REPORT FROM A BOU-FUNDED PROJECT

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Migration behaviour and winter distribution of a declining long-distant migrant, the Pied Flycatcher *Ficedula hypoleuca*

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BACKGROUND

Many long-distance Palearctic-African migrant birds are declining across Europe, in particular species that migrate to the wooded savannah and forested areas in Western Africa (Hewson & Noble 2009, Ockendon et al. 2012). This includes the Pied Flycatcher which has declined by 53% in the UK since 1995 (Baillie et al. 2014), and is in decline across Europe, with studies indicating that effects in wintering areas or on migration are likely to play a role (Both et al. 2006, Goodenough et al. 2009). Despite being very well studied in their breeding range we know almost nothing of their migration routes, timing of migration or winter distribution and ringing has been unable to answer these questions.

Miniaturisation of tracking technology, in particular geolocators, now enables use on some passerine birds. Geolocators are day-light recorders that allow daily location estimates of individual birds to be collected throughout their annual cycle, providing information on migration behaviour and non-breeding distribution. This project aimed to take the first steps in determining such information for UK breeding Pied Flycatchers, and the results were later combined with similar data collected in the Netherlands, Finland and Norway for an analysis looking at migration connectivity (Ouwehand et al. 2015).

DEPLOYING GEOLOCATORS

In 2012, following training in attachment of geolocators to Pied Flycatchers in the Netherlands, we deployed geolocators on 20 male Pied Flycatchers at East Dartmoor National Nature Reserve, Devon, UK (50°N, 3°W). Geolocators used were Biotrack MK6340C without a light stalk; average weight including harness was 0.59 g (range 0.57-0.62 g). The combined weight of logger and harness did not exceed 5% of body weight at capture for any individual (mean 4.87 %; mean weight of tagged males 12.21 g). Loggers were attached using a 0.7 mm diameter elastan Rappole-Tipton leg-loop harness (Naef-Daenzer 2007) fixed in a loop at a predetermined harness span, with the span varying by up to 3 mm between harness's to enable optimal fit to individuals.

Due to late granting of a license (permission was dependent upon the outcome of 2012 retrievals in the Netherlands) all were deployed 8-12 June 2012, near the end of the breeding season and predominantly on nests close to fledging. Weather during the breeding season was exceptionally wet (250 mm fell during June at the study site with only 4 June days without rainfall). June rainfall is known to affect nest success (Burgess 2014) and weather, combined with tagging late in the nesting cycle, precluded assessing effects of loggers on provisioning rates. All loggered males were watched at their nests the day after fitting and nests monitored to conclusion. Only one male was not subsequently seen feeding young, although this nest was close to fledging at deployment and successfully fledged young. Nineteen nests with loggered males fledged young. The one nest failure was a late nest with a male tagged when there were 9 young aged 8 days; these were fed by both parents for 4 days post tagging until both adults abandoned. Of nests with a similar hatching date to this failed nest (± 3 days, n = 15), but with an unloggered male, 40% were abandoned after hatching and an additional 20% suffered partial brood loss. Five nests suffered loss of 1-4 nestlings between logger attachment and fledging, mostly the loss of a single runt. Brood reduction is not unusual in wet seasons, and overall occurred in 65% nests (27% with loggered males, 35% of the unloggered control group).

RETURN RATES

In 2013 leg rings of all territory holding males were checked as territories became occupied, with almost all males captured during the season. In total two loggers were retrieved. Return rates of males with loggers (fitted with a red numbers metal ID ring) was compared to a closely matched cohort of ringed only males (blue ring), with cohorts matched by timing of breeding and age. Sex specific between year adult return rates for the study population are known since 2008-09 (Table 1). Return rates between 2012-13, for both sexes, was considerably lower than in previous years. Although the sample size is very small, comparing loggered males with the control group indicated that loggered birds may have suffered more as a result of carrying a logger (loggered 0.11, control 0.33). However, when including all the unloggered males in the population, the return rate (0.10) was no different than for loggered males. 2012-13 return rates were similarly lower than expected in the Netherlands population (Both pers comm.), and in other parts of Europe, indicating that return rates were affected by factors common to much of the breeding population. Geolocators deployed in the Netherlands in 2010 and 2011, and in Finland in 2011 (Laaksonen pers comm.), had no detected affect on return rates, but there was a negative effect in the Netherlands between 2012-13. The cause of the unusually low 2012-13 return rate is unknown. Very late spring arrival to breeding grounds (the East Dartmoor temporal trend shows male first arrival date is significantly advancing, but 2013 was the latest for 23 years) coupled with unseasonably low early spring temperatures may have contributed, but other factors may play a role.

	Return rate (n)		
	No geolocator		With geolocator
Years	Female	Male	Male
2008-09	0.41 (39)	0.50 (8)	
2009-10	0.43 (47)	0.47 (38)	
2010-11	0.54 (46)	0.51 (45)	
2011-12	0.47 (55)	0.43 (51)	
2012-13	0.24 (49)	0.10 (29)	0.11 (18)

Table 1. Return rate of males with and without geolocators to East Dartmoor. Note the 2012-13 return rate of the matched colour ringed cohort of unloggered males was 0.33, higher than the figure in this table which is for all unloggered males in the population.

CONCLUSIONS

Data from the retrieved loggers was noisy as a result of feather or vegetation shading affecting light readings. However it was possible to estimate breeding and winter ground departure and arrival dates and wintering area. Analysis was undertaken by Ouwehand et al. (2015) where methodology and results are described in full. Both birds departed in mid August, and arrived in final wintering ranges 33-35 days later. Although considerable latitudinal error was associated with locations, longitudinal error was small and both wintered in Liberia or south-east Guinea. This concurs with the very few October-February UK ringing recoveries (two in Guinea, one in each of

Liberia, Cote d'ivoire and Central African Republic). Spring departure from winter ranges was at the end of March and spring migration was quicker than in autumn, taking approximately 16-18 days.

Our UK data were combined with similar Pied Flycatcher geolocation data from the Netherlands, Finland and Norway (Ouwehand et al. 2015). This work suggests the differences in wintering locations, and unexpected pattern of migratory connectivity, results from geographical variation in breeding phenology and timing of migration. From a conservation perspective this highlights a need for more study of seasonal food availability in wintering areas and how this affects migration ecology and individual fitness. This work contributes to the growing literature and debate on migratory connectivity (Cresswell 2014) which tracking studies are well placed to contribute to, especially through pan-population analysis of tracking data.

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