



**ABSTRACTS FROM THE  
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**How does chick provisioning mode  
affect reproductive investment in  
plovers, gulls and terns?**

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We investigate the hypothesis that latitude-linked patterns of reproductive investment in plovers, terns and gulls are influenced by their chick-provisioning behaviour. Trends of reduced clutch investment at low latitudes are pronounced in terns, present, but not significant, in plovers, and absent in gulls. The fledging period of terns is inversely linked to clutch size, implying severe energy constraints at low latitudes. Latitude does not influence fledging periods of gulls. We suggest that true precociality (plovers) is the primitive condition among charadriiformes and regurgitative provisioning (gulls) the most derived.

Regurgitative provisioning reduces the time-travel costs of Central Place Foraging and has allowed gulls, which are dietary generalists, to overcome the energetic constraints of breeding at low latitudes. Some tropical terns are also regurgitative provisioners, although most are single-prey loaders. Failure of the former to increase clutch size or decrease fledging period may stem from their more specialised diet.

**The Chatham Island Oystercatcher  
*Haematopus chathamensis*:  
conservation conundrums**

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The Chatham Islands, 800 km east of New Zealand, have a high proportion of endemic avian species (36 of the 100 species recorded). The flora and fauna has undergone significant changes since the arrival and settlement of humans resulting in the extinction of over half the endemic land birds. Currently a high proportion of New Zealand's threatened bird species (over 1/3 of those classified as most threatened) occur on the Chathams. The Chatham Island Oystercatcher is one of the endemic species still extant, with an estimated population of 100–120 individuals (35–45 breeding pairs), and is classified as endangered.

Historic numbers for this species are unknown, but speculated to have been higher based on the nature of changes to the islands and population modelling. Little information is available on the species. Possible threats include the widespread establishment of marram grass (an introduced sand binder) which changes the shape of sand dunes and potentially decreases nesting habitat; introduced predators; superabundant native predators; disturbance (livestock and humans); and changes in climate patterns. Past conservation management has included nest manipulation, predator control, fencing, artificial incubation of eggs, and public education. Habitat restoration of dune ecosystems is planned for the future.

Conservation conundrums for the Chatham Island Oystercatcher include: determining how few are too few, what recovery target to set for the species, determining if the species is below the carrying capacity of the islands (defined as food resources), and what the limiting factors are for the population.

Research currently underway is attempting to provide some insights into these questions. The main objectives are to collect life history information, determine habitat requirements, and explore aspects of the territorial behaviour of the species. Data on productivity, habitat in breeding

territories, nest site selection, habitat use by individual birds, and reactions to models of oystercatchers was collected between 1994–1997 for 15 pairs of Chatham Island Oystercatcher on the north coast of main Chatham Island during the breeding season (Oct–March).

Overall hatching success was low, with many nests disappearing for reasons unknown. Of the known factors, flooding was the most frequent cause of nest lost. A broader range of habitat types was used for breeding than had been previously described. Models of oystercatchers were successful in eliciting aggressive behaviours. This provided a useful new technique for capturing adult birds and for approximating territory boundaries. During the breeding season pairs responded to a variety of models as long as the silhouette was the appropriate shape.

### **The population dynamics and conservation of the African Black Oystercatcher *Haematopus moquini***

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The African Black Oystercatcher *Haematopus moquini* is endemic to southern Africa, has a world population of less than 5,000 and is included in the International Red Data Book as ‘near-threatened’. The species has a naturally low reproductive output (modal clutch of two) and breeds on the open coast at the height of the summer tourist season. Adults are largely sedentary, and, although juveniles disperse, they return to their natal area to breed (usually at ages of 5–13 years). These life-history traits render African Black Oystercatchers vulnerable to human disturbance, especially during the breeding season. Recent surveys suggest the species may be facing a looming conservation crisis.

There is compelling evidence from protected areas that the population is well below coastal carrying capacity, and post-breeding surveys suggest that breeding success within protected areas is almost double that outside. A model of population dynamics based on 20 years of data from offshore islands suggests that mortality rates from hatching to attaining breeding age are

high. Of every 100 chicks that reach one week old, approximately 15 will achieve breeding age. Under these (near-optimal) conditions, oystercatchers need to breed for between 13 and 16 seasons to ‘replace’ themselves. In four of eight areas where breeding performance was monitored intensively during the breeding season of 1997/8, birds needed between 28 and 63 breeding seasons to replace themselves. This suggests that several mainland populations may be facing imminent collapse, as has happened on one offshore island where disturbance levels increased. The time lag between the onset of failed reproduction and a measurable decrease in adult numbers may be more than a decade.

An Oystercatcher Conservation Programme, under the aegis of the Percy FitzPatrick Institute of African Ornithology has been launched to develop a scientifically defensible conservation strategy for the species and, by using the oystercatcher as a flagship species, to raise awareness of the potential conservation problems facing South Africa’s coast.

### **The analysis of seasonality, illustrated by wader counts at Cape Recife, Port Elizabeth**

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Wader counts were undertaken regularly (monthly or bimonthly) along a 4 km stretch of coast at Cape Recife, near Port Elizabeth in the Eastern Cape Province, between 1981 and 1992. The counts for a species were modelled using the generalized linear model with a Poisson link function; seasonality was explained using trigonometric functions. Each of the 12 most common species, including ‘resident’ African Black Oystercatchers *Haematopus moquini* and Whitefronted Plovers *Charadrius marginatus*, showed seasonal patterns. Threebanded Plovers *Charadrius tricollaris* showed a winter (May–August) peak. African Black Oystercatchers showed the largest increasing trend over the period; Threebanded Plover was the only species to show a significantly decreasing trend.

### **Vision and nocturnal activity in wading birds and shorebirds**

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Activity during day-time and night-time is a characteristic of most birds that wade in search for food. Some species forage exclusively with the same feeding strategy, both at night and during daytime, e.g. visual pecking or tactile searching (probing and/or sweeping). Conversely, other species are visual peckers during daylight and in moonlight conditions but switch to tactile feeding on moonless nights or under low moonlight conditions. It can be expected that species which switch from visual feeding during daytime to tactile foraging at night have a poor night vision capability compared to species which are always sight foragers, irrespective of the time of the day. This issue is examined in this study by comparing the retinal structures and the rod- and cone-mediated ERGs (electroretinograms) of five shorebird, four ardeid, one ibis, and one spoonbill species. ERGs were obtained at different light intensities from anaesthetised birds, and the retinae were subsequently processed for histological observations. Under the tested conditions (i.e. –3.8 to 0 log units), all species are characterised by distinct ERG responses, both under scotopic and photopic conditions. These features are in accordance with photoreceptor ratios and densities, and with night-time and day-time activities and foraging strategies.

### **Does extent of breeding plumage reliably signal parasite resistance in high-Arctic breeding shorebirds?**

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High Arctic waders show a large degree of seasonal plumage dimorphism. Colourful breeding plumage has been interpreted to indicate shift in cryptic characteristic of habitats. Alternatively,

breeding plumages are sexually selected quality trades. In this contribution I will provide evidence for the latter hypothesis, reporting on parasite loads in godwits and Knots.

### **Hemispheric studies of the migration of Red Knots *Calidris canutus rufa***

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Over the past five years, international teams under our direction have carried out a concerted programme of cannon-netting of Red Knots along the Atlantic coast of the Americas. About 10,000 birds have been banded, most of which have year and locality-specific combinations of colour bands. Northward migration from Tierra de Fuego commences in February, and movements appear to be increasingly synchronised as the Red Knots reach Delaware Bay in the United States in May. Detailed observations of colour-banded birds over the month of March in San Antonio Oeste in northern Patagonia this year revealed that the same flock of about 7,000 Red Knots was resident throughout, and underwent a slow fattening regime prior to their departure in early April. Many of the resightings we obtained were of birds colour-banded at the same site in the previous October on their annual southward migration. The San Antonio Oeste birds also arrived earlier on average in Delaware Bay than birds colour-banded in New Jersey the previous year. Fidelity of particular flocks to specific stopover sites and different migration schedules raises the possibility of unsuspected population structuring in this species. Analysis of weight data revealed that rates of fattening in Delaware Bay are the highest ever recorded for Red Knots, and point to the importance of super-abundant horseshoe crab eggs in providing the vital reserves of fat necessary for successful breeding in the Canadian Arctic.

### **Predicting the consequences of habitat loss, deterioration and culling on wader populations**

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The major conservation problems are habitat loss, habitat deterioration and increased mortality, for example due to hunting or pollution. I will describe how to predict the consequences of each of these in turn and then show how they may be applied to oystercatchers.

### **Movements of Blacksmith Plover in south/central Africa**

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Different south/central African populations of Blacksmith Plover have variable movements dependent on rainfall. These movements may be classified as variably nomadic in most areas; as having population shifts from east to west or reverse dependent on extremes of rainfall conditions; or having a north/south or southwest migration from the highest rainfall regimes. The populations of South Africa and Namibia are generally nomadic whilst those of northern Botswana and Zimbabwe are either locally migratory to nomadic and subjected to population shifts and these are supported by counts in each country. Those birds from further north in Zambia and possibly Angola, Zaire and even southern Tanzania are basically migratory. The southward extent of this migration may vary from year to year being greatest in years of very high rainfall. Migrants caught in Zimbabwe were found to be carrying increased fat reserves of at least 25% indicating the potential for considerable onward movement.

### **Mate, territory and breeding site fidelity in the Purple Sandpiper *Calidris maritima*, a monogamous Arctic shorebird**

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I assessed the fidelity of monogamous Purple Sandpipers *Calidris maritima* to

their mate, territory, and breeding site, during a seven-year study in Svalbard, in the Norwegian high Arctic. The goal of the study, besides to contribute to basic knowledge about a previously little-studied species, was to test Greenwood's (1980) hypothesis that in species where one sex acquires mates by controlling resources, breeding site fidelity would be biased toward that sex. Purple Sandpipers exhibit 'normal' sex roles early in the season, *i.e.* males defend territories, court females, and share incubation. The roles are later reversed when males perform all brood care alone. Females depart the breeding grounds soon after hatching, and make one nesting attempt per season. Birds showed high annual return rates to the breeding area (mean 66%) and territory (mean 96%) and were highly faithful to their mates (mean reunited 92%). Nest success in the preceding year had no influence on return rates. The data did not support Greenwood's hypothesis with regard to adults, as there was a lack of sex bias in site and territory fidelity. This is probably because females, and not only males, have advantages of retaining a familiar, suitable territory, and possible benefits from reuniting with previous partner.

### **Genetic structure and migration patterns of Dunlin *Calidris alpina* revealed by mtDNA and Microsatellite Analysis**

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In the Dunlin *Calidris alpina* morphological overlap between populations makes it difficult to identify the breeding origin of migrating birds. Here, the possibility to use genetic markers for population identification is investigated. The genetic variation within and between breeding populations from various parts of the breeding range is revealed, using two types of genetic markers: mtDNA and microsatellites.

Thereafter, the genetic markers are used to estimate the breeding origin of flocks of migrating Dunlin. The use of different migratory routes and variation in the timing of migration is investigated by analysis of migrating Dunlin at various stopover sites.

## **Between Table Mountain and Taimyr: WIWO – research of waders and wetlands 1993–2003**

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The Dutch Foundation Working Group International Waterbird and Wetland Research (WIWO) is an initiative-supporting organization of volunteers studying waterbirds and their habitats within the African–Palearctic migration system for the benefit of nature conservation and education.

The general framework is the ‘annual life-cycle’ approach. Migrant waders and waterfowl are characterized by their itinerant life-cycle, being constantly on the move between breeding areas, stopover and moulting sites and wintering areas. Timing, in particular in spring, is crucial to individual reproductive success and survival. This implies that all information from all seasons within the annual life-cycle is relevant to the conservation of flyway populations of waders. WIWO-studies can usually be divided into two different lines of research: census work and migration ecology studies. The first leads to improved understanding of the international importance of wetlands. The latter, including studies of migration strategies and feeding ecology at stopover sites, is aimed to identify the critical conditions along the migratory route for survival and reproduction. An example of each approach will be given.

A brief overview of WIWO-projects carried out in 1994–1998 and new research priorities for wader studies in the Arctic and Mediterranean for 1999–2003 will be presented.

### **Ornithological importance of the wetlands of the Bourgas Complex, Bulgaria (results of 13 months’ monitoring with main threats noted and proposed conservation measures)**

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The complex of wetlands around the town of Bourgas are very important for breeding, migrating and wintering of many birds, including many rare and

endangered species. There are many scientific papers devoted to the ornithofauna of wetlands around Bourgas. Several years ago a team led by Ass. Prof. B. Ivanov carried out the first systematic monitoring of waterfowl in Bourgas region. The counts were conducted every month for a one year period (B. Ivanov pers. comm.). The results are as yet unpublished. This survey was carried out in the framework of the Bulgarian–Swiss Biodiversity Conservation Program from February 1996–April 1997.

### **The African–Eurasian Wildfowl Agreement**

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The African–Eurasian Waterbird Agreement (AEWA) is an Agreement under the Convention of Migratory Species of Wild Animals, commonly referred to as the Bonn Convention. AEWA aims to create a legal basis for a conservation and management policy of migratory species of waterbird by Range States. The first Meeting of the Parties to AEWA will take place in Cape Town in October 1999. The talk will discuss latest developments with respect to AEWA.

### **Stopover ecology of Bartailed Godwits in the Wadden Sea**

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Two populations of Bar-tailed Godwits use the European Wadden Sea as a stopover site on migration between wintering and breeding grounds. Birds of the Afro-Siberian population breed in Siberia and winter in West Africa. On spring migration they stay only for May in the Wadden Sea where they gain 5.6g/d in weight to conduct a 4,000 km non-stop flight to their breeding grounds. Birds of the European population breed in northern Scandinavia and around the White Sea and winter mainly in Great Britain and the western parts of the Wadden Sea. They immigrate to the eastern part of the Wadden Sea in March and stay in the area until mid May. During this time they gain 1.5g/d in

weight for a 2,000 km non-stop flight to the breeding areas. In the talk, mechanisms are discussed, how Afro-Siberian birds achieve a higher fat deposition rate and gain enough energy in a shorter time for a longer flight than European birds. Although birds of the European population are larger than birds of the Afro-Siberian population they have a higher weight-specific basal metabolic rate (8.3 mW/g vs. 6.35 mW/g). Consequently, thermostatic costs for Afro-Siberian birds in the Wadden Sea are higher than for European birds. However, Afro-Siberian birds occur later in the season in the Wadden Sea, when thermostatic costs are on a low level. Intake rates in April/May did not differ between the two populations (1.5 KJ/min for the Siberian and 1.8 KJ/min for the European migrants) but total energy intake was higher for the Siberian migrants, since they spend 50% of the day foraging vs. 30% in the European birds. This leads to a larger amount of assimilated energy. Furthermore, Afro-Siberian migrants start to moult into breeding plumage while they are still in their winter quarters in contrast to European migrants. Thus, the higher energy demand of the Afro-Siberian birds seem to be fulfilled by a combination of physiological adaptations, a tight time schedule, and a high working level.

### **Phenology of wader migration, and the effects of industrial salt pans on wader stop over, at Eilat, Israel**

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Israel is the only land bridge between three continents and a junction for birds migrating south between Europe and Asia to Africa in autumn and north to their breeding grounds in spring. Eilat is located at the southern end of the Arava Valley, on the northern edge of the Saharan–Arabian desert belt, at the edge of almost 2,000 km of continuous desert regions of the Sahara and Sinai deserts. Hence many birds land here to rest before (in autumn) or after (in spring) crossing the deserts. A ringing program for passerines was established in 1984 and has been operational ever since. Through the years waders have also been trapped and ringed while on migration. A total of 3,372 waders of 43 species have been ringed in 14 years.

The majority of the species ringed are Little Stint (*Calidris minuta*, 1901), Dunlin (*C. alpina*, 381), Wood Sandpiper (*Tringa glareola*, 195), Redshank (*T. totanus*, 122), and Common Sandpiper *Actitis hypoleucos*. Of these, only two (0.06%) were retrapped, a Greenshank *T. nebularia* after 455d at a distance of 3,500 km in Vologda, Russia; and a Green Sandpiper *T. ochropus* after 160d at a distance of 1900 km in the Ukraine. A significant increase in the number of waders trapped was noted following the construction of seawater pans for extracting table salt. In addition, exact numbers of waders were counted throughout the migration seasons of 1989 and 1990. Combining the data I established the phenology of the various wader species in the Eilat region. Of special interest is the migration of the Curlew Sandpiper *C. ferruginea* which is one of the earliest migrants appearing in mid-July till late September in autumn, and a comparatively very late migrant in spring with the peak in May.

**Lake Chrissie Panveld,  
Mpumalanga, South Africa**

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The presentation reports the results of 21 consecutive monthly counts at 14 pans in the Lake Chrissie region of Mpumalanga in eastern South Africa. Counts were made at a representative subset of the more than 300 pans and five lakes in the region, which vary from less than 1 hectare to more than 1,100 hectares in size.

The pans are endorheic; randomly distributed; roughly circular in shape; having no discernible inlet or outflow. The five lakes in contrast have both inlets and outlets; are kidney shaped; with rocky western and sandy eastern shores; occur along a north-south linea trend probably reflecting a fossil river system prior to river capture by the Vaal River in the west. The pans can be classified as grassy; sedge-lined; rocky; reed; saline and open. All the lakes fall into the open classification. A total of 63 species of waterbirds have been recorded from a theoretical checklist of some 75 species.

Previous counts in 1985/86 and 1991/94 reflected substantial numbers of both flamingos (10,000 – 12,000) and Scolopacids (up to 2300) on Lake Chrissie. The current surveys reflect markedly lower flamingo and Scolopacid concentrations – the totals

for all 14 pans seldom exceeding 200 birds in any one month. This is attributed to the absence of mud banks in what potentially are wetter conditions, though the bar charts of both monthly and yearly rainfall patterns do not indicate simple correlations. The census data has been submitted to the Avian Demography Unit for statistical analysis.

Within the Scolopacids, Curlew Sandpipers outnumbered Wood Sandpipers which in turn outnumbered Little Stints, Ruff and Greenshank. The Atlas of Southern African Birds (Vol 1 plxxix) suggests that, during dry periods, it is likely that the eastern panveld serves as an important drought refuge for waterbirds. The hypothesis suggested by the Atlas maps, that some species (*e.g.* Great Crested Grebe, Cape Shoveller, Southern Pochard and Maccoa Duck) may migrate annually between the winter rainfall and summer rainfall region., is not borne out by the Lake Chrissie censuses. The monthly counts are continuing.

**ABSTRACTS FROM THE  
CURLEW SANDPIPER  
WORKSHOP, SOUTH AFRICA 1998**

**Curlew Sandpipers in Australia**

*Clive Minton, Jim Wilson & Mark Barter (presented by Doris Graham)*

Comprehensive data collected through 25 years of study of Curlew Sandpipers in Australia has been analysed and compared with information generated in other flyways. Topics discussed include population sizes, migratory movements, biometrics, moult, weight and plumage changes associated with migration and variations in annual breeding success. Sex and age related differences in the above have also been investigated. The principal results include:

- A. The estimated population in the East-Asian–Australasian flyway is 250,000 birds with 188,000 spending the bulk of the non-breeding season in Australia.
- B. Recoveries generated from 36,000 Curlew Sandpipers banded in Australia show that birds from a wide spectrum of

the breeding range reach Australia. There is an overlap in breeding ranges of birds occurring in all the flyways around the world.

C. There is evidence of a loop migration with the route followed by many birds on the southward migration being to the west of that used on the northward migration, where the Chinese coast is the principle staging area.

D. Males depart on northward migration ahead of females and also arrive back in Australia ahead of females.

E. Biometric measurements are very similar to those reported from other flyways confirming that the Curlew Sandpiper is monotypic. Females are significantly larger than males.

F. Primary moult in adult birds generally starts in October and is completed in January with a duration of 120 days.

G. Many first-year birds undergo a partial primary moult in February to April with the outer 4 to 6 primaries being replaced.

H. One-year-old birds mainly remain in Australia throughout the year.

Migration back to the breeding grounds

for the first time occurs at two years old. I. Typical departure weights of birds leaving the northwest coast of Australia are 80–90g, this 60–70% addition to the fat free weights apparently being sufficient to carry them 3,000 to 4,000 km to southern China and Vietnam in a non-stop flight.

J. Annual breeding success as measured by the proportion of young in the population between the middle of November and the end of February is highly variable, but follows an approximate three-year cycle.

K. The average proportion of young birds in the population at 10.7% would not appear to be sufficient to maintain a stable population. Reasons for this apparent anomaly are discussed.

At the workshop the presentation, by Doris Graham, will focus on:

- migration routes and destinations.
- weight changes associated with migration.
- variations in annual breeding success.