2000 WSG MEETING

ABSTRACTS OF TALKS

The effects of changes in shellfish populations on shorebirds: results of a 30 year study on the Wash, England

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Oystercatcher and Knot numbers have declined on the Wash since the late 1980s. The Oystercatcher decline is due to changes in winter survival, which was related to cockle and mussel abundance. The decline in Knot was due to low juvenile recruitment to the Wash population. Poor recruitment of juvenile shellfish to the Wash populations was implicated in the decline in both mussels and cockles and possibly over-exploitation in the case of the mussel fishery. Management of the shellfisheries, especially through the recent addition of mussel farming, is likely to prevent the large kills of birds seen in several past winters.

Predicting the effects of sea-level rise on estuarine waterbirds

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Densities of intertidal waterbirds can be predicted from estuary morphology and location. LIDAR generated high definition contour maps of example estuaries. In combination the models and the topographic data allow informed prediction of how internationally important UK populations of waterbirds may respond to sea-level rise.

Oystercatcher spread – population movement from riparian to agrarian breeding

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Inland breeding by Oystercatchers first occurred in NW Lancashire (England) in 1929. Using historical data, regional surveys, habitat transects, site counts and detailed information from a study of colour marked individuals over the past 25 years, factors associated with the spread of inland breeding are discussed. Nest site selection, productivity, adult survival, non-breeding bird numbers, food supply and habitat changes are examined in relation to the move from solely riparian to agrarian breeding.

The impacts of climate change on bird populations

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Relationships between aspects of bird biology and weather have been relatively well studied over the years but their implications in relation to climate change have only recently begun to be explored. I will review studies of changes in phenology (especially laying dates and migrant arrival dates), breeding performance, population size, distributions and migratory behaviour. The evidence is in the form of anecdote (i.e. observations of distributional change without statistical correlations to climate change). Next there are studies of relationships between an aspect of biology and weather, with the inference that future changes in climate will cause long-term changes in the performance of an organism. Then there are observations of long-term changes which can be related to long-term changes in climate. The ideal, where we know the short-term mechanisms underlying observed long-term changes, is extremely rare, as are confident predictions of the consequences of long-term changes for aspects such as life-time reproductive success, fitness, population trajectories and distributional change. The largest body of evidence currently derives from phenological studies, and this is where the UK has the benefit of a number of long-running extensively gathered datasets, particularly those gathered by the volunteer network of the British Trust for Ornithology.

How to explain changes in the numbers of waders in the Dutch Wadden Sea?

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It appeared to be impossible to monitor the yearly or monthly changes in the number of waders on the Dutch Wadden Sea. However, in the early 1990s an alternative and less time-consuming monitoring scheme was developed for the area under the responsibility of 'SOVON Bird Census Work The Netherlands'. The general aim was to organize 24 simultaneous counts for the whole area during a period of ten years (two counts per month). By doing so, numerical changes can be studied by (1) calculating the mean numbers of bird-days per non-breeding season for a given ten-year period and (2) comparing these mean numbers of bird-days with earlier ten-year periods. If necessary, the

ten-year period can be shortened by intensifying the frequency of counting. For instance, along the Frisian mainland coast the period has been shortened, as the monitoring aims to identify relatively frequent habitat changes due to changing land ownership and grazing regimes. Thus the Wadvogelwerkgroep F.F.F. organizes 24 simultaneous counts every five years rather than every 10 years, allowing blocks of five years to be compared.

These comparisons will inevitably identify changes: some species having spent more bird-days in the area while others have spent less. It is necessary for ornithological groups to explain these changes. Explanations might include (1) population changes due to a series of bad breeding seasons in the Arctic or (2) changes in habitat caused by large-scale factors in the Wadden Sea itself (e.g. shellfisheries). It is also necessary to study the population composition of these wader populations. This is the main aim of our new ringing group 'Calidris' on Schiermonnikoog, the successor to the 'Steltloperringgroep V.U.' From the start, the activities of 'Calidris' have been linked to the SOVON-monitoring scheme. In order to obtain working permits we determined to answer the question: 'What is the minimum number of waders that needs to be caught to identify the numerical changes in the various species established by the SOVON monitoring schemes?' Four population composition parameters were considered to be particularly important: (1) geographical breeding origin, (2) weight, (3) age composition, and (4) moulting stages. During the talk our results will be presented. And in order to start lifting a small part of the veil we have to admit that we urgently need the co-operation of the other Wadden Sea ringing groups. However, as yet these are scarce.....

Integrating counts, ringing and population modelling to assess the impact of human activities

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Human activities are changing the face of the earth at an alarming rate. Most changes have a negative effect on bird numbers, but some have a positive effect. Counting and ringing the birds are necessary, but not sufficient, activities to assess the human impact. A full assessment requires that counting and ringing be integrated through population modelling. Such models also allow predictions on the effects of human activities. Two examples will illustrate this point. First, we describe the Brent Goose, whose population has been monitored since 1955 when the world population amounted to only 15,000 individuals. Since then numbers have risen to 220,000 to 310,000 birds. On the basis of data on adult survival and reproduction a discrete-time model was formulated, where the reproductive season in Siberia and the winter season in Europe are treated separately allowing for density dependence in each season. Density dependence was significant in reproduction, but not in adult survival. The best estimate of the current adult death rate, 0.149, corresponds to a predicted equilibrium population size of 300,000. An increase in mortality, for instance through hunting, inevitably leads to a decline in the equilibrium population size. Remarkably though, we could not detect a difference in mortality between periods when Brent geese were hunted and when they were not hunted. Second, we describe the Oystercatcher, whose world population is currently estimated at slightly more than 1,000,000 individuals. Some notable recent declines have occurred in several estuaries where the birds spend the winter and these declines are clearly linked to a decline in shellfish stocks. The extent to which the declines in shellfish stocks are due to mechanized shellfishing is hotly debated. For some time now, the Oystercatcher has been the state-horse of individual-based population models, which are built around the assumption that the birds are more or less ideal and free. Comparing well-studied estuaries, it is becoming increasingly clear that Oystercatchers are neither ideal nor free at a large spatial scale. Despite our nice models the saying of Niels Bohr therefore still holds that "it is very hard to make predictions, especially about the future". Instead of despairing we should continue counting, ringing and modelling: it is true both that much progress has been made and that much progress remains to be made.

Food and Feeding Behaviour of the Red Knot at its Argentinean wintering grounds: preliminary results

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The objective of this work was to evaluate the wintering area food resources and feeding behaviour for the American subspecies of the Red Knot *Calidris canutus rufa* that breeds in the Canadian Arctic and spends the non-breeding season in the sub-Antarctic areas of Tierra del Fuego.

The density and distribution of food resources were studied over an intertidal area of 4.5 km^2. The prey selection, activity, abdominal profile, and plumage observations for the wintering knots were recorded. We surveyed an area from Cabo Penias (53° 50'S, 67° 33'W) to Cabo Domingo (53° 41'S, 67° 50'W) weekly. The habitat use for all waders present in the area was evaluated during January and early February 2000.

An estimated 16,000 waders used the survey area during the study. White-rumped Sandpiper *Calidris fuscicollis* was the most abundant shorebird migrating over long distances. Sanderlings *Calidris alba*, Whimbrel *Numenius phaeopus* and Hudsonian Godwit *Limosa haemastica* were also present. There were an estimated 6,000 Red Knots using the area.

The main prey of Red Knot was the Blue Mussel *Mytilus edulis*. The mussels were found in patches that averaged 2473.12 prey m^{-2}. The size of the Blue Mussels selected by the knots ranged from 10 to 20 mm. The birds ingested an average of 4.25 prey min^{-1}. On the outgoing tide, before the mussel beds were exposed, the birds were observed feeding on Soft-shell Clam *Darina solenoides* in the soft-sediment intertidal areas that were present in very low densities (82.5 m^{-2}). The birds were observed ingesting large clams (15 to 35 mm) at an average of 0.42 prey min^{-1}.

Possible effects on prey populations and interspecific competition

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A brief review of the effects of temperature on prey productivity, availability and possible consequences for competition between shorebird species.

Large-scale site selection and individual movements in Black-tailed Godwits

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For mobile animals such as migratory birds, a major consequence of habitat loss will be redistribution between sites. Predicting the effects of habitat loss therefore requires an understanding of the consequences of redistributing birds between sites which are likely to vary in quality. Species that are increasing in number can provide opportunities to explore the consequences of increasing bird density for patterns of distribution and site selection.

The Icelandic Black-tailed Godwit population is currently increasing and Wetland Bird Survey (WeBS) counts have shown that, in the UK, the pattern of winter distribution has also altered in recent years. The role of site quality in determining these changing patterns has been examined by comparisons of prey selection, foraging behaviour and individual movements in different parts of the range. The relative quality of wintering sites may also have an influence on the date of arrival of birds on the breeding grounds, which can have an important influence on subsequent productivity. The timing of spring passage and arrival in Iceland has been examined by following individually colour-marked godwits and the links between these timings and winter site quality will also be presented.

Coping with the cold: overwintering by Rock Sandpipers in Cook Inlet, Alaska

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This study began in early 1996 with discovery of a population of Rock Sandpipers present in winter in Cook Inlet, Alaska (60-61°N), an area that regularly ices over and heretofore has not been known to host many wintering waterbirds, let alone waders. Through a combination of aerial surveys and on-ground studies the population was followed during three winters. The sandpipers that occur in Cook Inlet belong to the nominate form *Calidris p. ptilocnemis*, the largest-bodied of the four subspecies. Birds arrive in mid-October, reach peak numbers of 15,000-20,000 within two weeks and, depending on the severity of the winter, maintain those numbers until early April when they abruptly depart for the breeding grounds. Throughout winter most birds occur only on soft substrate intertidal flats that are kept relatively free of ice by strong tidal currents and are subject to more ice scour than other areas of the Inlet. These same areas support relatively high (2,000-5,000/m^2) densities of *Macoma balthica*, the sole food of the sandpipers. The bivalves occur in sufficient stocks for birds to maintain an average fat index of 17% (4.7 SD, range 14.2-24.5, $n = 20$). Birds apparently rely on these unusually high fat reserves to see them through extended periods (4-15 days) of severe cold (-15 to -30°C) that prevent or drastically

restrict intertidal feeding and occasionally force birds south to more ice-free portions of Cook Inlet. With amelioration of conditions birds return to preferred areas. In mid-winter 1998-1999 about half of the population could not be accounted for following a prolonged, record-setting cold spell (-40°C), and throughout the following winter numbers remained at about half those recorded the previous three winters.

Population ecology of Whimbrel in south Iceland

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Breeding density and productivity of Whimbrel *Numenius phaeopus* were studied on two sites in south Iceland in 1997 – 1999. The study areas were a riverbank at Efri-Sýrlækur (63°52'N, 20°40'W) and heathland at Mosfell (64°08'N, 20°40'W). Breeding birds were caught on nests and colour ringed. Breeding density was estimated by mapping nests and territorial birds. Nest success and fledging success were estimated. Return of colour-ringed individuals was observed in 1998 – 2000. Availability of surface arthropods was studied with pitfall traps. Vegetation cover was estimated and Whimbrel droppings were collected and analysed. Data on weather, from nearby weather stations, was analysed.

Breeding density at Sýrlækur was 40 – 45 pairs/km^2 and 6 pairs/km^2 at Mosfell. Daily nest survival at Sýrlækur was 0.983 – 1.000 but at Mosfell it was 0.853 – 0.944 (as computed by the Mayfield methods). At Sýrlækur, 61 – 100% of nests hatched some eggs annually, but the percentage at Mosfell was 1 – 19%. The main proximate reason for egg losses on both sites was predation. Unviable eggs were only observed at Sýrlækur (probably due to high predation rates at Mosfell) and were 6.6% of the total. In 1997 – 1999, 73 – 100% of breeding pairs fledged some chicks annually at Sýrlækur, 1.5 – 2.0 fledglings per breeding pair each year. At Mosfell 0 – 45% of pairs fledged chicks, 0 – 0.7 chicks per pair. The return rate of breeding birds at Mosfell was 60 – 71% and at Sýrlækur it was 63 – 82%. Most Whimbrels departed from the breeding grounds between 16 July and 15 August. Females departed, on average, a week earlier than males. Whimbrel diet consisted mainly of surface arthropods (beetles, dipterans and moths were common) and berries. At Sýrlækur, most groups of possible food items were more common and nest cover was better than at Mosfell. Nest survival was similar on both sites with 1998 being the best year.

Compared to other studies of breeding Whimbrel, breeding density and production of young, at Sýrlækur, were exceptionally good. On average, from 1997 – 1999, 75 fledglings were produced annually on each km^2 at Sýrlækur and chick production was probably in excess of what was required to balance adult mortality. At Mosfell, the production was poor, only about two fledglings annually on each km^2. Return rate of adult Whimbrel in this study were slightly lower than reported from other studies of Whimbrel and related species.

Breeding dispersal of Avocets

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In the main part of their breeding range, Avocets *Recurvirostra avosetta* inhabit ephemeral wetlands, where breeding conditions vary greatly from year to year. The ability to look for suitable breeding sites in a large geographical range could be seen as an adaptation to unstable habitats. On western European coasts, Avocets breed in relatively stable habitats (saltmarshes). Using sightings of individually colour marked Avocets we try to investigate whether juvenile and adult Avocets in Western Europe are faithful to their breeding sites. Preliminary results show that both young and adult Avocets may disperse over great distances. There seems to be a quite regular exchange of individuals between Spain, France, UK, The Netherlands and Germany. The degree of site faithfulness may, however, differ greatly between sites. We also observed differences in other demographic parameters between sites. In particular, first breeding seems to occur earlier in the French population. We propose a new project in order to get a better insight into the patterns of dispersal and demography of European Avocets.

What is Happening to Global Climate and Why?

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Evidence for the warming of our planet over the last 200 years is now

overwhelming. This is seen not only in climate observations, but also in physical and biological indicators of environmental change such as retreating glaciers and longer growing seasons. Scientists are also increasingly confident that many of the patterns associated with this warming betray the unmistakable fingerprint of human causation. This raises the remarkable likelihood that over the next one hundred years we will fashion a climate on Earth that will be warmer than any that the human species has lived through. The rate of this change may be unprecedented in the history of our planet and may induce significant risks for human health.

Recent work has established the first reconstructions of Northern Hemisphere surface air temperature for the last millennium based on a combination of tree-ring, ice core, coral and historical documentary evidence. While the uncertainty of these series increases further back in time, the data indicate relatively cool centuries between 1600 and 1900, highlight the effect of large volcanic eruptions in cooling the planet in certain years (e.g. 1601), and clearly suggest that the observed twentieth century warming has been most unusual. The year 1998 was probably the warmest of the last millennium.

Instrumental climate data allow us to monitor more accurately the changing global-mean air temperature since 1856. These data show a global warming at the surface of between 0.4° and 0.8° C, with the six warmest years all occurring in the last decade. For the majority of land areas the recent warming has been greater at night-time than during the day, partly reflecting increased cloudiness over land. Data series are much shorter for upper air temperatures, but radiosonde measurements taken since the 1960s suggest that the lower stratosphere has been cooling at a rate of about 0.5°C/decade.

Why should the surface of the planet have warmed in such a way, while the lower stratosphere has cooled? Global climate can vary naturally, due both to what is called 'internal variability' within the climate system and to changes in external forcing unrelated to human activities - for example, changes in the sun's radiation and volcanic activity. Recent climate model experiments show that these natural causes of global temperature variability cannot, on their own, explain the observed surface warming. When these experiments are repeated with rising historic concentrations of greenhouse gases and shifting distributions of sulphate aerosols, much better agreement between observed and modelled global patterns of temperature change is achieved. Although the precise contribution of human activities to global warming cannot yet be stated with confidence, it is clear that the planet would not be warming as rapidly if humans were not currently emitting about 6.4 billion tonnes of carbon into the global atmosphere each year. The IPCC concluded in their Second Assessment Report in 1996 that, "…. the balance of evidence suggests that there is a discernible human influence on global climate."

Given that humans are implicated in the cause of global warming, and recognising that the potential consequences of a rapidly warming climate for natural and human systems are large, it becomes important to estimate the possible range of future climates we will experience over future decades and centuries. Fundamental to this exercise are estimates of future greenhouse gas emissions - whether from energy, industrial or land-use sources. Of particular importance are estimates of future carbon dioxide emissions, the greenhouse gas that alone causes about 60 per cent of the human-induced greenhouse effect. Recent calculations suggest that, given the range of possible future emissions, the current 1999 CO_2 concentration of about 370ppmv would rise by 2100 to between 550ppmv and 830ppmv. These concentrations compare with concentrations before the industrial age of only about 280ppmv.

What effect will this growth in carbon dioxide and other greenhouse gas concentrations have on global climate? It depends largely on how sensitive the Earth's climate is to rising greenhouse gas concentrations. By combining a range of choices for the climate sensitivity with the range of possible future emissions, a range of future changes in global temperature and sea-level can be calculated. The annual global-mean surface air temperature over the period 1961-90 was 14.0°C and this has already risen to 14.3°C during the 1990s. In the future, the planetary temperature reaches between 15.3° and 18.6°C by 2100, representing rates of change of between 0.1° and 0.4°C per decade. This compares to a global warming rate of 0.15°C per decade since the 1970s and a warming of about 0.05°C per decade since the late nineteenth century. By comparison, the planetary surface air temperature is estimated to have reached only between 15.0°C and 15.5°C during the last interglacial period 125,000 years ago.

One of the most striking consequences of a warming climate will be

the rise in global-mean sea-level. Observed sea-level has risen by between 10 and 25cm over the last century, reaching its highest level during the 1997/98 El Niño event, and recent calculations suggest a future rise of between 22cm and 124cm by 2100 compared to average 1961-90 conditions. The largest contribution to this sea-level rise comes from the expansion of warmer ocean waters, while melting land glaciers contribute up to 20 per cent.

The climate sensitivity is defined as the change in global-mean temperature that would ultimately be reached following a doubling of carbon dioxide concentration in the atmosphere (e.g. from 275 ppmv to 550 ppmv). The Intergovernmental Panel on Climate Change (IPCC) have always reported the likely range for this quantity to be between 1.5° and 4.5°C, with a central estimate of 2.5°C.

Predicting the consequence of human disturbance on population of Ringed Plovers

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Human disturbance and its effect on breeding birds is an issue of current conservation concern. While many studies have shown a behavioural response to disturbance, few have been able to place this in a population context. Here I present a framework, based on territorial behaviour that allows disturbance to be considered in terms of its effect on population size.

Disturbance has been implicated as a factor in the population decline in a number of coastal breeding wader species. Here I present data on Ringed Plovers breeding in Norfolk, and using the framework consider the effect of disturbance on population size.

In the beginning - how it all started

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Gull Predation of Banded Stilt Colonies

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The Banded Stilt is endemic to Australia. Its breeding behaviour is unusual in that it nests in large tightly packed colonies, lays white eggs, has white young and creches the chicks. It nests on ephemeral salt lakes in inland regions and, since appropriate conditions only occur once or twice each decade, breeding can only take place at irregular intervals. Predation of Banded Stilt eggs and chicks by Silver Gulls has become a major problem at colonies in South Australia in recent years. In April this year Silver Gulls were predating eggs and young at the rate of two per minute, night and day, and they completely wiped out the last 9,000 nests in a large Banded Stilt colony on Lake Eyre North. A repeat nesting attempt a month later was also predated and abandoned in less than one week, before full control measures could be initiated.
In contrast, Silver Gulls do not penetrate far enough inland to cause similar predation problems in South Australia. The survival of the Banded Stilt is threatened unless gull predation is greatly reduced at future breeding events.

Habitat requirements of lapwing in upland enclosed grasslands in Northern Britain

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Lapwing populations in England and Wales have declined significantly in recent years. The majority of the remaining birds breed on grassland habitats, mostly upland enclosed grassland, where they are still declining at a significant rate. Conservation managers are aware of the management techniques that can be used to increase lapwing numbers within a reserve. However, despite the continuing declines, the majority of lapwings in the UK are present on farmland with no form of conservation protection. This study aims to identify habitat measures that will be applicable to agri-environment-friendly farming. Generalised linear models can identify the habitat and land-use features that can be used to predict the distribution and density of lapwings on a field by field scale. These lapwing – habitat associations are applicable across regions within northern Britain, and three minimum requirements for breeding lapwings in this habitat can be estimated.

Integrated shorebird monitoring over the next 30 years: the need for clear-headed counting, ringing, and analyses

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A powerful way to assess the fates and fortunes of shorebird populations in the changing global

environment would be to combine the results of the comprehensive counting/monitoring efforts and ringing efforts. Sufficiently informed demographic analyses might even allow prognostic uses. That this has not happened may be due to reasons such as: (1) lack of foresight by those in potential key positions in science and funding, (2) organisational conflict and confusion at national and international levels, and (3) inherent limitations and biases in the data, especially the ringing data that are required to inform questions on recruitment and survival of shorebird populations. We will explore these treacherous waters on the basis of our recent analysis of the demographic reasons for population changes in Red Knots *Calidris canutus* wintering in Britain in 1969-1994.

Red Knots have been widely acknowledged as one of our best known shorebird species, and yet the only published survival rate estimate is now forty years old! Since then over 85,000 knots have been ringed in Britain and produced over 800 non-local recoveries. The nation-wide counts of coastal shorebirds identified that in 1969-76 the knot numbers were declining by 6.9% annually. In 1977-84 numbers increased by 3.2% per year and in 1985-94 numbers showed no clear trend. For the three periods recruitment (estimated from juvenile proportions in catches) minus mortality (estimated with simple models from recovery data) nicely corresponded with changes in population size. British Knot populations appear to fluctuate as a consequence of factors in the breeding as well as the nonbreeding seasons, with strong evidence for density-dependent processes acting sometime in the annual cycle.

The low and falling rates of recovery of ringed knots, in Britain and elsewhere in the range, suggest that dependence on recovery series to estimate survival will continue to be unsatisfactory. The use of controls looks far more promising, if the handicap imposed by the decision not to ask for and file repeats and controls by ringers near the original ringing site can be overcome. Similarly, successful amateur ringing groups have difficulty in finding volunteers with the time to handle and analyse their own, often voluminous, data. The remedy may lie in careful choices of what data are most likely to provide useful results. If, for example, all the European ringing groups handling substantial numbers of knots (or any other species) could agree to compile and pool their control data for a period of ten years, it should be possible to learn much more about movements as well as about survival than has yet been found.

For shorebird catching and ringing too, it would be more productive for groups to select topics of interest to them and to plan their operations accordingly, rather than to continue catching as many shorebirds as possible, or whatever their local objectives may have been. At present there is little incentive for groups to collaborate in a designed approach, again because of the shortage of people with the time and skills needed to extract the most from the results of a clearly-focused inquiry. More should be done to encourage collaboration between volunteer ringers and professional biologists, in universities or elsewhere. However, this cannot happen without strong encouragement and financial support from individuals and agencies with money, guts and foresight.

Observed effects of climatic change on estuarine waterbirds

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An easterly shift in wintering waterbird distribution in the UK since the 1970s has been modelled in relation to weather patterns. The shift in distribution of five species is related to average minimum winter temperature. The higher proportion found in the east appears to be linked to increasingly favourable climatic conditions.

How do Palearctic Grey Plovers adapt primary moult to time constraints? An overview across four continents.

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The comparison of primary moult patterns and parameters of seven Grey Plover populations (ringing data from Britain, Italy, Kenya, South Africa, SE India, NW Australia, SE Australia) in relation to time constraints has allowed the discovery of some patterns of moult flexibility and adaptive limits in feather replacements. Excluding the small proportion of birds which shed the 1 – 3 innermost primaries at their breeding site, Grey Plovers start moulting soon after their arrival at wintering areas, whatever the distance they migrate (4,000 – 14,000 km). In order to compensate for the different 'time window' available, Grey Plovers are able to regulate moult durations. In Europe, where moult is not possible from November to March due to harsh weather, moult duration is 90 –

92 days against the 128 – 136 days observed in warmer regions. Birds arriving late in the season at European wintering site (*c.* 20 – 30%) have no time to complete the moult and suspend it before the onset of the winter. Suspended moults are completed soon after favourable conditions are restored, so that only a minority (2%) does not complete the primary moult cycle before pre-breeding migration. At southern latitudes, moult suspension is absent, apart from single individuals probably limited by the long migration journey. Different moult speeds are obtained by (i) varying the number of simultaneously growing feathers and (ii) regulating feather growth speed. In fast moulting populations the average number of growing primaries is four feathers when the moult limit is at p5, in southern populations it is three. Feather growth rate increases from inner to outer primaries both in northern and southern populations. Growth rate is similar between the two groups for the first feather tract, p1 – p5 taking 28 – 31 days to grow, whereas it differs in the second tract. P10 growth is 1.4 times faster in Europe than in South Africa. These data suggest that Grey Plover winter distribution is limited by a 'time window' of 90 days, eventually split into two periods, which is necessary for moulting primaries. Moult duration does not exceed *c.* 130 days, even where a longer moult period is available, suggesting that there is an optimal moult duration balancing the trade-off between the advantages and the disadvantages of moulting at different speeds such as predictability of food resources and environmental conditions, predation risk and structural quality of feathers. Primary abrasion is greater on primaries moulted at a fast rate.

Lunar periodicity in Dunlin weights

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Weights of Dunlin *Calidris alpina* caught on the Plym estuary, SW England, were monitored over five winters. During the first three, weights declined with date and also showed a lunar periodicity being higher around full moon than new moon. In the last two winters there was no decline with date and no lunar periodicity. Other significant predictors were time since low water (negative), wing length, bill length and sometimes temperature (all positive). In addition, first winter birds were lighter than adults.

Hypotheses for the lunar periodicity include (1) that the moon's illuminance enables the birds to feed more effectively, possibly changing from searching by touch on dark nights to searching by sight on moonlit nights and (2) that the moon's illuminance induces some change in the behaviour of the invertebrate prey, making them more available to the birds on bright nights. These hypotheses, however, appear to be inconsistent with the widely accepted explanation for the whole winter pattern of mid-winter peak followed by decline. This is that the cycle is endogenous and arises because of a trade-off between risk starvation and risk of predation. If the lunar cycle is also endogenous, it may mean that for some reason risk of starvation is higher around full moon and/or risk of predation is higher around new moon.

The lack of lunar periodicity in the last two winters may be associated with the improvement of nearby street lighting.

Alarming situation with population of Spoon-billed Sandpiper

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The population size of Spoon-billed Sandpiper, *Eurynorhynchus pygmeus*, is unknown. The largest flock ever recorded was of 257 birds in the Ganges Delta, Bangladesh (Howes & Parish 1989). The only attempt to estimate the population size of this species was based on the numbers recorded in several localities within the breeding range and map-based estimates of other possible breeding sites (Flint & Kondratyev 1977). Flint and Kondratyev concluded that in total there were 2,000-2,800 pairs of breeding Spoon-billed Sandpipers.

During the summer of 2000, an International Arctic Expedition of the Institute of Ecology and Evolution, Russian Academy of Sciences surveyed the Anadyr estuary coasts, Chukotka, and some lagoons further to the south. This was thought to be the southern "core part" of the breeding range of the Spoon-billed Sandpiper (Red Data Book of Asia – in press). Several new breeding sites were found, however numbers were much lower than expected, and the species was not recorded in several 'promising' areas. Currently the surveyed coasts therefore do not form part of the core breeding range of the

species, and the total species number must be much lower than was expected. Moreover, at Gek Cape (64°25' N, 178°15' E) where 8-10 pairs were breeding in 1933 and five males displayed in 1991 (Portenko 1939, A.V. Kondratyev, pers. comm.), no Spoon-billed Sandpipers were found in mid-July 2000. Further indications of declining numbers are available from several other sites in its breeding range.

Further survey and monitoring of Spoon-billed Sandpiper population is needed. Most probably there are fewer than 1,000 breeding pairs, and numerical decline may bring the Spoon-billed Sandpiper to the brink of extinction.

Sexual size dimorphism in *Charadrii*: the influence of sexual and natural selection

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Shorebirds, gulls and alcids (*Charadrii*) have an unusual diversity in their sexual size dimorphism. We use comparative analyses to investigate whether this variation relates to sexual selection or natural selection. As predicted by sexual selection theory, we found that in taxa with socially polygynous mating systems, males were relatively larger than females compared with less polygynous species. Furthermore, evolution toward socially polyandrous mating systems was correlated with decreases in relative male size. These patterns depend on the kinds of courtship displays performed by males. In taxa with acrobatic flight displays, males are relatively smaller than in taxa in which courtship involves simple flights or displays from the ground.

This result remains significant when the relationship with mating system is controlled statistically. We did not find evidence that evolutionary changes in sexual dimorphism relate to niche division on the breeding grounds. For example, biparental species did not have greater dimorphism in bill lengths than uniparental species, contrary to the hypothesis that selection for ecological divergence on the breeding grounds has been important for patterns of bill dimorphism. Our results strongly suggest that sexual selection has had a major influence on sexual size dimorphism in *Charadrii*, whereas divergence in the use of feeding resources while breeding was not supported by our analyses.

The Avocet *Recurvirostra avosetta* wintering in France: evolution and distribution

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About 17,700 (4,650 – 21,000) Avocets have wintered on the Atlantic coast of France every year since 1977 which represents 25 % of the European population. This number fluctuates according to the severity of the winter. Six sites satisfy the 1% criteria and their wintering populations are either stable or increasing. Eight sites show an increase of the wintering population (Baie des Veys, Baie de Goulven, Rivière de Pont L'Abbé, Golfe du Morbihan, Baie de la Vilaine, Traicts du Croisic, Ile de Ré and Baie de Moèze Oléron) while two others mark a significant decrease: Seine Estuary and Loire Estuary. The latter two estuaries support a large industrial development. The wintering conditions of the Avocet are given according to the main characteristics of the sites (surface, sediments...).

Oiled Penguins

Les Underhill

Director: Avian Demography Unit, Department of Statistical Sciences, University of Cape Town, Rondebosch 7701, South Africa

No abstract

Where do we take counts over the next 30 years

Les Underhill

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No abstract

Quickscan Gulf coast Islamic Republic of Iran: many waders, no Slender-billed Curlews (yet)

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Twenty-one wetlands along the Persian Gulf coast of the Islamic Republic of Iran were briefly visited in January-February 2000, funded by UNEP/CMS, with special attention to the presence of Slender-billed Curlews *Numenius tenuirostris*, a species globally threatened with extinction. Wetland types varied from extensive mangroves in the

Khouran Straits to sandy intertidal areas and estuaries with varying substrates in the Northern Gulf area. Most wetlands seems to be dominated by high crab densities and locally mudskippers are abundant causing intensive bioturbation. More than 53,000 waterbirds of 82 species were counted during the survey, including globally threatened species like Dalmatian Pelican, Marbled Teal, Ferrugineous Duck, White-tailed Eagle, Greater Spotted Eagle, and Imperial Eagle. Only a small part of each visited wetland could be counted, usually less than 5%. This quickscan suggests that the Iranian Gulf coast is still very important for waterbirds (possibly over one million in total) and in particular for waders and Dalmatian Pelican.

At least 1,200 Eurasian Curlews *N. arquata* and 250 Whimbrels *N. phaeopus* were checked individually, as well as several hundreds of Bar-tailed Godwits *Limosa lapponica* and Black-tailed Godwits *L. limosa*, but no Slender-billed Curlews were observed. However, the Hilleh Protected Area (42,600 ha) and Monde Protected Area (46,700 ha) were found to be suitable for Slender-billed Curlew, as well as much of the surrounding area up to Bushehr and Monde River Delta, consisting of irrigated wheat fields, extensive salt marshes, marshland and intertidal mudflats. At least two or three weeks of fieldwork is needed to survey this extensive area thoroughly for the presence of Slender-billed Curlews. Low tide counts of waders are needed to complement land-based counts of high tide roosts, because much of the Iranian Gulf coast is difficult to access from land.

New count of waders and waterbirds Banc d'Arguin, Mauritania, January 2000

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No abstract

Effects of human disturbance of foraging on parental care in Oystercatchers

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Assessment of the impact of human disturbance on animal populations is critical when taking management decisions on the level of disturbance that is considered acceptable. Many studies have in some way tried to assess the consequences of human disturbance, using different approaches. Unfortunately, most studies are correlational, which precludes demonstration of causality between disturbance and individual or population performance. We advocate the use of carefully controlled field experiments, focussing primarily on the consequences of disturbance relevant for population dynamics (i.e. parameters relating directly to reproduction and mortality). We present data on the effect of human disturbance of foraging on parental care in breeding European Oystercatchers *Haematopus ostralegus*. In the first experiment, pairs incubating a clutch were disturbed for three hours around low water on their feeding territory on the mudflat (which was separate from the breeding territory). Foraging and incubation behaviour were compared between the disturbance day and two control days; the disturbance day was sandwiched between the two control days.

Disturbance significantly reduced the proportion of time that the clutch was incubated, but also the proportion of time that the pair spent on the mud flat. In a second experiment foraging of pairs with chicks was disturbed, by placing two observers at different distances from the edge of the salt marsh where the chick resided. Observations lasted four hours, with a change of disturbance level (observer distance) after each hour. Observers alternated between three distances (100, 200 and 300 m), and recorded foraging and provisioning behaviour. Total food collected was independent of disturbance, but a larger proportion of the food collected was allocated to the chicks when disturbance level decreased. Thus both experiments demonstrate that human disturbance of foraging reduced the amount of parental care, and thus presumably productivity of the population.

The Australasian Wader Studies Group (AWSG) population monitoring project.

Jim Wilson

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This paper reviews the history and the present day organisation of the Australian Population Monitoring Project. Australia is well located to monitor wader populations in the East Asian Australasian Flyway. This is because Australia is used by over 90% of the total population in the flyway of seven migratory species, and by over 50% of a further 14 species, in the non-breeding season. Currently 23-30 sites are counted each February and June. Several sites have been counted every year since 1981, and one since 1965. It was originally thought that the June counts of immatures would give some indication of breeding success, and hence

help explain population changes. This has however several limitations because some species do not breed until they are three or four years old, and some species make partial movements within Australia in their first years. Some species monitored on the coasts also use inland wetlands, and their numbers in counts may be affected by flood/ drought cycles in Australia, thus making accurate monitoring impossible. Many of the best sites are so remote that they cannot be counted on a regular basis. The main weaknesses in the Australian Project, however, are lack of funding, lack of a modern database, lack of annual analysis, a loosely defined methodology, and lack of monitoring in some areas.

At present a consultancy, funded by the Australian Government, is doing a feasibility study for the project, including testing count methodologies. New environmental laws mean that precise recent data on wader numbers and distribution is needed on a database. The AWSG is doing a preliminary design of the database, and making proposals for funding for programming and data entry. In the long term it is thought that the project might be financed by the sale of data to state and local government, planners, reserve managers and consultants. The AWSG is already selling data. The Australian experience gives many lessons in how to monitor wader populations and highlights many of the pitfalls awaiting the unwary or overenthusiastic. The paper also illustrates some population changes detected by the project and results from four surveys of the Coorong made over 20 years.

2000 WSG MEETING

ABSTRACTS OF POSTERS

Long-term changes in the survival of shorebirds on the Tees estuary.

Stuart Bearhop

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We present some preliminary survival analyses for several shorebird species (curlew, sanderling, grey plover) spanning the last 25 years. We also outline the implications of these analyses and plans for future work.

Isotopic Study

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To understand fully the population dynamics of migratory shorebirds such as the redshank it is important to be able to identify the breeding grounds of each race and to determine their wintering areas. Knowledge of their natal origin, migratory stopovers and wintering grounds allows estimates of fluctuations in population to be obtained from census data and allows an effective conservation strategy to be developed on a site and species-specific basis. The population status of redshank on the majority of Scottish estuaries is one of international importance with five estuaries surpassing the international threshold of 1,500 birds in 1997-8.

It is well known that two races of redshank overwinter on Scottish Estuaries, *Tringa totanus brittanica* which breeds in Scotland and *T.t icelandica* which breeds in Iceland. However less is known about the relative proportions of these two races that occur in Scotland throughout the winter months. Differences in body measurements, especially wing, tarsus and bill length have all been used to separate the two races, as have age ratios and moult dates. Although it is acknowledged that inter-observer error may bias results it has been concluded that the vast majority of redshank wintering on Scottish estuaries are of Icelandic origin and that Scottish breeding birds winter further south.

Strontium levels in the bones of juvenile birds should reflect the underlying geology of the birds natal area, thus allowing the identification of a specific race on its wintering ground. To test this we will first define the isotope composition of the natal areas by analyzing foodstuff and soil, then bone samples from birds known to have been raised in each locality and finally, if these data prove to have given sufficient discrimination of isotope composition, we will look at the samples for bone from juveniles from east coast of Scotland to see if the two races are represented. Once the ratios for strontium have been established that can identify specific races, it will be possible to compare these signals to body measurement data collected for the same bird. If the measurement data agree with the race as determined by isotopic evidence, then this will help to validate the usefulness of wing, bill and tarsus length as race predictors.

Redshank has been chosen as the study species for this project not only because of its high conservation status but also because it is known that Icelandic birds winter in Scotland. Results from this study will help to clarify the status of this species in Scotland and also provide data, which can be used for studies other species which winter in both Scotland and Iceland, such as the Redwing *Turdus iliacus* and Black-tailed Godwit *Limosa limosa*.

The effect of shellfishing practices on the vertical distribution of the mudsnail *Hydrobia ulvae* and its implications for the food supply of shorebirds

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During the non-breeding season several species of shorebird feed on the snail *Hydobia ulvae*, a non-commercial macroinvertebrate that lives at or just below the surface of the tidal mud. We studied the indirect effect of people collecting bivalves at low tide on the vertical distribution of this snail, as well as the implications of this change in distribution on the food supply of shorebirds. In winter, a sampling program was carried out to assess the food supply of shorebirds on the intertidal areas of Cádiz Bay (SW Spain). Analysis of the intertidal samples, which were taken with cores to a depth of 20 cm (four slices of 5 cm each), showed that the unexpected presence of live snails at a depth of more than 5 cm was related to the occurrence of shellfisheries. The decrease in the accessible biomass of *Hydrobia* by shellfishing activity ranged from 62% to 79% in tactile and visual surface-foraging shorebirds, respectively. We suggest that these effects on shellfishery management be taken into account when considering site management.

Is energy expenditure similar in captive and free-living shorebirds?

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Daily energy expenditure (DEE) is a valuable measurement in many ecological studies. The most commonly used procedures to calculate it in free-living birds are the Doubly Labelled Water (*DLW*) method for actual measures, and Nagy's allometric equation for predicting the theoretical energy expenditure from body masses. The goal of this study was to determine whether there are differences between EE in captive birds and the theoretical predictions from their body masses. Kentish Plover *Charadrius alexandrinus* (n=20) were maintained in captivity in outdoors cages. We estimated EE using the DLW method and compared it with the values obtained from Nagy's equation. There was no difference in the mean daily energy expenditure between both methods (DLW: 107.8 ± 8.04 kJ/d; Nagy: 109.5 ± 5.92 kJ/d). This result is surprising, because free-living birds would be expected to have higher living costs than the captive birds. However, some studies have also not found any difference in food consumption between wild and captive shorebirds. We suggest that in areas in which the distances between feeding and roosting areas are short, measurements of DEE in captive shorebirds reflect the actual energy expenditure of free-living shorebirds.

Effects of shellfishing activity on waders: the Bar-tailed Godwit *Limosa lapponica*

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Waders mainly feed in intertidal mudflats. During the time the mudflats are left uncovered, birds daily need to obtain enough energy to maintain their metabolism. Nevertheless, birds only use a percentage of the available time they have. This percentage depends on natural factors such as energetic requirements of birds and their physiological characteristics, and human factors such as disturbance. The aim of this work is to know the possible impact produced by human presence on foraging behaviour of *Limosa lapponica* during the tidal cycle.

In an area of Sancti-Petri inlet (Cadiz Bay Natural Park, 36º 27' N, 6º 10' W) censuses of birds and people were made every half an hour during winter and prenuptial migration. A percentage of absolute (PAR) and relative (PRR) recuperation was calculated, as well as the speed of response and the balance between arriving and departing birds in cases of disturbance. Besides this, one-minute activity sequences were recorded every half an hour with and without human presence during the whole tidal cycle. Data on the minimum disturbance distance (MDD) were also recorded. *Limosa lapponica* presents a curve with two maxima, the first an hour before low tide (-1) and the second an hour after (+1), not coinciding with the highest human presence (0). In censuses with disturbance the birds depart at a medium speed and recover moderately once the disturbance has finished (PRR = 82%, PRA = -7%). The balance between arriving and departing birds in the sector is negative during the disturbance and positive before and after it. This species, during low tide, spends more than 91% of its time foraging and it needs one hectare without human presence. In cases of disturbance, as the distance to it decreases, the foraging time reduces to barely 10%, scanning time increases to 17.5% and there is a very important increase of the scanning rate.

The pattern of abundance during the tidal cycle is similar to those found in other areas by different researchers. The disturbance produces a displacement of birds from the previously chosen foraging area and they come back when there is no disturbance looking for trophic resources they could not obtain because of the human presence. *Limosa lapponica* is forced to use up the low tide period because it feeds almost exclusively in intertidal areas. The low number of aggressive encounters suggest that inter and intraspecific competition to obtain food is scarce and therefore that availability is high. The reduction of foraging time in cases of disturbance may mean that there is an important deficiency in its daily intake rate and consequently, in its body condition and survival.

Impact of agricultural practives on the wintering distribution of three continental waders in Mont Saint Michel bay (France)

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Lapwing *Vanellus Vanellus*, Golden Plover *Pluvialis apriaca* and Ruff *Philomachus pugnax* winter in the polders of Mont-Saint-Michel bay (France). Their spatial distributions were studied from 1980 to 1982. We present these feeding distributions from October to March according to cultural practice of these polders: natural grassland, maize, wheat-barlty, uncovered soils. We show that these three species have a preference for natural grasslands. The evolution of wintering numbers is also analysed with reference to the evolution of natural grassland areas in the polders of Mont-Saint-Michel bay.

Time activity budget, diet selection and feeding rate of migrating Black-tailed Godwit *Limosa Limosa* in non-tidal areas in Southern Europe

S. M. Estrella & J. A. Masero

During July-August, time-activity budget, diet selection and feeding rate of migrating Black-tailed Godwit *Limosa limosa* were studied in a supratidal area (salinas or salt-pans) in SW Spain. Godwits spend over 40% of the daytime foraging. Soft-bodied prey (*Chironomus salinarius*) was preferred to hard-shelled species (*Cerastoderma glaucum* and *Hydrobia ulvae*) because of the more favourable rate at which their energy can be processed. Overall, the feeding rate showed no firm trends through the daylight period and there was no significant difference in the number of prey caught per minute between sexes. Godwits seem to be able to increase their daily food consumption by maximising the foraging time when *Chironomus salinarius* is more active.

Field use by Lapwings and Golden Plovers in arable farmland

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Few studies have investigated field use of Lapwings and Golden Plovers in arable farmland. During four winters the study area supported 3,500 Lapwings and 5,300 Golden Plovers (peak means) – the latter exceeding the 1% threshold for European importance. How can large numbers of these species exist in arable farmland in the absence of pasture?

Weekly counts showed no relationship between field area and field use by plovers though there were clear patterns of habitat selection: the habitats positively selected for feeding were harrowed till (bare earth) and sugar beet stubble but in contrast to most other studies, plovers made little use of grassland in this Norfolk study. Cereal crops were used in proportion to availability.

Patterns of daytime feeding were closely linked to moon phase, with fewer birds feeding by day on and around the full moon. Temperature was also important – following colder nights more birds were feeding. Preliminary information on nocturnal behaviour will be presented.

It is clear that a thorough understanding of nocturnal behaviour, foraging behaviour and depletion will be the key to understanding how these large numbers of plovers can utilise arable farmland.

The seasonal distribution of Red Knot *Calidris canutus* in the Wadden Sea of Schleswig-Holstein, Germany: Integrating Counts and Ringing is necessary to understand Knot phenology

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On average 150,000-200,000 knots spend long periods during the spring and autumn migration in the Wadden Sea of Schleswig-Holstein. The phenology patterns differ between islands, sandbanks and

coastal areas due to the fact that two populations of Knot (Siberian Knot *Calidris c. canutus* and Nearctic Knot *C.c.islandica*) with different migration strategies pass through consecutively.

From March to early May the islands and outer sandbanks are used by Nearctic Knots. From May to early June the bird distribution changes as areas along the coast, the estuaries and embanked areas become used by Siberian Knots. In July and August numbers are high on the coast and low on the outer sandbanks. This distribution changes dramatically at the end of August, when the numbers decrease on the coast and increase markedly on outer sandbanks.

More than 300 Knots were caught, measured and individually colour-ringed on the coast in July and August between 1996 and 1999. It is clear from morphological measurements that both populations stay on the coast at that time. Movements of individually colour-ringed birds prove that the sudden change in numbers at the end of August described above can be explained in part by a shift of individuals from the coast to the outer sandbanks. In September it is probably mainly Siberian Knot that shift from the coast to the outer sandbanks while the Nearctic Knots migrate to West Africa from the end of August to early September.

Breeding waders in Spain: results of breeding wader project 2000

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The results of Breeding Waders Project 2000 in Spain are shown. More than 100 Spanish ornithologists provided and compiled data about breeding waders in Spain. Estimates include the Spanish peninsula and Balearic Islands but exclude the Canary Islands. Sixteen species have been found to breed regularly in Spain: Oystercatcher *Haematopus ostralegus* (53-63 pairs), Black-winged Stilt *Himantopus himantopus* (16,566-17,873 pairs), Avocet *Recurvirostra avosetta* (6438-6512 pairs), Stone Curlew *Burhinus oedicnemus* (7513-8778 pairs), Collared Pratincole *Glareola pratincola* (4594-4678 pairs), Little Ringed Plover *Charadrius dubius* (2487-3115 pairs), Kentish Plover *Charadrius alexandrinus* (5091-5651 pairs), Dotterel *Charadrius morinellus* (2-15 pairs), Lapwing *Vanellus vanellus* (1571-1939 pairs), Common Snipe *Gallinago gallinago* (87-113 pairs), Woodcock *Scolopax rusticola* (732-735 pairs), Redshank *Tringa totanus* (654-824 pairs) and Common Sandpiper *Actitis hypoleucos* (801-883 pairs). The Ringed Plover *Charadrius hiaticula* (0-1 pairs), Black-tailed Godwit *Limosa limosa* (4-4 pairs) and Curlew *Numenius arquata* (1-10 pairs) are rare breeders.

Spatio-temporal structure of wader communities in an intertidal-supratidal system

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We studied the spatio-temporal structure of waders in the intertidal mudflats and adjacent salines of Cádiz Bay (southwest of Spain) in 1988 and 1989. We carried out complete counts of the study area divided into the following five habitats on 52 occasions at low tide and 33 at high tide: storage ponds, evaporation ponds, concentration ponds, crystallisation ponds and mudflats. We applied the methodology proposed by Reay & McMahon (1993) combining spatial distribution and seasonality with abundance.

The results indicate that there is a greater niche overlap at low tide when a large part of the waders concentrate their feeding activity on mudflats. On the other hand, at high tide only the salines were available and the waders were segregated spatially thus decreasing the amount of interference that they were subjected to and separated according to the morphology of the different species in response to environmental heterogeneity. We propose different management measures to improve the carrying capacity of these intertidal-supratidal systems.

Project "Dornod 2000": Lake hopping or lake stopping on the migration through Mongolia

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The eastern part of Mongolia (Dornod) is a vast steppe area with more than 10,000 wetlands. Previous observations indicate that this area and the adjacent steppe and wetland areas of Russia (Torey lakes) and

China (Dalai Lake) is part of the Australasian flyway for shorebirds. On their way between South Asian and Australian wintering areas and Siberian breeding grounds the birds pass Eastern Mongolia and may use the wetlands as stop-over sites to refuel their energy reserves for their further travel. Mongolia is a white spot on the migration maps of the Australasian flyway. How many waders and which species use the inland wetlands of East Asia?

We conducted systematic investigations in a part of Eastern Mongolia during spring migration this year. Regular counts showed that the most common migrating shorebird species were *Tringa erythropus*, *Calidris temmincki* and *Calidris ruficollis*. Mist-netting and identification of marked birds *Calidris ruficollis* as well as intense observing of behaviour and numbers (other species) gave an idea about the stop-over strategy (lake hopping or stopping) of the different species. A rough calculation of bird-numbers using this area showed that according to the 1% criteria of the Ramsar-Convention the small area investigated already is an important stop-over site for some species. Considered the size of the whole wetland areas including Russia and China high numbers of birds should pass through their spring migration

Wader longevity in the north-west of the Black Sea (Ukraine).

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During the last 25 years, researchers at the Odessa State University have ringed breeding and migrating waders. Returns show that some birds have carried rings for a long time. For instance Redshank have been recovered after 12 - 14 years, Kentish Plover 11 - 12 years, Avocet 16 – 17 years, Little Ringed Plover 9 - 10 years. The study of bird demography consists of estimating several quantitative indices of separate natural populations. These indices, the birth-death ratio and the emigration-immigration ratio, are closely related to each other. In population studies the mechanisms that support optimal population sizes under certain environmental conditions are a big practical issue. Waders may be used as an indicator of the wetlands conditions.

Results of a two year project "Breeding waders in European Russia – 2000": species population estimates

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Between 1997 and 1999 the RBCU and Russian Working Group on Waders carried out an IWSG project to provide new region-by-region population estimates for breeding waders in European Russia (ER). By 30 December 1999 new updated information was contributed by 24 of the 45 administrative regions in ER, some 31% of the total ER area. Information for the other regions has been compiled on the basis of published information. New population estimates for every species are presented for each ER region with the exception of Woodcock, for these data are to be checked thoroughly by game resource specialists. The totals for European Russia include 390,000-690,000 breeding pairs of Lapwing, 175,000-350,000 pairs of Green Sandpiper, 1,100-1,800 pairs of Avocet, 8,500-19,000 pairs of Black-tailed Godwit, 41,000-83,000 pairs of Curlew, 30,000-79,000 pairs of Great Snipe and 320-1,250 pairs of Collared Pratincole. The population of the endangered Sociable Plover (RWGW logo) in European Russia is dangerously small at 30-80 breeding pairs. The numbers of Kentish Plover are also surprisingly low (110-1150 pairs). Two volumes with regional updates resulting from this project have been published with support from the Dutch MATRA programme and Vogelbescherming Nederland.

Oystercatchers in Kandalaksha Bay, the White Sea in 2000: some results of colour-ringing and observations

Elena A.Lebedeva

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Does surveying in non-wetlan sites improve the mid-winter estimate of Lapwing and Golden Plover populations in South Portugal?

Domingos Leitão

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In January 2000, together with regular mid-winter wetland surveys, we performed Lapwing *Vanellus vanellus* and Golden Plover *Pluvialis apricaria* counts in ten farmland and grassland sites located in South Portugal. The sites, ranging from 3,400 ha to 11,800 ha, were completely surveyed by one person driving a car during a maximum period of one day long. A total of 13,854 Lapwings was

recorded. The large majority of the birds were recorded in the farmland/ grassland sites. The same way, almost all of the 3,488 Golden Plovers recorded were in the non-wetland sites.

These surveys were an improvement in the population estimates of Lapwings and Golden Plovers wintering in South Portugal. However, in order to reach an accurate monitoring scheme of the populations of these two species, the number of non-wetland sites surveyed should be strongly increased.

Mate choice in the Kentish Plover: the role of badges and breast-feathers

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Kentish Plovers are shorebirds having a variable parental care system. Biparental care, uniparental male and uniparental female care occur in the same population. Most frequently male care occurs. Males have worse remating opportunities with greater variance than females. We considered breast badge as potential male sexual signal and breast-feather length as potential signal of parental care abilities upon which females can estimate males' quality and base their choice. Males have black breast-badges while females' badges are brown. Males' breast-feathers are longer than females'. We studied the role of badge size and the length of breast-feathers in the remating opportunities and fighting abilities of males.

We caught pairs on their nests, removed the females and the clutches and increased the badges or cut the breast-feathers of males. We had four manipulated groups: badge-enlarged – feather-cut, badge-enlarged – feather-control, badge-control – feather-cut and badge-control – feather-control. Remating time was not different among the treatment groups. Courtship behaviour of males was not different among groups. Nevertheless, the post-manipulation badge size of remated males was significantly larger than that of unmated males. Moreover, badge-enlarged males spent less time on fighting than badge-controls. We suggest that badge size may influence males' remating opportunities, however, other traits or males' behaviour can be more important in female choice. Badge size seems to signal male competitive abilities. The role of breast-feathers is still unclear.

Common Snipe *Gallinago gallinago* autumn migration in the Gulf of Gdansk – preliminary analysis of ringing recoveries.

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Between 1983 and 1998 the autumn migration of Common Snipe was studied in the western part of the Gulf of Gdansk (Polish Baltic coast). In that period 1,636 birds were ringed and 48 long distance recoveries were obtained. The Common Snipe is a favoured game bird and the recovery rate (2.93%) is rather high compared to other wader species. After leaving the Gulf of Gdansk birds continue their migration westwards. The majority of records were from France (60%) and Great Britain (10%).

Although over 87% of the recovered Common Snipes were shot, there were only three recoveries from the western Mediterranean and no recoveries from Italy, where hunting pressure is very high. This suggests that Common Snipe passing northern Poland follow exclusively the southern Baltic and the southern North Sea coasts. The recovery rate of birds ringed in July is over twice as high as in August and September, in spite of the fact that the majority of Common Snipes pass the study area between the second decade of August and the end of September. This difference in recovery rates might indicate that the later migrants pass through Western Europe quickly and that they spend winter in areas where the probability of recovery is low (e.g. in Northern Africa).

The recovery rate of shot birds has decreased in the 1990s. This might indicate a decrease in hunting pressure or more probably a deterioration of the effectiveness of the work of ringing centres, especially in France.

Visible Migratory Departures of Waders from NW Australia

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Ten years of data have now been collected on waders departing from Broome, Northwest Australia, on northward migration. Most depart in March/April with peak numbers in the last week of March and the first

three weeks of April. Most species leave over a period of a few days, with dates being similar each year. However, a few species have a more extended departure period, of up to five weeks.
Departures mainly occur in the last two hours of daylight (4 – 6 pm). Flocks average 50 to 100 birds and are usually single species. The direction of departure is mainly NNW which indicates a circuitous route as initial destinations (mainly in China) are due north. The biggest departures occur when southeasterly winds (tailwinds) occur throughout the likely migratory height band (500 to 3000 metres). Conversely cyclonic activity, often accompanied by northwest winds at these levels, inhibits departures. The processes undertaken by birds preparing to migrate and the procedures during the departure phase will also be described

Predation on Redshank nests in different landscape types

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Current state of International Breeding Conditions Survey on Arctic Birds

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International Breeding Conditions Survey on Arctic Birds was started in 1997 as a joint project of International Wader Study Group and Wetlands International's Goose and Swan Specialist Groups. By the current time the survey has mostly passed from the pilot stage to a phase of regular functioning. This took effect in publication of two issues of annual newsletter with overview of breeding conditions in summers 1998 and 1999, distributed among contributors to the survey and members of IWSG. The latest newsletter issue also expanded due to including discussion on techniques of lemming numbers' evaluation for the purpose of ornithological research and insight into wader breeding performance in 1999 in the Arctic from Australian non-breeding grounds. A network of respondents outside Russia showed a slight increase in 1999, but still remains insufficient for wide scale comparisons of bird breeding conditions and performance. In 2000 the database of IWSG along with the hot reports of 1999 field season has been fed with data for the period starting from 1995 that had been formerly published mostly in Russian, and currently holds information for the last five-year period (about two and a half hundred datasets in total). Extracts of these data have been made available at the WEB along with summary maps and results of processing of selected temperature variables at a pan-Arctic scale. In the near future intensive efforts will be put in increasing database availability for research and conservation purposes, primarily through the project WEB site, and further widening of geographic coverage.

Nest material use by Kentish plover

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Many waders line their nest with various materials such as shells, straws and pebbles. Although this habit is very well known, the function of this behaviour is hardly understood. We investigated the use of nest-materials in Southern Turkey, where the Kentish Plovers breed in a salt marsh. We found that parents used 34.2 ± 2.2 (SE) cm^3 materials in their nest-scrape (n = 77 nests). The volume of nest-material ranged between 3.0 cm^3 (minimum) and 87.3 cm^3 (maximum). We investigated how the amount of the nest-material varies during the day, during the incubation period and over the breeding season. First, we found that the volume of nest material (and thus the exposure of eggs) significantly varied over the day: the parents used most nest-material in early afternoon, whereas they used the least amount at midnight (n = 20 nests). This result strongly suggests that the parents actively regulate the amount of nest-material on a daily basis. Second, we detected no relationship between the amount of nest material and the number of days the clutch had been incubated. Third, we found a significant non-linear relationship between the volume of nest-material and the egg-laying date. We will discuss these results from the perspectives of the costs and the benefits of nest-material use in ground-breeding birds. Such benefits include the insulation of eggs from the ambient environment and camouflaging the eggs from visually searching predators.