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The spring migration of Grey Plover *Pluvialis squatarola* in Sweden

Vårflyttningen hos kustpipare *Pluvialis squatarola* över Sverige

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Abstract

In 1976–1995, 74,650 Grey Plovers *Pluvialis squatarola* were recorded on spring passage, 87% in the southern third of Sweden, and 59% while in migratory flight. Few were observed before May. The passage peaked 24 May–2 June (83%). About one fourth of all birds were observed on a few occasions, when grounded by inclement weather, showing that only a tiny fraction stops over regularly. In northern Sweden, passage peaked earlier (18 May) than in the south (29 May), and these early birds were presumably destined for breeding or staging in the White Sea region. The peak dates in southern Sweden correlate well with arrival time in Siberia, indicating a non-stop flight to these breeding areas. Flocks counted up to several hundred birds in the south but at most 34 birds in the north. Migration patterns along the East Atlantic Flyway were similar with those of the East African/West Asian and Mediterranian/Black Sea flyways. The spring passage of the Grey Plover conforms to the migration system of other tundra waders passing up through the western Palaearctic.

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Introduction

In spring, large numbers of Palaearctic waders migrating along the Eurasian route of the East Atlantic Flyway gather in the Wadden Sea area, before departing for their breeding grounds in northern Europe and Russia (Piersma et al. 1987, Prokosch 1988, Smit & Piersma 1989, Meltofte et al. 1994). When leaving this stopover area, the birds fan out along different flight routes, heading north to east. By its size and geographic position on the Scandinavian Peninsula, latitudinally extending from 55° N to 69° N, Sweden offers favourable opportunities for migration studies of this contingent of birds in Northwest Europe (Blomqvist & Lindström 1992, 1995, Green et al. 2003). There are no major staging areas for spring migrating arctic waders within Sweden, but vast numbers are known to pass. A well developed national system of organised bird reporting, based on local and regional ornithological societies, in combination with a network of bird observatories where regular observations are recorded, further facilitates such migration studies (Blomqvist & Lindström 1996).

So far, the spring occurrence in Sweden of five Arctic-breeding wader species has been analyzed: Red Knot *Calidris canutus* (Blomqvist & Lindström 1992), Sanderling *C. alba*, Little Stint *C. minuta*, Curlew Sandpiper *C. ferruginea* (Blomqvist & Lindström 1995) and Bar-tailed Godwit *Limosa lapponica* (Green et al. 2003). In the present paper, we describe the spring migration of another Arctic-breeding wader, the Grey Plover *Pluvialis squatarola*, for which much is still unknown concerning the composition of the migrating population, migration routes, regional movements and wintering areas (Pienkowski & Evans 1984, Smit & Piersma 1989, Byrkjedal & Thompson 1998, Exo & Stepanova 2001, Branson 2002).

We describe the geographical pattern and timing of the Grey Plover spring passage over Sweden, based on an extensive data set of Grey Plover observations from almost the whole country (Figure 1), including a long-term series of records from a

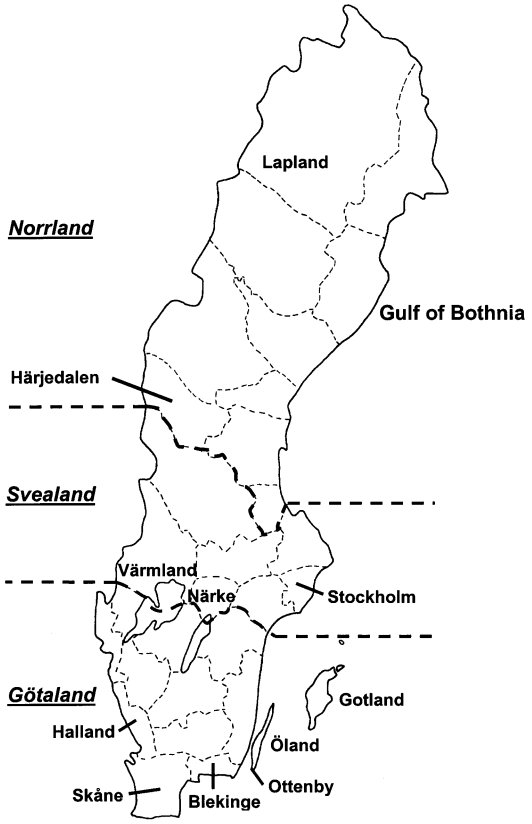

Figure 1. Map of Sweden with regional report areas, and the different provinces/counties mentioned in the text. The three large regions of Götaland, Svealand and Norrland, respectively, are separated by thick broken lines.
Karta över Sverige med de olika rapportområdena. Områden och regioner som omnämns i texten anges med namn.

single site (Ottenby), starting in the 1940s (Svärdsson 1947). We then compare the spring migration pattern of the Grey Plover with that of the previously analysed arctic wader species (Blomqvist & Lindström 1992, 1995, Green et al. 2003).

Breeding, distribution and migration

Breeding range

Grey Plovers observed in West Europe follow the Eurasian route of the East Atlantic Flyway. These birds are considered monotypic (Byrkjedal & Thompson 1998, but see Engelmoer & Roselaar 1998), and breed in the tundra zone from the western White Sea, and eastward over the Yamal, Gydan and Taimyr peninsulas (Beloposkii et al. 1970, Mineyev & Impe 1997, Byrkjedal & Thompson 1998). Birds ringed and recovered along the flyway support this view (Branson & Minton 1976, Prokosch 1988, Meltofte 1993, Exo & Wahls 1996, Byrkjedal & Thompson 1998, Exo & Stepanova 2000, Tomkovich et al. 2000, Branson 2002). However, the breeding range of the species extends farther east throughout arctic Siberia, via the Far East and Alaska, all the way to Baffin Island in northern Canada (Paulson 1995, Byrkjedal & Thompson 1998). The nesting habitat is mainly arctic heath tundra of dry hills, intersected by moister sections (Flint & Kondratjew 1977, Rogacheva 1992, Paulson 1995, Byrkjedal & Thompson 1998, Exo & Stepanova 2000).

Breeding regulation

The annual variation in breeding productivity of Grey Plover observed in the Wadden Sea (Prokosch 1988), in South Africa (Underhill 1987, Martin & Baird 1988) and in southeastern India (Balachandran et al. 2000) has been attributed to a cyclic interaction between lemmings and their predators on the tundra. These predators switch to eggs and young of ground-nesting birds in years following lemming peaks, and thereby affect the nesting success and the avian population dynamics (Summers et al. 1998, Blomqvist et al. 2002, and references therein). It is worth noticing that Grey Plovers following the East Atlantic Flyway do not breed until they are two or three years old, and therefore remain in the wintering habitat throughout the first summer (Prokosch 1988), and perhaps also the following summer (Dijk et al. 1990).

Wintering areas

In Sweden, a few observations of Grey Plovers have been reported in winter from the southwestern provinces of Scania (Skåne) and Halland (Roos 1962, Ekberg 1994, SOF 2002). Scattered winter observations are likewise reported from the southern coast of the Baltic Sea proper (Berndt 1984, Nehls & Struwe-Juhl 1998, Brenning 2001), but most Grey Plovers winter in areas of more benign climate. In winter during the 1980s, about 61,000 Grey Plovers were found along the European Atlantic coast, 23,000 in the western part of the Mediterranean Sea, and 81,000 birds in West Africa (Smit & Piersma 1989).

Population increase

Since the early 1950s, the breeding area of the Grey Plover has expanded westward in the European part of Russia, and the population has increased (Mineyev & Impe 1997). The species showed a spectacular increase in wintering numbers in British estuaries from the 1930s to the 1990s (Moser 1988, Tubbs 1991, Cayford & Waters 1996, Rehfisch et al. 2003). The Grey Plover population along the Continental Atlantic seaboard of West Europe has been reported to have increased strongly (Rösner 1994, Smit & Zegers 1994, Stroud et al. 2004, Blew et al. 2005a). Compared with the 1980s (Smit & Piersma 1989), the number of Grey Plover wintering along the Atlantic coast of Europe in 1997–1999 had increased to 90,000–100,000, while in the western part of the Mediterranean fewer birds (9,000–13,000) were found (Gilissen et al. 2002). The recorded increase may be due, at least partly, to a northward shift in the distribution of wintering birds, but most data indicate a true population growth to 247,000 birds in the East Atlantic Flyway (Stroud et al. 2004). However, it should also be noted that some decreases in spring staging numbers have lately been registered in the German part of the Wadden Sea (Günther & Rösner 2000, Blew et al. 2005a, b).

Northward migration

In West Africa, the Grey Plover is mainly found on the Banc d'Arguin in Mauritania (Trotignon et al. 1980, Gowthorpe et al. 1996, Smit 2004), and in the Arquipélago dos Bijagós in Guinea-Bissau (Zwarts 1988, Salvig et al. 1994, Frikke et al. 2002), but also as far east as Ghana (Ntiamoa-Baidu & Grieve 1987, Ntiamoa-Baidu 1991). Starting end of April, the Grey Plover departs from West Africa (Piersma et al. 1990), and passes successively up along the North Atlantic coast. Some birds are also reported from inland sites of Continental West Europe, but in fairly low numbers, i.a., in France (Le Mao 1980), and different cantons of Switzerland (Glutz von Blotzheim 1963, Baula & Sermet 1975, Schmid et al. 1992) and federal states of Germany (Dathe 1949, Harengerd & Mester 1966, Wüst 1966, Müller 1967, Harengerd et al. 1973). The largest spring gathering of Grey Plover (140,000 birds) occurs in the Wadden Sea in May (Meltofe et al. 1994). A recent study of the body mass of the birds departing from the North Sea area at the end of May (Serra et al. 2006), concludes that sufficient fuel is stored to allow Grey Plovers to fly non-stop to the Siberian breeding grounds in western Taimyr.

Material

Data collection

Our data cover the whole of Sweden, and originate from three main sources: (1) the regional report committees of the Swedish Ornithological Society, (2) direct communication with certain observers and observatories, and (3) literature searches, chiefly in local and regional ornithological bulletins. Observations from the time period of 1 March to 20 June were included in the analysis. As in the earlier analyses of the spring migration of arctic waders in Sweden (Blomqvist & Lindström 1992, 1995, Green et al. 2003), the bulk of the material is from the time period of 1975–1995, but some records from the period before 1975 are also included.

Replies were received from all 30 regional report committees in Sweden (Figure 1). These committees compile records reported voluntarily by ornithologists. Spring observations of the Grey Plover were reported to most of the regional committees, except that at times it was considered too common in north Halland, Öland and Gotland. From Halland observations were available from two bird observatories (Getterön and Nidingen), and from Gotland large flocks and migration count data have been reported. Hence, for most of the period studied (1975−1995), we believe that the data set fairly well reflects the spring occurrence of the Grey Plover in Sweden. Furthermore, a single observation series of 48 years (1947−1994) from the Ottenby Bird Observatory on the island of Öland, allowed an analysis of long-term trends.

To avoid double counts of birds within localities, all records were carefully assessed. Birds staying for longer periods at a stopover site were entered with the first date of observation. Hence, reported figures represent the minimum number of birds observed. All figures refer to the total number of Grey Plovers observed during an approximate 20-year period, unless otherwise stated. In the diagrams, the observations have been lumped into three-day periods. For details of the statistical tests used, see Sokal & Rohlf (1995).

Results

Spring observations of the Grey Plover were reported from all regional committees, except Härjedalen (Figure 2). In all, 74,650 Grey Plovers were

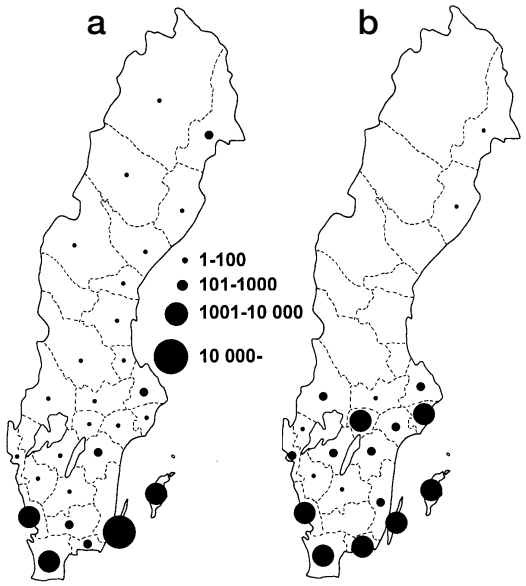

Figure 2. Geographic distribution of the total number of the Grey Plover *Pluvialis squatarola* observed in Sweden in spring (n = 74,650), separated into birds at stopovers (a) and on migration (b).
Den geografiska fördelningen av det totala antalet rapporterade kustpipare under våren i Sverige (n = 74.650), fördelat på rastande fåglar (a) och sträckande fåglar (b).

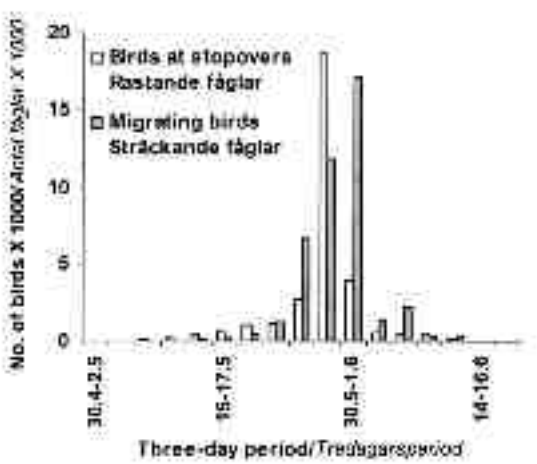

Figure 3. Number of the Grey Plover *Pluvialis squatarola* recorded during spring in Sweden. Median date for the grand total is 29 and 30 May, respectively (n = 74,650).
Tidsmönster för rapporterade kustpipare under våren i Sverige. Mediandatum för hela materialet är 29 respektive 30 maj (n = 74.650).

reported in Sweden during spring, mainly from the end of May to early June (Figure 3). Most (59%) were seen while in active flight, the rest on the ground (Figure 2). Yearly totals varied greatly, from 550 to 16,000 birds (Figure 4a).

Regional differences in bird numbers

The distribution of Grey Plovers observed in Sweden varied much between the three regions of Götaland (87%), Svealand (12%) and Norrland (<1%), respectively (Figure 5). The overwhelming majority of the Grey Plovers were reported from coastal marine areas of the southern third of the country. Small numbers were reported from inland areas of south Sweden in most years, in certain years reaching over one hundred birds. About 3% of the national grand total, in one year (1991) over 900 birds, were reported from the area of large lakes in south central Sweden, mainly in the provinces of Värmland and Närke.

In the east coast county of Stockholm, migration of Grey Plover was observed almost yearly, usually of less than a hundred individuals, but in 1992 ca. 1000 birds were reported. In all, 7% of the national grand total was recorded in the county of Stockholm. Most of the birds reported from Norrland were observed along the coast of Gulf of Bothnia.

Differences in geographical distribution were found between Grey Plovers recorded at stopovers and birds seen in flight (Figure 2 and 5). Large numbers of birds (>50) on the ground were recorded only in the five southernmost coastal provinces. Among these, Halland, Skåne and Öland were the only provinces regularly holding Grey Plovers at stopovers (Cederlund 1985, Wirdheim 1985, Ekberg 1994, Green 2003). On a few occasions, large numbers of birds were reported to halt temporarily in the southeastern parts of Sweden, when encountering headwind of gale force in combination with rain. Such situations occurred in 1976, with about 4500 birds at Öland 27–30 May (Breife 1976) and 800 birds at Gotland 27–29 May, and in 1987, with about 7050 birds at Öland 29–30 May, 1200 birds at Gotland 28–29 May and 300 birds in Blekinge 29–30 May (Waldenström 1987, Hedgren 1988). Also, on the last mentioned dates large numbers of low-altitude migrating birds (4500) were observed in Blekinge. These observations (25% of all birds recorded) show that only a tiny fraction of the passing Grey Plovers regularly use Sweden for stopover.

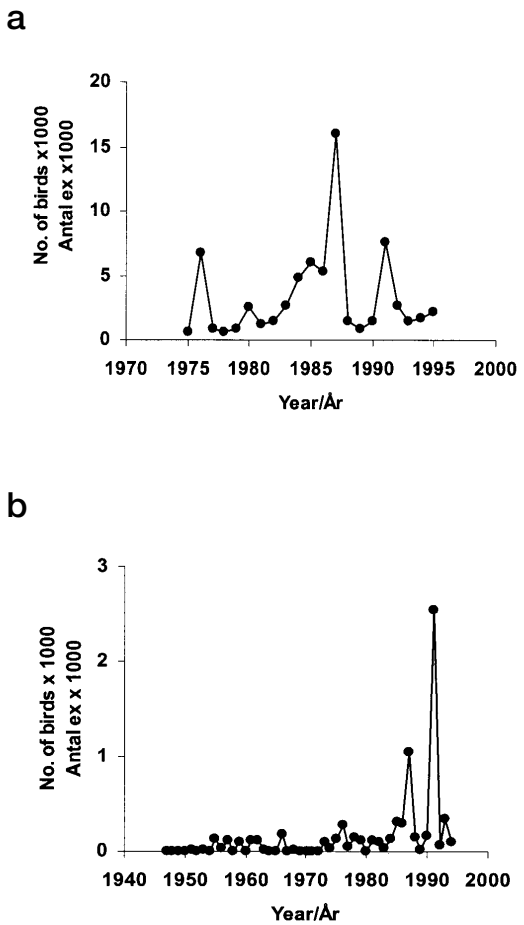

Figure 4. Annual spring number of the Grey Plover *Pluvialis squatarola* recorded (a) in Sweden 1975–1995 and (b) at Ottenby 1947–1994.
Årliga antal kustpipare som rapporterats från (a) Sverige under tidsperioden 1975–1995 och (b) Ottenby 1947–1994.

General time pattern

Grey Plovers turned up along the coasts of southernmost Sweden from the first week of May (Figure 5). In total, 6192 birds (8% of the national grand total) were observed before 24 May (Figure 3), mostly in the provinces of Halland, Skåne and Öland. The migration of Grey Plover in Götaland (Figure 5) peaked sharply in the last days of May and first days of June, with a concentration of 62,000 birds (83% of the national grand total) observed within the 10 day period of 24 May–2 June. Only a few birds were seen thereafter. A distinct peak applied to resting birds (median date 29 May), as well as those observed migrating (30 May). These dates are close to the median date (28 May) recorded for Grey Plovers resting and migrating in Svealand, although the birds observed in Svealand were somewhat less concentrated in time (Figure 5). However, in the region of Norrland the passage of Grey Plovers took place earlier than in the south; median date in Norrland was as early as 18 May, and here most (79%) passed before 24 May (Figure 5).

The number of birds passing before 20 May increased significantly at Ottenby during the 48-year period of 1947–1994 (Spearman's rank correlation r_s=0.51, n=48, p=0.002), but no significant trend in early numbers observed was recorded for the shorter 20-year period 1975–1994 (r_s=0.22, n=20, p=0.35). However, for the period of 1975–1995, there was a tendency towards increase over time in lumped numbers of recorded Grey Plovers (before 20 May) in the provinces of Skåne and Halland (r_s=0.41, n=21 years, p=0.07).

Flock size

Grey Plovers recorded in the first week of May appeared singly, or in groups of a few individuals. Later, the flock sizes and the number of large flocks increased in south Sweden, culminating in the 10-day peak period starting on May 24. In Norrland, Grey Plovers appeared singly, or in groups of up to maximally 34 individuals.

The data did not allow a thorough analysis of flock sizes since such information was only rarely provided. Nevertheless, considering 120 detailed records from Götaland, 16 from Svealand and 13 from Norrland, flock sizes ranged from single birds up to 925 individuals. The latter flock was seen at Klåvudden, Lake Vättern in Närke, on 28 May, 1991. In Götaland, the median number of birds per observation (flock size) was 47 birds, in Svealand 78 individuals, and in Norrland the median number was one bird. Flocks of >50 birds were observed only in Götaland and Svealand, during the end-of-May to early June peak.

Population trends

In the period of 1975–1995, the number of Grey Plover observed in Sweden varied between 550 birds in 1975 to 16,000 birds in 1987 (Figure 4a), but with no statistically significant overall trend (Spearman's rank correlation r_s = 0.34, n=21 years, p=0.13). However, if the three highest annual

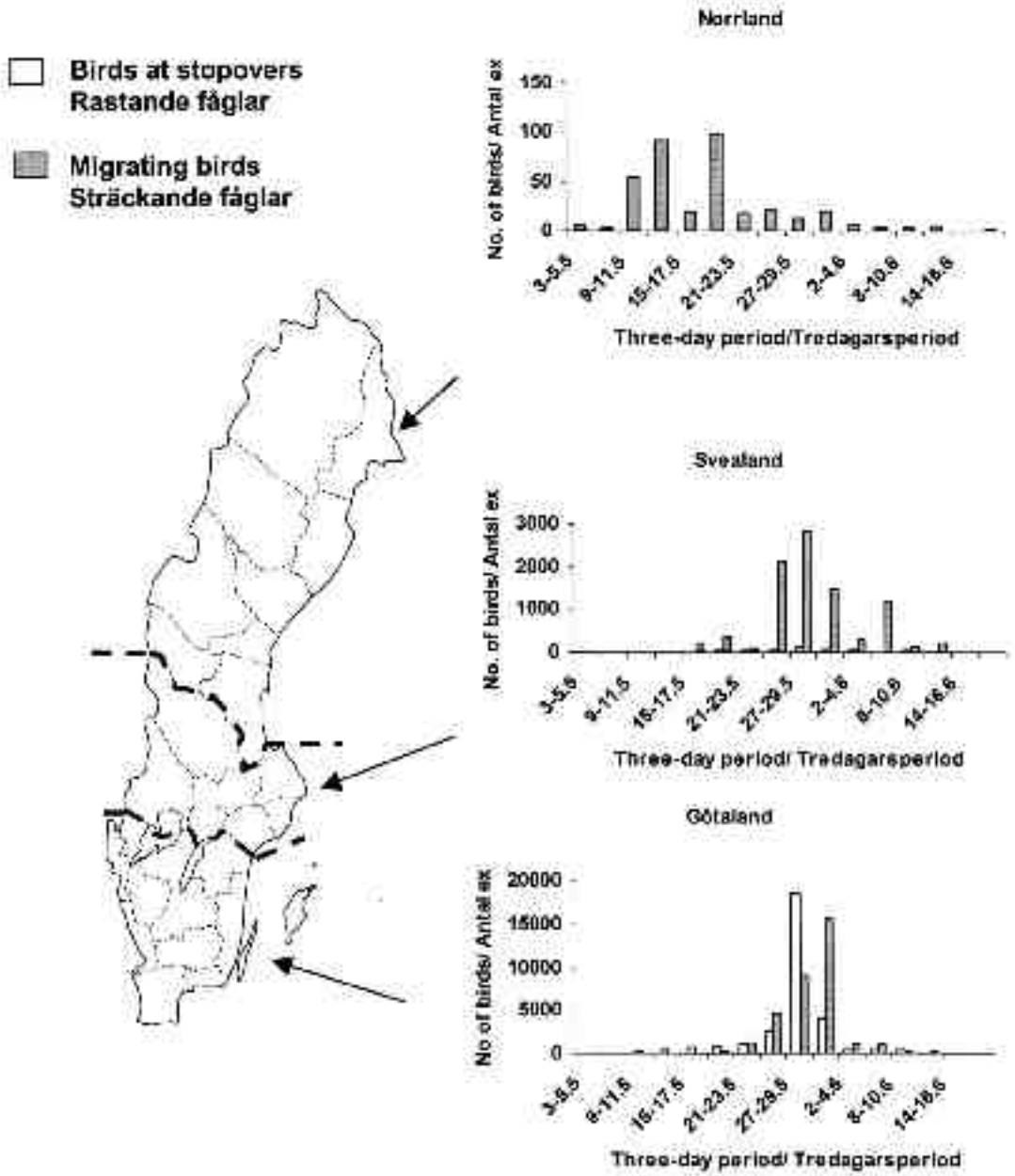

Figure 5. Time patterns in spring occurrence of the Grey Plover *Pluvialis squatarola* in three regions of Sweden (for regional median dates, see text).
Tidsmönster i vårupträdandet av kustpipare i tre olika regioner i Sverige (för mediandatum för de olika regionerna, se texten).

spring values (1976, 1987 and 1991—all related to extraordinary heavy grounding by inclement weather conditions) were excluded, a statistically significant increase appeared (r_s = 0.50, n = 18 years, p= 0.03).

In the longest time series (Ottenby 1947–1994), the annual spring numbers varied from a handful up to 2500 birds in 1991 (Figure 4b). A correlation analysis of this time series revealed a highly significant overall increase in the number of birds observed (r_s = 0.62, n = 48 years, p < 0.001). However, for the period of 1975–1994, corresponding to the period analysed for the whole country, no significant change in numbers with time were recorded at Ottenby (r_s = 0.22, n = 20 years, p = 0.34).

Finally, we tested whether the variation in annual number of Grey Plovers passing Sweden in spring, as represented by the long-term series from Ottenby (Figure 4b), was related to variation in predation pressure driven by the lemming cycle (Blomqvist et al. 2002), in the preceding breeding season in Taimyr. We assumed that either first summer birds (one-year old) or both first and second summer birds (one–two years old) remain in the winter quarters. However, neither with one nor two years delay did we find a significant correlation between the number of birds in the focal year versus the predation pressure (Appendix 2 in Blomqvist et al. 2002) in any of these previous years (r_s= -0.02, n = 38 years, p = 0.90 with first summer birds staying in the winter quarters, and r_s = -0.28, n = 38 years, p = 0.09 if also second summer birds stay in the wintering area).

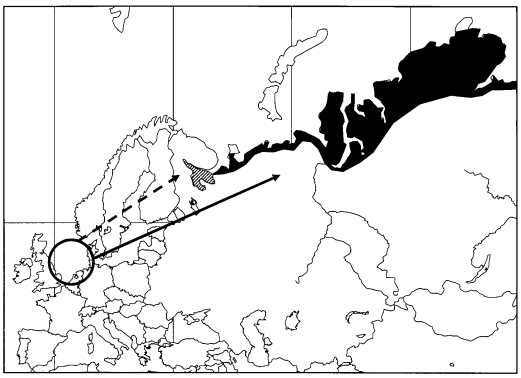

Figure 6. Spring routes of the Grey Plover *Pluvialis squatarola* migration from the Wadden Sea to staging posts/ breeding grounds in the White Sea (grey; Belopolskii et al. 1970), or directly to the main breeding areas (black), i.e., east of the White Sea to the Yamal, Gydan and Taimyr peninsulas (Mineyev & Impe 1997, Byrkjedal & Thompson 1998). Most (79%) of the former birds (dashed arrow) passed Norrland 10–23 May, whereas in the latter group (solid arrow) 83% passed southern Sweden principally 24 May–2 June. Map projection: Mercator.
Vårflyttningsrutter för kustpipare från Vadehavet till rast- och häckningsområdena vid Vita havet (streckad pil), respektive häckningsområdena österut till Taimyr (heldragen pil).

Discussion

In spring, the Grey Plover is a conspicuous species, easy to identify in flight, and by its typical loud call. Therefore, we feel confident that the spatial and temporal migration pattern compiled for the 74,650 birds observed during more than 20 years (Figure 2–5) fairly well reflects the general, overall spring passage of the Grey Plover over Sweden (Figure 6). If anything, the number of birds recorded in Norrland is comparatively low (Figure 5), in part due to relatively low density of observers (cf., Olsson & Wiklund 1999). Such a bias should, however, not influence the temporal pattern found.

Numerical occurrence

The total number of Grey Plover (n = 74,650) reported over ca. 20 years in Sweden, is about 30% of the estimated population size (n = 247,000 birds) following the East Atlantic Flyway (Stroud et al. 2004). During roughly the same period of years, proportionally fewer birds, 19%, were reported in the Bar-tailed Godwit: 160,300 individuals reported in Sweden (Green et al. 2003) out of two passing populations together amounting to 825,000 birds (Smit & Piersma 1989). In the Siberian Red Knot (*C. c. canutus*), with 55,000 birds recorded (Blomqvist & Lindström 1992) out of 570,000–750,000 spring migrants passing each year (Gudmundsson 1994), the observed fraction is 7% to 10%. In the Sanderling, with only 1939 birds reported during 20 years (Blomqvist & Lindström 1995), out of an estimate of some 50,000 Sanderlings passing (Meltofte et al. 1994), the fraction is merely 4%. Finally, for the smallest species analysed the proportions are even lower: about 1% in the Little Stint (n=1851; Blomqvist & Lindström 1995) out of 174,000 wintering birds along the East Atlantic Flyway (Smit & Piersma 1989), and only 0.2% in the Curlew Sandpiper (n=675; Blomqvist & Lindström 1995) out of 416,000 birds in the same flyway (Smit & Piersma 1989).

Several factors, often in combination, might affect the fraction of birds observed, such as conspicuousness and use of different migration routes. The

proportion of Grey Plover recorded in flight (59%) versus seen on the ground at stopover sites (41%; Figure 3) is fairly similar to the likewise large and visually conspicuous Bar-tailed Godwit, where two thirds of all reported birds in Sweden were seen on the ground (Green et al. 2003), but contrasts to the Red Knot, where stopover is only accidental (Blomqvist & Lindström 1992). Also, the loud, whistling call of the Grey Plover may make them easier to recognize than the more silent Bar-tailed Godwit and Red Knot. Many Little Stints and Curlew Sandpipers, and similarly some Sanderlings, wintering in West Africa follow a more continental eastern (trans-African) route of homeward migration (referred in Blomqvist & Lindström 1995). Thereby, the number of birds passing Sweden is reduced, and fewer small waders are observed. Large birds are easy to detect in flight, while small waders have mostly been seen on the ground in Sweden (Blomqvist & Lindström 1995), which certainly indicates an under-representation of the latter group.

Flock size

Some large and even very large flocks of Grey Plovers pass Sweden in spring. The largest flock size in the present data was 925 individuals. Previously, large flocks have been reported from the Baltic proper, for instance 500–600 birds on 27 May 1962 at the islands of Öja (Landsort) (Blomberg 1963), ca. 150 birds on 29 May 1955 (Norbeck & Melin 1955), and 100 birds on 27 May 1965 (Höjer 1967) at the island of Gotska Sandön. Inland a flock of about 300 Grey Plovers were seen near Kristinehamn (in Värmland) on 29 May 1937 (Samuelsson 1954). From the province of Skåne, a median flock size of 150 birds (range 17–250) has been reported (Green 2004). All in all, based on data of the present study and several previous reports from Götaland (Roos 1961, Höjer 1967, Hedin et al. 1969, Jönsson et al. 1990, Green 2003, 2004) and Svealand (Blomberg 1963, Betzholtz & Swenzén 1992, Tjernberg 1996), it is evident that flocks of up to 100 Grey Plovers (at times even several hundred birds) regularly pass southern Sweden, whereas in Norrland groups of some twenty or thirty individuals are found, with single birds the most frequent observation.

Population trends

The long-term increase in total number of spring migrating Grey Plover observed at Ottenby in the period of 1947–1994 (Figure 4b) agrees with a general long-term increase in the number of birds found wintering in the United Kingdom from the 1930s to the 1990s (Moser 1988, Tubbs 1991). The steady increase in number of birds recorded in our data set from 1977 to the peak year of 1987 (Figure 4a) coincides with a prominent annual increase in wintering numbers of birds reported from the United Kingdom (Prŷs-Jones et al. 1994), and accords with a reported increase from the Dutch Wadden Sea in the time period 1977 to the beginning of the 1990s (Smit & Zegers 1994). Likewise, autumn migration data of the Grey Plover in Denmark (Blåvandshuk) seem to reflect a population increase in 1965–2003 (Meltofte et al. 2006).

A considerable increase (almost 50%) in the number of Grey Plovers wintering in coastal areas of the European East Atlantic Flyway is reported from the mid-1980s to the early 1990s (Davidson 1998, Stroud et al. 2004). These population growths coincide with a period of mild winter climate in Northwest Europe (Hurrell 1995, Watkinson et al. 2004, Austin & Rehfisch 2005). Therefore, Stroud et al. (2004) suspected that the higher winter number of Grey Plover in Northwest Europe, at least partly, reflected a shift in wintering grounds rather than a true population increase. However, the large number of birds passing Ottenby during this time period (Figure 4b), seems likely to reflect a real increase in the total number of Grey Plovers following the East Atlantic Flyway, since only a redistribution of wintering areas would not result in a higher number of birds transiting the migration route upward the Wadden Sea, while the field activity at the Observatory has been roughly constant. Moreover, the long-term tendency of an increase in number of early passing Grey Plover agree with similar reports for the Bar-tailed Godwit in southern provinces of Sweden (Green et al. 2003), suggesting that arctic waders adjust the timing of their spring passage to climate change (cf., Vähätalo et al. 2004). These tendencies give high scientific priority to further studies of the timing of spring migration in Arctic-breeding waders in relation to climate change, as indicators of large-scale climate change effects (cf., Lindström & Agrell 1999, Rehfisch & Crick 2003, Piersma & Lindström 2004).

We found no correlation between the spring numbers of Grey Plover in Sweden versus the lemming-driven three year cyclicity of the predation pressure in Siberia when considering the time-lags of two to three years spent in wintering quarter and migration areas, before they for the first time transit Sweden upon returning to the Russian breeding areas (Prokosch 1988, Dijk et al. 1990). This lack of cor-

relation with lemming cyclicity contrasts to those reported on spring staging birds in the Wadden Sea (Prokosch 1988), in wintering birds in South Africa (Underhill 1987, Martin & Baird 1988), and likewise in southeastern India (Balachandran et al. 2000). Also worth noticing, is that years of late spring and slow thaw in Taimyr, such as in 1989 and 1992 (Syroechkovski & Lappo 1994, Stock & Bruns 1995, Kokorev & Kuksov 2002), plausibly resulting in very poor breeding success, seem not to result in a consistent change in the number of birds observed in Sweden (Figure 4).

Comparison with other tundra breeding waders

The two-peak temporal distribution pattern of spring migrating Grey Plover in Sweden (Figure 5) is found also in two other wader species passing Sweden in this season, namely the Red Knot and the Bar-tailed Godwit. All three species show a peak in mid-May in Norrland, and a much more prominent peak at the end-of-May to early June in southernmost Sweden (Blomqvist & Lindström 1992, Green et al. 2003, this study).

The mid-May peak of the Grey Plover now recognized in Norrland (median 18 May; Figure 5) is close in time to that reported for Nearctic-breeding Red Knot (*C. c. islandica*) passing the same area (median 16 May; Blomqvist & Lindström 1992), as well as the European population (*L. l. lapponica*) of the Bar-tailed Godwit (13–14 May; Green et al. 2003). These three similar-sized wader species, migrate through northern Sweden at about the same time, but with different final destination. The Red Knots head for transit staging areas in North Norway (Strann 1990, 1992, Blomqvist 1991, Wilson et al. 2006), before entering a non-stop, trans-oceanic flight to the New World (Davidson et al. 1986, Uttley et al. 1987, Wilson & Strann 2005). The Bar-tailed Godwits are mainly bound for breeding areas in the tundra of northern Fennoscandia (Green et al. 2003). Grey Plovers passing northern Sweden in mid-May are presumably en route for staging posts in the White Sea area, where they are reported to arrive around 22 May (average of 19 years; Belopolskii et al. 1970). This arrival matches nicely the recorded mean passage of 18 May in Norrland (Figure 5).

The end-of-May peak of Grey Plover in southern Sweden (median 28–30 May; Figure 5) coincides with the time of departure of the species from the Wadden Sea (Prokosch 1988, Meltofte et al. 1994), and with the peak of birds recorded staging at the south-west coast of the Baltic Sea proper in 1976–1999 (Brenning 2001). The passage schedule matches fairly well with a reported arrival date of 6 June from breeding areas in western Taimyr (Hötker 1995). The end-of-May passage of the Grey Plover in southern Sweden also coincides with the migration peak of other wader populations destined for breeding grounds on the Taimyr Peninsula, or perhaps even farther eastward, such as the Afro-Siberian Bar-tailed Godwit (*L. l. taymyrensis*) (28–30 May; Green et al. 2003), the Sanderling (29 May) and the Curlew Sandpiper (29 May–3 June) (Blomqvist & Lindström 1995). The Siberian Red Knot peaks about 10 days later (median 8 June; Blomqvist & Lindström 1992). In the Little Stint, the spring migration culminates already 24 May (Blomqvist & Lindström 1995), possibly reflecting a somewhat earlier spring arrival in breeding areas southwest of Taimyr.

Parallelism of flyways

The Grey Plover also winters and migrates up along the East African/West Asian–Mediterranean/Black Sea flyways (*sensu* Stroud et al. 2004), although winter counting from East Africa (Summers et al. 1987, also Bregneballe et al. 1989), the Persian Gulf (Zwarts et al. 1991, Have et al. 2002), and the Mediterranean region (Smit 1986) give a lower total number than for the East Atlantic Flyway (Stroud et al. 2004). The East African/West Asian–Mediterranean/Black Sea flyways merge near the Black–Azov seas (Summers et al. 1987, Smit & Piersma 1989, Kube et al. 1998, Stroud et al. 2004), a conclusion supported by ringing recoveries of the Grey Plover (Korzukov 1991, Serra et al. 2001).

Interestingly, the timing of spring migration is very similar in Grey Plovers following the East Atlantic Flyway and the East African/West Asian–Mediterranean/Black Sea flyways. From the end of April, the Grey Plover starts leaving West Africa (Piersma et al. 1990), and passes successively up along the European Atlantic coast, via Portugal (Rufino & Araujo 1987), Spain (Galarza 1984, Becerra & Pajuelo 1985, Dominguez & Rabuñal 1991), France (Bredin 1985, Girard 1989) and Holland (Dijk & Wassink 1980). Analogously, Grey Plovers in East Africa (Pearson & Britton 1980, Pearson & Serra 2002), at the Persian Gulf (Hirschfeld 1994) and in the southern and eastern Mediterranean region – in Tunisia (Berk & Have 1990, Ruiters 1993), Egypt (Berk & Have 1990), southern Turkey (Have et al. 1988, Berk & Have 1990, Berrevoets et al. 1994) and in northeast Greece (Nobel et al.

1990) – starts migrating north mainly in the end of April and first or second week of May.

Farther north, in the area of the Black and Azov seas, such as the Kizilirmak Delta in Turkey (Hustings et al. 1994), the Dobrodgea-Danube area in Romania (Brehme et al. 1992, Schmitz et al. 2001) and the Sivash lagoon system in Ukraine (Berk & Have 1990, Winden et al. 1993), the occurrence of Grey Plovers appears to culminate in the third week of May to first five days of June. This timing is in parallel with the end-of-May to early June peak in the southern Baltic Sea area (Figure 5). Finally, as further parallels, the remaining flight distance to the breeding grounds from the Wadden/Baltic seas and Black/Azov seas when following the East Atlantic and the Mediterranean/Black Sea flyways is quite similar (2500–4500 km and 3000–4500 km, respectively), and no major stopover sites are known farther up along any of the two migration routes.

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Sammanfattning

Sverige ligger geografiskt väl till för att studera det vårsträck av arktiska vadare som går från Vadehavet (Nederländerna, Tyskland, Danmark) upp mot den nordvästeuropeiska och sibiriska tundran. Denna artikel följer på tidigare redovisade arbeten om våruppträdandet av arktiska vadararter i Sverige, d.v.s. kustsnäppa *Calidris canutus*, sandlöpare *C. alba*, småsnäppa *C. minuta*, spovsnäppa *C. ferruginea* och myrspov *Limosa lapponica* (Blomqvist & Lindström 1992, 1995, Green et al. 2003).

Kustpiparens utbredning, flyttning och antal

Endast en population kustpipare förekommer regelbundet i Europa (Byrkjedal & Thompson 1998). De häckar på tundran från Vita havet till Taimyrhalvön. Arten förekommer även vidare österut i Sibirien, ända bort till arktiska Kanada, men dessa fåglar berör inte Västeuropa.

Häckningsframgången hos tundralevande fågelarter varierar starkt mellan åren, ofta relaterat till lämlarnas cykliska förekomst i häckningsområdena. När det finns få lämlar ger sig lämmelätande predatorer på fåglars ägg och ungar med svag reproduktion som följd. Goda lämmelår lyckas vadarna bättre (Summers et al. 1998, Blomqvist et al. 2002). Kustpiparna häckar inte förrän de uppnått två eller tre års ålder och stannar fram tills dess i sina vinterkvarter.

Senaste uppskattningen av antalet kustpipare som flyttar via Västeuropa uppgår till 247.000 fåglar (Stroud et al. 2004). Dessa övervintrar från Västafrika i söder till Vadehavet och Storbritannien i norr. I Sverige ses arten endast i enstaka exemplar om vintern (SOF 2002). I slutet av april börjar kustpiparna lämna Afrika och passerar sedan successivt upp längs Europas västkust (Piersma et al. 1990). Den största koncentrationen av kustpipare påträffas i Vadehavet under maj månad (140.000 fåglar; Meltofe et al. 1994). Vikterna hos dessa fåglar indikerar att de sedan flyger non-stop till sina häckningsområden (Serra et al. 2006).

I denna uppsats beskriver och analyserar vi kustpiparens vårflyttning över Sverige, baserat på observationer från ett förnämligt system av lokala rapportkommittéer, fågelstationer och enskilda observatörer (Blomqvist & Lindström 1996).

Material och metoder

Insamling av data

Våra data härstammar framför allt från svar på förfrågningar hos landets 30 regionala rapportkommittéer (rrk, Figur 1), men också från direkta kontakter med vissa observatörer och fågelstationer, samt litteratursökning i nationella och regionala tidskrifter. Observationer från 1 mars till 20 juni under i huvudsak perioden 1975–1995 har analyserats. Alla vårobservationer har tidigare genomgående begärts in av rapportkommittéerna, förutom i Halland, på Öland och Gotland. För dessa landskap finns dock observationer från fågelstationer, av större flockar och från enstaka observatörer. Från Ottenby har vi analyserat observationsdata från perioden 1947−1994.

Resultat

Uppgifter om observerade kustpipare fanns från alla rapportområden utom Härjedalen (Figur 2). Så mycket som 59% av fåglarna sågs förbiflygande, medan resten iakttogs rastande. Flest kustpipare observerades i slutet av maj och början på juni (Figur 3, 5). Sammanlagt rapporterades 74.650 kustpipare, inom intervallet 550 till 16.000 individer per år (Figur 4a).

Regionala skillnader i uppträdande

Fynden fördelade sig med 87% i Götaland, 12% i Svealand och mindre än 1% i Norrland (Figur 2). Övervägande mängden fåglar sågs längs kusterna. Omkring 3% av samtliga observerade fåglar (som mest drygt 900 individer år 1991) rapporterades nära de stora sjöarna i Mellansverige (Värmland och Närke). I Stockholmstrakten sågs arten årligen (7% av samtliga observationer), med som mest 1000 fåglar år 1992. Större antal rastande fåglar sågs endast i de sydligaste landskapen, framför allt då fåglarna tvingats ner av mycket dåligt sträckväder. Så mycket som 25% av alla observerade kustpipare i Sverige sågs vid några sådana väderbakslag, vilket tyder på att kustpiparna normalt undviker att rasta i Sverige.

Tidsmönster och flockstorlekar

De första enstaka fåglarna dök upp i Sydsverige första veckan av maj (Figur 3, 5). Flyttningen i Götaland kulminerade i slutet av maj, med 83% av hela Sveriges totalsumma observerad under tiodagarsperioden 24 maj till 2 juni, med mediandatum 28 maj för rastare och 29 maj för förbiflygare. Sträcket i Norrland kulminerade tidigare än i Sydsverige, med mediandatum 18 maj (Figur 5).

Tidsserien 1947–1994 från Ottenby visar att antalet kustpipare som passerat före den 20 maj ökat. En tendens till tidigare passage finns även för perioden 1975–1995 från Skåne–Halland.

De tidigaste kustpiparna uppträdde ensamma eller i små grupper. Flockarna var som störst när sträcket kulminerade i slutet av maj, som mest sågs 925 fåglar i en flock (Klåvudden vid Vättern, 1991). I Norrland sågs ingen flock med mer än 34 individer.

Populationstrender

Ingen statistiskt säkerställd förändring kunde påvisas i antal observerade kustpipare i Sverige under perioden 1975–1995, med mindre än att tre extremår (1976, 1987, 1991) uteslöts ur observationsserien (Figur 4a). Vid Ottenby ökade antalet observerade fåglar under perioden 1947–1994 (Figur 4b), dock påträffades inte heller här någon statistiskt säkerställd trend för perioden 1975–1994, d.v.s. då observationsdata även finns från övriga Sverige.

Antalet kustpipare förväntades variera i antal mellan åren gentemot lämmeltillgången. Inget samband kunde dock påvisas mellan antalet fåglar sedda vid Ottenby om våren och lämmelförekomsten på den ryska tundran åren före.

Diskussion

Troligen motsvarar de rapporterade fåglarna förekomsten i Sverige i stort, även om Norrland på grund av sin lägre täthet av ornitologer säkert är underrepresenterat i observationsmaterialet. Dock bör detta inte påverka artens tidsmässiga uppträdande.

Antal och geografiskt mönster

Om man delar antalet observerade kustpipare (74.650) med den förmodade populationsstorleken (247.000) erhålls ett relativt andelsmått på artens förekomst om 30%. För de andra arterna som vi redovisat tidigare (Blomqvist & Lindström 1992, 1995, Green et al. 2003) skulle motsvarande andel vara 19% för myrspov, 7–10 % för kustsnäppa, 4% för sandlöpare, 1% för småsnäppa och 0,2% för spovsnäppa. Större vadararter upptäcks således proportionellt oftare än mindre former. Här spelar naturligtvis både storlek och ljudlighet in. I fallen med små- och spovsnäppor påverkas den fåtaliga

vårförekomsten av att dessa arter väsentligen passerar söder och öster om Sverige.

Tendensen med ökande antal kustpipare som observerades tidigt om våren i södra Sverige under senare år är ett fenomen i linje med vad som rapporterats hos myrspov (Green et al. 2003), och indikerar att artiska vadare under tidsperiod med mildare klimat kan tidigarelägga vårflyttningen.

Populationstrender

Tendensen mot ökat antalet observerade kustpipare i Sverige under åren 1975–1995 (om de tre extremåren uteslutits) är intressant (Figur 4a). Och en långsiktig ökning av antalet fåglar sedda vid Ottenby under perioden 1947–1994 (Figur 4b) stämmer väl överens med artens generella ökning på vinterlokaler på Brittiska öarna och i Nederländerna. Denna sentida ökning beror till del på mildare vintrar. Vi fann inte ett förväntat samband mellan predationstryck på tundran och antalet kustpipare räknade vid Ottenby. Troligen går det inte att dra några slutsatser av artens uppträdande vid Ottenby för enskilda år, medan däremot den funna långtidstrenden med ökande antal observerade fåglar bör vara relativt tillförlitlig (Figur 4b).

Jämförelse med andra tundrahäckande vadare

Kustpiparens tvåtoppiga förekomst i Sverige (tidig topp i Norrland, sen topp i Sydsverige, Figur 5) återfinns även hos två andra nordliga vadare, nämligen myrspov och kustsnäppa. Märkligt nog betyder detta mönster olika saker i de tre fallen. Toppen i mitten av maj för kustsnäppa gäller de fåglar (*C. c. islandica*) som via rastplatser i Nordnorge skall vidare till grönländska och eventuellt kanadensiska häckningsplatser (Blomqvist & Lindström 1992). För myrspov gäller det fåglar (*L. l. lapponica*) som är på väg till sina Nordskandinaviska häckningsområden (Green et al. 2003). I kustpiparens fall är det fåglar på väg till häckplatser vid Vita havet (Figur 6), alternativt rastning inför vidare flygning österut.

Sträcktoppen i södra Sverige (mediandatum 28–29 maj) sammanfaller med avflyttningsdatum från Vadehavet (Prokosch 1988, Meltofte et al. 1994), men också med ankomstdatum till häckningsområden (Hötker 1995). Sträcket sammanfaller också väl med det av andra vadare på väg mot den ryska tundran. Motsvarande mediandatum för myrspov (*L. l. taymyrensis*) är 28–30 maj (Green et al. 2003), sandlöpare 29 maj och spovsnäppa 29 maj –3 juni (Blomqvist & Lindström 1995). De sibiriska kustsnäpporna (*C. c. canutus*) är dock betydligt senare (8 juni; Blomqvist & Lindström 1992) och småsnäpporna något tidigare (24 maj; Blomqvist & Lindström 1995).

Parallella flyttningsvägar

De kustpipare som häckar längre österut i Asien flyttar från vinterkvarter i södra, östra och nordöstra Afrika, upp via Persiska viken och Svarta havet. Detta sträck pågår i stort sett parallellt med, och på ett snarlikt vis som, flyttningen från Västafrika via Nordeuropa (över Sverige) till västra Rysslands tundra (Figur 6). I slutet av april bryter nämligen kustpiparna upp från Västafrika och Östafrika och söker sig successivt upp mot rastplatserna i Vadehavet respektive Svarta havet. Dessa rastområden lämnas i månadsskiftet maj–juni för non-stop-flygningar om 250 till 450 mil till häckningplatserna på tundran.