

our of Turnstones in different habitats within the Wash were quantified in relation to season, tidal state and weather.

Numbers of Turnstones using non-intertidal habitats increased over the winter and use of the port area was significantly greater around high tide and on colder days. Prey remains from all habitats were found in individual faecal samples, indicating that individual Turnstones were not restricting themselves to particular habitats. Radio-tracking individual Turnstones confirmed that both intertidal and non-intertidal habitats were used on a daily basis. A depletion model was used to predict the number of Turnstones that could be supported by the port, under a range of resource densities and environmental conditions. This showed that on 90% of days the port could support much greater numbers of Turnstones than actually occurred there.

The tidal nature of port use and the potential for a much greater proportion of the Turnstone population to use the port than currently does suggests that the port is not a preferred resource. Low food quality and high levels of disturbance and predation risk may be the cause of this. The use of these habitats therefore suggests that the preferred intertidal food supplies are not currently capable of supporting the Wash Turnstone population throughout the winter.

The role of plumage and bill coloration in the aggressive behaviour of oystercatchers

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Strongly contrasting coloration in oystercatchers is considered to be an adaptation to the seashore habitat. However, its cryptic function appears to be rather ineffective as the species has low reproductive success due to predation by gulls and crows (Bianki 1967, Rudenko 1988). The coloration

might have appeared and evolved during the development of the oystercatcher's social system and territorial behaviour. Thus colour patterns may be used as signals in self-advertising by a territory owner or in conflicts with intruders (combined with behavioural patterns).

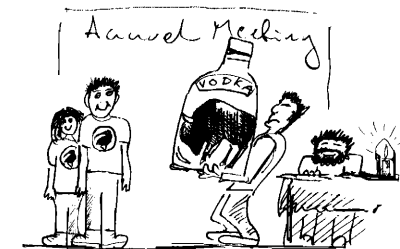
The aggressive behaviour of oystercatchers was studied in the White Sea, NW Russia, and in the Black Sea, S Ukraine, during 1999–2002. In order to investigate the role of colour in species identification and in eliciting or restraining aggression, three-dimensional models were placed within the nesting territories of 28 pairs. The models were of the same size as oystercatchers but coloured differently: (1) "normal" – coloured exactly as an oystercatcher, (2) "absent red" – pied body with black bill, (3) "hyper red" – pied body with red head and bill, (4) "absent white" – black body, red bill, (5) "vague" – with indistinct border between black and white.

All models were successful in eliciting aggressive behaviour. The greatest number of attacks and highly aggressive postures and demonstrations were performed towards the "absent red" model. The "normal" model elicited the same responses as performed in conflicts with real intruders. "Hyper red" caused mainly displacement activities, but attacks were recorded occasionally. The most variable responses were recorded towards the "absent white" model. Piping was performed mainly towards the "normal" and "vague" models. The response of breeding pairs in areas with a low density of oystercatchers was different from that in high-density areas. A black and white pattern and a red bill were significant in species identification. However, both "absent white" and "hyper red" models were identified as conspecifics, therefore coloration limits to recognition are rather wide. Absence of red colour elicited aggressive responses, while its presence made opponents keep their distance. The greater the number of neighbouring pairs, the more variable were the responses towards both intruders and the models. The signal role of colour patterns is probably increased in conditions of social stress.

Annual Conference – Poster Abstracts

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

- ★ **1st prize: Management techniques for breeding waders on lowland wet grassland** by Mark Smart, Jennifer Smart, Catherine Joiner, Nick Wilkinson & Mark Bolton
- ★ **2nd prize: Uniparental care in purple sandpipers – a consequence of male territoriality?** by Jannik Hansen, Elin P. Pierce & Torben Dabelsteen
- ★ **3rd prize: Cockles, oystercatchers and the conflict between nature values and commercial exploitation** by Simon Verhulst, Bruno J. Ens, Kees Oosterbeek & Anne Rutten
- ★ There was also a special prize for the poster displaying the **best artwork**. This was won by Anton P. Ivanov for **Waders on steppe wetlands in European Russia during migration: an analysis of spatial distribution at both regional and local scales**.



The prize in the poster competition was essentially Polish.



Feeding ecology of the Curlew *Numenius arquata* in winter in Western France

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The feeding ecology of the Curlew *Numenius arquata* was studied during the 2001/2002 winter in the nature reserve of Moëze-Oléron, Charente-Maritime, Western France (45°54'N, 1°03'W). The study area, managed by the Ligue Pour la Protection des Oiseaux, is a large tidal mudflat of about 6,000 ha and includes 13 km of coast and 214 ha of coastal wetlands consisting of pastures and saltmarshes.

Around 800 Curlews were present from October 2001 to early February 2002. This number is similar to the wintering population recorded throughout the 1990s.

The feeding behaviour of Curlews was studied from October to March on both ebb tide and rising tide in four 250 m square study plots, marked out on the mudflats 400–800 m from the shore at high tide. Data on feeding behaviour were recorded during 2-minute fixed intervals (see method reviewed by Piersma 1987 *Mar. Ecol. Prog. Ser.* 38: 187–196) and birds were counted in each study plot every 30 minutes.

The main results, obtained over a cumulative total of 80 hours of observations, were:

1. The density of Curlews in the study plots decreased during winter from 0.5 to 0.2 birds/ha.
2. The density of Curlews was positively correlated with average air-temperature.
3. The density of Curlews was positively correlated with the density of 1st year *Scrobicularia plana* (but not with the density of adult *Scrobicularia*).
4. Prey consisted mainly of *Scrobicularia plana* (the proportion of which decreased during the winter) and ragworms *Nereis diversicolor* (the proportion of which increased during the winter).

Declining shorebird populations and agricultural change in NE Poland

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In recent decades, declines in the numbers of breeding shorebirds in both Europe and North America have received considerable attention from researchers. In many cases these have been attributed to loss or damage to nesting habitat as a result of changes in the management of agricultural land. In this study, we present results from long-term observations of nest densities of Lapwing, Redshank and Black-tailed

Godwit. The number of nesting birds on a river island in the valley of the Narew was monitored from 1982 to 2002. These data were compared with agricultural statistics taken from *Concise Statistical Yearbooks of Poland* published by Polish Official Statistics. We noted statistically significant declines in the number of nests of Lapwings ($r = -0.852$, $p = 0.000$), and Black-tailed Godwits ($r = -0.6863$, $p = 0.001$) in our study site. The number of Redshank nests fluctuated, but did not show a statistically significant change. Nevertheless in the last two breeding seasons, 2001 and 2002, we did not find a nest of any of our three study species. In recent decades, mechanical harvesting has led to an increase in the number of meadows that have been drained. This has allowed farmers to increase production and reduce costs and has led to intensification, and a concentration of farming in profitable areas, coupled with the abandonment of fields that are difficult to access. We consider that changes in agricultural practices have resulted in a loss of habitat for grassland-breeding waders.

Preliminary results of a study of post-breeding migration of Wood Sandpipers *Tringa glareola* in Northern Italy

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The Wood Sandpiper is a regular migrant and an irregular winter visitor in Italy. In order to understand migratory routes and timing of passage of birds crossing the Po Plain, a ringing project was undertaken at a restored inland wetland in the Province of Modena. The study covered the post-breeding migration (mid-July to mid-September), when the Wood Sandpiper is one of the commonest waders in Italy. The birds were attracted by tape-lure and stuffed decoys and trapped with pull-nets during the day. Additional night catching was also carried out using mist-nets. A total of 368 birds (107 adults and 261 juveniles) were captured, including four previously ringed in other countries (two in Germany, one each in Poland and Sweden). We retrapped only two birds, both juveniles, one the next day, the other after 13 days. Morphometrics and weight of each bird were taken as well as subcutaneous fat and moult scores. The first sightings of adult migrants in the area were during pentade 39 (10–14 July), some earlier observations were scattered and probably due to over-summering birds. Migration flow increased steadily from pentade 40 (15–19 July) to a peak in pentade 45 (9–13 August), followed by a quick decline until pentade 47 (19–23 August). The first juveniles arrived in pentade 41 (20–24 July), followed by a dramatic increase to 80% or more of total captures after pentade 42 (25–29 July). Juveniles passed through later than adults, with about a 3-pentade time-difference. On average, juveniles (mean = 60.4 g, SD = 7.0, N = 259) were 5% lighter than adults (mean = 63.3g, SD = 8.8, N = 106). The bird retrapped after 13 days had gained 5.4 g, 10% of its previous weight.



Behaviour guide for amateur census workers? Black-tailed Godwits in Nyord Enge, Denmark

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The Danish Bird Protection Foundation (a subdivision of BirdLife Denmark) has a number of bird reserves across Denmark. In several of these, regular breeding bird census work is carried out.

The Nyord Enge reserve holds a breeding population of Black-tailed Godwits *Limosa limosa*, which have recently been a priority species in the management of the reserve.

Census work is heavily reliant on volunteers, which to a certain degree poses problems in terms of accuracy in the counts of breeding pairs.

The aim of our behaviour guide for amateur census workers, is to give the volunteers a quick introduction to the territorial and breeding season behaviour of Black-tailed Godwits in order to improve the volunteers' ability to distinguish breeding birds from non-breeding or surplus birds. A chart of postures, along with a short introduction to flight displays, is an idea currently being considered.

Uniparental care in purple sandpipers – a consequence of male territoriality?

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Female brood desertion is uncommon among birds in general, but widespread among shorebirds. In the Purple Sandpiper *Calidris maritima*, females leave at hatching, and males perform brood care alone. By caring for the brood and holding the territory longer, males may gain greater benefits from brood care than females such as the opportunity to assess potential future mates and preventing late-breeders from nesting nearby. These possible benefits might mean that males have a greater net gain from sole brood care than females.

In Svalbard, we tested whether males were territorial during three periods: pre-incubation, during incubation and while caring for the brood. During pre-incubation, males per-

formed the full range of territorial behaviours, but the number of these declined markedly during incubation, with few behaviours displayed while caring for the brood. Many types of territorial behaviour were only displayed during pre-incubation. The "male territorial benefit theory" is therefore not supported.

Waders on steppe wetlands in European Russia during migration: an analysis of spatial distribution at both regional and local scales

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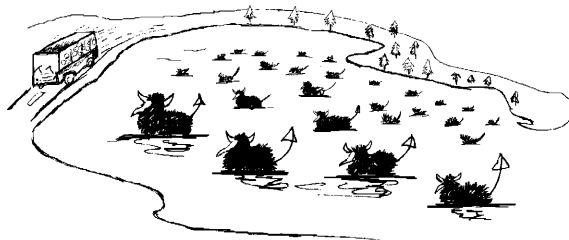
The spatial distribution of migrant waders using steppe wetlands in southern European Russia was studied based on a survey of 40 sites containing potentially suitable habitat. Altogether 36 species were recorded. The analysis was carried out at both regional and local scales. The regional analysis looked at species distribution between the wetlands surveyed. The local analysis looked at distribution between microhabitats within each wetland.

At the regional level, Redshank *Tringa totanus*, Black-winged Stilt *Himantopus himantopus*, Lapwing *Vanellus vanellus* and Ruff *Philomachus pugnax* were the most widespread species, using the largest number of wetlands as stopover sites. In contrast, Avocet *Recurvirostra avosetta*, Curlew *Numenius arquata*, Dunlin *Calidris alpina* and Broad-billed Sandpiper *Limicola falcinellus* were found at the fewest sites. Dunlin, Avocet and Little Stint *Calidris minuta* had the most similar distributions whereas Lapwing and Ruff showed the highest dissimilarity from the distributions of other species.

At the local scale, Ruff, Dunlin and Redshank showed the highest variability in microhabitat choice, whereas Kentish Plover *Charadrius alexandrinus*, Ringed Plover *Ch. hiaticula*, Little Stint, Black-tailed Godwit *Limosa limosa* and Avocet were the most restricted in the microhabitats they used.

The interspecific overlap of distribution at a regional level was often accompanied by microhabitat segregation between the same species. This was especially evident among morphologically different, unrelated species such as Dunlin and Avocet. A high interspecific overlap of microhabitats was common for congeneric species with similar morphology, such as Dunlin and Little Stint or Kentish Plover and Ringed

Plover. It is probable that such species pairs compete with one another for food resources. Dunlin and Little Stint, for example, not only have similar feeding ecologies, but there was also a high similarity between their distributions at both regional and local scales.



During the conference excursion along the Hel peninsula, participants were watching small, black creatures on the water. From the distance they looked like Coots, but this wasn't the case.



**The Bothnia Line and farmland birds:
waders are among the key-species in monitoring
the impact of a new railroad on breeding birds**

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A new 190 km railroad, the Bothnia Line, will be built between Nyland and Umeå along the Gulf of Bothnia in the north of Sweden. Construction will take nine years (2000–2008) and the price tag is € 1 billion.

Agriculture in this region is generally extensive and small-scale. Therefore it contributes strongly and positively to the biodiversity of the Taiga. Fair densities of Eurasian Curlews and Lapwings breed on farmed land while several other waders breed in the agricultural landscape at large. Farmed land is also important for migrating waders, especially Golden plovers and Ruffs.

Thirteen plots along the proposed railroad track and six control plots are territory-mapped each year. Lapwing, Eurasian Curlew, Little Ringed Plover, Snipe, Green Sandpiper and ten non-wader species were selected for the study. Four phases (initial state, construction phase, railroad without traffic and railroad with traffic) will be compared. Fragmentation and differences in response between species are important issues.

This is a long-term study and to date only a few preliminary results are available. These include:

- Curlews appear to be more sensitive to disturbance by construction work than Lapwings.
- Substantial numbers of migrating waders roost on farmland in summer (June–July).
- Most observations of Ortolan Buntings are made on patches of clear-cut forest adjacent to agricultural land.

For information about the Bothnia Line, look at:
www.botniabanan.se

**Potentially pathogenic fungi isolated from waders
(*Charadrii*)**

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Wading birds, as organisms connected directly with the water environment, are one of the epidemiological chain-links in the circulation of pathogenic fungi, both in the natural environment and in the environment of man. Many fungi found in birds do not cause pathological changes in them because of their high body temperature. However, the same fungi (e.g. *Cryptococcus neoformans*) in the human body can cause very serious diseases. Water ecosystems, especially those that are polluted, eutrophic, or subjected to strong anthropopression, are natural reservoirs of potentially pathogenic fungi and thus they can be sources of mycoinfections.

Birds, like mammals, can be infected with fungi through natural openings in the body and penetration is most often through the respiratory or digestive systems. The progress of the infection is influenced mainly by the general physiological condition of the animal infected. Mycotic infections

develop mostly in birds that have been weakened, e.g. by exhaustion following migration or by the presence of external or internal parasites. Young birds are generally more susceptible to mycosis than adults. The progression and expansion of mycoinfections is influenced by climatic conditions (humidity and temperature), pollution, the degradation of the environment, and the density of the population.

During 1999–2000, preliminary research was conducted in the Reda mouth, Gulf of Gdańsk, Poland, with the aim of determining the role of birds in spreading potentially pathogenic fungi. Material was analysed from the throats of 49 young birds (42 Dunlins *Calidris alpina* and seven Ringed Plovers *Charadrius hiaticula*). In 20 birds, five species of yeast-like fungi and one species of mildew fungus were found. Three fungi colonies isolated were classified only to genus. Most pathogenic fungi isolated from the birds were: *Candida albicans* (found in nine birds), *Cryptococcus neoformans* (in four birds) and *Aspergillus* sp. (in three birds). The results indicate a need of more intensive research on mycoinfections in waders, aimed at completing (so far as possible) the list of fungi species potentially pathogenic for man that are carried by these birds.

**The dynamics of wader numbers during spring
and autumn migration in the bird refuge of
Bagno Morg, Poland**

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This study was conducted during 1991–93 in the bird refuge of Bagno Morg, located in the NE part of Ilawa Lake District, NE Poland. The refuge comprises 185 ha of open waters, rushes and meadows. The protected area borders directly on the town of Morg, but is otherwise surrounded by agricultural land. Censuses were carried out every five days between 15 February and 10 November in each year of the study.

Eighteen species of waders were recorded during spring and autumn passage. Six species were regular migrants (Lapwing *Vanellus vanellus*, Wood Sandpiper *Tringa glareola*, Redshank *Tringa totanus*, Spotted Redshank *Tringa erythropus*, Ruff *Philomachus pugnax* and Common Snipe *Gallinago gallinago*). Most numerous were Lapwing (max. 400), Wood Sandpiper (200), Ruff (80), Spotted Redshank (50) and Common Snipe (30).

Green Sandpipers *Tringa ochropus*, Greenshanks *Tringa nebularia*, Little Ringed Plovers *Charadrius dubius*, Common Ringed Plovers *Charadrius hiaticula*, Curlews *Numenius arquata*, Whimbrels *Numenius phaeopus*, Common Sandpipers *Actitis hypoleucos*, Grey Plovers *Pluvialis squatarola*, Golden Plovers *Pluvialis apricaria*, Dunlins *Calidris alpina* and Temminck's Stints *Calidris temminckii* were recorded only in some years or occasionally and were not numerous. In each autumn, single Jack Snipe *Lymnocyrtus minimus* were recorded.

We describe the dynamics of the passage of the six regular migrants mentioned above in detail.



Changes in wader numbers in the floodplains of the south basin of the Biebrza river valley, Poland

Jacek J. Nowakowski

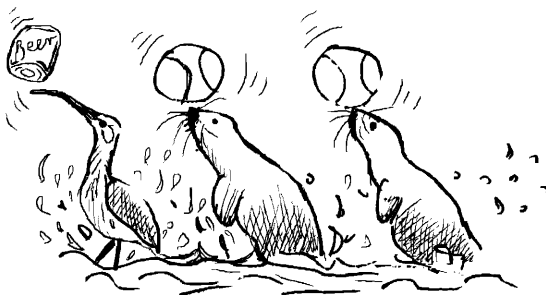
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The number of breeding waders in the floodplains of part of the South Biebrza Basin, Poland, were counted in the years 1989–1999. The study area consisted of a 15 km long section of the river floodplains between its junction with the Narew river and Chyliny village. Counts were carried out from the beginning of April to mid-July.

Fourteen wader species were confirmed to breed in the study area (Lapwing *Vanellus vanellus*, Redshank *Tringa totanus*, Green Sandpiper *T. ochropus*, Marsh Sandpiper *T. stagnatilis*, Common Sandpiper *Actitis hypoleucos*, Black-tailed Godwit *Limosa limosa*, Common Snipe *Gallinago gallinago*, Great Snipe *G. media*, Curlew *Numenius arquata*, Little Ringed Plover *Charadrius dubius*, Common Ringed Plover *Ch. hiaticula*, Ruff *Philomachus pugnax*, Woodcock *Scolopax rusticola*, Dunlin *Calidris alpina*) and one species probably bred (Jack Snipe *Lymnocyptes minimus*). The breeding wader community was dominated by just four species: Lapwing, Redshank, Black-tailed Godwit and Common Snipe. In addition, the following species bred in every year of the study: Common Sandpiper, Green Sandpiper, Great Snipe, Curlew, Woodcock. Common Ringed Plover and Dunlin started to breed in 1991, and Green Sandpiper in 1995. The other species only bred occasionally.

Over the eleven-year study period, the numbers of five species declined strongly. Between 1989–1991 and 1998–1999, Lapwings declined from 380–400 to 100–150 pairs, Black-tailed Godwits from 240 to 40–100 pairs, Redshanks from 100–130 to 40 pairs, Ruffs from 10–16 to 1–3 breeding females and Great Snipe from 10 to 2–5 breeding females. Only the numbers of Curlews increased.

The decline in the numbers of breeding waders correlates with reduced water levels on the floodplains, which has led to significant changes in the vegetation. Also changes in agriculture management since 1990 have altered vegetation cover. Many pastures, grasslands, and peatlands have undergone successional changes leading to reedbeds, shrubby Salix, and encroachment by tree species.



Visiting the sealarium was really exciting.

Management techniques for breeding waders on lowland wet grassland

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The Royal Society for the Protection of Birds purchased Buckenham and Cantley Marshes (900 acres) in the Norfolk Broads in 1993. At this time there were small numbers of breeding waders (<20 pairs). By changing water management and grazing regimes the number of breeding waders has now risen to approximately 200 pairs.

In order to make appropriate management recommendations for other wet grassland sites and to justify their further development, it is necessary to test these management techniques in a scientific way.

In this poster we present the results of two research projects: (1) to test the effects of different grazing densities on breeding lapwings using an experimental set-up and (2) to examine nest-site selection and chick foraging distribution in lapwings in relation to wet features in marshes, principally foot drains (shallow, gently sloping ditches about 2 m wide and 30 cm deep that allow water to be retained on marshes into the breeding season and provide edge habitat for foraging).

The original plumage coloration of the genus *Haematopus* – black or pied?

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There are two opinions concerning the origin of oystercatcher colouration. Some consider that the pied pattern derived from black birds (Heppleston 1973), others hold the opposite view (Hockey 1996). However, neither give full explanations for their opinions. Probably, the ancestral coloration of oystercatchers was not black and white (pied) but brownish-black-white because: (1) chicks generally have ancestral coloration and young oystercatchers are of that colour pattern (both pied and black species); (2) there are black species with dorsal brownish-black coloration (*H. ater*, *H. bachmani*) and pied species with brownish-black upper part of body, and black head, neck and tail (*H. palliatus*); (3) all brownish black and brownish-black-white species are distributed close to the supposed radiation centre of the genus; (4) Feumelanin providing brownish-black colour is more ancient than eumelanin providing pure black colour. Therefore it seems likely that in all other species of the genus, black replaced brownish-black. The replacement might have taken place either to meet changed habitat demands or for some other reason.

The pied colour pattern of oystercatchers is considered to be an adaptation to the seashore habitat as it has been shown to be more cryptic than completely black plumage (Lauro 1994). However, both black and pied species have rather low



breeding success due to the intensive predation by Corvidae and Laridae (Rudenko 1988, Hockey 1996). Thus the cryptic role of plumage patterns seems to be of questionable value. Monochromic black plumage is supposed to be an adaptation to intensive solar radiation (most black species are distributed near the equator), but pied oystercatchers living in this area are as viable as black ones (Hockey 1996).

Strong contrast, black-white or completely black plumage combined with red bill and iris are identification features that may assist birds to find mates over large distances. However, several species among both black and pied oystercatchers differ from each other only in morphological parameters. Black species sometimes hybridise with pied ones, especially in the areas of low density (Jehl 1978). Moreover the black morph of *Haematopus unicolor* commonly form pairs with the pied morph (Baker 1975). Therefore plumage coloration does not lead to complete reproductive isolation.

The reasons for the evolution of coloration in oystercatchers are probably connected with their social system. All species are as territorial during the breeding period as the European Oystercatcher (*H. ostralegus*), individuals of which must select an appropriate strategy in order to establish a nesting territory, find a partner and maintain them (Ens 1992). Bright coloration may help territory holders to identify intruding conspecifics at a distance allowing them to prepare to defend their territories. Even immature birds have strong coloration and this may make them vulnerable to attack and injury by territory holders. Therefore bright coloration may be better for the social system of the species, but not necessarily for the individual. However, oystercatchers, which are powerful birds, also have behavioural mechanisms that tend to prevent actual fights and to restrain aggression between territory holders and non-breeders. Both pied and black species perform piping displays (show red bill) and false sleeping (hide red bill), but pied species also use postures that draw attention to white patterns; for example, on the neck and wing (*H. ostralegus*) and on under tail coverts (*H. leucopodus*) (Makkink 1942, Miller & Baker 1980).

Therefore it seems that an original cryptic brownish-black dorsal and white ventral coloration of oystercatchers may have been replaced by strongly contrasting colours as plumages have been changed through the evolution of social systems and territorial relationships. In turn, these new plumages may have led to the development of special behaviour patterns.

Day- and night-time activity of Redshanks *Tringa totanus* breeding in Wadden Sea saltmarshes

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In the context of studies of the population biology of Redshanks breeding in the Wadden Sea saltmarshes of the Jade Bay, Germany, daily activity patterns of adults were recorded in 2001 and 2002. As revealed by data loggers measuring nest temperatures continuously for 5–21 days of incubation ($n = 5$ nests), Redshank clutches were incubated discontinuously. Among clutches, the average number of interruptions per day ranged up to a maximum of 5.4 (one interruption is

defined as ≥ 30 min of absence) and the average duration of interruptions per day ranged up to a maximum of 3.2 h. Altogether, the mean duration of absence of incubating adults was 8.02 h per day, i.e. 33.4 % of the day.

Adults interrupted incubation more frequently but for shorter periods during daylight than during darkness. During daylight, adults were absent for 37.3% of the time, whereas nests were uncovered for 26.3% of the time at night. Preliminary results of radio-tracking breeding birds during several 24-h sessions showed that individual adults spend considerable parts of the night on adjacent tidal flats rather than on the saltmarsh or at the nest site. This ratio was reversed in daylight. Factors related to feeding ecology and to high predation pressure are proposed as possible causes of this behaviour, which is different from that observed in the saltmarshes of the Wadden Sea island of Wangerooge in the 1950s.

Cockles, oystercatchers and the conflict between nature values and commercial exploitation

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Conflicts between nature values and commercial exploitation of natural resources are common. A classic example is the conflict between fisheries and birds. The cockle fishery in the Dutch Wadden Sea has increased in recent years due to the introduction of intertidal suction-dredging. Oystercatchers feed mainly on cockles and mussels in winter, and oystercatcher numbers and reproductive success have declined strongly in the past decade. We used an experimental approach to assess the consequences of cockle fisheries for oystercatchers. 30% of the Wadden Sea has been closed for shellfish fisheries since 1993, and cockle density is now six times higher in the closed areas. We made the assumption that on average there are no other differences of importance between open and closed areas. We caught oystercatchers at different sites and compared diet and body condition between areas open or closed for cockle fishery. We used new physiological measures of condition, which are validated by relating them to survival and reproduction. We further compared oystercatcher densities, because an ideal free distribution between open and closed areas could prohibit variation in body condition.

Clay-pits in the Wadden Sea saltmarshes: attractive staging and feeding sites for migratory waterbirds?

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At the end of the 1990s, clay was removed from the Wadden Sea saltmarshes in the course of coastal protection measures. As the construction site is located in the National Park of Lower Saxony, Jadebusen, Germany, and because of the



international importance of the area for migratory waterbirds, such as Shelduck, Avocet and Curlew, federal legislation calls for an extensive research programme to analyse ecological impacts. In order to identify any effect of the clay-pit, the numbers and spatial distribution of migratory waterbirds were investigated by spring-tide counts in 2001. Time and space patterns of the most abundant species were also assessed by behavioural observations in the impact area in comparison with an adjacent reference site on intertidal flats.

In respect of the macrozoobenthos, the clay-pit was proved to be a habitat similar to the adjacent mudflat. In spring, biomass was dominated by polychaetes, such as *Nereis diversicolor*, at both sites, whereas in autumn mudsnails *Hydrobia ulvae* were most abundant in the pit and polychaetes on the adjacent mudflat. However, biomass was higher in the pit than on the mudflat in both seasons. The most abundant bird species visiting the clay-pit in spring were Dunlins and Redshanks, in autumn Avocets and several duck and gull species. In spring, most of the birds fed on polychaetes, whereas in autumn polychaetes, crabs *Carcinus maenas* and mudsnails were the main food. The number of birds and their feeding times in the pit were lower than on the mudflat despite higher biomass in the pit. The energy intake of most of the birds studied did not differ between study plots, neither in spring nor in autumn. Thus, the clay-pit appears to be of relatively low importance for the majority of the staging birds. In addition to food supply and availability, predation pressure and limited space in the pit were probably further important factors determining its comparatively restricted use.

Wintering waders in Italy: distribution, numbers and trends in 1991–2000

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Updated numbers and distributions of wintering waders in Italy in 1991–2000 are presented, according to the results of IWC counts in 615 wetland systems (counting sites lumped according to the principle of functional or ecological unit). Positive (site censused, species counted) as well as zero counts (site censused, species absent) were input to the database and used to produce population estimates and distribution maps.

All areas where a species was present in at least one year during 1991–2000 were considered as potential sites for that species. Potential sites were divided into three categories: (1) occupied sites, i.e. sites were visited and species was present in that year, (2) un-occupied sites, i.e. sites were visited, species was absent (although present in at least one year during 1991–2000), (3) un-surveyed sites, i.e. sites where the species was present at least once in 1991–2000 which were not visited in that year.

In addition to yearly totals, given for each species, two indices were calculated. A coverage index (number of sites visited in every year divided by the number of potential sites) was used to show how much of the potential distribution of a species was covered by counts in each year. A distribution index (number of sites where a species was present in a given year divided by the number of potential sites which were visited in that year) highlighted year-to-year variations of the

size of the national wintering range.

A total of 33 species was recorded, including such occasional winter visitors as Whimbrel, Slender-billed Curlew, Marsh Sandpiper, Wood Sandpiper, Temminck's Stint and Red-necked Phalarope. The highest number of waders was found in 1997 (138,877). Most abundant species were Dunlin (average 1996–2000: 62,534) and Lapwing (48,739). The latter was also the most widespread species, followed by Common Snipe, Common Sandpiper and Kentish Plover. Internationally important numbers of Avocets were counted regularly at Manfredonia-Margherita di Savoia (average 1996–2000: 1187, 35% of the Italian population). The lagoons of Venice and Grado-Marano hosted internationally important numbers of Dunlins (respectively 23,720 and 15,880, 66% of the Italian population). The latter site nearly qualified as internationally important for wintering Grey Plovers (1,407, 53% of the Italian population). For 18 species, an abundance index and a population trend for 1993–2000 were calculated using TRIM (TRENDS and INDICES for MONITORING data, version 3, Pannekoek & van Strien 2001). A substantial population increase was found in 10 wader species, a substantial decrease in 4 (Black-winged Stilt, Avocet, Kentish Plover and Little Stint) and a poorly known trend in 4. The data confirm the utmost importance of the North Adriatic wetlands (the lagoons of Venice and of Grado-Marano, the Po Delta and the Cervia salines) for wintering waders, as well as some large concentrations in the central and southern wetland complexes (Manfredonia-Margherita di Savoia, coastal wetlands of Sardinia, Tuscany and Latium).

Autumn migration of Sanderlings *Calidris alba* at the Vistula river mouth, 1983–2000

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Sanderlings occur regularly at the Vistula river mouth during autumn migration, but only in small numbers. The largest flock recorded was 160.

Each autumn during the 18 years 1983–2000, waders were caught between mid-July and the end of September in 30–40 Ottenby walk-in traps along the seashore and riverbank. A total of 689 Sanderlings, 141 adults and 548 juveniles, were captured, varying between 0 and 113 in a single year. Over the years, the percentage of juveniles varied between 25% and 98%.

The pattern of catching shows two peaks: one in pentade 42 (25–29 July), comprising adults and the second in pentades 51–52 (8–17 September) comprising juveniles. The first young birds were caught in pentade 45 (9–13 August). Mean body mass was relatively low: adults, 51.6 g (range 39–69 g); juveniles, 52.8 g (38–81 g). Only four (3%) of the adults were caught more than once in the study area in the same season. On average, they stayed for only 1.7 days. Juveniles stayed longer (5.6 days) with 10% caught more than once.

Retraps showed that the change in body mass was negative on first day after the capture (–1.31 g) and positive for birds caught subsequently (0.98 g/day). In total, 25 long-term recoveries were obtained (3.6% recovery rate).

