Nicky Petkov

Ruff *Philomachus pugnax*

Geographical variation and distribution

The Ruff is a monotypic species with a wide breeding distribution across the Palearctic from the U.K. (few) and The Netherlands to the Chukotsky Peninsula at about 180ºE in the Russian Far East. The main breeding areas are in Siberia between 65ºN and 73ºN, but the range extends southwards to about 50ºN in temperate Western and Central Europe and also locally in Kazakhstan. Small numbers winter in Western Europe, the Mediterranean basin and South-west Asia, but the great majority spend the northern winter in sub-Saharan Africa, in the northern tropics from Senegal to Sudan and Ethiopia, and in parts of Eastern and Southern Africa. There is a much smaller wintering population in the Indian sub-continent (east to Bangladesh), but only tiny numbers of birds occur further east in South-east Asia, and the species is only a straggler to Australasia.

Movements

Evidence from ringing shows that birds breeding in Northern Europe generally move south-south-west on a broad front across Europe, North Africa and the Sahara to winter mainly in the Senegal and Niger inundation zones in West Africa east to Lake Chad (Cramp & Simmons 1983, Smart *et al.* 2002). There are numerous recoveries of birds ringed in Northern and Western Europe in Senegal, Mauritania, Mali and Guinea-Bissau (Cramp & Simmons 1983), although birds ringed on autumn passage in Finland and Sweden have also been recovered in Sudan (Urban *et al.* 1986). A small number of birds, predominantly males, remain throughout the winter in Western Europe (Denmark, southern Germany, The Netherlands, Britain and France) and the Mediterranean basin (east to Greece).

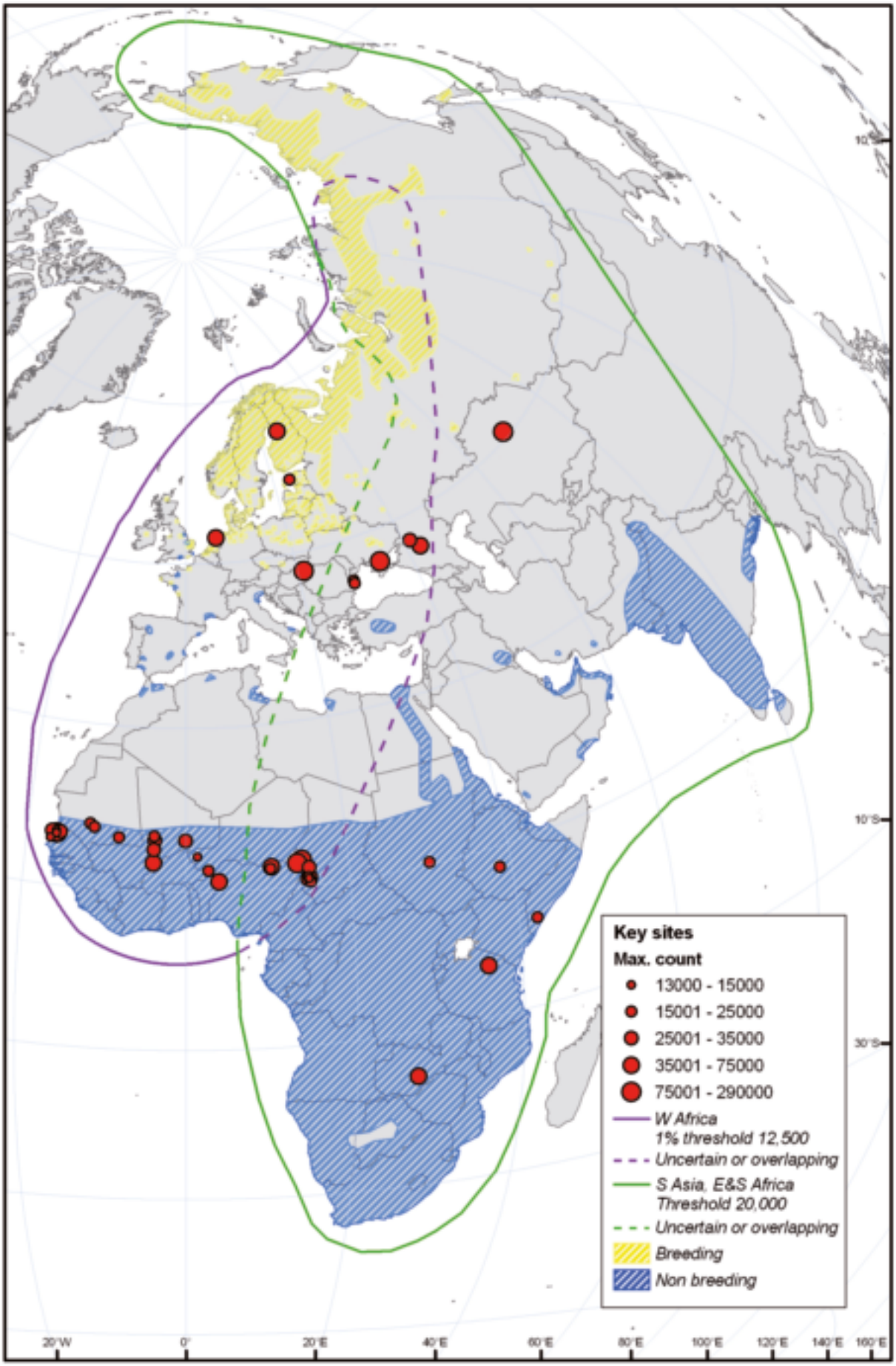
In most of Europe, Ruffs are a lot more numerous on spring migration than in autumn (Wymenga 1999). Birds ringed on autumn passage in northern Norway appear to follow two routes to West Africa: some migrate south-west along the coast of Western Europe, while others fly more directly southwards through Finland, western Russia and Ukraine to the Mediterranean basin (Bakken *et al.* 2003). Most recoveries of Ruff ringed on autumn passage in southern Norway, Sweden, Britain and Ireland are concentrated in Western Europe from The Netherlands to France and North Africa. On the return spring passage, however, there is some evidence of an easterly shift in distribution, as most recoveries are centred around Italy and to a lesser extent the Balkans (Cramp & Simmons 1983, Bakken *et al.* 2003, Smart *et al.* 2002). Also, Ruffs are more abundant in spring than in autumn in Israel (Krabbe 1980), Egypt (Goodman & Meininger 1989), Greece and Hungary. The possibility of there being a “loop” migration in Europe clearly requires further investigation.

Some of the birds wintering in West Africa and occurring on passage in Europe are of Siberian origin. A bird ringed in Senegal was recovered in the Ob basin (65ºE), and birds ringed in Tunisia and Nigeria have been recovered as far east as the Lena River (125ºE) (Urban *et al.* 1986). A number of birds ringed on autumn passage in Finland, Sweden, Norway, Denmark, The Netherlands, Germany and the U.K. have been recovered in Siberia, mostly in Western Siberia, but with some from as far east as Yakutia at 130ºE (Cramp & Simmons 1983, Bønløkke *et al.* 2006). This suggests that some birds are undertaking long east to west movements across Eurasia in sub-arctic and temperate latitudes before turning south and heading towards Africa (Cramp & Simmons 1983). Most recoveries of British and Norwegian ringed birds in summer have been in Europe east to the Urals (53ºE), but there has been one recovery of a British ringed bird from the Russian Far East (Smart *et al.* 2002) and one recovery of a Norwegian ringed bird in Western Siberia (Bakken *et al.* 2003, Smart *et al.* 2002).

Birds wintering in Eastern and Southern Africa appear to be almost entirely of Siberian origin, and show “leap-frog” migration, with the most easterly breeders migrating to the most southerly part of the non-breeding range in Africa (Underhill *et*

Ruff

Philomachus pugnax



al. 1999). Recoveries of birds ringed in Southern Africa indicate that the pre-nuptial migration follows a Great Circle route inland along the African Rift Valley, through the Black Sea and Caspian Sea, and through Kazakhstan and the Ob and Yenisey basins to staging areas on the southern Lena River. Recoveries within the breeding range lie from the Lena River (120ºE) eastwards to the Kolyma basin at 164ºE (Underhill *et al.* 1999). The southward post-nuptial migration is less well documented, but it appears that some birds first move west across northern Asia before heading south into Africa. While some birds from eastern breeding areas are known to reach Europe and West Africa, there is little indication that any western breeders reach Eastern or Southern Africa. Despite the considerable amount of ringing that has been carried out in Western and Central Europe and Southern Africa, there has been only one recovery linking anywhere in Europe west of Ukraine with Southern Africa – a bird ringed on passage in Germany and recovered in South Africa (Underhill *et al.* 1999).
The sexes differ somewhat in their migration strategies, the females generally migrating much further than the males. In winter, males outnumber females in Europe. In sub-Saharan Africa, the proportion of females increases from north to south. The ratio of females to males has been estimated at 1.85:1 in Senegal (Tréca 1994, OAG Münster 1996), 9:1 in Kenya (Pearson 1981), and between 8:1 and 15:1 in Southern Africa (Tree 1985). A similar situation is found amongst juveniles, with the proportion of females increasing gradually from north to south.

Adult males leave the breeding grounds first, from late-June to early-July, with adult females following from mid-July and juveniles in late July to August. The main staging and moulting areas are situated along the Atlantic coast of Europe, on the western side of the Black Sea, in the Volga Delta and along the Nile Valley. The first males arrive in Senegal in mid-July. Arrival in Southern Africa commences in early August and continues until November. Here the birds are highly nomadic, moving in response to rainfall events which create or drown suitable habitat (Underhill *et al.* 1999). The northward migration starts as early as mid-February for males. However, the main movement occurs between March and mid-May, with females departing a month later than males. Two peaks are evident in Europe: one in late March, involving birds from South-west Europe and North Africa, and the other in late April, involving birds from sub-Saharan Africa. There is some evidence that Ruffs are able to migrate from wintering areas in Senegal to staging areas in Central Europe in one non-stop flight (OAG Münster 1998). The breeding grounds are reoccupied from mid-April in Western Europe, but progressively later to the north and east. Birds arrive on the breeding areas in Siberia from mid-May to June. Large numbers of non-breeders remain in their winter quarters throughout the year (Cramp & Simmons 1983).

Population limits

No discrete populations are identifiable. All four editions of *Waterbird Population Estimates* recognise two "populations" of Ruff in Western Eurasia and Africa on the basis of separate wintering areas: a population wintering in West Africa, and a population wintering in Eastern and Southern Africa. Evidence from ringing has revealed that these two "populations" overlap extensively on the breeding grounds in Siberia. However, it appears that the birds wintering in West Africa originate mainly from breeding areas in Europe and Western Siberia, and migrate through Western Europe, the Black Sea and Mediterranean region, while the birds wintering in Eastern and Southern Africa originate entirely from breeding areas in Siberia (mainly between 70ºE and 164ºE) and migrate through Western Asia. Stroud *et al.* (2004) therefore retained two populations in Western Eurasia and Africa, and these were defined as follows:

1) birds breeding mainly in Northern and Central Europe and Western Siberia, and migrating through Western Europe, the Black Sea and Mediterranean region to winter in West Africa;
2) a population entirely of Siberian origin (breeding between 70ºE and 164ºE), migrating through Western Asia, and wintering in Eastern and Southern Africa.

Some evidence from ringing links the birds breeding in the Yamal-Nenetsk region east of the Urals with European breeders, and Thorup (2006) therefore suggested that the Yamal-Nenetsk birds should be included within an enlarged "European breeding population". This is consistent with the above treatment, which acknowledges that some birds of Western Siberian origin winter in West Africa.

The relatively small numbers of Ruff wintering in the Indian sub-continent and further east have been assigned to a third population in *Waterbird Population Estimates*. It has been supposed that these birds originate from breeding areas in Central and Eastern Siberia. Zöckler (2002a, 2002b), however, has suggested that they originate from breeding areas in the Taymyr and central Russian Arctic, thus "crossing over" birds on their way from breeding areas in the Russian Far East to Southern Africa. A bird ringed in Rajasthan in India (78ºE) and recovered during the breeding season in the Krasnoyarsk region at 94ºE in Western Siberia (Roberts 1991) lends some support to this view. However, Pearson (1981) has suggested that a high proportion of the males from breeding areas in Central and Eastern Siberia winter in India. If this is the case, it is possible that many of the females from the same breeding areas stage in northern India before continuing on in a south-westerly direction to Eastern and Southern Africa. This would explain the abundance of the Ruff as a passage migrant through Pakistan (Roberts 1991), south-eastern Iran (D.A. Scott unpubl. obs.) and the Arabian Peninsula (Jennings 1981, Richardson 1990), and would also explain the movements of a female ringed in northern India in September and recovered three months later in South Africa (Underhill *et al.* 1999). Another bird ringed at the same locality in India was subsequently recovered in Kenya (Underhill *et al.* 1999). It seems likely, therefore, that the birds wintering in the Indian sub-continent are an integral part of the main Siberia/Eastern and Southern Africa flyway, and should not be given separate treatment. Around 90% of the birds wintering in Eastern and Southern Africa are females (Pearson 1981, Tree 1985, OAG Münster 1996). The "short-stopping" by a substantial number of males in the Indian sub-continent could help to explain the whereabouts of some of the missing males in this population. In the present review, therefore, the birds wintering in the Indian subcontinent are included within an enlarged "Eastern & Southern Africa & South Asia" wintering population. Thus only two populations are recognised in Eurasia and Africa, primarily on the basis of their non-breeding ranges:

1) birds breeding mainly in Northern and Central Europe and Western Siberia, and migrating through Western Europe, the Black Sea and Mediterranean region to winter sparingly in Southern Europe and North-west Africa and commonly in West Africa east to Chad (identical to population 1 of Stroud *et al.* 2004);

2) a population of Siberian origin (breeding east to the Bering Sea), migrating through Central and Western Asia to winter in relatively small numbers in South Asia (probably<10%) and commonly in Eastern and Southern Africa.

There is a considerable amount of overlap between these two "populations" on the breeding grounds in Western and Central Siberia and probably also at staging areas in the eastern Mediterranean and Black Sea.

Population size

Population estimations for this species are very imprecise. Estimates of breeding populations are of low precision for most of the breeding range, and estimates of wintering numbers are very varied, due to the difficulty of surveying the main concentrations in sub-Saharan Africa.

1. West Africa (non-breeding)

Population estimate	1% threshold	Population trend
1,000,000-1,500,000	12,500	Decreasing

The first three editions of *Waterbird Population Estimates* and Stroud *et al.* (2004) gave the size of this population as >1 million based on estimates of breeding populations in Europe. The IWC database shows that only a few thousand birds winter in Europe (c. 6,800), whilst the total count within the entire range of this population during the 1990s was 430,000 (Stroud *et al.* 2004). However, this is known to be a serious underestimate because of incomplete coverage in much of West Africa. Indeed, other data for the main concentrations in West Africa suggest that this population is very much larger and probably over 1 million as suggested by Smit & Piersma (1989). Trolliet & Girard (2001) have presented a full review of numbers in West Africa and have reported the results of aerial surveys of the main concentrations between 1998 and 2001. These surveys located 300,000 Ruff in the Inner Niger Delta (Mali) and 500,000 in the Lake Chad basin (Chad, Cameroon, Nigeria and Niger). ONC studies in 1990-1993 found 170,000-200,000 Ruff in the Senegal Delta (Trolliet *et al.* 1992, 1993, Triplet & Yésou 1998). About 4,500 were counted In Mauritania outside the Senegal Delta in January 1999 and 2000 (Benmergui in Trolliet & Girard 2001). Altenburg & van der Kamp (1986) estimated that there were 50,000-75,000 Ruff wintering in rice fields in Guinea-Bissau. However, Ruff are not abundant in Burkina-Faso, and surveys in 1999 and 2000 found only a few hundred birds (Broyer in Trolliet & Girard 2001). Trolliet & Girard (2001) concluded that there were just over 1 million Ruff wintering in West Africa, while Dodman (2002) gave a very precise estimate of 1.15 million. In view of the uncertainties, a broader estimate of 1 million -1.5 million was adopted in *WPE4*.

Girard & Kirby (1997) estimated the European breeding population, excluding Russia, to be in the region of 105,500-139,200 pairs, and the Russian population to be around three million pairs. However, in recent compilations of national breeding totals, Thorup (2006) and BirdLife International (2004a) have estimated the size of the European breeding population (including European Russia) at 244,000-526,000 pairs and 200,000-510,000 pairs, respectively. These estimates equate to about 600,000-1.55 million individuals. This number of birds (i.e. birds breeding west of the Urals) could account for the great majority of birds wintering in West Africa, and might suggest that relatively few birds of Siberian origin reach the region. However, Tertitsky *et al.* (1999) have estimated that there are between 2.1 and 3.5 million breeding females in the Yamal-Nenetsk region, just east of the Urals. This could equate to as many as 5-10 million birds in the non-breeding season. If these birds join European breeders to winter in West Africa, as Thorup (2006) suggests, a discrepancy arises between the population estimate derived from breeding numbers and the number of birds that can be accounted for on the winter quarters. The most likely explanation for the discrepancy is that the estimate of Tertitsky *et al.* (1999) is too high. Tomkovich (2002) has shown that the method of calculation used to derive this estimate produces overestimates, while Zöckler (2002a) has estimated that there are only about 2.28 million breeding females in the entire world population of the Ruff.

2. South Asia, Eastern & Southern Africa (non-breeding)

Population estimate	1% threshold	Population trend
E (>1,000,000)	Not established	Unknown

The first two editions of *Waterbird Population Estimates* gave the size of this population (excluding South Asia) in the broad range D/E (100,000->1 million). Only a few thousand Ruffs winter in South-west Asia; the total derived from midwinter counts and estimates in the 1990s was just 3,900 (Stroud *et al.* 2004). The 1990s count total for the entire region came to 245,000, including some 150,000 in Eastern Africa and 90,000 in Southern Africa, but these figures are known to be serious underestimates because of the very incomplete coverage (Stroud *et al.* 2004). The largest concentration of Ruff within Eastern and Southern Africa is probably in Sudan, where G. Nikolaus (in Summers *et al.* 1987) estimated the non-breeding population at between 300,000 and 1 million birds. It has not been possible to carry out extensive surveys in Sudan since then, and in recent years, the highest counts from Sudan have barely exceeded 1,000 (Stroud *et al.* 2004). Over 77,000 Ruffs were counted in Eastern Africa in January 1995, including 45,500 at Lake Manyara in Tanzania (Dodman & Taylor 1995). There were over 71,000 at Kafue Flats and 20,000 in the Bangweulu Swamps in Zambia in January 2001 (Leonard 2001). Underhill *et al.* (1999) gave a very rough estimate of 50,000-500,000 for the total number of birds wintering in Southern Africa, and almost 83,000 were counted in this region in January 2001 (Dodman & Diagana 2003). Considering these figures and the patchy nature of the coverage, Stroud *et al.* (2004) concluded that this population almost certainly exceeds one million birds, and this was the estimate adopted in *WPE3* and *WPE4*. Dodman (2002) suggested that there were well over a million birds in this population, which he considered to be larger than the population in West Africa.

By comparison, the number of birds wintering in South Asia is small. Perennou *et al.* (1994) estimated the wintering population in South Asia at >100,000, although the midwinter counts could account for only 19,500 birds. The maximum midwinter count in South Asia during the period 1994-2001 was 11,380 in 1994, and in five years, fewer than 4,000 were recorded (Lopez & Mundkur 1997, Li & Mundkur 2004). Very few birds occur further east in winter. The highest midwinter counts in East Asia and South-east Asia during the period 1994-2001 were 44 (in 2000) and five (in 2001), respectively; the highest count in Australia during the period 1997-2001 was only two birds in 1998 (Lopez & Mundkur 1997, Li & Mundkur 2004).

In the absence of more precise information, the former estimate of E (>1 million) is retained here for the entire South Asia and Eastern and Southern African non-breeding population. Zöckler's (2002a) estimate of 2.28 million breeding females in the global population suggests that there should be at least 5 million and possibly as many as 6 million individuals at the end of the breeding season. As there are unlikely to be more than 200,000 Ruffs wintering in South Asia, it is possible that there are still at least 2.0-3.5 million Ruffs unaccounted for in Africa.

Conservation status

Although there is some monitoring of breeding populations in temperate regions of Europe, little information is available on the status of populations on their Arctic breeding grounds. Likewise, there is little information on trends from African wintering areas, a consequence of the large numbers and extensive distribution. Information on trends is accordingly very incomplete except in Western and Central Europe.

Declines in breeding numbers have taken place in most countries in the European part of the range (Zöckler 2002a, 2002b). Major declines (over 50% between 1970 and 1990) have occurred in Denmark, Finland, Latvia, The Netherlands and Poland (BirdLife International/EBCC 2000, Mägi 2002). In The Netherlands, the population has fallen by 90% since the 1950s (Osieck & Hustings 1994), and in Denmark, there was a 75% decrease between 1970 and 1995 (Grell 1998). The total population in England, France, Belgium, The Netherlands, Germany, Denmark, southern Sweden, Poland, Estonia, Latvia and Lithuania is now fewer than 2,000 breeding females, only 10% of the numbers about 50 years ago (Thorup 2006). The two largest populations in Europe, in Russia and northern Sweden, are now also thought to be declining, and only the populations in Norway and Belarus are believed to be stable (BirdLife International 2004a). Ruff have only been recorded wintering in Britain and Ireland since 1934, after which numbers increased rapidly to over 1,000 in the 1970s, and then declined to only a few hundred in recent years, e.g. 400 in 1998/99 (Smart *et al.* 2002).

The declines seem to have been caused by several factors but especially drainage of breeding and feeding areas, increased use of fertilisers (causing the depletion of insects) and deterioration of previously mown or grazed breeding sites, together with increased predation, and impacts from hunting and other human persecution. In areas of intensive farming, the Ruff has disappeared completely as a breeding bird (Zöckler 2002a). Away from the breeding grounds, shooting in Europe and “pest control” and other persecution on rice fields in some African countries have also had a negative influence on population sizes. In West Africa at least, there has been a dramatic reduction in floodplain habitat formerly used by Ruffs, with obvious consequences for the species (H. Hötker *in litt.*). However, in Mali, a wintering population of 150,000-250,000 appears to have been relatively stable between 1972 and 2008 (O. Girard pers. obs.) The numbers wintering in Southern Africa increased during the twentieth century, the birds apparently benefiting from the great increase in artificial wetlands, irrigation schemes and agricultural land (Harrison *et al.* 1997).

Zöckler (2002a, 2002b) explored at length the evidence that changing climate is the ultimate factor causing the observed declines, and showed that declines are most pronounced in the most southerly parts of the breeding range. He considers that the Ruff is highly sensitive to the consequences of a changing climate and that they may be a valuable indicator species. Disentangling climate change effects from those of habitat modification and destruction resulting from agricultural intensification is, however, problematic.

Habitat and ecology

The main breeding habitat of the Ruff in the temperate zone is wet, low-lying, grassy terrain at sea level (or below sea level, as on the polders in The Netherlands). Further north, it breeds on moorland bounded by pine forests, and still further north or above the tree-line, it occupies tundra (Girard & Kirby 1997). Outside the breeding season, the Ruff prefers muddy margins of lakes, pools, ponds, rivers, marshes and flooded areas, including brackish, saline or alkaline waters. During migration in Western Europe, birds commonly use shorelines, e.g. muddy creeks in salt marshes, and freshly mown or heavily grazed grasslands. Sometimes they occur on tidal mudflats and coastal lagoons, but this is not common. African wintering sites include flooded or dry plains, marshes and grass, wheat or rice fields (where they are considered by some to be a pest), not always close to water (Tréca 1994).

Site fidelity during the breeding season is generally low, and Ryabitsev & Alekseeva (1998) found no site fidelity on the breeding grounds on the Yamal Peninsula. Some young birds appear to settle at a considerable distance to the north-east of their natal area (Cramp & Simmons 1983). By contrast, there are some indications in Britain of a high degree of site fidelity to wintering sites, but this has not been quantified (Smart *et al.* 2002). Males and females appear to have different moult strategies that may be related to the different migration pattern of the sexes. Males caught in autumn in eastern Britain were in early stages of active moult, while females caught at the same time either had not started moult or had a maximum of three growing primaries (Smart *et al.* 2002). The wing moult is usually interrupted during migration and completed on the winter quarters.

Network of key sites

The 1% threshold for the population which spends the non-breeding season in West Africa is 12,500, and there is a sizeable network of key sites in both Africa and Europe. key sites on migration have been identified in The Netherlands, Hungary, Romania, Ukraine and Russia, and further north in Finland. These sites form a chain which appears strikingly equi-distant between breeding areas in Siberia and wintering areas in West Africa. Key sites in Africa are concentrated in the major river floodplains, and four key sites have been identified in Cameroon, three in Chad, five in Mali, four in Mauritania, two in Niger, four in Nigeria and six in Senegal.

The population wintering in Eastern and Southern Africa (and South Asia) is less well-known and the threshold for identifying key sites, 20,000 is based on Ramsar Criterion 5. Staging sites for this population are poorly known, and the seven key sites identified so far are spread between, Ethiopia, Somalia, Sudan, Tanzania and Zambia.

Protection status of key sites

Some of the key wintering sites in Africa are protected, e.g. Lake Manyara in Tanzania, Kafue Flats-Lochinvar in Zambia, and the Djoudj, Ndiael and Djeuss in Senegal. Others are only partially protected, e.g. the Logone floodplain in Cameroon, and there are vast zones without protected areas, e.g. Inner Niger Delta, Mali. Here the birds are extensively hunted.

Table 63. Key sites for Ruff. Sites where 1% or more of a population has been recorded

Country	Site	Lat.	Long.	Season	Max total	Year max	Average total	Basis for average	Source	Population(s) at site
Cameroon	Lac Maga	10.80	14.98	Non-breeding	14500	1986			AfWC database	W Africa + E & S Africa
Cameroon	Parc National de Waza Logone	10.83	15.00	Non-breeding	48861	1996	24434	1996-01 (5)	AfWC database	W Africa + E & S Africa
Cameroon	Plain d'Inondation Logone Environs Zina	11.00	14.97	Non-breeding	17090	1993			AfWC database	W Africa + E & S Africa
Cameroon	Semry I: Rizières Yagoua Nord	10.43	15.18	Non-breeding	22000	1984	20500	1984-87 (2)	AfWC database	W Africa + E & S Africa
Chad	Bas-Chari	12.17	15.12	December	30720	1999			B Trolliet, unpublished data	W Africa + E & S Africa
Chad	Plaine du Logone	11.00	15.20	December	33754	1999			B Trolliet, unpublished data	W Africa + E & S Africa
Chad/ Cameroon/ Nigeria/Niger	Lake Chad	13.17	14.25	Non-breeding	247327	1999			B Trolliet, unpublished data	W Africa + E & S Africa
Estonia	Matsulu National Park	58.75	23.84	May	20000	1997			ULS database	W Africa
Ethiopia	Lake Abijatta	7.55	38.52	Non-breeding	21481	1997	8008	1995-99 (5)	AfWC database	E & S Africa
Finland	Oulu Region Wetlands	64.92	25.17	Migration	50000	1997			Skov *et al.* 2000	W Africa
Hungary	Hortobagy	47.62	21.07	Spring	200000	1995			Kube *et al.* 1998	W Africa
Kazakhstan	Tengiz-korgalzhyn Lakes	50.50	69.40	Spring migration	195153	2000	194224	1999-04 (6)	Schielzeth *et al.* In prep.	S Asia, E & S. Africa
Mali	Fleuve Niger: Downstream the Inner Delta	16.25	-0.08	Non-breeding	27300	1983	10154	1978-86 (5)	AfWC database	W Africa
Mali	Inner Niger Delta	13.50	-4.00	Non-breeding	47281	1998-04			Zwarts *et al.* 2005	W Africa
Mali	Lac Faguibine	16.75	-4.00	Non-breeding	20500	1983			WBDB	W Africa
Mali	Lac Horo	16.22	-3.92	Non-breeding	32000	1978			WBDB	W Africa
Mali	Timisobo--Képagou	15.13	-3.97	Non-breeding	31000	1978			WBDB	W Africa
Mauritania	Bassin de R'Kiz	17.47	-11.55	Non-breeding	22612	2001			AfWC database	W Africa
Mauritania	Keur Massene	16.57	-16.32	Post-breeding migration	15000	1976			AfWC database	W Africa
Mauritania	Mahmouda	16.45	-8.38	Non-breeding	22000	2001	14050	2000-01 (2)	AfWC database	W Africa
Mauritania	Tâmourt en Na'âj	17.85	-12.12	Non-breeding	24000	2000			WBDB	W Africa
Netherlands	Friesland Province	53.10	5.90	Spring	47500	1998	39500	1997-03 (5)	SOVON, The Netherlands, 2005	W Africa
Niger	Fleuve Niger. Labbezanga -Niamey	14.25	1.42	Non-breeding	13000	1984			AfWC database	W Africa
Niger	Fleuve Niger. Niamey -Gaya	12.57	2.73	Non-breeding	15400	1984			AfWC database	W Africa
Nigeria	Baturiya Kafin Hansa	12.48	10.37	Non-breeding	16971	2000			AfWC database	W Africa + E & S Africa
Nigeria	Hadejia-Nguru	12.67	10.50	Non-breeding	70845	1995	51822	1994-98 (5)	AfWC database	W Africa + E & S Africa
Nigeria	Lac Tchad - Nigerian part	12.83	13.67	Non-breeding	217119	2000			AfWC database	W Africa + E & S Africa
Nigeria	Niger: Gaya-Kainji dam	11.17	4.00	Non-breeding	47000	1984			AfWC database	W Africa
Romania	Danube Delta & Razim Sinoe Lagoons	45.00	29.00	Spring	20000	1995			Kube *et al.* 1998	W Africa + E & S Africa
Romania	Razim-Sinoie Lagoons	44.67	29.00	April	18000	1992			C. Sudfeldt *in litt.*, Schmitz *et al.* 2001	W Africa + E & S Africa
Russia	Burukshunskiye limans	45.98	42.42	Migration	50000	1973			WBDB	W Africa + E & S Africa
Russia	Veselovsky Rice Field	47.08	41.17	Spring	30000	1975			Kazakov *et al.* 1984, per V. Belik	W Africa + E & S Africa
Senegal	Lagunes de St.Louis	15.67	-17.00	Non-breeding	14500	1977			AfWC database	W Africa
Senegal	Ndiael	16.23	-16.08	Non-breeding	75000	1993	16244	1996-00 (5)	AfWC database	W Africa
Senegal	Ntiagar	16.50	-16.83	Non-breeding	26000	1994	12000	1976-95 (3)	AfWC database	W Africa
Senegal	Parc National des Oiseaux de Djoudj	16.33	-16.25	Non-breeding	200000	1996			WBDB	W Africa
Senegal	River Sénégal (Ntiagar to Richard-Toll)	16.48	-15.77	Non-breeding	26000	1994			WBDB	W Africa
Senegal	Zic de Djeuss et environs	16.25	-16.30	Non-breeding	14900	1975			AfWC database	W Africa
Somalia	Far Waamo	0.40	42.27	Non-breeding	20000	1984			WBDB	E & S Africa