008, and funding sought from the ABC Conservation Fund to pay for increased monitoring by ITFC field assistants during 2009.



Nest-box inspection

Methods

Throughout 2009 two ITFC field assistants, Narsensius Owoyesigire and Savio Ngabirano, closely monitored all Stripe-breasted Tit breeding attempts in nestboxes erected in the vicinity of Ruhija. All 50 boxes at Ruhija were inspected at least monthly to determine laying patterns, and a further 30 boxes (at a more distant, higher altitude site) were inspected when the opportunity arose. Using standard protocols developed with P.S., N.O. and S.N. recorded the dates and outcomes of all breeding events (laying, hatching, fledging), levels of nest attentiveness during incubation, adult provisioning rates and nestling weights. All nestlings were uniquely colour-ringed, as were all breeders and helpers, to determine their subsequent survival, the number of broods reared by each participant and their respective contributions. Systematic searches for colour-ringed birds were made on 1-2 mornings each month throughout the year, to record the duration of post-fledging care and the proportion of birds surviving. P.S. participated in fieldwork and supervised the work during visits in February 2009 and January-February 2010, coinciding with annual peaks in breeding activity.



Female Stripe-breasted Tit

Results

During the year, N.O. and S.N. gained valuable experience of systematically recording and managing field data, handling and ringing adults and nestlings, and recording biometrics. The skills they have developed, largely through their involvement in the Stripe-breasted Tit project, have enabled the assistants to support several other recent ornithological studies at Ruhija.



Nest with clutch of three eggs

Sixteen breeding attempts were logged during December 2008 - January 2010. These involved 25 breeders and helpers, of which 17 had either been colour-ringed previously or else were ringed during the period. All 32 nestlings produced (to date) were also ringed. Clutch and brood sizes were recorded at all nests. Incubation, nestling periods and growth rates have also been recorded (nine broods to date). Levels of nest attentiveness and adult provisioning rates were logged at 16 and 11 nests, respectively ($n > 1,000$ hrs of observation). As in previous years, egg laying occurred mainly during months with low or declining rainfall. As a result, nestling food requirements will have peaked during the drier months of the year, coinciding with a peak in leaf production by several locally common tree species⁶. The production of new leaves is thought likely to raise caterpillar abundance during these months.

The duration of post-fledging care was monitored in five broods that fledged during January-March 2009. Juveniles continued to associate with their parents for several months, and were fed for up to 11 weeks post-fledging. Three offspring remained with their parents during subsequent breeding attempts, and helped feed their younger siblings. Of 13 marked adults alive during December 2008 - February 2009, only seven (62%) were seen in December 2009 - February 2010, suggesting a lower survival rate than has been evident in previous years. Their replacements, most of which were initially unringed individuals, will add much-needed diversity to the study sample.

⁶ Derived from leaf phenology data, provided courtesy of M. Robbins, Max Planck Institute.

The relatively large volume of data collected during 2008-10 will be combined with data from previous years, to determine the relationship between recent rainfall patterns at Bwindi, Stripe-breasted Tit laying dates and breeding success. Fieldwork will be extended at least to mid-2011, in part to capitalise on the larger sample of marked adults now available. Results from this work will be published in due course, and made available to the BirdLife-RSPB-WCS-McArthur project *Conservation in the face of climate change*, providing a case study illustrating the potential impacts of climate change scenarios on a scarce, dry-season breeder.



Stripe-breasted Tit chick – 17 days old

Expenditure

The projected budget for 2009 was as follows:

Item		Cost	Sub-totals	Total
N. Owoyesigire and S. Ngabirano: salary and expenses				
Monthly nestbox inspections, observations on breeding attempts, monthly searches for ringed birds	150 person-days @ £3.88	£582		
Use of vehicle to check distant boxes	5 months @ £12 per month	£60		
			<u>£642</u>	
P. Shaw: proposed visit in Jan 2010				
Research permit, Uganda Wildlife Authority		£90		
Flights		£600		
Transport: in Uganda		£114		
Accommodation & food		£258		
Insurance		£90		
Report production		£15		
			<u>£1,167</u>	
				<u>£1,809</u>

Actual costs incurred were:

Item		Cost	Sub-totals	Total
N. Owoyesigire and S. Ngabirano: salary and expenses				
Monthly nestbox inspections, observations on breeding attempts, monthly searches for ringed birds	247 person-days @ £4.69	£1,158		
Use of vehicle to check distant boxes	2 trips @ £7.50 /trip	£15		
			<u>£1,173</u>	
P. Shaw: visit during Jan-Feb. 2010				
Research permit, Uganda Wildlife Authority		£77		
Flights		£483		
Transport: in Uganda		£130		
Accommodation & food		£400		
Insurance		£93		
			<u>£1,183</u>	
				<u>£2,356</u>

No breeding attempts were recorded in a group of 30 nestboxes located some distance from the field station. Consequently, the cost of vehicle hire to this location was lower than expected. The field assistants' time (247 days) and costs (£1,158) exceeded that predicted (150 days, £582), however, due mainly to the increased number of breeding attempts monitored over the course of the year, and to a salary increase at the beginning of the year. This additional cost was covered by P.S.

We would like to take this opportunity to thank the African Bird Club for generously supporting this work, by donating £642 from the Conservation Fund towards the cost of the field assistants' salaries and expenses in 2009. This enabled us to investigate the species' breeding ecology and survival much more fully than would otherwise have been the case. The data collected during 2009, when combined with our existing dataset, will provide a much better understanding of the links between current climate, leaf phenology and breeding activity in this scarce Albertine Rift endemic.

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