

## Reports from BOU-funded projects

# Status of migrant and resident waders, and moult strategies of migrant waders using African inland wetland habitats, at Barberspan Bird Sanctuary in South Africa

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Barberspan Bird Sanctuary in North West Province (26°33'S, 25°37'E) has been a Wetland of International Importance since 1975 and is one of South Africa's Important Bird Areas (IBAs) (Cowan 1995, Barnes 1998). The 3200-ha reserve, administered by the provincial parks board, is centred on a shallow alkaline lake covering from 257 to 2000 ha depending on rainfall. The lake is fed by the Harts River and is the only perennial waterbody among hundreds of ephemeral pans in the neighbouring farmlands. Barberspan lies on the inland African flyway at the end of the Great Rift Valley corridor. Its location and perennial character make it a refuge for birds during droughts. Thousands of intra-African and Eurasian migrant waders and waterbirds depend on it as a stopover, breeding or foraging site (Milstein 1975, Swart & Cowan 1992). Barberspan supports thousands of migrant Little Stints *Calidris minuta* and Curlew Sandpipers *Calidris ferruginea*, as well as significant populations of breeding and intra-African nomadic waders such as Kittlitz's Plover *Charadrius pecuarius*, Blacksmith Plover *Vanellus armatus* and Crowned Lapwing *Vanellus coronatus*. The lake regularly attracts tens of thousands of waterbirds, including many Red-knobbed Coot *Fulica cristata*, Egyptian Goose *Alopochen aegyptiaca*, Spurwinged Goose *Plectropterus gambensis*, Yellow-

billed Duck *Anas undulata*, Southern Pochard *Netta erythrophthalma* and South African Shelduck *Tadorna cana* (Milstein 1975, Skead & Dean 1977). At times, up to 40 000 Lesser Flamingos *Phoenicopterus minor* and smaller numbers of Greater Flamingos *Phoenicopterus ruber* gather on the neighbouring Leeupan, which is within the IBA borders. Barberspan falls on the border of three uniquely southern African biomes: Kalahari thornveld, sandy Highveld grassland and semi-arid Karoo. The protected area around the lake includes all of these habitats and their typical birds, such as larks, pipits and chats. Almost 400 species of birds have been identified in the reserve over the past 60 years.

Migrant waders from the Palaearctic moult while in Africa and their new flight feathers must be ready for their return to the breeding grounds. The availability and abundance of food at wetlands affect the waders' moult strategies. Most moult studies have concentrated on waders using coastal habitats, which provide predictable food resources (Piersma 2003) and we know much less about the moult of waders using inland wetlands. These birds contend with ephemeral and unpredictable habitats, so we predict their moult strategies are more flexible than those of waders depending on stable coastal habitats. Resident and nomadic waders that use these inland wetlands are not constrained by the timing of seasonal migration and appear to moult more slowly than migrants. But we still know little about the moult strategies of many resident African waders.

An active bird ringing programme from the 1950s to the 1980s established Barberspan as a renowned ornithological field station. Up to 40 000 birds of 190 species were ringed annually (Milstein 1975, Swart & Cowan 1992) before the reserve fell into neglect in the 1990s. Now its conservation status is threatened, as the lake is becoming eutrophic, compounded by sewage treatment plants upstream. Local farmers blamed the once-extensive reedbeds surrounding the reserve for supporting thousands of breeding Red-billed Queleas *Quelea quelea*, which damage wheat crops. The farmers destroyed the surrounding reedbeds and now exert pressure to cut back the remaining patches in the reserve, considerably reducing essential habitat for migrant and local waterbirds, and eliminating the main buffer against eutrophication. These factors threaten the lake's ecological balance and erode its importance for birds.

Our project aimed to establish habitat-related patterns in the moult strategies of migrant and resident waders that use southern Africa's inland wetlands. We also aimed at reinforcing the local conservation authorities' understanding of Barberspan's importance for waterbirds and the threats to its status as a Ramsar site, and we hoped to help efforts to restore Barberspan as a pre-eminent ornithological field station by training staff in bird ringing and survey techniques, and preparing them as field assistants for visiting researchers. Their

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skills were honed with projects to monitor waterbirds for highly pathogenic avian influenza, to conduct habitat and population surveys, to observe nesting and breeding events, and to undertake detailed moult studies.

## FIELDWORK AND TRAINING

We conducted four expeditions at Barberspan over the season when Palaearctic waders visit the reserve, involving 108 days of fieldwork between September 2009 and May 2010. Each expedition was led by two or three qualified bird ringers from South Africa and Poland, sometimes supported by a student or a research assistant, and conducted with two to eight local trainees, including the reserve's staff and interns as well as officials of conservation agencies. Trainees played an active role in all research activities.

The initial 2-month wader ringing expedition from 3 September to 30 October 2009 covered the time of the migrants' arrival and the resident waders' peak breeding periods. This expedition was conducted with the support of researchers from the University of Gdansk in Poland visiting South Africa in cooperation with the Avian Demography Unit at the University of Cape Town. Two shorter expeditions with smaller teams took place on 23 January–8 February 2010, in the middle of the migrant waders' moult, and on 17 April–3 May 2010 when most migrants had finished replacing their primaries and were involved in pre-nuptial moult and depositing fat reserves before leaving for the breeding grounds. The expedition in February–March was combined with the annual South African ringers' conference, held in Barberspan from 11 to 15 March 2010. It was attended by 50 participants from South Africa and six other countries.

We ringed 1063 birds of 65 species in the 2009–2010 season, including 832 waders of 14 species. The most numerous species were Kittlitz's Plovers (362), Little Stints (266) and Blacksmith Plovers (68). Recaptures of Kittlitz's Plovers and Little Stints provided information on the progression of moult and changing body mass over the season, as well as data for a study on the population size. Other migrant waders included Common Sandpipers *Actitis hypoleucos*, Common Ringed Plovers *Charadrius hiaticula*, Curlew Sandpipers and Ruffs *Philomachus pugnax*; residents included Three-banded Plovers *Charadrius tricollaris*, Crowned Lapwings and Spotted Thick-knees *Burhinus capensis*. Nomads or intra-African migrants included groups of Kittlitz's Plovers that appeared in March and April, White-fronted Plovers *Charadrius marginatus* and Chestnut-banded Plovers *Charadrius pallidus*. We also ringed 19 ducks, mainly Cape Teals *Anas capensis*, Red-billed Teals *Anas erythrorhynchos* and Southern Pochards, and other waterbirds of 10 species, as well as 212 passerines and birds of other groups. A full set of morphometric measurements was taken from most birds, including moult details of all flight feathers (primaries,

secondaries and tertials) and the tail, and for Little Stints we described in detail the advancement of the post-nuptial and pre-nuptial body moult. During the ringers' conference, more than 300 Red-billed Queleas were colour-ringed so any movements between the reserve and neighbouring farms could be followed.

Our trainees practised ringing, handling and identifying birds, taking measurements and recording moult formulae, sexing and ageing. They took blood samples and prepared smears, and also took tracheal and cloacal swabs for studies on avian influenza and avian malaria. They received extensive training in the precautions and procedures for working in potentially biohazardous conditions. Between ringing sessions the team conducted bird surveys and counts, concentrating on the protocol of the South African Bird Atlas Project (SABAP2). Lists were submitted online to the atlas database hosted by the Avian Demography Unit at the University of Cape Town. We conducted separate counts of waders and waterbirds around the lake, as well as counts of nests in the reserve's breeding colonies of White-breasted Cormorants *Phalacrocorax lucidus*, Goliath *Ardea goliath* and Black-headed herons *Ardea melanocephala*. Between expeditions the trainees conducted their own wader and waterbird counts to practise their skills and ensure that the reserve's staff are able to conduct these surveys on their own.

## RESULTS AND FORTHCOMING PUBLICATIONS

The data we collected on the moult and body mass of Little Stints showed that despite the ecological threats it faces, Barberspan is still a prime wintering and stopover location for this migrant wader, as it was in the 1970s and 1980s (Dean 1977). Up to 1000 Little Stints at a time were observed foraging around the lake. We found the progression of their primary moult at Barberspan resembled the pattern described at the West Coast of South Africa but differed from the pattern found at ephemeral inland sites. In April, Little Stints doubled their usual body mass before departing northwards. These results show that Barberspan still provides a rich and stable food supply for waders, comparable to the regular food supply of coastal habitats.

Other Palaearctic and intra-African migrant waders occurred in the reserve in flocks of up to a few hundred. All were in good condition and were often in moult. In March and April we observed an influx of migrant or nomadic Kittlitz's Plovers that fed intensively around the lake and had already accumulated fat deposits. This is similar to the irregular influxes of this species described at Barberspan decades earlier (Milstein 1975). Our capture–recapture study of Kittlitz's Plovers showed that the banks of the lake provide good breeding habitat for a strong resident population of this species. We estimate the resident

breeding population at about 100 breeding pairs along just one section of the lake. These birds had an extended breeding season from early September to mid-March. There are also stable local breeding populations of Blacksmith Lapwing and Crowned Lapwing. Regular high counts of waterbirds, regular influxes of moulting ducks, as well as the breeding colonies of White-Breasted Cormorants, African Darters *Anhinga rufa* and Caspian Terns *Hydroprogne caspia*, confirmed the importance of this site for waterbirds.

These results have been presented as talks at the International Wader Study Group conferences in 2009 and in 2010. Three publications derived from these results have been submitted or are in preparation and will be published in scientific journals during 2011. A detailed report of our research will be prepared at the end of 2010 for publication in AFRING news, and will be provided to the North West Parks Board and BirdLife South Africa to underpin conservation actions and to help mitigate the anthropomorphic threats facing Barberspan Bird Sanctuary.

## Outputs

In March 2010, SAFRING, the authority responsible for bird ringing in South Africa, awarded four of the trainees certificates as C grade trainee ringers. These four trainees and two other members of the reserve's staff were also awarded certificates by the Animal Demography Unit as qualified field assistants, acknowledging the skills they have gained. As a result of our programme, the North West Parks and Tourism Board has formally acknowledged the importance of research at Barberspan and will restructure the staff setup to ensure their skills are retained at the reserve. The team built 32 walk-in traps for waders, five duck traps, and found a sponsor for a full set of ringing equipment and mist-nets. A new computer with an internet connection has been set up in the reserve for the use of the rangers in the bird team and for visiting researchers. The rangers are atlasing on their own. We believe that our programme has established a sound basis for future research projects at the reserve, has motivated the staff to improve their qualifications and has helped invigorate management's plans to restore Barberspan to its former illustrious position.

We organized the 2010 ringer's conference at Barberspan with the help of SAFRING and the ADU in part to promote the reserve as a venue for research. The help of staff from the provincial Department of Agriculture, Conservation, Environment and Rural Development in preparation for the conference, visits by representatives of this department and the involvement of senior members of the North West Parks Board all signal a fresh commitment to Barberspan. Senior staff are now actively working to preserve Barberspan's Ramsar status and re-establishing the reserve as a centre of ornithological

research. The ADU and SAFRING are also promoting its importance and Barberspan has already been chosen as the venue for the conference in 2011.

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