

Annual Conference of the International Wader Study Group, Knockadoon Head, Co. Cork, Ireland, 7–10 October 2005

When we arrived at Knockadoon Head for the 2005 IWSG annual conference, our jaws dropped and we gazed round in amazement. What a stunningly beautiful location for a conference! There we were, perched on the cliff-side overlooking the sea. There was a Yellow-browed Warbler in the hedge. Oystercatchers, Turnstones and Gannets passed by and, most thrilling of all, six to eight Bottle-nosed Dolphins cavorted in the bay, often leaping right out of the sea.

Our 2005 conference was hosted by the Environmental Research Institute, University College Cork, and sponsored by BirdWatch Ireland (poster competition prizes), Cork County Council (excursion buses), Environmental Protection Agency (free books and pens), GlaxoSmithkline, Heritage Council, Janssen Pharmaceutical, Limosa Environmental, Marine Institute and the National Parks and Wildlife Service.

Other help was provided by James Collins, Michael Twomey and Harry O'Halloran of Fehily Timoney and Company who printed the conference program for free, Mark Hartl who set up and maintained the website, Heineken Ireland and Barry O'Mahony who provided the free beer, Philip Newton and Hugh Jermyn (remarkably skilful and cheerful caterers), Mark O'Leary who designed the WSG Cork 2005 logo and University College Cork who provided insurance.

We are particularly thankful to the Dominican Church who kindly allowed us to use Knockadoon Head Field Centre and the director of the centre, Father Joe Bulman.

Everyone who attended this excellent conference are most grateful to its organiser, Lesley Lewis, and her committee, John O'Halloran, Tom Kelly, Pat Smiddy and Paul Dansie, for all they did to make it such a successful occasion. Other volunteers who helped in various ways were Mike Cobby, Ruth Croger, Chris Cullen, Anne de Potier, Katherine Kelleher, Pete Potts, Marita O'Connell, Daphne Roycroft and Dave Watson. The organisers were also grateful the many members of the conference who helped in a variety of ways and for the excellent community spirit.

The conference kicked off to a brilliant start with the

screening of a film made by Jim Wilson on studies of Icelandic Black-tailed Godwits covering not only their Iceland breeding grounds but also many of their staging and wintering sites, especially those in Ireland and Iberia. Although a film with a serious message, it was also witty and entertaining. Most memorable was the cannon-netting sequence to Tchaikovsky's 1812 overture. We knew the cannons were due very soon, but they still hadn't finished setting the net! Fortunately the film speeded up and the cannons roared at just the right moment.

Saturday morning began with the IWSG Annual General Meeting followed by a full day of talks. It ended with a most enjoyable social evening led by a group named *Roilleach*, which is Irish for "Oystercatcher". Fortunately their traditional Irish music and dancing greatly exceeded the cultural abilities of Oystercatchers and a great time was had by all.

After more talks on Sunday morning we all embarked on buses for an excursion led by Patrick Smiddy to Ballycotton Bay and the Ballymacoda Estuary. This blew away the conference cobwebs and we saw some birds. On the way back, we enjoyed another typically Irish cultural experience by visiting a pub.

Although the conference had formally ended, most people stayed for two parallel workshops on the Monday: one on *Passage and Wintering Golden Plover*; the other on *Why do wader populations decline globally? Merging population ecology theory with field data*.

Altogether 123 delegates from 18 countries attended the IWSG Conference in Cork:

UK	39	Poland	3
Ireland	24	United States	3
The Netherlands	21	Sweden	2
Portugal	6	Spain	1
France	5	Italy	1
Russia	4	Estonia	1
Germany	4	South Africa	1
Norway	3	Argentina	1
Denmark	3	Canada	1



Minutes of the 2005 International Wader Study Group Annual General Meeting

The 2005 IWSG Annual General Meeting was held at 09.00 h on Saturday 8 October during the annual conference at Knockadoon Head, Co. Cork, Ireland.

The Chairman (Hermann Hötker) opened the meeting and welcomed everyone to Knockadoon Head. Apologies were received from Gerard Boere, Nick Davidson, Mike Pienkowski and Rodney West. The minutes of the 2004 AGM, published in the WSG Bulletin 105, were accepted by the delegates and signed by the Chairman.

Chairman's report

The Chairman's report was published in Bulletin 107. In addition the Chairman stated the group is in a healthy state. The ExCo has been active with e-mail discussions on various topics together with an interim meeting in April. Within the ExCo several changes took place. Robin Ward stepped down as News & Notes editor of the Bulletin after many years. This task was taken over by Silke Nebel. Rodney West stepped down as Membership Secretary and stands for the newly created post of Publicity Secretary.

Highlights of last year's group activity were the publication of the IWS volume *Breeding Waders in Europe 2000* and the *WSG Bulletin 107* with the results of the Pied Avocet workshop. He thanked Humphrey Sitters and all authors for their magnificent contributions.

An ever-recurring issue was the need for new members. After asking the audience whether any non-members were present (many were), the aim was formulated that at the end of the conference all these people will be turned into active members of the group.

Treasurer's report

The Treasurer's report including the balance sheet was published in *WSG Bulletin 107*. There were no questions from the audience.

Auditor's report

The report of the auditing committee, which consisted of Tom van der Have and Martin de Jong, was read by Bob Loos. The report confirmed that the group's finances were in excellent order.

Membership Secretary's report

Robin Ward reported that present membership is 470.

Editor's report

The Editor's report was printed in *WSG Bulletin 107*. Humphrey Sitters asked for papers for the coming Bulletins. There were no further questions from the audience.

Project Co-ordinator's report

Ole Thorup reported that one of the major projects of the IWSG has been finalised with the publication of the IWS volume *Breeding Waders in Europe 2000*. Two projects were active in 2004:


- ✎ An international Ruff census was organised in spring 2004 by E. Wymenga. The coverage was far from complete; particularly in Italy there were many uncovered areas. A compilation of the counts is planned for publication in the near future.
- ✎ An update on the project *Tringa glarola 2000* was presented by Magdalena Remisiewicz. The project is coming to an end and is at the analysis stage. It was estimated that the results will be worked up for publication within 18 months.

Further projects reported were:


- ✎ The 2003 Golden Plover count by Lars Maltha Rasmussen. Compilation of the results showed that more



than 1,000,000 Golden Plovers had been counted in NW Europe. He tried to stimulate interest in more simultaneous counts.

 Niall Burton reported on the 1997/1998 Non-Estuarine Waterbird Survey (NEWS). Twelve countries were involved and the papers are in preparation.

 Mark Collier reported on the IWSG colour marking register. The number of resightings had increased through the Euring website which has an online form for reporting colour rings. This form seems to be accepted as the main means for reporting marked birds. Alternatively, resightings can be sent to the e-mail address of the colour marking register: wsg@bto.org.uk or by ordinary mail. One of the major tasks for the moment is to enter all registered colour marking schemes into a database which will speed up response times to colour ring reports.

 Simon Delany reported on the Wader Atlas. Work for the atlas started seven years ago. It covers 90 species from the AEWA region. For all species, breeding and wintering range, as well as migration routes will be shown. The 450 pages of text are ready. However, production of the maps has caused problems. The species accounts will be sent out to experts for reviewing this year. No funding has yet been found for publishing the atlas on paper. Publication via CD and the Wetlands International website is not a problem.

Conference Co-ordinator's report

Petra de Goeij expressed her apologies for the limit of only 100 delegates for the Cork conference. This conference was the first one to reject people who wanted to register. For 2006 the venue sets a limit of 150 delegates. Therefore, everyone was encouraged to book in plenty of time. The 2006 conference will take place during 14–15 October at Höllviken near Falsterbo, Sweden, by invitation of Åke Lindström and his group at the University of Lund. In 2007 Pierrick Bocher from the University of La Rochelle has invited the IWSG. For 2008, there is already an offer from the Kuling group in Poland, but other offers will also be welcome.

IWSG–Wetlands International Liaison Officer's report

David Stroud reported on the activities of the IWSG in its capacity as a specialist group within Wetlands International. The IWSG had provided input for the next production of *Waterbird Population Estimates* in 2008.

Further activities include developing a memorandum for co-operation between the IWSG and IUCN. The IWSG has been asked to provide information for the Red List database.

International Wader Studies had two publications last year: *Breeding Waders in Europe 2000* and the Avocet workshop results in *WSG Bulletin* 107. Further publications planned are on Curlew Sandpipers, Non-Estuarine Waterbird Counts, and the AWSG Conference proceedings. Funding for the publication of these volumes is needed.

International Wader Studies foundation

Bob Loos announced plans to form a foundation to support the work of the IWSG. This will be used as a means whereby members and supporters can make gifts and legacies to underpin the IWSG. Since it will be a foundation under Dutch law, it is possible that gifts will only be tax deductible for Dutch donors. However, the possibility that donors from other countries will also be able to deduct tax will be explored. The legal objective of the foundation will be to support the work of the IWSG. It will have three board members, which will always be leading members of the IWSG. The AGM approved the proposal to set up the foundation and agreed that the detailed formalities should be carried out and approved by the Executive Committee.

Elections

The terms of office of several ExCo members ended in 2005 and Rodney West stepped down as Membership Secretary. The following ExCo members were elected by the AGM unanimously:

Theunis Piersma as Vice Chairman
 Nick Davidson as Vice Chairman
 Rodney West as Publicity Officer
 David Stroud as IWSG–WI Liaison Officer
 Ole Thorup as Project Co-ordinator
 Robin Ward as Membership Secretary
 Martin de Jong and Tom van der Have were re-elected to the audit committee.

Any other business

Robin Ward announced that there might be problems with delivery of the Bulletin. In such cases, members were asked to contact him.

Brett Sandercock announced the meeting *Shorebird Science in the Western Hemisphere* 27 February–2 March 2006 in Boulder, Colorado, USA.

INTERNATIONAL WADER STUDY GROUP ANNUAL CONFERENCE 2006

‡ elcome to Höllviken!

The annual conference of the IWSG will be held during 13–16 October at Höllviken near Falsterbo, Sweden, hosted by the Department of Animal Ecology at the University of Lund and organised by Åke Lindström and his group.

Further details will be announced in the next issue of the *Bulletin* (April 2006). In the meantime any enquiries about the conference should be addressed to Åke Lindström (Ake.Lindstrom@zoekol.lu.se).

1. International workshop on passage and wintering Eurasian Golden Plovers

WORKSHOP SUMMARY

Workshop summary compiled by **SIMON GILLINGS¹** with the help of the Golden Plover experts from each country, named below

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INTRODUCTION

During recent years there has been growing interest in the status and ecology of Eurasian Golden Plovers *Pluvialis apricaria*. In recognition of this a workshop was held at the 2005 International Wader Study Group Conference to consider the status and ecology of passage and wintering Golden Plovers, review recent and current survey efforts and identify directions for future research and international coordination throughout the range. Experts were present from all countries supporting major passage and/or wintering Golden Plover populations.

Theunis Piersma got the workshop off to a flying start describing the unique demographic dataset collected by Dutch wilsterneters since 1949 and demonstrated how these invaluable data could be used to estimate survival, recruitment and population trends. This was followed by a series of talks describing recent trends or status assessments in various European countries. Rob Fuller showed how distribution patterns changed at various spatial scales and cautioned relying upon counts of known sites as a means of assessing population size and trends. David Stroud considered the requirements for monitoring and protection under the different legislative frameworks that apply to the four Golden Plover populations. A country-by-country assessment of current and future survey plans was presented which enabled a full discussion assessing gaps in monitoring, assessing the best time to gain a complete population estimate and identify future priorities. When considering these it is worth referring to Figure 1 which shows the timing of southward migration. In particular it is worth noting that in the first half of October Golden Plovers are concentrated into the smallest area and this may be the best time to attempt population size assessments. However at this time three of the populations (see below) may already have mixed within Britain and Ireland.

WHERE ARE THE GAPS? (compiled by DAVID STROUD)

Four breeding populations of Eurasian Golden Plover are identified:

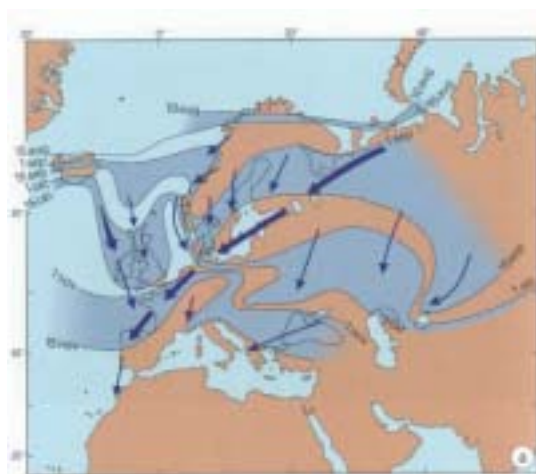


Fig. 1. Outline of the timing and geography of the southward migration of Golden Plovers. Arrows indicate the most important migration routes, and size of arrow is an indication of migration intensity. Reproduced with kind permission from Jukema *et al.* 2001.

P. a. altifrons breeding in Iceland and the Faeroes

P. a. altifrons breeding in NW Europe

P. a. altifrons breeding in north-central Siberia

P. a. apricaria breeding in the UK, Ireland, Germany and Denmark.

As can be seen from Table 1 the level of knowledge available on which to base a flyway conservation strategy is distinctly lacking for certain criteria or for certain populations. In particular, knowledge of the north-central Siberian *altifrons* population is scant as are some population trends and information at the site level. Therefore in terms of species status assessment there is a need for information on population estimates and trends, distributional information (flyway atlases and site inventories) to interpret population estimates and for key site protection. In terms of management more information on requirements at sites and bag sizes are needed.



Table 1. An assessment of the level of knowledge for developing a flyway conservation strategy for each breeding population of Eurasian Golden Plover (after Davidson *et al.* 1998). ☺☺ = very good; ☺ = good; ☹ = adequate; ☹☹ = poor, ☹☹☹ = very poor.

Topic	Population			
	<i>altifrons</i> (Iceland & Faeroes)	<i>altifrons</i> (NW Europe)	<i>altifrons</i> (N–C Siberia)	<i>apricaria</i> (UK/IR/DK/D)
Population size	☺	☺	☹☹	☹
Population trend	☹	☺	☹☹	☹
Breeding location	☺☺	☺☺	☹	☺☺
Non-breeding location	☹	☹	☹☹	☺
Site roles and links	☹	☹	☹	☹
Key features on sites	☹	☹	☹	☹
Pressures on sites	☹	☹	☹☹	☹
Constraints on site use	☹	☹☹	☹☹	☹

Country-by-country summary of current surveys

(main contributors named in parentheses)

Iceland (Aevar Petersen, Tomas Gunnarsson)

Golden Plovers are entirely migratory in Iceland. They begin to flock in August and largest flocks are seen in September. The birds gradually decline in numbers through October while the occasional bird is seen into November (Petersen 1998). The Golden Plover is a very common bird in Iceland but currently no one is engaged in any research projects on the species. For instance there are no dedicated ringing projects for Golden Plovers, although *c.*150 individuals (mostly pulli) are ringed per year as part of general ringing activities. Densities of breeding individuals exist for several regions and habitats but more information is needed on breeding birds. Resident ornithologists have not been monitoring/ringing autumn birds at all (nor the summer population); some have expressed an interest in this as a project but there is a shortage of researchers.

Sweden (Julianna Dänhardt, Martin Green)

On autumn passage south Sweden may support 100,000–150,000 Golden Plovers (based on a conservative minimum count of 101,500 in October 2003). An area of farmland (coastal and inland) in Scania supporting perhaps 20–30% of these birds has been intensive studied since 2003. This ongoing work includes regular counts, habitat studies, ringing and radio-telemetry. There is no formal region-wide or countrywide winter monitoring of Golden Plovers in Sweden.

Denmark (Lars Maltha Rasmussen)

Golden Plovers were counted in Denmark in October 1993 and October 2003. During the 2003 survey Denmark supported *c.*35% of the total flyway count, which is more than any other single country. Most major flocks are within 5–10 km of the coast. Reductions in direct hunting may have allowed an increase in the area occupied and later prolonged staging but birds disappear with the first nights of subzero temperatures (currently late October). There is a need for more information in early autumn and also on spring passage. There are annual counts of wetlands but these are not important for Golden Plovers. There is no annual monitoring of this species. Periodic coordinated surveys are possible but due to the availability of observers perhaps no more frequently than every 5 years.

Poland (Włodzimierz Meissner)

The passage of Golden Plovers through Poland usually starts in September and lasts into November, with peak numbers in October. Though some wetlands are monitored these do not support many Golden Plovers and most are found on farmland. In 2003 volunteers surveyed Golden Plovers for the first time and found 21,000 in October, dropping to 9000 on the same sites in November (Meissner *et al.* in press). There is interest in conducting further surveys but since this is all in a voluntary capacity these could not be done every year.

Germany (Hermann Hötter)

On autumn passage at least 220,000 Golden Plovers are found in northern Germany, most in coastal regions of Lower Saxony, Schleswig-Holstein and Mecklenburg/Vorpommern regions. They are present from August to May, with peak numbers in October/November and April. All regions supporting Golden Plovers were surveyed for the October 2003 survey but due to differences in coverage from 1993 it was not possible to assess exact trends. Populations seem to have been generally stable. Golden Plovers are counted on the German Waddensea counts at selected sites on spring tides, but there is no formal monitoring of wider countryside populations and it is unlikely that surveys could be conducted more frequently than every 5 years.

The Netherlands (Romke Kleefstra, Theunis Piersma)

The Netherlands has perhaps the most extensive and long-running history of Golden Plover monitoring. There have been total counts in 1976, 1978, 1996 and 2003, as well as monthly counts on wetlands since 1975/76. Furthermore the long history of 'wilsternetting' has provided an invaluable dataset from which to describe migration patterns and estimate demographic parameters. In 2003 approximately 180,000 and 250,000 birds were present in peak months of October and November respectively. Distribution, numbers and residency are affected by wetness and freezing temperatures. Long-term increasing trends from wetlands mirror those derived from mark-recapture analyses but conflict with declines evident from total counts. Differential trends

between habitats suggest a shift from agricultural areas to wetlands. Ongoing analyses hope to correct the overall trend to account for under-sampling in agricultural areas and periodic total counts are recommended every 5 years.

Ireland (Olivia Crowe)

A combination of the Wetland Bird Survey (WeBS) in Northern Ireland and the Irish Wetland Bird Survey (I-WeBS) in the Republic of Ireland have produced monthly counts of Golden Plovers on 741 wetlands during the last 10 years. This includes aerial surveys of the Shannon Callows, Little Brosna and Shannon and Fergus Estuary. Total counts are stable at 154,000 but since these only include wetlands a figure of 200,000 is used. However since a high proportion of the estimated 930,000 birds from the Iceland and Faeroes breeding population is thought to winter in Ireland, there is a considerable shortfall. There are tentative plans to conduct a dispersed waterbird survey in the future and the forthcoming British and Irish Atlas may provide further distribution and abundance information. It is unclear whether birds from other populations reach Ireland, especially if there is a westward shift during cold weather. Birds are principally present from October to February with peak numbers in January (December only 5% lower). This is two months after virtually all birds have left Iceland suggesting that either a habitat shift (farmland to wetland?) or a significant immigration (from Britain) occurs in mid winter.

Britain (Simon Gillings)

Since 1970 Wetland Bird Survey core counts have provided some indications of numbers of Golden Plovers on wetlands but the majority on farmland have not been systematically monitored. Nationwide they were surveyed to varying degrees in 1977–79, during the early 1980s for the Winter Atlas, from 1999–2003 for the Winter Farmland Bird Survey, in January 2003 for the Dispersed Waterbird Survey and in October 2003. Counts on wetland have increased such that in 2005 the top 60 wetlands held over 250,000 birds – the same figure as the published winter population size – without including the farmland component. The October 2003 survey recorded 143,000 which is likely to be an underestimate due to under-sampling of farmland. Future surveys must be sample-based to accommodate the widespread distribution of the species. A pilot of a sample-based survey (2 km × 2 km units) is being trialled in winter 2005/06 with a full survey in winter 2006/07.

France (Bertrand Trollet)

Small numbers of Golden Plovers have been regularly counted on wetlands but far larger numbers occur in farmland, particularly in the north-western half of the country. Numbers increase from mid-October and large numbers occur from November onwards. Their extensive distribution makes them unsuitable for site-based census and in January 2004 a sampling approach was trialled using communes (the smallest administrative unit) as the sampling unit. In January 2005 this was extended to the main wintering range and will be extended to the whole country (in a stratified manner) in January 2006. Approximately 1.2 million Golden Plovers were estimated for the main part of the winter range

in January 2005. Birds were highly aggregated (5% of the communes held 92% of the birds) but there was no way *a priori* of identifying which communes these would be. Relatively few birds are present before mid-October making co-ordination with northern areas unnecessary at that time.

Spain

By mid-winter large numbers of Golden Plovers could be present on the steppe and farmland areas of Spain but SG is not aware of any monitoring or focussed research on this species at present.

Portugal (Domingos Leitao)

For the last six winters Golden Plovers have been monitored in two regions of Portugal using transects at 42 sites. These two regions are thought to sustain c.90% of the winter population. Extrapolated counts give a mean winter estimate of 190,000 birds (range 44,500 to 450,000). Indices show an increase from 2000 to 2003 followed by a decrease which is probably weather related. The transect scheme is ongoing and the number of sample sites increases each year. This will improve the accuracy of estimates and geographic representation. Recent population estimates should be considered more reliable than the older ones.

Italy (Lorenzo Serra, Michele Sorrenti)

Golden Plovers may be found on lowlands throughout Italy, including Sicily and Sardinia. Small numbers (average 1996–2000: 3017; 2001: 4889; 2002: 3195; 2003: 2325) are regularly counted on wetlands (source: Italian IWC database at Istituto Nazionale Fauna Selvatica). In January 2004 and 2005 Golden Plovers were counted on non-wetland sites, giving a further 9,117 and 13,000 birds respectively. Considering existing overlaps between the two counting schemes, a figure of 15,000–20,000 may be present in mid-winter. The wetland counts will certainly continue and it is hoped that additional counters can be found in South Italy and the Po Plain to increase the coverage for future non-wetland surveys.

Morocco

Certainly in the past Golden Plovers were regular wintering species in Morocco. However, increasingly mild winters may mean that fewer individuals are forced so far south. SG is not aware of any monitoring of this species at present.

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Abstracts of workshop talks

Golden moments: a review of Eurasian Golden Plovers in Ireland

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There are two populations of Eurasian Golden Plovers *Pluvialis apricaria* that occur in Ireland. During the breeding season, a relatively small proportion of the nominate form *P. a. apricaria* is restricted to the uplands of NW Ireland. These birds winter in NW Europe, though numbers wintering in Ireland are thought to be small.

Ringling recoveries have shown that most Irish wintering birds are from the *altifrons* population, which breeds in Iceland and the Faeroes. During winter, golden plovers occur in a variety of wetland and non-wetland habitats. There are two sites, Ballymacoda in County Cork and the Little Brosna Callows on the County Offaly/Tipperary border, that regularly support internationally important concentrations. As a result of their highly dispersed distribution and extensive use of non-wetland habitats, total wintering numbers are difficult to quantify. However, numbers present at sites that are regularly monitored as part of the Irish Wetland Bird Survey and the Wetland Bird Survey in the Republic and Northern Ireland respectively appear to have remained relatively stable since the winter of 1994/95. The mean peak winter population from 1999/2000 to 2003/04 is estimated at 154,000. However, this is an absolute minimum, as it is based on counts made on or adjacent to wetlands only. Assuming that these birds are all *altifrons* implies that Ireland is highly important for the subspecies, supporting at least 17% of the population in winter.

Volatility of Eurasian Golden Plover and Northern Lapwing distributions at different spatial scales in winter

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Both golden plovers and lapwings are often considered to be faithful to particular winter feeding sites. However, both species can undergo rapid shifts in distribution, both in terms of the selection of relatively fine-scale foraging patches and on a much wider geographical scale. Using examples from two regions of lowland England, one arable and one mixed farmland, I will demonstrate how birds can show sudden shifts in selected foraging locations both within and between winters. These small-scale shifts cannot all be readily explained by changes in local foraging conditions; predation risk and disturbance may also be important. At larger scales, there is evidence that distribution patterns of these species have changed within England over approximately the last 15 years, with decreases in central England coinciding with increases in eastern England, especially in coastal habitats. It is suggested that a redistribution has occurred, probably driven mainly by changing climate.

Trends in winter abundance and distribution of Eurasian Golden Plovers and Northern Lapwings in Britain between 1970 and 2003

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Data from the Winter Farmland Bird Survey and Wetland Bird Survey provide the only recent information on the status in Britain of wintering golden plovers and lapwings. Regional trends in coastal wetlands show a marked increase on the east coast and reductions elsewhere. Data from inland wetlands are only sufficient to show short-term trends and these are generally uncorrelated with numbers on the coast. They highlight the insufficiency of monitoring of inland wintering waders. Winter distribution maps show contraction of golden plovers into more easterly localities, and many observers report localised declines from the interior of Britain. Changes in lapwing distribution are less pronounced and they remain relatively widespread. The use by these species of both wetlands and farmland, combined with the large geographical spread of sites and the difficulty of defining them are major problems in monitoring of golden plovers and lapwings in Britain.

Eurasian Golden Plovers and Northern Lapwings in the Netherlands: trends in numbers and distribution 1975–2003

Romke Kleefstra & Marc van Roomen

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Country-wide counts of golden plovers and lapwings were organised in the Netherlands in the autumns of 1996 and 2003. For golden plover, similar counts are also available for the 1970s. In addition, both species are included in the Netherlands large-scale monitoring programme in which wetland waterbirds have been counted every month since 1975/76.

The number of golden plovers in the country-wide count of 2003 was similar to 1996, with 180,000 in Oct and 257,000 in Nov. In contrast, the number of lapwings was much lower with only 407,000 compared with 954,000 in Oct 1996. The spring, summer and autumn of 2003 were extremely dry and this is probably the main factor that led to reduced numbers of lapwings. October was particularly dry and golden plovers and lapwings were widely spread in small groups. November was wetter and flocks were larger and more concentrated.

Over the long-term, counts of golden plovers in the whole of the Netherlands in autumn have decreased since the 1970s. However numbers in the sites counted monthly, mainly wetlands, show an increase over the same period. Trends differ considerably between regions. In salt- as well as freshwater wetlands, trends are positive, but on farmland numbers have dropped. The largest increases are found in estuarine sites.

We hypothesize that the decrease in total autumn numbers of golden plovers in the Netherlands between the 1970s and 1996/2003 does not reflect a decrease in flyway numbers but a shift in autumn distribution within NW Europe with higher numbers in other countries, especially Denmark. The population remaining in the Netherlands in winter appears to show a long term increase and this may reflect increases in the flyway population as a whole. However the latter conclusion is less certain because of under-sampling of agricultural areas in the waterbird monitoring programme.

Regular country-wide counts are needed to give a clear insight into changes of numbers of waders in agricultural landscapes. These are even more valuable when they are integrated with international counts covering several countries at the same time.

Survival, recruitment and reconstructed population sizes of Eurasian Golden Plovers staging in the Netherlands between 1949 and 2000

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Changes in annual survival and recruitment over the second half of the 20th century were calculated from 1,834 recoveries and 602 recaptures of 77,069 Eurasian Golden Plovers ringed in the Netherlands. Almost all plovers were captured by the traditional 'wilster-netting' technique. From 1980, ageing became normal practice and the number of birds ringed stabilised at 2,500–3,500 birds per non-breeding season. The birds breed in Fennoscandia and northwest Russia. The Netherlands provided 18% of all recoveries and the combination of France, Spain, Denmark and Portugal a further 64%; all these countries showed a decline in recovery rate over the last two decades.

Using Program MARK, vital rates in Eurasian Golden Plovers were examined. A Burnham model that combines data from both live recaptures and dead recoveries for the period 1980–1997 showed that juvenile true survival rates were *c.* 11 percentage points lower than adult survival rates. A recaptures-only model for data on live encounters from 1949 to 2000 suggests that local annual survival (ϕ) was 18 percentage points lower before 1963 than later (57% and 73%, respectively) and that the recapture probability (p) doubled after 1976. The estimated average true adult survival rate (S) in the Burnham model was 11.2 percentage points higher than local annual survival (ϕ) in the recaptures-only model (82.5% vs 71.3%), a difference explained by emigration. There was some evidence for increasing numbers of adults to move further southwards (presumably) in colder winters, but survival estimates were only reduced in the coldest winters. Pradel (or temporal symmetry) models were used to estimate annual growth rates. The Eurasian Golden Plover population staging in the Netherlands appeared to show consistent growth from 1963/64 and by 1990/91 had reached a level *c.* four and half times the initial size. Since the early 1990s population size may have levelled off. After 50 years of monitoring, density-dependent effects may have kicked in.

Eurasian Golden Plovers in NW Europe: results of the coordinated count of October 2003

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Golden plovers are among the most numerous waders migrating through Europe. Staging sites are both on the coast and extensive inland areas. The species is therefore not well covered by co-ordinated counts of coastal waders.

Around 10 Oct 2003, a co-ordinated count in the framework of the International Wader Study Group was carried out up covering most of NW Europe. This was the first co-ordinated attempt to plug some of the gaps in our knowledge of the sites used during migration and on the population dynamics of this numerous "inland" wader.

The objectives of the count were to answer the questions: What is the total autumn population of golden plovers in NW Europe? Where are the most important staging sites in autumn? How did numbers change in the countries where a count was made ten years ago?

More than one million golden plovers were counted in Estonia, Sweden, Denmark, Poland, Germany, Ireland, the Netherlands, Britain and Ireland. France, Spain and Portugal were not surveyed, but a few counts were obtained.

At the time of the count around 10 Oct, most Scandinavian and Russian golden plovers have left their breeding grounds, and Denmark and southern Sweden provide the most important stopover sites. Numbers in Niedersachsen and the Netherlands were also important, but lower compared to previous counts. This indicates a change in the timing of migration, since there is no evidence of a major change in total numbers over the past ten years.

The co-ordinated count of Oct 2003 was the first attempt to gain a basic understanding of the numbers and distribution of golden plovers across a wide area of NW Europe. The results highlight the importance of the many sites found to support large numbers. Many countries have entered into agreements to protect the Eurasian Golden Plover, but few can report adequate counts of passage and winter populations. Future co-ordinated counts will increase our knowledge of spatial distribution and changes over time and as well as provide a better understanding of habitat use. This knowledge could have implications for the conservation of the species throughout Europe if it leads to amendments to the Common Agricultural Policy which has a crucial influence on the use of the land that comprises the golden plover's principal habitat.

Data and information needs for conservation of the Eurasian Golden Plover: the international policy context

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The Eurasian Golden Plover has high conservation status under a number of international conservation treaties, specifically the Birds Directive and the African–Eurasian Waterbird Agreement. One consequence of its current unfavourable

avourable conservation status is the need for a range of data and information on populations to guide practical conservation actions and broader policies (at both national and international scales). These requirements will be outlined, and some of the major data and information gaps highlighted. Finally, IWSG's proposals for a full international review of the status of the Eurasian Golden Plover will be summarised. This international population review is intended to feed into the fifth edition of Wetlands International's Waterbird Population Estimates due for submission to the Ramsar Convention in 2008.

Eurasian Golden Plover winter census in France

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A Northern Lapwing and Eurasian Golden Plover census was

carried out in January 2005 in an area of north-western France covering 154,000 km². The birds were counted between 5 and 12 Jan by 280 observers in a random sample of 784 (among 9,312) communes (i.e. the smallest French administrative unit).

Golden plovers were present in 13% of the communes, but 92% of the 89,000 birds counted were in only 5% of the area sampled. In addition, 13,700 were counted along the whole of the coast of the study area. The total number estimated for the study area was 1.2 million. Only a third of the flocks, and 13% of the individuals, were not mixed with lapwings.

Golden plovers preferred winter cereals (77% of the birds on 25% of the agricultural area) to meadows (3% of the birds on 29%); 14% of the birds were on ploughed or bare lands (21% of the agricultural area).

This census will be extended to the whole of France in January 2006.



Golden Plover by Tommy Holden

International Wader Study Group Workshop 10 October 2005 on passage and wintering Eurasian Golden Plovers

Statement of Conclusions

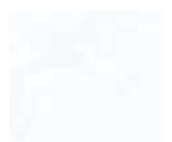
The International Wader Study Group (WSG) held a conference at Knockadoon Head, Ireland from 7–10 October 2005 which was attended by 123 participants from 18 countries. Within this meeting an international workshop was held on the monitoring of Eurasian Golden Plovers *Pluvialis apricaria* in the non-breeding season (passage and wintering periods). This workshop received presentations on the status of current and past monitoring in the following countries: Denmark, France, the Netherlands, Ireland, UK, Portugal, Italy, Germany, Poland, Iceland and Sweden.

The workshop concluded that:

Population assessments

- ◆ There is an urgent need for more internationally co-ordinated surveys of the four populations¹ of Golden Plover that migrate through, or over-winter in, Europe. These surveys should address the need to assess total population sizes, population trends, as well as to provide data on the importance and functional use of key sites. Where desirable and feasible, these surveys could also include, at national level, assessments of species of similar habitats such as Northern Lapwing *Vanellus vanellus* and Eurasian Curlew *Numenius arquata*.
- ◆ Information on numbers at key sites is important to support the conservation of those areas, not only through their formal designations, but also their subsequent management. Through much of the wintering range, such site-related data is typically best gathered in mid-winter.
- ◆ An international assessment of Golden Plover populations is desirable within a few years. For the NW European population of *Pluvialis apricaria altifrons*¹, a survey in October 2008 is desirable, and ideally should be followed by further evaluations at six year intervals (October 2014 etc.). For the Iceland and Faroes population of *Pluvialis apricaria altifrons*¹, a census timed later in the winter may be more desirable. These surveys should ideally be combined with international mid-winter surveys (late November – early January) in the same years.
- ◆ Surveys to assess population size should be undertaken during periods when the populations are most highly concentrated in those areas which are both accessible and have large numbers of observers. For the NW European population of *Pluvialis apricaria altifrons* this would be early October.
 - Pilot work to assess distributions in the UK, Iceland, lowland Norway and the Baltic states would be valuable prior to the next international survey.
- ◆ Further work is needed to refine methods and approaches for Golden Plover monitoring at an international scale, especially with respect to:
 - the nocturnal use of sites,
 - spatial scales,
 - coverage and observer distribution,
 - regional differences of phenology, and
 - unpredictability of distributions.Such work may best be progressed at a further technical meeting, ideally to be held as soon as possible, so as to be able to assess any financial and other resources that may be needed for the 2008 international survey.
- ◆ Research on the dynamics of habitat use of Golden Plovers would be valuable. Outside wetlands, data is poor – notably on farmed landscapes.
- ◆ The north–central Siberian population of *Pluvialis apricaria altifrons* is very poorly known, with an unknown population size and trend. Development of a better understanding of the population, its size, trends, distribution and key sites used are all priorities for the countries within its range.

¹ Populations as defined by Stroud, D.A., Davidson, N.C., West, R., Scott, D.A., Hanstra, L., Thorup, O., Ganter, B. & Delany, S. (compilers) on behalf of the International Wader Study Group (2004). Status of migratory wader populations in Africa and Western Eurasia in the 1990s. *International Wader Studies* 15. www.waderstudygroup.org



- ◆ It is highly desirable that national datasets from the October 2003 international census be archived as part of the wader database curated by Wetlands International. WSG should seek to facilitate this.
- ◆ There was strong support for the development of Golden Plover web-pages within WSG's web-site that would assist the international exchange of data and information and so improve communication between those interested in the species.

Flyway-scale assessments of movements and population structures

- ◆ Ringing provides an essential tool to understand movements of populations at flyway scales. Other techniques will also help delimit populations and their movements, notably:
 - the undertaking of co-ordinated radio-telemetric studies at flyway scales; and
 - the assessment of stable isotopes from birds of different breeding areas, so as to assess proportions of birds from these areas which occur on different wintering areas.
- ◆ A Pan-European assessment of the existing information on the movements of ringed Golden Plovers is highly desirable. This would especially help the conservation management of Golden Plovers in those countries used by multiple populations.

Demographic monitoring

- ◆ Extensive and long-term trapping of Golden Plovers through traditional wilsternetting in the Netherlands has provided an internationally unique assessment of long-term trends in demographic parameters, especially productivity and survival rates. This provides essential information for the management of the population. It is a high priority that this monitoring continues at existing levels of activity.

Conservation management

- ◆ There is legal requirement under the African–Eurasian Migratory Waterbirds Agreement (AEWA) for an international action plan for the *apricaria* race of Golden Plover – which breeds in the UK, Ireland, Denmark and Germany – should the hunting of this population continue. There is an urgent need for a re-assessment of the size of the breeding population of this race.
- ◆ The development of harvest estimates is desirable for all populations as an aid to management. For three populations, this is a legal requirement under AEWA.

*International Wader Study Group
10 October 2005
Knockadoon, Ireland*



Golden Plovers by Simon Gillings

2. International workshop: Why do wader populations decline globally? Merging population ecology theory with field data

Workshop organised by PABLO ALMARAZ & TAMAS SZEKELY

Almost half of the known wader populations are declining globally. At the 2003 IWSG Conference in Cadiz, it became clear that this global decline occurs in many species with different geographic distribution, ecology and life-style. However, the ecological and evolutionary factors that influence population declines, and population trends in general, remain largely unknown. We urgently need studies to reveal the intrinsic biological traits and extrinsic human-induced threats driving population trends in waders.

The purpose of this workshop is to address these top priority issues. The aim is to create a stimulating and multidisciplinary atmosphere by bringing together fieldworkers, theoreticians and policy makers.

The Workshop has four major objectives:

- to reveal how theoretical ecology and population dynamics may help us to understand, predict and possibly reverse the declining trend of wader species and populations;
- to identify the key population variables we need to measure in the field;
- to encourage researchers to investigate population ecology of waders worldwide, and mobilise long-term datasets on wader populations for theoretical research;
- to emphasize the value of population viability analyses implementing both environmental and demographic variation for an effective conservation strategy.

Abstracts of workshop talks

Population models in wader ecology: theory and data

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Ecology has come a long way since the early debates on regulation vs limitation of wild populations. Current efforts are being concentrated both on the development of realistic mathematical models describing the dynamics of populations and on advanced statistical techniques to fit those models to data. Depending on its nature, a first, broad distinction can be made within the mathematical approaches available: the inverse (unstructured) approach begins with a mathematical construct, whether phenomenological or mechanistic, describing the spatio-temporal dynamics of a given population, and then uses some statistical theory to fit the model to real data. On the other hand, the prospective (structured) approach uses data on vital rates to predict the dynamics of a population from a demographic transition matrix derived from the life-cycle of the species. Both approaches differ in the specific biological features they illuminate and thus in their relative utility to conservation biology. Here, the theory underlying the approaches outlined above is briefly described, and I focus specifically on the advantages and limitations of each method. Real wader population data from two of the major European wetlands (Marismas de Doñana and Delta de

l'Ebre) is used to illustrate the method. I conclude the talk with some suggestions on the kind of data we need to gather in the field depending on the kind of questions we want to answer, both from a basic and applied standpoint.

Local declines in wintering waders on estuarine Special Protection Areas in the UK

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The UK provides essential wintering habitat for many thousands of waders, and substantial protection is afforded to sites of importance. To identify potential problems with sites designated as Special Protection Areas (SPAs), an extensive review of factors thought to contribute to local declines of greater than 25%, as identified using the Wetland Bird Survey (WeBS) 'Alerts' system, was undertaken. Ecological factors considered to be of relevance included habitat change and loss, water quality and abstraction, climate change, shellfishing, disturbance and dredging. These largely human-induced factors were often site-specific and cumulative, but illustrate some of the negative pressures affecting the wintering populations. Interpretations of processes underlying negative local trends are offered, including the effect of relevant factors on local distribution and individual survival rates, which may have knock-on effects for breeding populations. The problems faced by waders wintering in the UK may reflect wider pressures existing along the East Atlantic Flyway, and illustrates how local-level knowledge can contribute to macro-ecological questions.



**Trends in numbers of waders wintering in Europe, 1989–2002:
Results from the International Waterbird Census**

Simon Delany¹ & Bruno Ens

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The International Waterbird Census (IWC) organised by Wetlands International, has been running since 1967, and has amassed a large volume of January count data on Anatidae, but rather fewer data on other groups of waterbirds. Waders have been counted as a routine part of IWC in most European countries since the late 1980s, but some problems with the IWC data for species other than Anatidae have taken time to solve. It is now possible to present population trends between 1989 and 2002 for many wader species wintering in Europe, based on January counts at over 5,000 sites and involving nearly every country.

Trends were estimated using the TRIM (TRENds and Indices for Monitoring data) software in four regions of Europe: the Baltic, the north-west, the W Mediterranean and the E Mediterranean. Data quality was sufficiently high to be able to estimate population trends directly from count data for 17 wader species in NW Europe and the W Mediterranean. The Baltic holds few waders in winter, and data quality in the E Mediterranean is still inadequate. Of the 17 species, ten appear to be decreasing in NW Europe and/or the W Mediterranean. Others have populations which appear to be stable or increasing overall, and several show different trends in NW Europe and the W Mediterranean. The IWC has developed into a useful tool for estimating trends in the number of waders at large geographical scales. However, we are not yet in a position to offer explanations for these changes.

The decline of Eurasian Oystercatcher populations wintering in the Netherlands

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Approximately one-third of all Eurasian Oystercatchers *Haematopus ostralegus* in Europe spend the winter in the Netherlands. The two major wintering areas in the Netherlands are the Dutch Wadden Sea and the Oosterschelde. In both areas, oystercatchers have declined. Model calculations indicate that in the Dutch Wadden Sea, the decline was primarily due to the disappearance of the intertidal mussel beds, which were heavily fished around 1990. A smaller part of the decline was due to the decrease in cockle stocks as a result of suction dredging cockles. In the Oosterschelde, the decline was due to mussel culture lots being moved from the intertidal areas to deeper water and to a decline in the cockle stocks according to calculations with the same model. Some of the decrease in the cockle stocks could be linked to suction dredging of cockles. The tidal flats in the Oosterschelde are subject to erosion as a result of the construction of the

storm surge barrier, which was completed in 1986. The model calculations indicate that this erosion of the tidal flats had no significant impact on the feeding opportunities of the birds during the 1990s, but will decrease the carrying capacity of the Oosterschelde for oystercatchers by another 10,000 birds after 2010.

Population models for migratory waders: the case of the Upland Sandpiper

Brett Sandercock

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Ongoing declines in populations of migratory waders are a global conservation concern. Development of effective conservation strategies would be aided by robust estimates of demographic rates and their contributions to the finite rate of population change, as well as a mechanistic understanding of the impact of environmental factors on these demographic processes. One possible approach is to explore field data from wader populations with models based on projection matrices. First, I present alternative population models that could be used to synthesize information on age at first breeding, fecundity, and survival for different wader populations. Second, I discuss how the mark-recapture methods of Program Mark can be used to obtain the best possible estimates of demographic rates and their variance. Last, I illustrate this approach with field data from a 5-year population study of Upland Sandpipers *Bartramia longicauda* at Konza Prairie Biological Station, northeast Kansas. Upland Sandpipers are a species of conservation concern in much of their breeding range in the continental U.S. My field project is the first intensive population study of this secretive species, and my demographic analyses are based on encounter histories for 600+ marked individuals and a sample of 150+ nests.

Can ideas about stock market indices be adapted for wader indices?

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The paper will recycle, into an ecological context, ideas developed by econometricians for economic time series data. The *Market Model* provides an approach used to analyse the relationship between the index for a stock market as a whole and the individual shares that compose that index. These methods decompose the “risk” of a share into “market risk” and “unique risk”. Analogous analyses can be carried out for waders; replace the time series of the price of a share with the time series of counts for a species at sites, and replace the overall share index with the index for the species. The outputs from this analysis provide a measure of the extent to which fluctuations for a species at a site relate to factors unique to the site rather than to changes in the overall index. This will provide a new ordering of sites for each species, and also opportunities to compare how different species use sites. The paper is illustrated using wader count data for British estuaries, supplied by the British Trust for Ornithology.

Estimating turnover and return rates of three different populations of Red Knots in Delaware Bay in 2004

Philip Atkinson¹, Karen Bennett, Allan Baker, Nigel Clark, Kimberly Cole, Amanda Dey, Simon Gillings, Patricia Gonzalez, Brian Harrington, Kevin Kalasz, Clive Minton, Larry Niles, Inês L. Serrano, Ron Porter, Rob Robinson & Humphrey Sitters

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Long-distance migrants tend to stop and refuel in widely spaced and highly productive staging sites. These can be of critical importance to the ongoing survival or likelihood of successful breeding of individuals. For Arctic-breeding species, the timing of arrival on the breeding grounds is crucial for successful breeding. Since deterioration of staging site quality can have marked population level consequences, understanding arrival, departure and residence times on staging sites is of applied importance if the species in question are in any way threatened.

Delaware Bay, USA, is one of the most important spring stopover sites for shorebirds in the west Atlantic flyway. Most feed to some degree on the eggs of Horseshoe Crabs *Limulus polyphemus* which are laid in bay beaches during April–July. The crab population has declined due to commercial exploitation and in some years suppressed egg availability has prevented shorebirds gaining the fat reserves needed for the final leg of their northbound migration to Arctic breeding grounds. The Nearctic population of Red Knot *Calidris canutus rufa* feeds almost exclusively on Horseshoe Crab eggs whilst staging in Delaware Bay and has shown large declines in its South American wintering areas and sustainable population management solutions are actively sought.

In spring 2005, we used observations of individually marked Red Knot to estimate return rates and residence time of birds in the Bay. For c.500 birds we knew the wintering area based on stable isotope analyses of feathers and compared the staging behaviour of birds known to winter in south-eastern USA, north-western South America or Patagonia. Both return rate and residence time within the Bay varied between the groups. There were also slight differences in arrival and departure patterns. The longest distance migrants from Patagonia showed (a) lower return rates and (b) greater heterogeneity in arrival, such that the total passage period of the group was longer (though the stopover length of individuals did not significantly exceed that in other populations).

Is sex-ratio adjustment exacerbating population decline in the Tierra del Fuego population of Red Knot *Calidris canutus rufa*?

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We determined gender with molecular methods in samples of Red Knots collected from the austral summering population

in Tierra del Fuego, and on passage in Patagonia and Delaware Bay in the USA. During the period of dramatic population decline in 2000–2001, adult sex ratio in Tierra del Fuego was significantly biased in favour of females in November 2000 (1.8:1) and 2001 (1.5:1). Following the 2002 breeding season in the Canadian arctic, a sample of 58 juveniles in Tierra del Fuego contained a surplus of males (1.8:1) which was perpetuated in the two following years in immature and adult cohorts. Analysis of resighting data in South America showed that both sexes have similar estimates of annual survival, apparently eliminating sex-specific differences in survival as the cause of the male bias. We hypothesize instead that the bias may arise from sex ratio adjustment by females in response to late arrival and refuelling problems in Delaware Bay. In these circumstances theory suggests that females mated to males whose attractiveness (redness) is condition-dependent should adjust the sex ratio of their offspring in favour of sons. If this is correct then the severe population decline the population is currently experiencing could be exacerbated by a relative shortage of breeding females in the near future.

Foraging decisions and social structure: a choice experiment with Red Knots

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Many shorebird species live in groups. Possible benefits include reduced risks of predation, the possibility of information sharing and an increase in the mean food intake rate due to social foraging. However, there are disadvantages too. The rate of (resource- or interference-) competition increases when there are more individuals in the same area of habitat or sharing the same total resource. The Red Knot *Calidris canutus* is a shorebird that typically forms flocks of 4,000–15,000 individuals, but groups of 100,000 individuals have been recorded in the Dutch Wadden Sea. What causes the Red Knot to flock in such large numbers? To assess the costs and benefits, the artificial mudflat at the Royal Netherlands Institute for Sea Research was used to create two patches, of low and high food density. Red Knots were released onto one of each of these patches, or were faced with a choice of the two patches in groups of 1–8 individuals for a period of 4 minutes. Intake rates, time budgets and spatial distributions were recorded by video. Because social status may influence foraging decisions, the dominance status of each bird was assessed and incorporated as a treatment effect along with food density and group size. We used a unique system of moving patches to avoid the problem of food depletion. The hypotheses that intake rates decline with increasing bird

density and with decreasing food density and dominance rank were supported by our data. Furthermore, contrary to our predictions, dominant individuals only claimed priority at the high food density patch when there were intermediate numbers of competitors.

Capture stress and immune function in captive versus free-living Red Knots *Calidris canutus*

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Long distance migration and ecological immunology are exciting and productive fields of study, yet many aspects of both remain biological mysteries. Most studies concerning migration have focused on the physiological and energetic demands of migration, whereas most ecological immunology studies have focused on trade-offs between immune investment and reproduction. Little is known about seasonal, environmental and individual variation in the immune investment of long distance migrants throughout their annual cycle. Experiments on wild birds in captivity are a powerful way to determine the seasonal and environmental factors that affect immune function. However, captivity itself may have an effect on immune function and birds held in long term captivity may be less affected by capture-stress than free-living birds. A major problem in assessing the seasonal effects of stress on immune function is teasing apart those due to biological factors such as migration, and investigation artefacts such as capture-stress. Here we discuss a comparative study of immune parameters, measured at a series of times after capture, to examine the capture-stress response, between long-term captive and free-living Red Knots. We measured heterophil: lymphocyte ratios, total white blood cell counts and the bactericidal activity of whole blood in knots housed in aviaries at the Royal Netherlands Institute for Sea Research and free-living knots captured in the Dutch Wadden Sea.

An Atlas of Wader Populations in Africa and West Eurasia: What progress has been made?

Simon Delany & Derek Scott

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Waterbird conservation takes place increasingly at the level of flyways of individual biogeographic populations. A simple but powerful concept in waterbird conservation is that of the 1% threshold, under which any site which regularly holds 1% or more of a population of waterbirds qualifies as Internationally Important under the Ramsar Convention on Wetlands, the EC Birds Directive and other similar instruments. In order to know which sites hold 1% of a population, definitive international population estimates are required, and Wetlands International provides triennial updates of waterbird population estimates at global level on behalf of the Ramsar Convention on Wetlands. Practitioners using these estimates as the basis of waterbird conservation policies and plans need to know which estimates to apply in which geographic areas, and Wetlands International has produced a series of Flyway Atlases to facilitate this process. The latest

of these, which is currently entering its final phase, is *An atlas of wader populations in Africa and west Eurasia*.

The Wader Atlas started life in 1998 as a joint project of Wetlands International and the International Wader Study Group, and a Consultation Draft covering 39 species was produced in 1999. The second phase of work was stopped by the financial closure of the Africa-Europe-Middle East office of Wetlands International in 2001–2002. Further funding was secured in 2003, and we now have a draft covering all 90 species of wader occurring in the region covered by the African-Eurasian Migratory Waterbird Agreement (AEWA). A map of each species shows the population boundaries which should be used when calculating 1% thresholds, as well as the breeding and non-breeding range of each species. Key sites for each population are also shown, together with selected count data, and we remain hopeful that it will be possible to include ringing recovery data on the maps. Over 400 pages of text have been drafted and it is hoped that the Wader Atlas will be the definitive source of information about numbers and distribution of waders in the AEWA region for many years to come. About 30 International Wader Study Group members were closely involved in production of the early drafts, and we look forward to their input during the peer review process this coming winter.

Modelling the optimal flyway of arctic-breeding shorebirds

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Shorebirds are prominent long-distance migrants and depend on chains of wetlands for their survival. These are a threatened habitat and many countries, including the Netherlands, have signed international agreements to protect them. Effective protection requires a tool to assess the consequences of habitat loss along the migration route. Optimality models of migration might provide such a tool. The dependency of reproductive success on time of arrival and condition at arrival on the breeding grounds is an important component in such optimality models of migration. Yet, this function is poorly known for arctic-breeding shorebirds. We therefore organized expeditions to Medusa Bay in Siberia in the years 2000–2002 to study how reproductive success depends on time of arrival and condition at arrival. It proved impossible to obtain direct information on this link, but useful estimates could be made through indirect routes. Next, we combined these estimates with estimates for other important model parameters derived from the literature and investigated the extent to which the optimal migration model parameterized for the two subspecies of Red Knot (*islandica* and *canutus*) succeeded in describing their migration schedule. We found that, for reasonable parameter estimates, *islandica* is predicted to migrate via Iceland, which is the route taken by the majority of birds. However, a sensitivity analysis indicates that some parameters need only to be changed slightly to make migration via northern Norway the optimal route.

Seasonal matching of habitat quality and fitness in Black-tailed Godwits

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The quality of habitat that individuals occupy can have important consequences for fitness. In migratory species, occupation of high quality breeding and wintering habitat could have considerable fitness benefits for individuals, with important demographic and evolutionary implications. We use an intensive tracking study of colour-marked Icelandic Black-tailed Godwits *Limosa limosa* and analyses of stable isotope ratios to link patterns of individual use of good and poor quality habitat in summer and winter. The Icelandic Black-tailed Godwit population is currently increasing and, in both summer and winter, godwits appear to be expanding into poorer quality habitats. We also use marked birds to assess whether, across the migratory range, individuals are likely to use either traditional or recently occupied sites in both seasons. Seasonal matching of habitats of parallel quality in summer and winter may be a key process in population regulation, and can have important implications for conservation strategies. How seasonal matching is initiated in shorebirds is not obvious but possible mechanisms will be discussed.

Sex-specific mortality associated with the drastic decline of Red Knot *Calidris canutus rufa* in 2000?

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Adult sex ratio in catches of Red Knots at Río Grande in Tierra del Fuego in November 2000 was biased in favour of females (2:1) $p < 0.0416$, $N = 87$, following the onset of a severe population decline after the northern migration that year. Knots from the Tierra del Fuego population captured at San Antonio Oeste on northern migration in 1998 had a balanced sex ratio (ns, $N = 219$), but subsequent recaptures from these and other knots banded before 2000 showed the same bias in favour of females ($p < 0.0045$, $N = 60$) as at Río Grande. This suggests that males suffered higher mortality than females over this period, and thus contributed to the population decline.

Sex-specific differences in breeding behavior, migratory patterns and moult strategies might contribute to stronger selective pressures operating on males. Males tend to migrate earlier than females on average, arrive earlier on the arctic breeding grounds, and take care of the young, whereas females leave the nest after eggs hatch and begin to migrate south 3–4 weeks earlier than males. If the quality of breeding plumage honestly signals the condition of individuals and plays a role in sexual selection as has been suggested, then the redder breeding plumage of males exerts a selective pressure to moult earlier.

Males arriving in Río Grande after the southern migration were initially behind females in acquiring winter plumage

($p < 0.0001$, $N = 367$), but they were ahead of females in acquiring breeding plumage when the following northern migration began ($p < 0.0015$, $N = 164$). Similarly adult males captured at San Antonio Oeste in March 1998 had 0.50 times the probability of females of being resighted or caught in following years ($p < 0.000$), and this was negatively correlated with date of capture ($p < 0.0003$) and positively with active body moult ($p < 0.0001$). In seasons when conditions for migration are unfavourable, these factors are likely to significantly increase the risk of mortality in males, and contribute to population decline and unbalanced sex ratios in adults.

Black-tailed Godwits in the Selenga delta, Lake Baikal, eastern Siberia: May–June 2002

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The Baikal region is of great importance for a variety of migratory birds. The lake and its surrounding mountains seem to form a demarcation line between eastern and western species. As part of the Australasian flyway, the ecological status of the coastal wetlands is for many species still uncertain. Several studies have indicated that the system is under stress from chemical pollutants. Of the coastal wetlands of Lake Baikal, the Selenga Delta is by far the largest, and geomorphologically almost entirely undisturbed. At 54,000 ha, it is also one of the most extensive marshland areas in the entire biogeographical region. Over the years, 46 wader species have been recorded of which 14 have been proved to breed.

The lower Selenga and its delta are among the main breeding sites of the eastern race of the Black-tailed Godwit *Limosa limosa melanuroides*. In 2002, this population was estimated at 100 pairs. However, the area is quite isolated from other populations. The size of the breeding population of *melanuroides* in Siberia is uncertain, but the Australasian wintering population of the species is about 162,000 comprising both *melanuroides* from East Siberia and *L. l. limosa* from central and western Siberia.

During our stay in the delta in the Siberian spring of 2002, we found 26 nests and trapped 17 adult Black-tailed Godwits and 4 freshly-hatched chicks. Besides work on Black-tailed Godwits we carried out some observations on the breeding biology of the Asian Dowitcher *Limnodromus semipalmatus*. During the expedition we observed many species from the Buryat and Russian red data book including: Whooper Swan, Spotbill Duck, Falcated Duck, Bittern, Short-eared Owl, White-tailed Eagle, Black Stork and Peregrine Falcon.

Wet grassland management for breeding waders at Loch Gruinart

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Water levels, sward heights and lapwing chick foraging behaviour

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Balancing conflicting management requirements for breeding waders on lowland wet grassland

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These three talks will focus on habitat management and research issues at the Royal Society for the Protection of Birds' nature reserve at Loch Gruinart on the Isle of Islay, W Scotland. This reserve extends to 1667 ha encompassing a complex range of habitats from intertidal mudflats to blanket bog and 150 ha of wet grassland. The latter occurs in a network of low lying fields, which are gravity drained by a grid of foot drains and ditches, and separated from the salt marsh by a low seawall. This is managed for a range of species including breeding Corncrakes *Crex crex* and waders as well as wintering geese. The breeding waders occur at an overall density of 1.6 pairs/ha and comprise Northern Lapwings *Vanellus vanellus*, Redshanks *Tringa totanus*, Eurasian Curlews *Numenius arquata* and Common Snipes *Gallinago gallinago*.

The key factors in the management of this land for breeding waders are the maintenance of vegetation structure and the control of water levels. However, some compromises have to be made in order to accommodate the other key species that use the area. A study in 2005 into redshank productivity on the site addressed whether the current management regime targeting geese and lapwings is in conflict with redshank nesting and chick foraging requirements.

Two thirds of the wet grassland is subject to a 7-year reseeded rotation, and is cut for silage. The remaining third is kept much wetter and is grazed in July/August and then cut. Due to the scale and location of the reserve the farming operation is carried out by RSPB staff.

A major concern in relation to the management of the wet grassland is soft rush *Juncus effusus* encroachment. Soft rush is managed by an integrated control programme that includes grass reseeded, silage-making, grazing, cutting and some use of herbicide.

Water management of the site is dependant on the grid drainage system and the high rainfall. A major project, run over the last 5 years, has reinstated the original drainage system with additional control features. One of the main considerations in the planning of this project was to maintain access for management.

The degree of control we have over the management of this site and the grid structure of the landscape means that it is particularly suitable for wader research.

Individual variation in characteristics, timing and environmental factors influencing reproductive success in Black-tailed Godwits

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Many bird species display a seasonal decline in components of reproductive success. This phenomenon is surprising

because selection should act on late breeders and remove them from the population. This non-selective effect might be caused by deteriorating environmental conditions with the progress of the season and variation in individual timing due to the fact that late breeding birds are unable to pay the price of laying early. Major changes in agricultural practice in the Netherlands – in particular the advanced mowing date – have amplified the penalties of laying late for the ground-breeding meadowbird community and are thought to eliminate most late offspring. Black-tailed Godwits are particularly vulnerable to earlier mowing, because of their relatively late breeding season. This negligible reproductive success of late breeders has been mentioned as a possible explanation for the strong population decline in recent decades. In the Netherlands, we found a seasonal decline in reproductive performance of Black-tailed Godwits in different breeding populations unaffected by early mowing and during several years. Thus, timing of breeding seems to be an important natural variable in a godwit's life cycle. We assume that the natural variation in individual timing of breeding correlates with individual quality which might also be affected by environmental conditions. We studied the influence of several measures of individual quality and possible environmental factors on the timing of breeding in Black-tailed Godwits in an extensively managed nature reserve in the northern Netherlands. By disentangling the web of relationships between individual quality, environmental variables and reproductive success, we might be able to shed some light on the mechanisms causing the recent population decline.

Nest success of Northern Lapwings on organic and conventional arable farms in the Netherlands

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Previous studies show that organic arable farming leads to higher territory densities of ground-breeding farmland birds like the Northern Lapwing. However, higher densities do not necessarily mean higher reproduction rates. Nests and chicks can either be lost as a result of farming activities or through other factors, such as predation. There are various differences in farming practice between organic and conventional farms, such as mechanical weeding on organic farms and spraying with herbicides on conventional farms. These could lead to reduced breeding success of lapwings on organic farms compared with conventional farms. If so, organic farms could function as an ecological sink for lapwings and other ground nesting farmland birds. This study aimed to compare nest success of lapwings on organic and conventional arable farms, in order to determine whether organic farms are an ecological sink.

The study was carried out on 20 organic and 20 conventional arable farms in the Netherlands. Altogether, 135 lapwing nests were found of which 87 were on organic farms and 48 on conventional farms. On organic farms, almost half of all nests hatched, but the proportion of nests that hatched on conventional farms was higher. Farming activities were the main cause of nest loss on organic farms, but only caused a small number of nest failures on conventional farms. Predation rates were more or less equal on both farm types.

As fewer nests hatched on organic farms, chick survival

might need to be higher than on conventional farms otherwise organic farms could be an ecological sink. Future studies should show whether reproductive output is high enough on organic farms for their lapwing populations to be self-sustaining.

Is the abundance and distribution of Dunlin *Calidris alpina* in estuaries influenced by the presence of macroalgal mats? A long-term approach

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Estuaries used by shorebirds during the non-breeding season face many types of human pressure, including eutrophication and consequent occurrence of macroalgal blooms. The impact of this phenomenon on the abundance of Dunlin in the Mondego estuary, Portugal, was explored using a long-term, monthly time series, between 1993 and 2003. The data series included total macroalgal cover, macroinvertebrate biomass and Dunlin abundance.

We observed an increase in Dunlin abundance that matched the decrease in macroalgal cover that occurred after the promotion of management actions since 1998. We suggest that this increase was related to the increase in the abundance of some of its main prey species, the polychaete *Hediste diversicolor* and the bivalve *Scrobicularia plana*.

At smaller scales, no effect of macroalgae was observed on the proportion of Dunlin that chose to feed in alternative habitats (salinas) during the low tide period. However, the level of algal cover affected the proportion of birds recorded on macroalgae: birds avoided macroalgae at intermediate levels of coverage (around 25% of total mudflat area), whereas they seemed to prefer areas covered by macroalgae at high levels (above 35% coverage).

Energetic importance of night foraging for waders wintering in a temperate estuary

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Several studies have shown that most waders forage at night, probably achieving a significant portion of their daily energy intake during this period. However, despite being a widespread phenomenon, few studies have addressed the importance of night foraging for the energetic balance of waders.

We compared the foraging behaviour of several wader species during the day and during the night in the Tagus

estuary, Portugal. Focal observations were carried out at 13 study sites during the day and during the night. Night observations were recorded with infra-red (IR) sensitive cameras coupled with IR illuminators. We also compared day and night diets, through the analysis of faeces, and by direct observations of focal birds. Energy intake rates were estimated based on prey intake rates, proportion of active birds, proportion of each prey type in the diet, and average energetic content of each prey type.

The visual foragers, namely Grey Plover *Pluvialis squatarola*, Kentish Plover *Charadrius alexandrinus* and Ringed Plover *Charadrius hiaticula* foraged exclusively by sight during the night, but other species like Redshank *Tringa totanus*, Black-tailed Godwit *Limosa limosa* and Pied Avocet *Recurvirostra avosetta* seem to be more tactile at night, increasing the frequency of probes and the time spent scything. All studied species had higher peck rates, step rates and turning rates during the day, indicating that they forage more intensely by day. Redshank and Avocet had similar energetic intakes by day and by night. In contrast, Grey Plover achieved a higher energetic intake by night. Only Black-tailed Godwits were able to fulfil their daily energetic requirement during diurnal low tide. This probably explains why this species was rarely seen foraging at night.

Climate-mediated changes in the distribution and abundance of over-wintering waders in Europe

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Using count data collected from over 3,000 sites and spanning more than 30 years, it is established that climate change has affected over-wintering wader populations in NW Europe. Changes in site abundance of seven out of nine common wader species have been positively correlated with changes in temperature over the same period. This relationship is most marked at colder sites suggesting that responses are temperature dependent. The implications of these findings for conservation policy are briefly presented.

Dunlins *Calidris alpina* in Northern Europe: Do molecular genetics support the currently recognized subspecies?

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The Dunlin is a circumpolar wader breeding in arctic and subarctic habitats. In Northern Europe, there are three currently recognized subspecies: *schinzii*, *alpina* and *arctica*, but their taxonomy and distribution are unclear. We carried out tests to determine whether genetic structuring supports the currently recognized subspecies of Northern Europe. We used three different molecular markers: mtDNA, microsatellites and AFLPs (Amplified Fragment Length Polymorphisms). We describe the diversity within and between the populations representing the different subspecies, and find that *alpina* and *schinzii* are supported by all three genetic markers. *Arctica* is very similar to *schinzii*, whereas the proposed subspecies *centralis* (Buturlin 1932) in central Russia

tends to differ genetically from *alpina*. We also investigate the subspecies affiliations of Dunlins on Svalbard.

How do wintering Eurasian Oystercatchers *Haematopus ostralegus* change their foraging behaviour across the seasons?

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We investigated changes in the foraging behaviour of wintering Eurasian Oystercatchers *Haematopus ostralegus* on the Exe estuary, SW England, across the seasons, autumn-winter-spring, between September 1996 and April 1997.

Almost everyday, adult oystercatchers that open edible mussels *Mytilus edulis* by hammering the ventral surface were observed foraging throughout the whole period of tidal exposure from a scaffolding hide with a telescope. Individuals were selected at random for 10-minute focal observation. Behaviours recorded included search speed, successful handling time, successful hammering time, successful carrying time, number of mussels rejected between mussels opened successfully, waste handling time, waste hammering time, and waste carrying time. The effect of season on foraging behaviour was investigated by including date (days since 1 Aug) as a predictor variable in stepwise multiple regression and non-linear regression equations. The effects of other potentially significant predictors (mussel length, state of the tide and competitor density) were controlled by inclusion in the regression equations.

Search speed increased until 21 Nov after which it decreased. The number of short pecks (pecks lasting <3s) made per five paces increased through the winter, whereas the number of long pecks (pecks lasting >3s) decreased. This change might be associated with size selection of potential prey (mussels). The birds took increasingly larger mussels in early autumn but started to accept smaller and smaller mussels after Oct. Towards the end of winter they switched back to larger mussels. Successful handling time increased until 21 Dec when it reached an asymptote. Similarly successful hammering time increased until 22 Dec when it reached an asymptote. This increase was probably due to an increase in the ventral thickness of the mussels available on the mussel bed due to the selective predation of oystercatchers themselves on thin-shelled mussels. Successful carrying time increased throughout the winter and this change could be associated with increased interference competition. There was some evidence that the number of mussels rejected between mussels successfully opened declined until 24 Nov and then increased during the rest of the winter. However, more data are needed to confirm this. Waste handling time declined at the beginning of winter, increased around mid-winter, but again declined towards the end of the winter. The precise dates on which these changes occurred could not be established. These behavioural changes could also be associated with changes in mussel size selection. Waste hammer-

ing time and waste carrying time did not show significant variation across the season.

The north-eastern Mongolian steppes: a stopover site of importance for Pacific Golden Plovers

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Pacific Golden Plovers *Pluvialis fulva* breed on the arctic tundra of Northern Siberia and Alaska, and spend the winter on islands in the Pacific, such as the Hawaiian Islands, and in Australia and New Zealand. The migration routes between wintering areas and breeding grounds are among the longest flights known in shorebirds. The general routes followed are more or less clear, but detailed knowledge about the trans-Asian part of the flight is lacking. Recent reports of about 50,000 Pacific Golden Plovers in the Torey Depression in the north-eastern steppes of Mongolia suggest that this area is of importance for the species as a stopover site. To obtain better knowledge of the area as a site of potential importance for the species, we went on expedition to the Torey Depression in May 2005. Large flocks of Pacific Golden Plovers were present between mid May and early June. Using a traditional Frisian catching method, we trapped 325 Pacific Golden Plovers. Average arrival mass was *c.* 119 grams. With an average weight gain of 2.8 g/d, the birds weighed on average 165 grams (maximum 184 grams) in early June. We discuss the importance of the north-eastern Mongolian steppes as a refuelling site for Pacific Golden plovers by describing their general stopover ecology, changes in organ size during stopover, migration phenology.

Increases in worm-eating waders in the Dutch Wadden Sea in 1975–2003

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As a part of a study on the effects of shellfisheries on water bird numbers in the Dutch Wadden Sea (the 'Eva II-program'), we analysed trends in numbers of 18 benthivorous species in 1975–2003. Recent decreases (starting somewhere around 1990) were observed in all shellfish-eating species and these were linked to the effects of shellfisheries. In contrast, many worm-eating species increased in numbers. In this paper the trends of worm-eating species are presented. These trends will be compared to trends in other wetland sites abroad and hypotheses that could explain the observed patterns will be presented.

The role of artificial illumination on the nocturnal foraging of waders

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Many estuarine areas used by waders are affected by artificial illumination at night. However, although several studies have acknowledged that artificial light has a potential impact on their feeding behaviour, its influence has received little attention.

We compared numbers and foraging behaviour of waders at 13 intertidal areas with and without artificial illumination during the night. Birds were observed using infra-red sensitive cameras with additional infra-red illuminators.

Visual predators, namely Grey Plover *Pluvialis squatarola*, Kentish Plover *Charadrius alexandrinus* and Ringed Plover *Charadrius hiaticula* were generally more abundant in illuminated areas, while tactile predators like Redshank *Tringa totanus* and Pied Avocet *Recurvirostra avosetta* showed no differences in numbers between areas.

Foraging behaviour was significantly different between illuminated and non-illuminated areas for all studied species except for Pied Avocet. Both Kentish Plover and Ringed Plover showed higher feeding activity in illuminated areas, with higher peck and step rates. Redshanks tended to use a visual predation strategy in illuminated areas, increasing the pecks at the surface of the sediment, and decreasing probe rate and time spent scything.

The feeding success of Kentish Plover and Grey Plover was higher in illuminated areas, and this will probably apply to other visual predators.

Day and night feeding and roosting by Red Knots in Delaware Bay

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Automatic radio-telemetry showed that the Red Knots *Calidris canutus* that fed on the western (State of Delaware) side of Delaware Bay while staging in May 2003 roosted day and night on marshland 1.7 km inland from the bay-shore. Enquiries suggest that, worldwide, knots usually roost at night on the shore at sites that are remote from features such as cliffs or trees that might give cover to predators. So far as we are aware, this is the first record of knots roosting inland at night anywhere.

In May of 2004 and 2005, the inland roost site was not used, possibly because of extensive flooding. Instead, many of the knots that fed on the western side of the bay by day commuted across both the bay and the Cape May peninsula to roost on an island sandbank on the Atlantic coast of New Jersey, a round trip of 94 km. We assume that the birds flew

so far because of the lack of any safe, suitable roosting site on the Delaware shore. The energetic cost of this commuting over the approximate 14-day stopover is equivalent to almost half the flight to the birds' arctic breeding grounds.

Delaware Bay is the final stopover on the northward flight and the birds need to lay down the resources they require both to fly to the arctic and sustain themselves after arrival. Since the birds have limited time in which to put on weight, regular long-distance roosting flights of this magnitude could compromise their ability to breed successfully. These observations indicate that the conservation of stopover shorebirds not only involves ensuring that they have sufficient food supplies but also a nearby safe and suitable roosting site.

Changes in wader ranges and populations in the Russian Arctic during the 20th century: prosperity vs decline?

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Changes in breeding distribution and abundance of 57 species of waders during the 20th century (mostly recent decades) were determined on the basis of the literature survey undertaken for *The Atlas of the Breeding Waders of the Russian Arctic*. Ranges and numbers of the majority of the species were certainly or presumably stable. One group of species had positive trends in ranges and/or populations, while negative trends were found in surprisingly few species. Changes in a species range were discovered more often than changes in abundance. This reflects, firstly, the absence of population trend monitoring in the Russian Arctic and, secondly, easier detection of distribution as opposed to numerical change in the primarily faunistic data available for analysis. The prevalence of positive over negative trends in wader distribution can be explained by the fact that range expansion is more readily recorded than range shrinkage.

Northward expansion of southern species was the most common trend (13 of 23 expanding species), which led to the appearance of three new breeding species in the Arctic. Spoon-billed Sandpiper is the only species that experienced both distribution contraction and population decline across its range. In other cases, decline was found only in some populations.

Regionally negative trends were characteristic of populations in the extreme western and eastern parts of the Russian Arctic. Population increasing and expansion trends predominate in the same regions and additionally in West Siberia. These results are influenced by regional differences in survey activities, but also depend on natural phenomena. Western European Russia is characterized by the most dynamic population processes in waders (e.g. majority of the northward range extensions and population declines were recorded in this region). In the Far East, a large proportion of species with positive population trends belong to the American Flyway (n = 5).

**Thermogenic capacity and cold acclimatization
in a medium size shorebird,
the Red Knot *Calidris canutus***

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The Red Knot is now known as much for its long-distance migrations as for its extreme physiological flexibility allowing the species to survive through a wide array of ecological conditions. In this study, we investigated metabolic adjustments leading to cold acclimatization in the *islandica* subspecies which breeds in the Canadian arctic and north Greenland and winters in Western Europe. Seasonal cold acclimatization in birds typically results from increased shivering endurance and elevated thermogenic capacity. Although studied for decades in passerine species, our understanding of the physiological basis for cold endurance and acclimatization of shorebirds remains unclear. Some studies on passerines show that improved cold endurance during winter is associated with a significant increase in summit metabolic rate (Msum), a measure of maximal thermogenic capacity and an indicator of the level of sustainable heat production, while in other cases improved cold endurance can develop without any changes in Msum. Improved cold endurance can also be accompanied by an elevated basal metabolic rate (BMR), but not in all cases. In our study, knots experimentally maintained in a constant cold aviary (3°C) consistently showed a basal metabolic rate (BMR) > 20% higher than birds maintained under constant warm (25°C) conditions. Msum was also higher in cold acclimated birds, but this effect disappeared when controlling for the effect of body mass. There was nevertheless a clear effect of thermal regime on cold endurance since birds kept in constant cold needed much colder temperatures (34%) than warm birds to attain Msum. Initially, BMR and Msum were correlated, but the relationship disappeared when controlling for body mass, showing for the first time in birds that the known interspecific relationship between BMR and Msum does not hold intraspecifically. Therefore, our results suggest that knots acclimatize to cold through modulation of lean body mass and adjustments in tissue metabolism.

**American Oystercatchers breeding in New
Jersey: evidence of a habitat shift in response to
human disturbance on coastal barrier beaches**

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American Oystercatchers *Haematopus palliatus* breeding along the New Jersey coast face significant threats including habitat loss, habitat degradation, human disturbance and increasing threats from predators. The coastal barrier beach

habitat ordinarily utilized by the species is either unavailable or heavily disturbed in New Jersey, which may be leading to a habitat shift forcing the species into salt marsh habitat to breed. Although the population in New Jersey appears to be increasing, the effect on the population of a habitat shift into potentially sub-optimal breeding habitat remains unclear. The purpose of my research is to investigate whether or not such a habitat shift is occurring in response to human disturbance and to determine what effect this shift may be having on the overall reproductive success of the population.

I have recently completed the first year of a two-year study investigating the breeding success and causes of nest failure for oystercatchers breeding on coastal barrier beaches and in adjacent salt marshes. Reproductive data was collected at three study sites, which were selected over a gradient of human disturbance levels. Data was collected for all pairs found with established territories in both barrier beach and salt marsh habitats at each site. Results were compared between sites and between habitat types.

Based on the results for the first year of my study, there is strong evidence that higher numbers of oystercatchers occur in salt marsh habitat adjacent to barrier beaches along the New Jersey coast in areas where human disturbance on the beaches is high. Additionally, there is strong evidence that overall reproductive success for oystercatchers attempting to breed in salt marshes is significantly lower than for those breeding on barrier beaches.

**Waders and other wetland birds at
Walvis Bay, Namibia**

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Between 1997 and 2005, the complex of wetlands at Walvis Bay, central Namibia, supported, on average, 156,000 waterbirds in summer (median of nine January surveys) and 82,000 waterbirds in winter (median of eight July surveys). For 25 species, maximum counts exceeded the 1% thresholds for the flyway populations and for 19 species the median counts exceeded this threshold. Key species are Curlew Sandpiper *Calidris ferruginea*, Sanderling *C. alba*, Little Stint *C. minuta*, Chestnut-banded Plover *Charadrius pallidus*, White-fronted Plover *C. marginatus*, Pied Avocet *Avocetta recurvirostra*, Ruddy Turnstone *Arenaria interpres* and Grey Plover *Pluvialis squatarola*. The paper provides an overview of wader populations along the southwestern coast of Africa, where the upwelling associated with the Benguela Current drives the ecosystem. The paper shows that the Walvis Bay wetlands support the largest number of waders of any wetland in the region. The wetland is a Ramsar site and an Important Bird Area. The paper will discuss the conservation issues: reduction of intertidal habitat; the juxtaposition of the wetlands with the town of Walvis Bay, Namibia's main deep-water port; and siltation of the lagoon.

Annual Conference – Abstracts of posters

During the conference, Petra de Goeij organised the usual poster competition and participants voted for the one they preferred. The results were:

- 🏆 **Joint first prize: *Ireland's wintering waders 1994/95–2003/04*** by Olivia Crowe, Helen Boland and Andy Musgrove
- 🏆 **Joint first prize: *Managing water levels for breeding waders on grassland*** by Sarah Eglington, Jenny Gill, Andrew Watkinson, Bill Sutherland, Mark Bolton and Mark Smart
- 🏆 **Third prize: *The effects of traditional shellfishing on bird usage of mudflats in the Tagus Estuary, Portugal*** by Maria P. Dias, Filipa Peste, José P. Granadeiro and Jorge M. Palmeirim

Phenology of northward migration of Red Knots at Peninsula Valdés, Argentina, 1994–2005

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Since 1994, the National Patagonian Center CONICET, has carried out systematic censuses of Red Knots *Calidris canutus rufa* at Fracasso Beach, Peninsula Valdés, Argentina, during their northward migration in the austral autumn. Weekly counts are made from late February to the beginning of May. During 1994–1999, we recorded knots stopping over in March and April. However, from 2000 the pattern changed with the main passage occurring later, peaking in April. In 2004–2005, knots were even observed in the first fortnight of May.

Although changes in the migration phenology of shorebirds are not unusual, those recorded at Peninsula Valdés could have important consequences for the population if they mean that the birds are late arriving on their breeding grounds and this has a negative impact on breeding success. Alternatively the birds may be adjusting to changes in global conditions without impact on reproductive success or survival.

Impacts of changes in sewage disposal on waders wintering in north-east England

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Over the last 15 years, there have been major improvements in the treatment and discharge of sewage throughout the European Union as a result of the 1991 Urban Waste Water Treatment Directive. The impact of this has raised concern as sewage discharges may provide considerable food supplies to birds, either as directly edible matter or by enhancing concentrations of invertebrate food. Our study, following on from monitoring work undertaken by the University of Durham, investigated how changes to sewage disposal in the Northumbria Coast SPA in north-east England might have impacted waders wintering in this area. At a local scale there were declines in the numbers of Ruddy Turnstones and Purple Sandpipers – the two species for which the SPA is designated.

Preliminary analysis of colour-ring sightings suggests that the decline in turnstone numbers may have been due to a drop in adult survival a year after changes were implemented.

Ireland's wintering waders 1994/95–2003/04

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Wintering waterbird populations and the wetlands upon which they rely have been monitored in Ireland as part of the Wetland Bird Survey (WeBS) in Northern Ireland and the Irish Wetland Bird Survey (I-WeBS) in the Republic, since the winters of 1993/94 and 1994/95 respectively. Both surveys employ the 'look-see' method, where counters record the number of individuals of all waterbird species present on frequent visits to pre-defined discrete wetland sites.

Of the waterbirds recorded during these surveys, 15 wader species regularly occur in significant concentrations and at a relatively large number of sites in Ireland. Many migrate to Ireland from the northwest, predominantly Canada, Greenland, Iceland and the Faeroes (Eurasian Oystercatcher *Haematopus ostralegus*, Ringed Plover *Charadrius hiaticula*, Eurasian Golden Plover *Pluvialis apricaria*, Red Knot *Calidris canutus*, Black-tailed Godwit *Limosa limosa*, Redshank *Tringa totanus* and Ruddy Turnstone *Arenaria interpres*). Others (principally Northern Lapwing *Vanellus vanellus*, Grey Plover *Pluvialis squatarola*, Sanderling *Calidris alba*, Purple Sandpiper *Calidris maritima*, Bar-tailed Godwit *Limosa lapponica*, Dunlin *Calidris alpina*, Eurasian Curlew *Numenius arquata* and Greenshank *Tringa nebularia*) come from breeding grounds ranging between northern Europe east to Siberia. It is likely that some proportion of wintering oystercatchers, curlews and Redshanks in particular include residents from the respective Irish-breeding populations.

In recent seasons, eight species have been shown to occur in internationally important concentrations at one or more sites in Ireland, including Black-tailed Godwit at 19 sites, Redshank at eight sites and Bar-tailed Godwit at four sites. Ireland supports significant proportions of the flyway populations of both Black-tailed Godwit (40%) and Ringed Plover (20%). In total, 23 sites in Ireland regularly support

in excess of 10,000 waders. Dundalk Bay, Strangford Lough, the Shannon and Fergus Estuary, Cork Harbour and Wexford Harbour and Slobs are the top five most important wader sites. Of the 24 sites that support internationally important concentrations, Dundalk Bay supports the most (oyster-catcher, knot, Black-tailed Godwit, Bar-tailed Godwit and Redshank). Dublin Bay and Strangford Lough each support internationally important concentrations of four species while a further five sites support internationally important concentrations of two species. Over the 10 seasons between 1994/95 and 2003/04, seven species have shown declining trends, in particular Grey Plover, lapwing, knot and Dunlin, while there were increases in five species, most notably Sanderling and Greenshank. The trends of Eurasian Golden Plover, Bar-tailed Godwit and Ringed Plover appear to have remained stable.

Differences in the ectoparasitic loads of Red Knots at two wintering sites in South America

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Differences in parasite load between habitats and differences in immunodefence investment between species are basic factors that might explain certain peculiarities in the distribution patterns and migratory strategies of shorebirds. In this study, we analyzed the ectoparasite load of Red Knots *Calidris canutus rufa* in two wintering sites: Tierra del Fuego (Argentina) and Maranhão (Brazil). The birds were captured during November 2004 (Argentina) and February 2005 (Brazil). Parasite loads were estimated as number of ectoparasites in the following ranges: 1–100, 101–200, 201–400 and >400.

Of the 113 individuals sampled in Tierra del Fuego, only five were found to have any ectoparasites, all in the range 1–100. All ectoparasites found in that site belonged to the order Mallophaga. In contrast, all 38 knots sampled in Maranhão showed ectoparasites from both orders Mallophaga and Acari, and the majority of birds had ectoparasites in the range >400. The differences found in ectoparasite loads could be related to the environmental characteristics of the wintering sites. In general, tropical latitudes, such as those of Maranhão, have a higher prevalence of parasites compared with temperate latitudes, such as those of Tierra del Fuego. Therefore the conditioning of the knots and their migratory strategies could be affected not only by the distance between the wintering sites (in this case 6,000 km), the food they have to offer and such factors as temperature and predation risk but also the risk of infection with ectoparasites.

Stop-over ecology of Eurasian Golden Plovers *Pluvialis apricaria* in Southern Sweden

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During stopover on migration, large flocks of Eurasian Golden Plovers use the modern agricultural landscape in Southern Sweden. As they select large fields in one of the most intensively used areas of arable land, it seems that this species benefits from modern farming practices. However, many aspects of their stopover behaviour are still unknown, and we do not know how modern agriculture affects the plovers in a longer perspective.

In our project, we try to increase the understanding of how modern agricultural practises affect birds using farmland during migration. In relation to the Eurasian Golden Plover, we ask the following questions: How long do individual birds stay in the area? What do they do – moult, build up fat/muscles etc? Do the plovers, as we suspect, feed mainly at night? And if so, what types of fields do they feed on? By radio-tracking, regular observations and time-budget-studies of flocks and colour-marked individuals, we hope to find out more about the plovers' behaviour and utilisation of different types of fields. Analyses of blood samples and respirometer studies will help us to determine energy budgets, fuel deposition rates and pesticide exposure of individual birds. The poster presents the project and some preliminary results.

The effects of traditional shellfishing on bird usage of mudflats in the Tagus Estuary, Portugal

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Industrial shellfish exploitation is recognized as a major threat to the quality of the feeding habitats of many species of waders. In contrast, the impact of traditional, non-intensive shellfish harvesting on wader numbers and behaviour is still poorly known. On the Tagus estuary, Portugal, many wader species prey on the bivalve *Scrobicularia plana*, a species commonly harvested by a large number of local shellfishers. During the 2004/2005 winter, we studied the impact of this activity on wintering waders on the Tagus estuary. We quantified the depletion caused by shellfishers on *S. plana* and evaluated whether *S. plana* harvesting and sediment digging affected the use of the mudflats by waders. Shellfishery pressure was quantified during several surveys in which the number of active shellfishers present was counted. The impact of hand harvesting of shellfish on bird usage of mudflats was evaluated by comparing the densities and feeding behav-

four of waders before and after the areas were dug for shells. Overall, shellfishery pressure in the estuary is rather low, mainly because large intertidal areas are inaccessible from the shore. However, locally the impact may be high, especially near the main urban centres, where many shellfish and bait diggers concentrate. The density of Pied Avocets *Recurvirostra avosetta* decreased following the hand harvesting of *S. plana*, but Redshank *Tringa totanus* and Black-tailed Godwit *Limosa limosa* did not show any noticeable change in feeding density. None of the species changed their feeding behaviour following the sediment digging. We therefore conclude that traditional shellfish harvesting has no major effects on the numbers and feeding behaviour of waders in the Tagus estuary.

Restinga or sandflat? Prey selection of Red Knots *Calidris canutus rufa*: an unusual northern migration season in 2004 at San Antonio Oeste, Río Negro, Argentina

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From February to April, San Antonio Oeste is an important stopover site for Red Knots after leaving their wintering grounds in Tierra del Fuego. Usually, flocks of thousands of knots feed by day on a *restinga*, a broad intertidal rocky flat, where they ingest the small mussel *Brachidontes rodriguezi*. These occur in patches attached to the substrate and are located visually. During March–April 2004, however, unusually knots were observed probe-feeding on an extensive intertidal sandflat.

Benthic sampling in March/April 2004 plus nine collections of 100–150 droppings and 34 pellets showed:

- On the *restinga*, mussel size distribution, total mussel density, the density of sizes selected by knots, the biomass of selected sizes (19.4–78.8 g AFDM total biomass/m²) and biomass equivalent per dropping (0.063–0.065 g AFDM total) were in the same range as and not significantly different from those found in a similar study carried out in 1992.
- In the sandflat, the main prey was the clam *Darina solenoides* with a length range of 9–35 mm. Despite the low clam biomass of selected sizes (0.886 g AFDM total/m²), biomass equivalent per dropping (0.068 to 0.091 g) and per pellet (0.088 g) were higher than those found on the *restinga*. Mussels eaten (4–20 mm) and positively selected sizes (6–13 mm) were smaller than clams eaten (16–35 mm) and positively selected (16–24 mm).

Clams were a better quality food than the mussels because they have thinner shells relative to biomass (AFDM/Ash of clams = 2*(AFDM/Ash of mussels), $p < 0.001$). The knots fed on mussels on the *restinga* only by day and it was assumed that the reason why they did not feed there at night was because of an increased risk of predation due to the proximity of dunes and cliffs. In 2004, the knots fed on the sandflat both day and night and their breeding plumage scores

(an index of body condition) were significantly higher than in 2001–2003. It is concluded that they were reaping the benefit of an unusually good food supply of clams on the sandflat and were feeding there for that reason rather than because of poor availability of mussels on the *restinga*.

Managing water levels for breeding waders on grassland

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Lowland wet grasslands are a habitat of extreme importance for many breeding bird species across Europe, most of which are presently declining in number. Across the UK, loss of quantity and quality of wet grassland habitats is a major cause of these declines. There is thus a pressing need to identify management techniques which can (a) deliver maximum conservation benefits for breeding waders on nature reserves in the face of continued habitat loss, and (b) deliver significant conservation benefits outside of nature reserves whilst being compatible with current farming practices.

This PhD project is exploring the costs and benefits associated with water management in grasslands, both for breeding waders, and for farmers. It is focussing on the most appropriate design and management of wet features for both maximising breeding wader densities on nature reserves, and improving grasslands for breeding waders in the wider countryside, whilst ensuring that this is compatible with farming practises.

The project is specifically looking at the use of footdrains to help create suitable conditions for breeding waders whilst minimising any practical management problems for farmers. Although footdrains were originally installed for surface drainage, they can also be used to hold water and transport it to the centre of the grazing marsh. This increases the area of grassland suitable for breeding waders.

This poster will present some of the findings following the first year of fieldwork in which the importance of wet features for nest site selection and chick foraging preferences in the Lapwing *Vanellus vanellus* have been investigated at sites throughout the Norfolk Broads, E England. It will also cover some of the practical issues of re-creating grazing marsh from arable land and managing water levels.

Some aspects of Black-tailed Godwit *Limosa limosa islandica* ecology in the national nature reserve of 'Marais d'Yves', Charente-Maritime, France

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The "Marais d'Yves" is one of the national nature reserves of the "Pertuis charentais", which are among the most important wetlands in Western France. It is a major site for many migratory water birds, particularly in winter (20,000 waders in Dec and Jan). The reserve includes three main habitats:

dune, lagoon and wet grassland. It is edged with a broad mudflat and the Charente estuary. In 1992, a new species started wintering at this site: Black-tailed Godwit ssp *islandica*. Since then, the population has shown an exponential increase both on the reserve and nationally. During two winters (2001/2002 and 2002/2003) a detailed survey was undertaken to understand how the species uses the site.

At high tide, the Black-tailed Godwits concentrate on the lagoon, where we counted the roost on 40 occasions. These counts were analysed in relation to tide height, the birds' arrival time, the water level in the lagoon, weather conditions and the birds' precise location. At low tide, an observer ran between the national nature reserve and the Charente estuary in order to plot the birds' feeding sites on a map. This was carried out during 48 low water periods during the two winters. When the Black-tailed Godwit flocks fed near the shore, foraging scans (248) were carried out: each bird was observed for two minutes and we counted the number of prey taken, differentiating between round prey (bivalves) and long prey (worms). Benthic samples were also taken from the mudflats.

Black-tailed Godwits were the first waders to go to the roost, doing so 3–5 hours before high tide (depending on tide height). They were also the last to leave. They fed in a specific strip of the tidal zone, an area that became rapidly submerged by the rising tide. The location of the roost depended on the level of the water in the lagoon. Nine feeding sites in three main areas were identified. During the two winters, there were many differences in their use by the birds: one site might be used regularly in one year and almost deserted the next. The scans showed that Black-tailed Godwits fed almost exclusively on round/bivalve prey. Samples from the feeding areas showed that three species of mollusc (*Macoma balthica*, *Cerastoderma edule*, *Scrobicularia plana*) and one species of worm (*Nereis diversicolor*) were abundant in the mudflat. Future studies, comparing these results with the other local sites, will allow better understanding of the temporal and spatial use of the area by Black-tailed Godwits.

Red Knots in the cold better keep a full gut

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The Red Knot *Calidris canutus* is a long distance migrant known for its extreme capacity to adjust to challenging ecological conditions. The subspecies *islandica*, breeding in north Greenland and the Canadian arctic and wintering in Western Europe, has to cope with relatively cold environments for a major part of its life cycle making it an ideal candidate to study energy budgeting in relation to thermoregulatory demands. We were interested in the potential use of heat generated by digestion, the Heat Increment of Feeding (HIF), as a compensatory measure for thermostatic costs. Using standard respirometry techniques, we measured the metabolic rates of fifteen long-term captive Red Knots in fasted and unfasted states at thermoneutrality (20°C) and

under mild cold conditions (3°C). This provided within-individual data on basal metabolic rate (BMR), HIF, thermoregulatory costs as well as the level of thermoregulatory compensation. Food processing at thermoneutrality increased metabolic rate by 1.5 times over BMR while fasted thermoregulation induced a 2.2 fold elevation in energy consumption. However, when measured in the cold, there was no difference in the level of metabolism comparing fed and fasted states. We therefore conclude that the energy invested in HIF and thermoregulation is not additive, but rather that the Heat Increment of Feeding is fully used for thermoregulation. Therefore, keeping a full gut in the cold allows for substantial thermoregulatory savings.

The ecology and behaviour of the Greenshank *Tringa nebularia* in winter

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Ireland holds the majority of Greenshanks *Tringa nebularia* wintering in the British Isles. However, little is known of their habitat requirements or their feeding ecology and behaviour during the winter months. This ongoing study, which commenced in 2002 at estuaries in West Cork, is focusing on the foraging behaviour of the Greenshank and its habitat preferences. *T. nebularia* rarely feeds in open mudflats but instead forages along the banks of the main- and sub-channels, in runnels and in shallow sandy pools or in those with both a sandy and rock-strewn shoreline. Video studies have enabled us to define and classify the different daytime foraging behaviours. Prey types were identified by telescope, video and photography. The benthic fauna of selected sub-habitats has also been studied. Greenshank feed on a variety of different crustaceans and on fish, including flat fish. It is probable, though as yet unproven, that the same individuals occupy the same disjunct and isolated sub-habitat locations throughout the winter. Preliminary evidence suggests that the Greenshanks in SW Ireland may be experiencing competition from the recently arrived and rapidly expanding Little Egret *Egretta garzetta* population. There is considerable overlap in the habitat preferences (and perhaps prey) of the two species. Greenshanks appear to abandon locations which are subject to continuous human disturbance.

Investigating shorebirds, algal mats and eutrophication at a West Cork estuary: on-going studies for an on-going problem

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Clonakilty Bay (West Cork, Ireland) has been affected by algal mats for well over a decade. During 2005, the bay was affected by algal blooms that exceed all observations in recent times. Linked to organic enrichment (eutrophication),

algal mats are present from spring through to their breakdown in late autumn/winter and extend over more than half of the muddy intertidal areas.

Previous studies of shorebird–algal mat interaction within Clonakilty Bay have shown that:

- Many shorebird species actively avoid algal areas particularly Black-tailed godwits *Limosa limosa islandica* and Redshank *Tringa totanus*. Foraging distribution however, is still best explained by the distribution of invertebrate prey.
- Benthic invertebrates within algal-affected areas are characterised by low species diversity and a reduction in some prey species e.g. bivalves. Following algal mat breakdown some prey species rapidly re-colonise and form dense aggregations e.g. *Hydrobia ulvae* and *Corophium volutator*.

Black-tailed godwits increase their foraging success and intake rates within previously algal-covered areas during the months following algal mat breakdown. We hypothesise that this reflects successful patch use by shorebirds locating ‘hot-spots’ of prey due to the increase and aggregation of detritivores when other intertidal areas are potentially exhibiting prey depletion. Black-tailed Godwits may out-compete Redshank for this ephemeral resource.

We highlight on-going research that aims to determine shorebird foraging intake rates across the bay including areas unaffected by algal mats but affected to the same degree by organic enrichment. Early indications are that shorebird intake rates are high relative to other published data. The collection of long-term data also seeks to investigate the effects of a proposed wastewater treatment plant upgrade and a proposed barrage construction on shorebird densities, diversity and foraging success within this highly sensitive estuarine environment.

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Different timing of the migration of “eastern” Dunlin in the Baltic and Adriatic

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There is a quite clear tendency for the number of Dunlins *Calidris alpina* in active moult while incubating or rearing chicks to increase from west to east across their Eurasian

breeding range (Gromadzka 1989, Engelmoer & Roselaar 1998, Holmgren *et al.* 2001). Birds from E Siberia complete their primary moult before autumn migration (Engelmoer & Roselaar 1998). The Yamal Peninsula seems to be an intermediate area where some birds show no primary moult when breeding while others do (Gromadzka 1989).

Generally, white wing coverts in winter plumage are diagnostic of adult Dunlins and buffish wing coverts diagnostic of juveniles. However, some adults in winter plumage may have wing coverts with buffish or orange-reddish tips that are grown in late summer or autumn (Gromadzka 1986, 1989) and it has been shown that these are birds that start moulting while still on the breeding grounds (Gromadzka 1989). Engelmoer & Roselaar (1998) claimed that the presence of these coverts is a typical character of *C. a. centralis*. These adult-type buff coverts can be distinguished from juvenile coverts because they lack a dark subterminal band (see details in Gromadzka (1986)).

We compare the phenology of autumn migration in the Baltic and Adriatic of adult Dunlins with white wing coverts suggesting they are easternmost breeding *C. a. alpina* with those having buffish coverts suggesting they are westernmost breeding *C. a. centralis*. We call the latter “eastern” Dunlins and distinguish them by the presence of adult buff wing coverts and the fact that they have completed their primary moult.

First, eastern Dunlins arrive on the Baltic coast in the second ten days of August, earlier than on the Adriatic coast. In the Baltic, the percentage of eastern birds increases in late August and is then more or less stable in September in the range 20.6–23.5%. In the Adriatic, the number of eastern Dunlins increases in the third ten days of September, when they comprise 13.7% of all adults. On the Baltic, between the second ten days of August and the end of September eastern Dunlins comprise 9.3% of adults while in the Adriatic area they comprise 6.5% (a significant difference: $\chi^2 = 10.39$, $p = 0.0013$).

We suggest that eastern Dunlins, heading to the central and western Mediterranean, stop in the Black Sea to complete their moult, so delaying their arrival on their wintering grounds. The proportion of eastern dunlins in the Baltic is higher than in the Adriatic, probably because their main migration route leads from Siberia through the Baltic to wintering grounds around the North Sea.

Survey of Sociable Plover *Vanellus gregarius* in the South Urals, May 2005

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A pilot survey of Sociable Plovers was carried out in the South Urals in May 2005. All sites where Sociable Plovers have bred in the last 10 years were checked. Only one colony of 3 pairs was found in the region. This was located on an agricultural field near a site where there was a breeding colony in 1992 and 1997. Data on behaviour, structure of colony and dynamics of its numbers were obtained. Possible reasons for the species’ decline and threats are discussed.

Chick viability in the Kentish Plover

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In precocial species, survival of offspring from hatching till fledging may strongly depend on their ability to escape from predators, especially the speed at which they can run. Therefore running speed may be a good measure of offspring viability. We tested this prediction in the Kentish Plover *Charadrius alexandrinus* during a study in the United Arab Emirates. We performed a test in which chicks were made to run a distance of 10 m and recorded the time they took. No relationships were found between chick performance during the test and individual growth rates or survival. We also discuss the effects of environmental factors such as date and temperature on chick performance and viability.

Artificial nest experiment suggests equal predation pressure on waders in coastal meadows and mires

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Estonia supports a substantial proportion of the European breeding populations of several wader species, e.g. a third of the Baltic Dunlin *Calidris alpina schinzii* population. Yet, there are no coherent quantitative data available on the breeding success of and predation pressure on Estonian waders. In order to compare the quality for breeding waders of managed coastal meadows and inland mires, an artificial nest experiment was carried out in 2004 and 2005 in western Estonia. Eight pairs of adjacent coastal meadow and mire sites were selected. The pairs of sites were on average 20.8 km apart (SD±9.9 km). At each site, ten artificial nests containing quail eggs were surveyed at 5–7 day intervals over 21 days; searches were also made for the real nests of waders. No significant differences were detected between the predation rates of artificial nests on meadows and mires (paired t-test: $p = 0.70$). Survival rates of the real wader nests showed similar tendencies as those of the artificial ones, but sample sizes of the real nests were too small to allow analysis.

Sex and age differences in body mass gain of Wood Sandpipers *Tringa glareola* on spring passage in NE Poland

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In this study, differences in body mass gain were found between females and males, and between second-year and older females in Wood Sandpipers on spring migration.

Wood Sandpipers were caught by WRG KULING between 27 April and 14 May at two stopover sites (Nisko, Kwiecewo) in NE Poland during 2003–2004. Birds caught were aged as second-year or older and weighed; blood samples were taken for sexing. The birds were sexed by DNA analysis, based on amplification of the CHD gene with PCR technique (Griffiths *et al.* 1998). In total, 70 females and 46 males were identified in 2003 and 19 females and 13 males in 2004. In both seasons, body mass increased significantly with the progress of the season in females (2003: $r = 0.48$, 2004: $r = 0.49$), while in males it remained at the same level. In 2003, second-year females were on an average 4.8 g lighter than older ones, while no significant differences occurred in the body mass of males according to age category. Body mass increase estimated according to a regression equation relating mass to date for all second year females caught was only 0.7 g/day, while older ones put on 1.2 g/day. These results might indicate different strategies of fat accumulation between the sexes, as well as lower feeding efficiency of young females during spring migration.

Variation in the diet of Red Knots *Calidris canutus* during winter in national nature reserves of the Charente Straits, France

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The national nature reserves of the *Pertuis charentais* are among the most important wetlands in Western France. They support many migratory birds, particularly in winter. These mudflats constitute the main southern limit of the distribution of the *islandica* subspecies of the Red Knot, which feeds exclusively on molluscs. These are ingested in their entirety, a fact that facilitates our study of diet throughout the winter period. We determined how diet changed with date in terms of prey species and quantity and in relation to changes in resource availability.

First, we surveyed the mollusc resources in three nature reserves (five samples from four locations every month from September 2004 to February 2005) in order to estimate temporal and spatial variation in the availability of different organisms and their energetic content. Second, these results were compared with changes in the knot's diet determined by faecal analysis. Every month, faeces were collected from three different sites and their contents identified and quantified.

Five species of molluscs were abundant in the mudflats (*Hydrobia ulvae*, *Macoma balthica*, *Cerastoderma edule*, *Abra tenuis* and *Scrobicularia plana*) but with large differences in densities and proportions between sites. Similarly

these five species could occur in very different proportions in the diet at over time and between the five sites. Among the prey species, the gastropod *Hydrobia ulvae* was the main species taken when suitable sizes of bivalves (mainly *Macoma balthica*) were not accessible to the knots, especially at the end of the winter. Variations in diet composition and resource availability over the winter were related to the number of wintering Red Knots at each site.

Breeding numbers and nest success of waders in a changing environment on the Taimyr Peninsula, Siberia

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Numbers and nest success of Arctic-breeding waders were monitored during 1994–2003 on the Taimyr Peninsula, Siberia. A trend towards earlier breeding was significant in all species, which tallies with increasing early June temperatures throughout the study period. The summers of 2001–2002 were particularly warm and dry. This resulted in record low wader breeding densities. The range of variation in breeding density in nomadic species (Pectoral Sandpiper *Calidris melanotos*, Little Stint *C. minuta*, Grey Phalarope *Phalaropus fulicarius*, Ruff *Philomachus pugnax*) was much higher than in site-tenacious species (Dunlin *C. alpina*, Pacific Golden Plover *Pluvialis fulva*).

Nesting density of all wader species combined correlated with precipitation in the first half of June, but low precipitation could have been compensated by later snowmelt in terms of effect on wader density. Nest success ranged between 14.0 and 80.7% (mean 47.4%) in waders during 1994–2003 and did not correlate significantly with summer temperatures or precipitation. Nest success in waders positively correlated with abundance of lemmings (alternative prey for predators) in the first 7 years of studies, but during 2001–2003 low abundance of lemmings did not lead to low nest success. The hot seasons of 2001–2002 were also characterized by lower biomass and earlier occurrence in peaks of abundance of invertebrate wader prey. Thus we found indications of diverse effects of the warming trend in Siberia on Arctic-breeding waders. Years with early snowmelt are favourable for wader breeding numbers when precipitation is moderate to high and devastating when precipitation is low. Dry conditions early in the season may result in a shortage of food resources for adult waders and their chicks. The chicks may also suffer when peaks of invertebrate prey occur prior to the main hatching period.

Spatial variation of Redshank reproduction in the Wadden Sea: evidence for ecological trap or buffer effect?

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Recent studies show that Redshanks *Tringa totanus* breeding

in the Wadden Sea can occur at high densities in limited areas of the mainland coast of Germany, but achieve low hatching success due to high nest predation. In contrast, densities are lower on islands but hatching success appears to be much higher. Populations are stable in both areas. These observations appear to be conflict with the usual expectation that occupying attractive habitats (as reflected by high breeding density) should result in positive fitness consequences. The following hypotheses might explain this phenomenon: (1) the mainland birds are caught in an “ecological trap” (mal-assessment of habitats on the mainland) or (2) there is a buffer effect arising from insufficient good quality habitat (low quality birds being forced to breed at high density in poor sites at a time when the total breeding population is high in relation to the amount of available habitat).

To evaluate these hypotheses, in 2004 and 2005 we investigated breeding success and body and health condition of adult and chick Redshanks on the mainland coast of Germany (Jadebusen) and on Wangerooge Island. As in earlier studies, we found that breeding density was lower but hatching and overall breeding success was higher on the island than on the mainland. However, we found no clear evidence that adults and young were of poorer quality on the mainland compared to the island as indicated by biometric parameters, a simple body condition index and haematocrit values (blood analysis). These findings suggest that the spatial differences described above may not reflect a buffer effect but can possibly be explained by source-sink dynamics including an ecological trap.

Recent local increases in Eurasian Golden Plovers in western France

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Eurasian Golden Plover *Pluvialis apricaria* numbers have been monitored weekly or fortnightly for more than 20 years at three inland sites in western France:

- Chanteloup (46°33'N, 01°47'W): a brackish marsh and former salt-pans, used as a roost by birds feeding in nearby agricultural areas
- Lac du Cébron (46°46'N, 00°11'W): a 186 ha water storage basin that was filled in 1982, surrounded by meadows and cultures
- Argentonais (47°00'N, 00°25'W): a 200 km² rural area with 20 fish ponds.

Depending on the site, mean numbers peak in Dec or Jan.

On the French coast, comprehensive plover counts have been carried out in mid-Jan since 1980 (Mahéo 1980–2005). Coastal numbers have increased since the mid-1990s (1980–1993 mean = 3,430; 1994–2005 mean = 12,160).

At the three inland sites, there have been strong increases since 2000, 2001 or 2002.

These increases are too great to be accounted for by a simple global increase in the population, though that may be part of the reason. The main explanation is probably related to changes in behaviour and/or winter distribution.

Mahéo, R. (1980–2005). *Limicoles séjournant en France (littoral), janvier*. Rapports annuels Wetlands International/ONCFS.