

REPORT FROM A BOU-FUNDED PROJECT

Niemc, A. & Remisiewicz, M. 2018. Condition and body moult of Little Stints *Calidris minuta* at wintering site (Barberspan Bird Sanctuary, South Africa) before departure to the breeding grounds



A BOU-funded project report. BOU, Peterborough, UK. Aleksandra Niemc was awarded £1,500 by the BOU in 2016.

Condition and body moult of Little Stints *Calidris minuta* at wintering site (Barberspan Bird Sanctuary, South Africa) before departure to the breeding grounds

ALEKSANDRA NIEMC^{1*}, MAGDALENA REMISIEWICZ^{1,2}

¹ Bird Migration Research Station, Faculty of Biology, University of Gdańsk, Wita Stwosza 59, Gdańsk, 80-308 Poland

² Animal Demography Unit, Department of Biological Sciences, University of Cape Town, Rondebosch 7701, South Africa

* aleksandra.niemc@phdstud.ug.edu.pl

INTRODUCTION

Little Stint is a numerous (IUCN category Least Concern), long-distance migrant wader (BirdLife International 2016). It is monomorphic in plumage but shows small degree of reversed sexual size dimorphism (Cramp & Simmons 1983). Females are slightly larger than males, but their measurements overlap, which impedes sexing them in the field. Before the departure towards the breeding grounds Little Stints undergo two energy demanding activities: fuelling and partial pre-breeding moult (Cramp & Simmons 1983). During this moult they replace only the body feathers to change plumage from non-breeding to breeding (Prater et al. 2007). Good quality breeding plumage is essential for finding a mate, thus the pre-breeding moult might be subjected to sex-specific selection pressures, and males and females may differ in timing and progress of this process. This moult may overlap with pre-migratory fuelling, which depends on quality of wintering sites and might change due to long-term habitat changes.

Main aims of our project were to:

- determine if pre-breeding body moult strategy differs between males and females of Little Stint (data from 2008-2017);
- establish the trade-off between the body moult pre-migratory fuelling (data from 2008-2017);
- check if long-term environmental changes and closing of local sewage plant had a significant influence on pre-migratory fuelling of Little Stints (data from 1968-1973 and 2008-2017).

STUDY SITE AND METHODS

Our study area was Barberspan Bird Sanctuary ($26^{\circ}33'S$, $25^{\circ}35'E$) in North West Province, South Africa. It is a Wetland of International Importance of the Ramsar Convention and Important Bird Area according to BirdLife International. Barberspan lake is fed by the Harts river and is the only permanent water reservoir in the surrounding farmland, which makes it an important stop-over and wintering site for migrant waders (Remisiewicz & Avni 2011). The expedition, in which my participation was funded from this grant, took place during 5th April-1st May 2016. We analysed a wider dataset from January–April 2008–2017, including data from 2016, and also material collected by W. R. J. Dean in 1968–1973. We caught Little Stints using mist nets and walk-in traps. All captured birds were ringed and from each individual we took blood sample (for DNA-sexing) and measurements. We assessed the percentage of new grown feathers in six tracts: head, back, scapulars (which formed Body Moult Index) and in lesser, median, greater coverts (which formed Wing Moult Index) (Meissner et al. 2011). We sexed Little Stints using P2/P8 primers (Griffiths et al. 1998). For the samples collected in 2016 we also used also 2550F/2718R primers (Fridolfsson & Ellegren 1999); both methods gave the same results. We sexed by DNA 121 females and 108 males. To analyse the course of pre-breeding body moult we rescaled both moult indices into the range 0 (no breeding plumage feathers) to 1 (full breeding plumage). We applied Underhill-Zucchini moult model for the first time to body moult data; so far this method was used to analyse primary moult. This model estimates the mean start date, its standard deviation and mean duration of moult (Underhill et al. 1990). We used *moult* package in R (Erni et al.

REPORT FROM A BOU-FUNDED PROJECT

Niemc, A. & Remisiewicz, M. 2018. Condition and body moult of Little Stints *Calidris minuta* at wintering site (Barberspan Bird Sanctuary, South Africa) before departure to the breeding grounds



A BOU-funded project report. BOU, Peterborough, UK. Aleksandra Niemc was awarded £1,500 by the BOU in 2016.

2013). To analyse the pre-migratory fuelling we used an algorithm which estimates a smoothed curve of body mass through time (Remisiewicz et al. 2016). This procedure was used to compare the fuelling of Little Stints in 2008–2017 and in 1968–1973 (body masses of 192 Little Stints collected by W. R. J. Dean).

RESULTS

Because of drought in South Africa during austral summer in 2015/2016 we caught only 12 Little Stints during the field expedition co-funded by this grant. At that time numbers of Little Stints were low in Barberspan Bird Sanctuary, probably because the drought caused extremely low water level and dried mudflats in the lake. Fortunately, this project aimed at filling in the gaps in our larger dataset, and after additional expedition in 2017 material was sufficient for analyses. Males on average moulted upper body longer and slower than females, but did not differ in Wing Moult Index. Little Stints started their pre-breeding moult around 14th February, and the pre-migratory fuelling around 13th March. During 1968–1973 Little Stints began fuelling a week earlier (7th March) at 0.12g/day on an average, during 2008–2017 the rate was 0.27 g/day.

CONCLUSIONS

Little Stints exhibit sex differences in Body Moult Index. Males tend to replace body feathers slower and depart to the breeding grounds with less advanced breeding plumage than females. A lack of sex differences in Wing Moult Index suggest that wing coverts are less crucial for the breeding plumage than the upper body. Long-distance migrants generally avoid investing energy into moult while breeding, migrating, and fuelling, to avoid combined energy expense of overlapping these activities. Our results show that Little Stints start pre-migratory fuelling approximately month after beginning of pre-breeding moult, but these processes partly overlapped. The results suggest that conditions for waders in Barberspan Bird Sanctuary changed over 50 years, and nowadays the rate of fuelling is almost two times faster than it was in 1960s–1970s. We will explore these results further to draw proper conclusions, to present them in publication of our projects' results.

ACKNOWLEDGEMENTS

We thank staff and volunteers in Barberspan Bird Sanctuary for their help and making us feel welcome. The study was also supported by the Faculty of Biology of the University of Gdańsk, Polish Ministry of Science and Higher Education, National Centre for Research and Development (NCBiR) in Poland and the National Research Foundation (NRF) in South Africa (PL-RPA/BEW/01/2016), within the Poland-South Africa Agreement on Science and Technology. Opinions expressed and conclusions arrived at, are those of the authors and are not necessarily to be attributed to the NRF.

REFERENCES

- BirdLife International. 2016. *Calidris minuta*. The IUCN Red List of Threatened Species 2016: e.T22693379A86624964.
- Cramp S., Simmons K.E.L. 1983. The birds of the Western Palearctic. Handbook of the birds of Europe, the Middle East and North Africa. Tom 3: 303–310. Oxford Univ. Press, Oxford.
- Erni B., Bonnevie B.T., Oschadleus H.-D., Altwegg R., Underhill L.G. 2013. Moult: An R-package to analyze moult in birds. *J. Stat. Software* 52: 1–23.
- Fridolfsson, A.K. & Ellegren, H. 1999. A simple and universal method for molecular sexing of non-ratite birds. *J. Avian Biol.* 30: 116–121
- Griffiths R., Double M.C., Orr K. & Dawson R.J.G. 1998. A DNA test to sex most birds. *Mol. Ecol.* 7: 1071–1075.
- Prater, T., Marchant, J. & Vuorinen, J. 2007. Guide to the identification and ageing of Holarctic waders, Tring: BTO.
- Remisiewicz M., Avni J. 2011. Status of migrant and resident waders, and moult strategies of migrant waders using African inland wetland habitats, at Barberspan Bird Sanctuary in South Africa. *Ibis* 153: 433–437.

REPORT FROM A BOU-FUNDED PROJECT

Niemc, A. & Remisiewicz, M. 2018. Condition and body moult of Little Stints *Calidris minuta* at wintering site (Barberspan Bird Sanctuary, South Africa) before departure to the breeding grounds



A BOU-funded project report. BOU, Peterborough, UK. Aleksandra Niemc was awarded £1,500 by the BOU in 2016.

Remisiewicz M., Tree A. J., Underhill L. G., Burman M. S. 2016. Age-specific variation in relationship between moult and pre-migratory fuelling in Wood Sandpipers *Tringa glareola* in southern Africa. *Ibis* 159: 91–102.

Meissner W., Remisiewicz M., Gogga P. 2011. Sex and age differences in the development of breeding plumage in the Wood Sandpiper *Tringa glareola* during spring migration in north-eastern Poland. *Ornis Fennica* 89: 44–52.

Underhill L.G., Zucchini W. & Summers R.W. 1990. A model for avian primary moult-data types based on migration strategies and an example using Redshank *Tringa totanus*. *Ibis* 132: 118–123.