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Palearctic shorebird research in South Africa - past, present and future

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A discussion on developments in wader studies in South Africa up to 1987 was provided by Les Underhill in *Bulletin* 53: 15-17. This article follows up with further insights into wader research and associated recent events in South African "waderland".

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South Africa has long been recognized as an important wintering ground for Palearctic-breeding migratory waders. The establishment of the Western Cape Wader Study Group (WCWSG) in the early seventies initiated the first wader counts along the South African coast. The Langebaan Lagoon in the southwestern Cape Province is the most important wader destination in the country supporting ca. 36,000 waders during the austral summer. Because of its importance, the area has been censused twice a year by the members of the WCWSG since 1975. In the seventies, studies by Ron Summers on the energetics and distribution of wader populations at Langebaan Lagoon, Gillian Puttick on the foraging ecology of Curlew Sandpipers *Calidris ferruginea* and Tony Tree on the biology of Greenshanks *Tringa nebularia* awakened wader research in South Africa. It was not until the late 1980s, however, that an important era in shorebird studies commenced. At that time shorebird research in Europe was going through a traumatic period of controversy over the mechanisms shaping migratory patterns of shorebirds and several hypotheses were erected to explain the phenomenon. However, the scarcity of data on the shorebird-prey relationships in the southern hemisphere, weakened the empirical basis of these models and hypotheses. The most controversial winter-competition model proposes that it is advantageous for all birds to stay as close to the breeding grounds as possible during the nonbreeding season but that some are prevented from doing so by competition. A prediction of this model is that competition for winter resources during the nonbreeding season should be greater at north temperate sites than in tropical and south temperate areas. Because South Africa lies at the southern end of the Palearctic-

Afrotropical bird migration route, we are in the ideal geographical position to test this and other hypotheses.

Under the protective "wings" of Phil Hockey, several PhD research projects were initiated by the Percy FitzPatrick Institute of African Ornithology (PFIAO), University of Cape Town, in the late eighties. The foreigners began to invade South Africa: Paul Martin "migrated" from England to unravel the mystery of shorebird predation at the Swartkops estuary, eastern Cape Province (Martin & Baird 1987; Martin 1991). The cultural mix of Chilean (Claudio Velásquez) and Polish (myself) "folklores" enlivened the quiet life of Velddrif, a small fishing village on the Berg River estuary, southwestern Cape. The research of the latter two, recognized locally as a bird-man and a mud-lady (respectfully - mind you!), soon revealed that this small estuary, partly modified by the local salt extraction industry, supports one of the highest densities of the Palearctic waders on the East Atlantic coast (Velásquez *et al.* 1991). This finding provided an ideal opportunity to investigate the existence of competition. There is, however, no single, simple index with which to quantify competition, and several aspects of shorebird ecology were examined in order to demonstrate its presence.

The high density of waders at the Berg River estuary, results in a concomitantly high predation pressure. However, any reductions in the prey density and biomass caused by predation is compensated by the high production of invertebrate prey (Kalejta 1992; Kalejta 1993). Similar high production of benthic invertebrates has been found in two other very important shorebird wintering localities in South Africa, Langebaan

Lagoon and Swartkops estuary (Kalejta & Hockey 1991). In addition, the highest production of invertebrates in these localities coincides with the highest energy requirements of birds prior to their northward migration. Although feeding conditions are ostensibly good at the Berg River estuary, diurnal foraging alone is insufficient to meet the increased energy requirements in the immediate post- and pre-migration periods and birds forage at night on the intertidal mudflats (Kalejta 1993) or use commercial salt pans and salt marshes as supplementary foraging areas during the period when mudflats are inundated (Velásquez & Hockey 1992). Good management of the artificial salt pans is crucial in increasing their role as foraging sites for migratory shorebirds during periods of high energy demands (Velásquez 1992). Although dietary overlap between waders at the Berg River estuary is high, there is clear separation between species in the preferred size classes of their principal prey, nereid worms (Kalejta 1993). Furthermore, a clear habitat segregation and redistribution of birds within the estuary is brought about by the birds' different foraging modes, prey and habitat attributes rather than by behavioural interactions (Kalejta & Hockey 1994; Kalejta 1992).

Although the study at the Berg River estuary confirmed one of the predictions of the winter-competition model, namely that competition is lower at a south temperate estuary than at the estuaries further north, this observation alone is insufficient to prove whether long-distance migrations are undertaken by choice or are necessitated by competitive displacement. The obvious conclusion which derives from this study is that the benefits of superabundant food resources and concomitantly reduced competition in the southern hemisphere might outweigh the costs of long distance migration. In contrast to south temperate estuaries, the lowest prey availability in north temperate latitudes coincides with the highest predation pressure by shorebirds. The seasonal asynchrony between the predation pressure by shorebirds and production of invertebrate prey in the northern and southern hemispheres might have important implications for the latitudinal dispersion pattern of shorebirds. We followed our intuition and with the help of a simple mathematical model we were able to conclude that wader populations track the carrying capacities of coastal wetlands across a wide latitudinal range (Hockey *et al.* 1992). This observation is contrary to the predictions of the previous models.

Jane Turpie, is the most recent PhD student at the PFIAO. Although, Jane's thesis is still in preparation, certain interesting aspects of her study have already been revealed. On the basis of the ecological correlates of migration distance of Whimbrels *Numenius phaeopus* and Grey Plovers *Pluvialis squatarola*, she was able to demonstrate that patterns of density and competition indices do not support the winter-competition model and that birds enjoy equal net benefits irrespective of migration distance (Turpie & Hockey 1993). Jane's and

Phil Hockey's study on nocturnal foraging confirmed empirically for the first time a long-suspected myth that the energy intake rates of shorebirds at night are equal to those during the day (Turpie & Hockey 1993). Recently, Phil and Jane undertook expeditions to Mauritius and Kenya to add a tropical perspective to their research. The results are eagerly awaited!

Although shorebird research in South Africa has contributed quite significantly to our understanding of the latitudinal distribution pattern of shorebirds, the phenomenon is still covered by a cloud of controversy. The mystery will not be resolved until sufficient data are available on the comparative survival rate of shorebirds in relation to migration distance from the same breeding localities.

Prof. Les Underhill is known worldwide as a scientist with a statistical mind but a "waderologic" heart. His contribution to wader research in South Africa is substantial and the projects he has been involved in range from parasitism in waders (Earlé & Underhill 1993), moulting (Underhill & Summers 1993; Underhill *et al.* 1990), breeding (Underhill *et al.* 1989, 1993; Summers & Underhill 1991), population structure (Summers *et al.* 1988; Nicoll *et al.* 1988), and wader distribution (Underhill 1992a; Underhill *et al.* 1992). The well established "wader-firm" Underhill-Summers (interchangeable!) has probably one of the highest turnover of publications in the wader research world!

Les's involvement in overseas projects resulted in the recent "recognition" of our privileged research opportunities (geographical position, high density of Palearctic migrants, pleasant field-working conditions, fairly well accessible study sites, *etc.*) by international experts. Two students of Theunis Piersma visited South Africa in February and March of 1993 to study energy correlates of their precious Knots *Calidris canutus* in the equally precious wintering locality, Langebaan Lagoon. Although we felt slightly "territorial", Popko Wiersma and Leo Bruinzeel received a warm welcome. With the help of the members of the Western Cape Wader Study Group, the hospitality of Les Underhill and the generosity of the local "entertainment industry" they left South Africa with a collection of exciting data and memories!

THE BIRTH OF A NEW ORNITHOLOGICAL RESEARCH UNIT IN SOUTH AFRICA

The most recent development in South African ornithology is the establishment of the Avian Demography Unit (ADU). The ADU is part of the Department of Statistical Sciences at the University of Cape Town, with Prof. Les Underhill a director. The reason the ADU merits mention here is that the unit has launched a Coordinated Waterbird Counts Project (CWAC). CWAC was initiated by the Ramsar Working Group of the South African Department of Environment,

is affiliated to African Waterfowl Census of the International Waterfowl and Wetland Research Bureau (IWRB) and is sponsored by Teal's Whisky (what a connection!). Although the aim of CWAC is to determine the national population sizes of all waterbirds on a basis of mid-winter and mid-summer counts throughout the whole country, it will provide important information on the numbers and distribution of waders across a wide spectrum of inland wetlands. This is a wonderful breakthrough, since the present estimates of the national wader population in South Africa are based almost entirely on coastal surveys, conducted mainly by the members of the Western Cape Wader Study Group in the early seventies and the eighties. South Africa is endowed with a network of thousands of ephemeral pans and man-made dams. Censusing the former habitats is especially difficult because of their unpredictable nature, inaccessibility and sheer numbers. Consequently, little is known about the distribution and population sizes of waders wintering at these inland wetlands. CWAC has officially been adopted by the Southern African Ornithological Society (SAOS) as one of their priority projects. This is a good example of cooperation between enthusiastic amateurs and dedicated professionals to ensure the success of such a project. It will, however, be some time before the full picture of shorebird abundance and distribution emerges.

Another important component of the ADU is SAFRING (South African Bird Ringing Unit) - worldwide the only ringing scheme based in a statistical environment! Placed at the southern tip of the Palearctic-Afrotropical migration route, SAFRING has a unique opportunity to collect ringing recoveries on long-distance migrants. Recently, an exciting recovery involved a Turnstone *Arenaria interpres*. The bird ringed in Namibia in 1977, was recovered 16 years later only 11 km away (!!!). Unfortunately, it died of red tide poisoning. Recoveries like this can contribute significantly to our knowledge of survival rates of long-distance migrants.

SOUTH AFRICA - HOST TO AN INTERNATIONAL SYMPOSIUM

Between 12-16 September 1993, an International Symposium on Migration, Dispersal and Nomadism, took place at Langebaan Lagoon. The Symposium was sponsored by the Southern African Ornithological Society and was organized by the staff of the ADU. Inevitably, a wader session formed a significant part of the symposium and was the most important wader event of the year, if not the decade, in South Africa! A highlight of the symposium was a unique reunion of four scientists: Ron Summers, Les Underhill and two Russians, Lena Lappo and Eugeni Syroechovski. All four participated in the international ornithological expedition to Taimyr Peninsula in 1991, where they studied the breeding biology and distribution of waders (Les Underhill was the first South African scientist to visit

this unique wader breeding locality (Underhill 1992)). Lena and Eugeni were thrilled to have the opportunity to see the most distant wintering grounds of the waders breeding in their homeland and they were looking anxiously for birds with the Siberian rings! Eugeni gave us a stunning performance (in perfect English, to the surprise of many of us!), on the migration phenology of waders and their well-being in the Siberian tundra. Ron Summers produced an exciting insight into the mysteries of his beloved Purple Sandpipers *Calidris maritima*.

The latitudinal distribution pattern of waders was discussed by Phil Hockey in the light of wader diversity and ecological packing and interpreted in terms of the nature, abundance and productivity of invertebrate prey and the foraging modes of waders. This topic was further supplemented by Jane Turpie's poster. Site fidelity of high Arctic breeding waders was explored in the poster by Pavel Tomkovich (in absentia), whereas René Navarro and Claudio Velásquez added an exotic flavour to the event by presenting a poster on the prey availability and migration phenology of Whimbrels in an estuary of Southern Chile. My poster with the intriguing title: Migrants vs Residents: active competition or negotiated settlement?, generated a little confusion among the local patriots!

The symposium was highly successful and positive thought is already being directed towards a future meeting in another exciting southern hemisphere wintering locality (naturally not only for the birds!) - Australia. See you there!

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