

# FULVOUS WHISTLING-DUCK

## *Dendrocygna bicolor*

### Subspecies:

Monotypic.

### Distribution:

Pantropical, occurring in tropical South America, southern North America, Africa and southern Asia. The species occurs widely in Africa south of the Sahara and also in Madagascar, but is rather locally distributed, much more so than its congener, *D. viduata*. In West Africa, it is rare south of about 12°N, except in the River Niger valley in Niger. The species is often abundant where present, and absent from other areas that seem suitable.

### Movements:

There is no evidence for any regular migratory movements in Africa, but irregular, perhaps mainly local movements take place, and the periodic appearance of huge numbers of birds in some areas suggests that the species is highly mobile. Possibly the species is especially apt to undertake long-distance pioneering movements in search of suitable habitat. This is suggested by the very wide world range without geographical variation (Snow, 1978). Many populations, including those in Madagascar, appear to be mainly sedentary. However, the species is known to be at least locally migratory in East Africa, where it is present on some lakes in May to September and on other lakes in August to May. It is present in the Ruzizi Marshes in Zaire and Burundi in May–June and November–March. There may be a regular movement of birds southwards into southern Africa during the hot wet season (austral summer), with most birds returning north after breeding and before the dry season. One bird ringed at Lochinvar in Zambia was recovered in Sudan (R.J. Douthwaite, *in litt.*). In Cameroon, the presence of the species is highly variable, and appears to be related to flooding conditions (P. Scholte, *in litt.*).

### Population limits:

There is a considerable break in the distribution north of the Equator between the Lake Chad region and the Nile in western Sudan, but there are no major gaps in distribution from Sudan and Eritrea south to South Africa. West African birds are tentatively split off as a separate population, but because of the extent of movements shown by the species in southern and eastern Africa, birds in these regions are treated as a single, large population. The Madagascar birds appear to be mainly sedentary, and are therefore treated as a separate population.

### Population size:

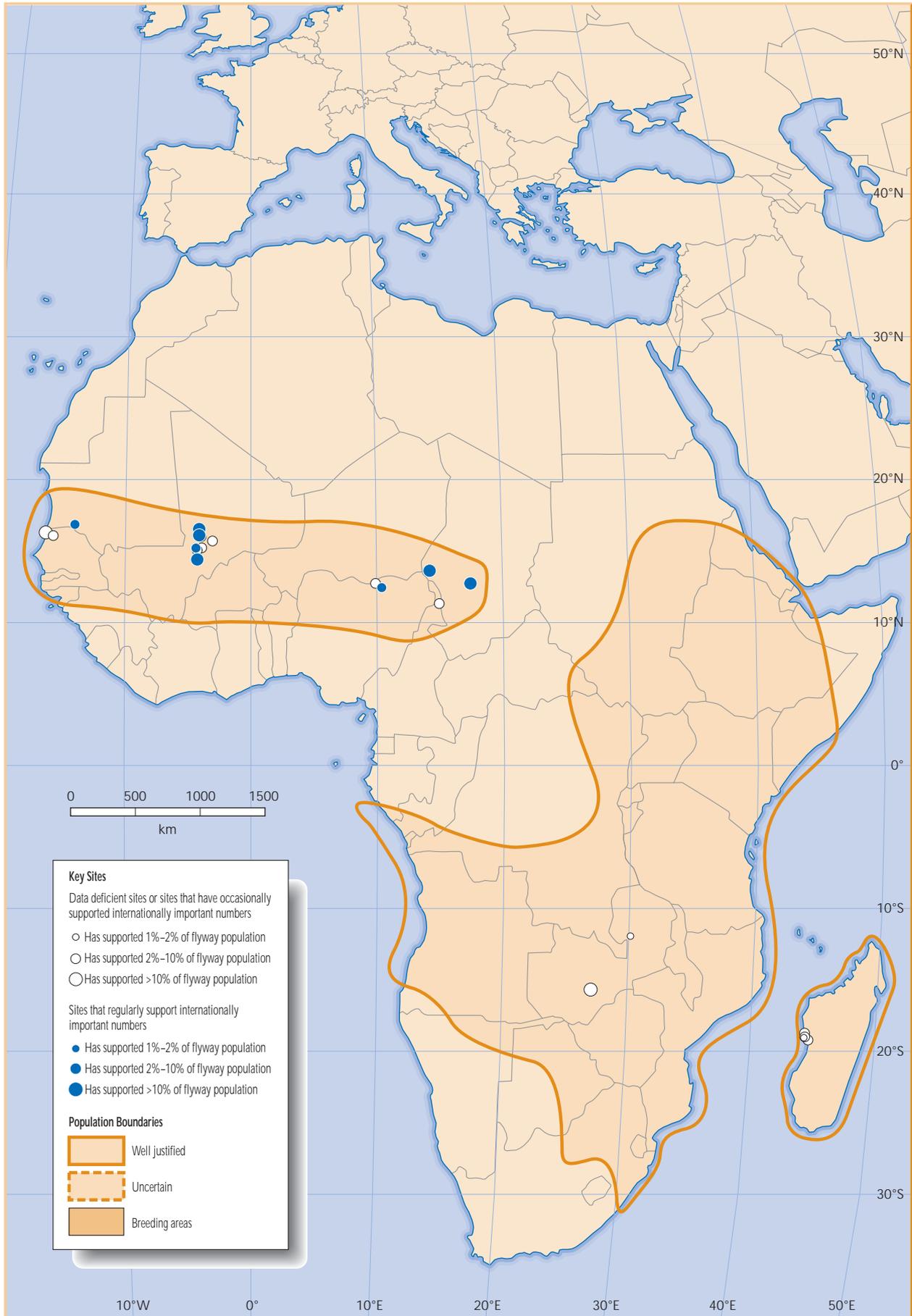
- **West Africa: 100,000 (Perennou, 1991a). 1% level 1,000.**

Locally abundant in West Africa, where the highest mid-winter count has been 85,000 in 1983. Populations in the Senegal Delta and Central Niger Delta are variable, with numbers in the Senegal Delta varying from a few hundreds in January 1972 and 1974 to many thousands. In Cameroon, concentrations of over 1,000 have been recorded on the shores of Lake Chad, while total numbers in the Logone floodplain are often thought to exceed 2,000 (P. Scholte, *in litt.*).

- **Eastern and southern Africa: 200,000–500,000. Provisional numerical criterion 3,500.**

Said to be regular in small flocks in Eritrea (Smith, 1957); locally abundant in Ethiopia (Urban & Brown, 1971) and Somalia (Ash & Miskell, 1983); common and widespread in Kenya, Tanzania and Uganda (Britton, 1980) and Malawi (Benson & Benson, 1977); and locally common in northeastern Zambia (Benson *et al.*, 1971), Botswana (Newman, 1989), Mozambique and Zimbabwe. High counts have included 2,300 at Lake Turkana, Kenya (1987), 5,000 in southeastern Zaire (July), 12,000 at Lake Chuali, Mozambique, flocks of up to 3,000 year-round in Malawi, 58,250 at Kafue Flats in Zambia (January 1994), 1,385 at Chivero Dam in Zimbabwe (January 1995), and 1,000–2,000 in Transvaal, South Africa (February). It occurs seasonally in hundreds at a number of sites around Lake Victoria. However, only 1,945 were recorded at wetlands in Tanzania during a nationwide census in January 1995. The highest total during the African Waterfowl Census in eastern and southern Africa has been 60,750 in January 1994.

FULVOUS WHISTLING-DUCK *Dendrocygna bicolor*



- **Madagascar: 15,000–25,000. Provisional numerical criterion 200.**

Generally rare but still locally common in the west and north (e.g. at Sahaka Lake, Maromandia and Bealanana Marshes), where large gatherings can still be observed on the major lakes (e.g. 2,000 at Ihotry Lake in September 1983). 1,500 were recorded at Lake Bemamba in June 1982, and 750 were at this lake in June 1993. It is rather rare on the high plateau (31 at Alarobia Lake in November 1988). A total of 1,692 was recorded during the African Waterfowl Census in July 1993.

**Habitat/ecology:**

*D. bicolor* frequents fresh waters of many sorts including lakes, pans, rivers, swamps and floodplains. Birds breeding north of the Zambezi breed during months of low rainfall, while those breeding to the south breed in the wet season. Moulting has been recorded during April–July (Zambia), April–May (Transvaal) and 5–10 months after breeding (Senegal).

**Conservation status:**

Some populations of *D. bicolor* in West Africa show large fluctuations which are at least partly related to the extent of rice cultivation (Tréca, in prep.), and the species appears to be decreasing in some areas. It is now only an occasional visitor to northern Burkina Faso, where it was common prior to the mid-1970s, and there have been no recent records from Ghana and Togo (J.F. Walsh, *in litt.*). Langrand (1990) reports a decline in the Madagascar population; the species was formerly common throughout the island, but is now rare in the east and rather rare on the high plateau. There has been a marked decline in numbers at Lake Alaotra, attributed to hunting (shooting and trapping), and only the inaccessible lakes of the west coast still harbour substantial numbers (Langrand, 1990). No information is available on trends in eastern and southern Africa.

**Network of key sites:**

Very little quantitative information is available on the distribution of *D. bicolor* outside of the December–February season. All but one key sites have been selected on the basis of counts conducted during these months, so the feasibility of a key sites network approach in other seasons is unknown. All three populations can be shown to occur in large concentrations at key sites, but only two sites, both in Zambia, could be identified for the eastern and southern Africa population. This suggests that there are many more key sites still to discover for this population. For the Madagascar and West Africa populations, key sites networks could be a potentially useful conservation tool. In Madagascar, four key sites potentially support up to 20% of the estimated population size, while in West Africa the 15 key sites identified account for the majority of the January population. The distribution of birds between sites in West Africa is, however, highly variable between years, according to water regime.

**Protection status of key sites:**

Five of the 15 key sites in West Africa are protected and three are partially protected. There is at least some protection in all three major drainage basins on which *D. bicolor* so heavily depends (Senegal, Niger and Chad). No protected status information was available for Madagascar and both of the sites in Zambia are protected.

# WHITE-FACED WHISTLING-DUCK

## *Dendrocygna viduata*

### Subspecies:

Monotypic.

### Distribution:

Widespread in tropical South America, southern Central America and Africa. The species occurs widely in Africa south of the Sahara and also in Madagascar and on the Comoro Islands. It is abundant in suitable areas, being in many places the most abundant species of Anatidae, and is the only common species of Anatidae on the coastal plain of West Africa.

### Movements:

Some populations, including the population in Madagascar, appear to be mainly sedentary, while others are migratory, undertaking long-distance movements during the wet season, especially in West Africa and southern Africa. Flocks, sometimes of several hundred birds, are subject to local movements according to food availability. There are reports of regular northward movements to breed during the rainy season in the northern tropics, and to higher ground from the lowlands in southern Africa (Snow, 1978). In West Africa, local movements have been recorded in Ghana and Senegal, and there is an influx of birds into coastal regions during the dry season. In southwestern Sudan, the species is a common breeding visitor during the wet season, and also a passage migrant (Lynes, 1925). Local movements have also been recorded in eastern Zaire and Kenya. In southern Africa, the species disperses to breed on small water bodies during the rains, and congregates at the end of the breeding season in suitable dry season habitat (R.J. Douthwaite, *in litt.*). Movements are generally in the order of tens to hundreds of km, but movements of up to 540 km have been recorded in Zambia and Zimbabwe.

### Population limits:

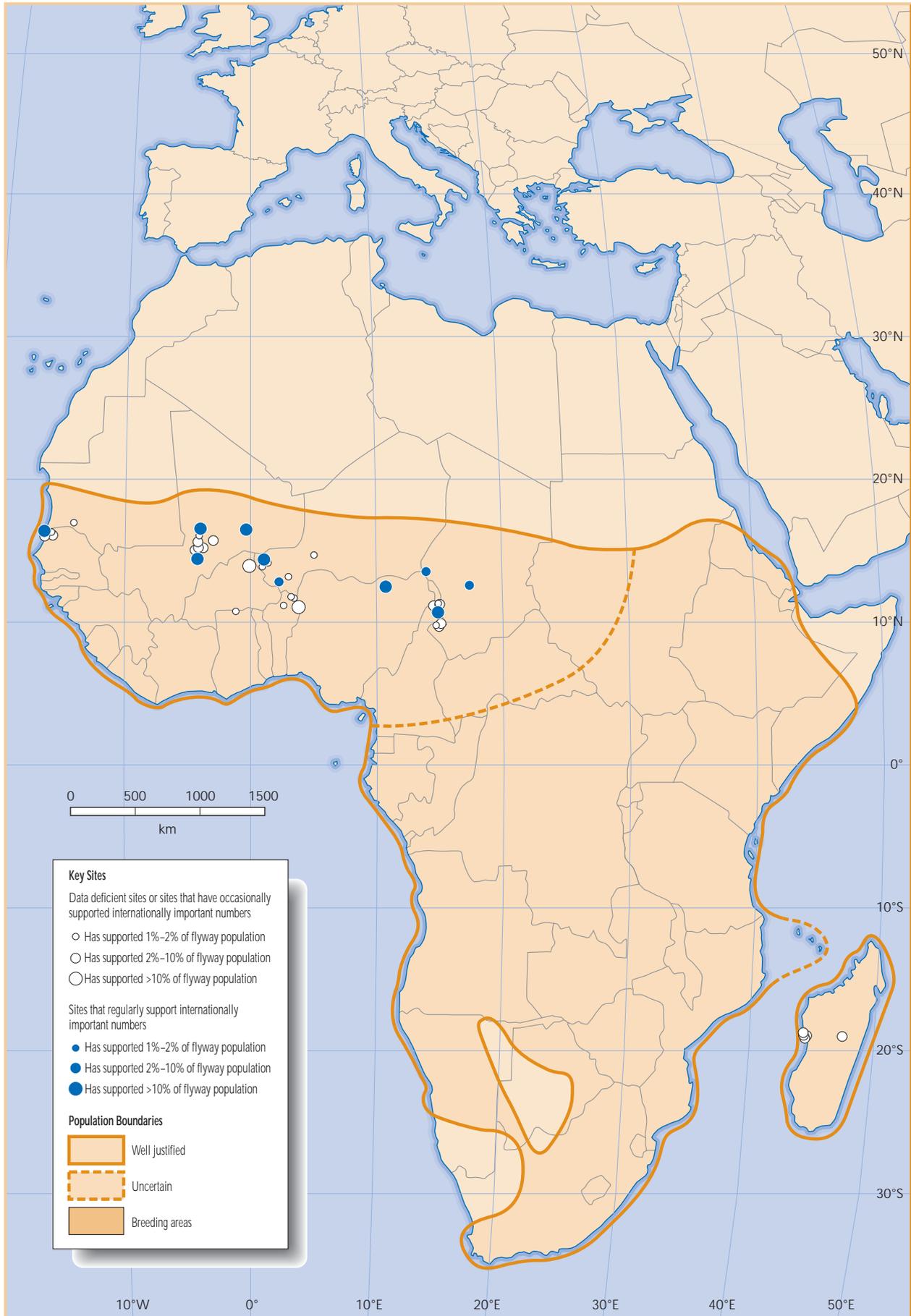
The species is very widely distributed over Africa south of the Sahara, and there do not appear to be any major gaps in its distribution except in the lowland forested areas of Cameroon and in the deserts of the southwest. Because of the extent of movements shown by the species in Africa, the entire African population is probably best treated, biologically, as a single, very large population. However, for practical reasons it is proposed that the West African birds (east to Chad) be treated as a separate population, although it is acknowledged that there may be a considerable amount of interchange between this population and birds in central and eastern Africa. *D. viduata* is said to be mainly sedentary in Madagascar, and there is no evidence of interchange with the African population. Thus three populations are recognized: a West African population, an eastern and southern African population, and a Madagascar population. Birds occurring in the Comoro Islands are provisionally included in the eastern and southern African population even though some other species move from Madagascar to the Comoros (Young, 1996).

### Population size:

- **West Africa: 250,000 (Perennou, 1991a). 1% level 2,500.**

A common and widespread resident almost throughout West Africa. The maximum mid-winter count in West Africa was 200,000 in 1987. High counts have included up to 66,000 in Djoudj National Park in the Senegal Delta, up to 71,500 in the Central Niger Delta in Mali, and over 28,000 in Niger (mainly along the Niger River). In Cameroon, concentrations of several thousand occur in Waza National Park, in Kalamaloue National Park and on the Logone floodplain (P. Scholte, *in litt.*). Concentrations of over 1,000 have been recorded in the Middle River region of Gambia (Jensen & Kirkeby, 1980); flocks of 1,000 were regular in the Oti Valley of Togo in the late 1980s (Cheke & Walsh, *in prep.*), and flocks of up to 500 have been recorded in Ghana (Grimes, 1987). Perennou (1991a, 1991b) has estimated the West African population at 250,000, but this estimate makes little allowance for the large numbers of birds on the coastal plain, and the actual population may be nearer to 500,000 (J.F. Walsh, *in litt.*; W.C. Mullié, *in litt.*).

WHITE-FACED WHISTLING-DUCK *Dendrocygna viduata*



- **Eastern and southern Africa: 1,000,000–2,000,000. Provisional numerical criterion 15,000.**

An abundant duck, said to be common to locally abundant in Botswana, Burundi, Eritrea, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Somalia, Tanzania, Uganda, Zaire, Zambia and Zimbabwe. Up to 16,000 have been recorded at Kafue Flats in Zambia (in June), and many thousands in the Luangwa Valley, also in Zambia. Other high counts have included: 5,000 in Zululand and 1,000 at Witwatersrand, Transvaal; 4,000–5,000 in the Ruzizi Marshes (eastern Zaire and Burundi) in February; 1,410 at Lake Chivero in Zimbabwe (July 1994), and 2,225 at wetlands in Tanzania (January 1995). The maximum count during the African Waterfowl Census (1991–94) in eastern and southern Africa was 20,000 in July 1993.

- **Madagascar: 20,000–50,000. Provisional numerical criterion 350.**

Common throughout the country, and one of the two most frequently encountered ducks in Madagascar (Langrand, 1990). Very common in some locations, such as certain western lakes and rivers. About 500 were present at Lake Bemamba in July–August 1992. A total of 4,135 was recorded during the African Waterfowl Census in July 1993.

#### Habitat/ecology:

*Dendrocygna viduata* is found on waters of many kinds, including freshwater lakes, dams, swamps, flooded land and estuaries. In many areas, the species commonly feeds in rice-fields. It breeds mainly during the late wet season and early dry season (September to December in Togo, November to March in western Madagascar), while *D. bicolor* breeds during the dry. The moult (when mature birds are flightless) follows breeding: in May–August in Zambia, April–May in southern Zaire, and May–July in South Africa.

#### Conservation status:

Over much of Africa, the species has adapted well to man-made wetlands and locally has become a serious pest on rice-fields. It has probably benefited from the protection of extensive areas, and appears to be increasing in many areas. However, in Madagascar it is probably decreasing as a result of habitat alteration (O. Langrand, *in litt.*) and hunting (H.G. Young, *in litt.*).

#### Network of key sites:

In Madagascar, six key sites can be identified during the December to February season. These support up to 20% of the population and include the same four wetlands also listed for *D. bicolor*. No key sites could be identified for *D. viduata* in eastern and southern Africa. Here, *D. viduata* is highly dispersed and consequently it is probably not an appropriate candidate for the development of a key sites network. Information from seasons other than December to February would be necessary before this could be confirmed. In West Africa, the smaller population size and the extreme concentration of open water in the three main drainage basins at certain times of year, combine to give many enormous key site concentrations of *D. viduata*, although not quite so large as the concentrations of *D. bicolor* in the same region. During the December to February season, a network of 38 key sites can be identified for *D. viduata*. Depending on annual water regime, the numbers present at these sites vary markedly between years, but in an average year at least 60% of the population can be found at these 38 wetlands.

#### Protection status of key sites:

None of the wetlands in Madagascar are effectively protected. Only eight of the 38 key sites in West Africa are protected, three are partially protected and eight are not protected at all. Most key sites are of unknown protected status including six of the eight sites known to support over 10% of the population in optimum years.

# WHITE-BACKED DUCK

## *Thalassornis leuconotus*

### Subspecies:

Polytypic. Two subspecies have been described: *T. l. leuconotus* of the African mainland and *T. l. insularis* of Madagascar.

### Distribution:

Confined to the Afrotropical Region. The nominate form occurs in West Africa from Senegal to Chad, and in eastern and southern Africa from Ethiopia south to Cape Province, South Africa. *T. l. insularis* is confined to Madagascar. In West Africa, the species occurs regularly only in Senegal, Mali, Niger, Nigeria and Chad, but there are two recent records from Togo (Cheke & Walsh, in prep.), and single records from Cameroon (three birds in July 1994; P. Scholte, *in litt.*) and Equatorial Guinea. The species formerly bred in Pemba (until at least the 1920s) and may have occurred in Zanzibar, but there have been no recent records from either island (Pakenham, 1979).

### Movements:

The isolated populations of *T. leuconotus* in West Africa appears to be mainly sedentary, but others are at least partially migratory, with regular seasonal movements known to take place in eastern, central and southern Africa and in Madagascar. The movements are little understood, but apparently related to rainfall patterns throughout the species' range. In southern Africa, the preference of the birds for often temporary pans causes birds to move to more permanent waters in drought periods. In Transvaal, the species apparently moves only following fairly consistent rains. In Zimbabwe, an influx occurs during the rains (December–April), while in Zambia an influx occurs in the dry season (February–September), peaking in May–June. One bird ringed in Zambia was recovered 180 km to the northeast. In Madagascar there are certainly movements as birds disperse from the drying west coast lakes between April and October.

### Population limits:

The small population in West Africa is widely separated from the main population in eastern and southern Africa, and clearly merits treatment as a separate population. There are no major gaps in the distribution of *T. leuconotus* from Ethiopia to South Africa, and because it exhibits regular seasonal movements throughout this range, there would seem to be little justification for splitting the population into separate units. Callaghan and Green (1993) also recognize two populations: one in West Africa and one in eastern and southern Africa. The subspecifically distinct Madagascar birds constitute a third population.

### Population size:

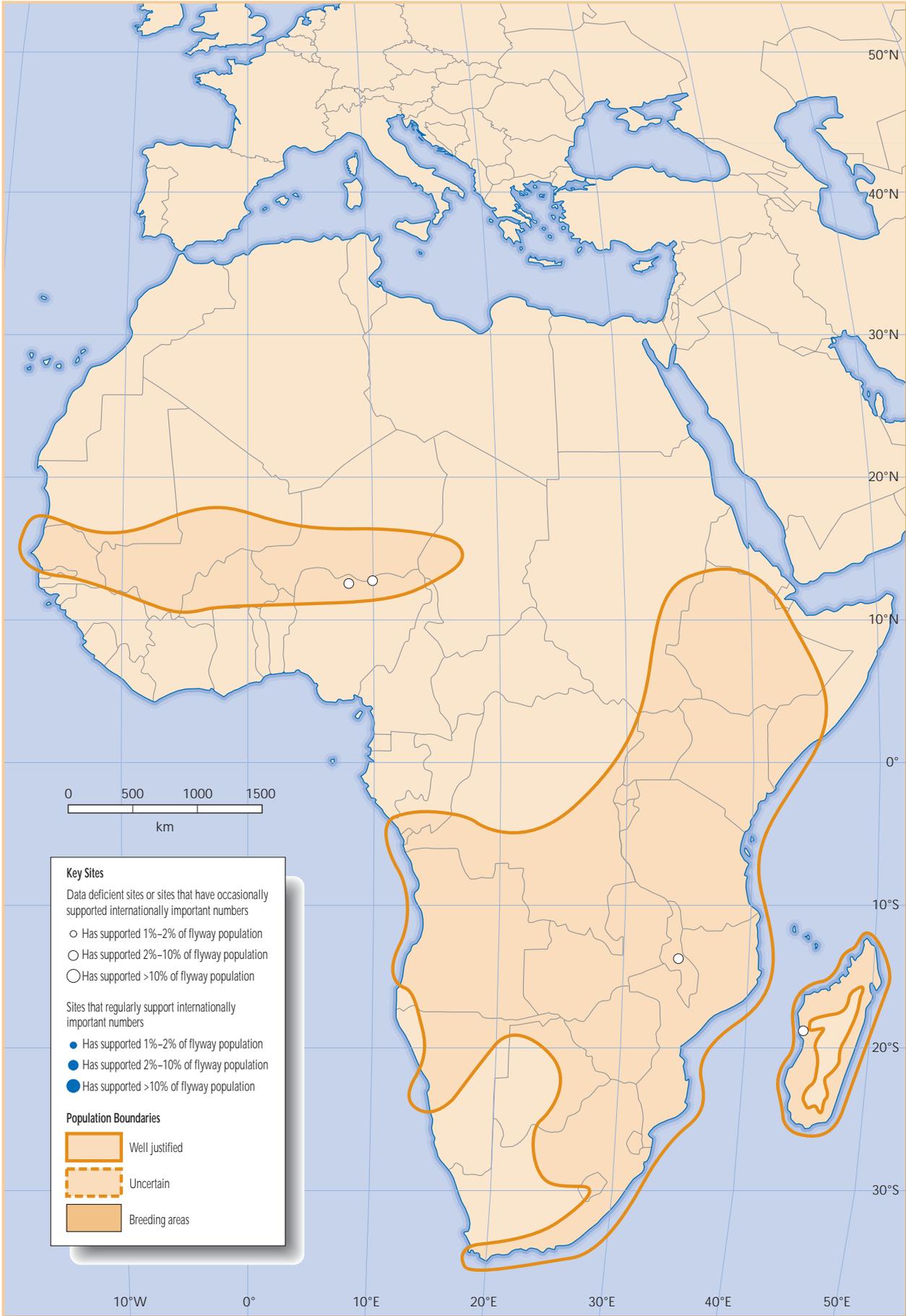
- **West Africa: 1,000 (Perennou, 1992). 1% level 10.**

Perennou (1992) estimated the total population at no more than 1,000 birds, based on the tiny numbers recorded during the African Waterfowl Census. The maximum mid-winter count in West Africa has been only 20 birds in 1968.

- **Eastern and southern Africa: 10,000–25,000 (Rose & Scott, 1994). Provisional numerical criterion 180.**

A locally common resident throughout much of southern Africa, and fairly common and widespread in Kenya, Malawi, Tanzania, Uganda and Zambia. Described as frequent to uncommon in Ethiopia (Urban & Brown, 1971), but recorded only once in Somalia (Ash & Miskell, 1983). In Botswana, said to be a sparse but locally common resident in the Okavango Delta (Penry, 1994). The Zimbabwe population was estimated to be in the thousands in the 1970s (Ewbank, 1993), and the South African population is also estimated to be in the thousands. The Swaziland population has been estimated at 10 breeding adults, and the Lesotho population at under 100 individuals (Callaghan & Green, 1993). High counts have included: up to 500 at Lake Naivasha, Kenya; 550 at Kuti Ponds in Malawi (1992); 133 at Miengwe, Zambia (November 1992); 174 at Luanshya, Zambia (November 1985); and 150 at Three Sisters, Zimbabwe (late 1985). There is an old record of 500 at Kafue Flats in Zambia (Douthwaite, 1977), but only small

WHITE-BACKED DUCK *Thalassornis leuconotus*



numbers have been recorded in this area in recent years (P. Leonard, *in litt.*). Only 182 were recorded at wetlands in Tanzania during the very extensive counts in January 1995. The maximum count during the African Waterfowl Census (1991–94) in eastern and southern Africa was 617 in 1992. The entire eastern and southern African population has been estimated to consist of fewer than 25,000 individuals (Rose & Scott, 1994), but seems certain to exceed 10,000 individuals (Callaghan & Green, 1993).

• **Madagascar (*insularis*): <10,000 (O. Langrand, *in litt.*). Provisional numerical criterion 30.**

Found throughout the island with occasional records on the central high plateau, but now uncommon except at some of the smaller, relatively undisturbed lakes (e.g. Lake Antsamaka 252 January 1995) which are mainly in the western part of the country (Langrand, 1990 and *in litt.*). None have been recorded during the waterfowl censuses in Madagascar in recent years with the exception of 1995 (as yet unpublished) when 332 were counted.

**Habitat/ecology:**

The species frequents quiet waters of lakes and ponds with abundant screening vegetation, from the lowlands up to 3,000 m (in East Africa). In some areas, e.g. parts of Zimbabwe, it has occupied dams and stock ponds in farming areas. It is usually found in pairs or small groups. When not breeding, it congregates in groups of usually 20–100 individuals. The breeding season usually coincides with the period of higher and more stable water levels. Flightless birds in moult have been recorded in June–July.

**Conservation status:**

According to Callaghan and Green (1993), despite local decreases, overall numbers in the population in eastern and southern Africa seem to be stable and may be increasing. The construction of artificial dams is thought to have resulted in local increases in several areas, e.g. in Zambia, the Transvaal region of South Africa, Zimbabwe and Malawi. According to Ewbank (1993), numbers have increased in Zimbabwe, although D.V. Rockingham-Gill (*in litt.*) records a slight decrease in this country in recent years. In the southern Rift Valley, numbers have declined sharply due to widespread, illegal use of gill nets, and the species is generally uncommon or rare in parts of its range in southern Africa, e.g. in Cape Province of South Africa, Namibia, Swaziland and Lesotho (Callaghan & Green, 1993).

*T. leuconotus* is now very rare in West Africa (J.F. Walsh, *in litt.*), and Perennou (1991a) suggests that this discrete population is on the verge of extinction. In Nigeria, the species was previously a not uncommon resident in wetlands in the north, but there have been no records in the past 20 years (Elgood *et al.*, 1994).

The Madagascar subspecies *T. l. insularis* is listed as 'vulnerable' by Green (1996). This subspecies was formerly quite common, but is now rather rare throughout its range, except at the lakes and marshes of Soalala, where it is fairly common. It has already disappeared from a number of sites, especially in the east and on the central high plateau (O. Langrand, *in litt.*), and was thought to be extinct at Lake Alaotra by 1989 (Young & Smith, 1989), however a single individual was captured here in October 1993 (Pidgeon, 1996). Langrand (1990) attributes the decline in numbers to hunting and trapping. Other factors include the transformation of habitat, widespread introduction of exotic fish that compete for food, introduction of exotic plants, and deterioration in water quality as a result of deforestation and soil erosion in catchment areas (Green, 1992; O. Langrand, *in litt.*).

**Network of key sites:**

Too little is known about the distribution and movements of *T. leuconotus* to speculate on how useful a key sites network could be. No concentrations of over 30 individuals have been recorded for the Madagascar subspecies and the only records of over 10 individuals for the now very small West Africa population are outdated (1967 and 1968). For the larger eastern and southern Africa population it is possible that many key sites remain to be found. Currently, Kuti Ponds in Malawi is the only key site known, and this has held large numbers in two of the last three years.

# WHITE-HEADED DUCK

## *Oxyura leucocephala*

### Subspecies:

Monotypic.

### Distribution:

Palaearctic; a threatened species with a highly fragmented breeding distribution from southwest Europe and northwest Africa to central Asia (from 25°N to 60°N and from 10°W to 100°E); currently known to breed only in Spain, Algeria, Tunisia, Romania (irregularly), Turkey, Syria, Iran, Afghanistan, Uzbekistan, Kazakhstan, Turkmenistan, Mongolia and Russia, and probably also in northwest China. The main breeding areas of the species are thought to be in the steppe and semi-desert regions of Kazakhstan. It has almost disappeared as a breeding species in Turkmenistan, although it still breeds in small numbers in the Middle Amu Darya Valley. The species has become extinct as a breeding species this century in Morocco, France (Corsica), Italy (Puglia, Sardinia and Sicily), Hungary, Yugoslavia (Serbia), Greece, Albania, Israel, Azerbaijan and Egypt. Attempts have been made to re-introduce the species in Hungary, Corsica, Sardinia and Majorca through captive-breeding programmes.

### Movements:

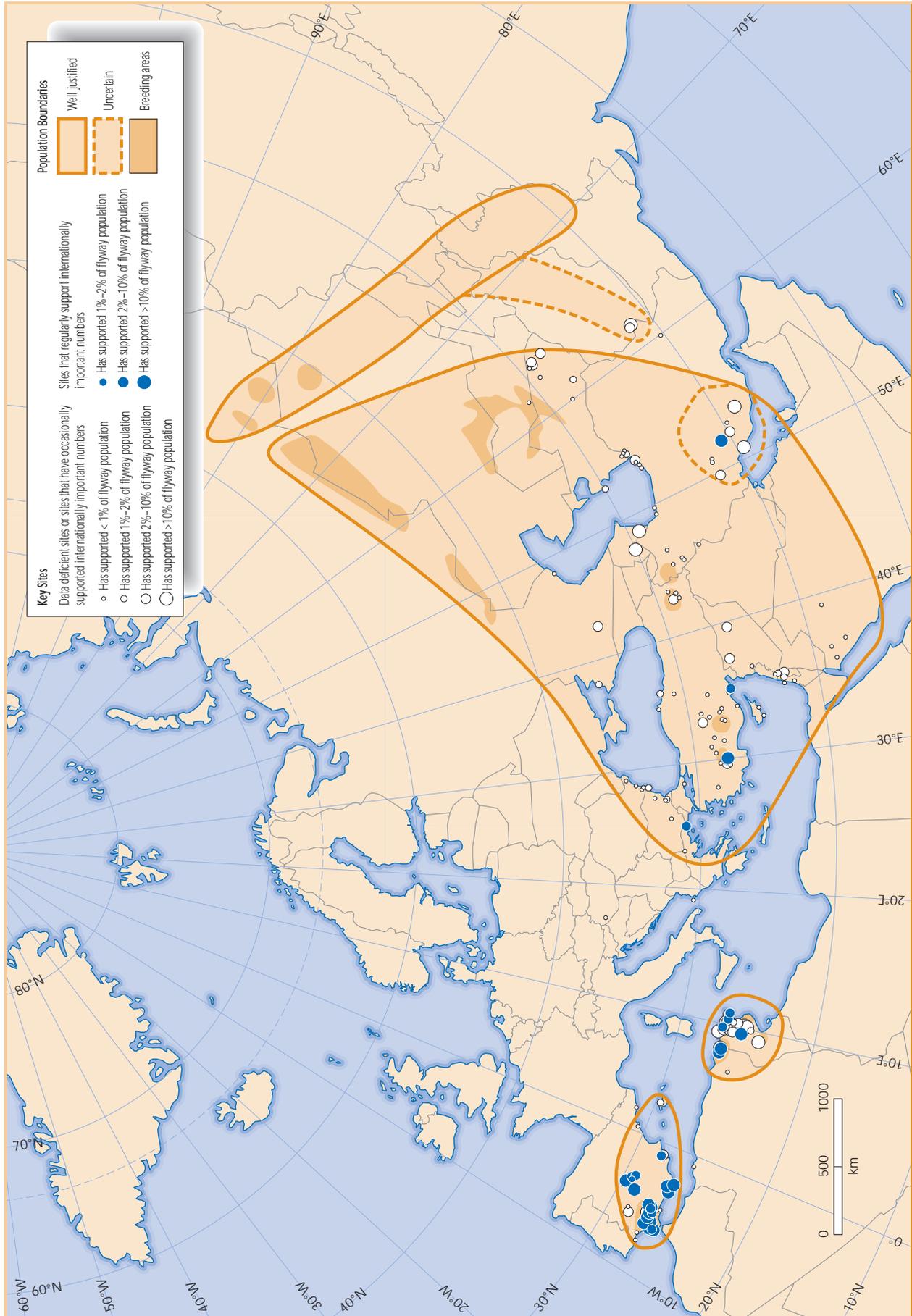
The movements of *O. leucocephala* are very poorly understood, as there is an almost total lack of ringing data. The bulk of the west-central Asian population apparently migrates southwest to winter in the Caspian region and Turkey. The winter movements of this population are not well understood, but it is assumed that the central Asian republics retain only 5–10% of their breeding stocks in winter (Monval & Pirot, 1989), the remainder wintering to the south of Kazakhstan in countries bordering the Caspian Sea and Black Sea, but mostly in Azerbaijan, Turkey and Iran. The Manych-Godilo and east Manych Lakes north of the Caucasus are a major staging area in spring and autumn, holding up to 1,000 birds in autumn (Krivenko, 1995), and the Kizilirmak Delta is also very important in spring (Green & Hughes, 1995). The origin of the small number of birds that winter regularly in the Dobrodja, Romania and Bulgaria, is unknown. There are no longer any known regular breeding areas in Romania or Ukraine, but the presence of an undetected breeding population to the north or northeast of the Black Sea remains the most likely explanation. The small population breeding in southwest Iran (and perhaps also Iraq) appears to be sedentary. Birds breeding in the western Mediterranean are chiefly sedentary, undertaking only short-distance movements.

### Population limits:

Monval & Pirot (1989), and more recently Green & Hughes (1995), recognized two separate populations of *O. leucocephala* in Western Eurasia, one centred around the west Mediterranean and the other centred around the east Mediterranean and the coasts of the Black Sea and Caspian. However, the distribution of *O. leucocephala* has become increasingly fragmented in recent decades, especially in Europe, and it now seems likely that there are at least three isolated groups in Western Eurasia. The Spanish population would now appear to be discrete. There is no evidence of movement between the Spanish population and the population in Tunisia and Algeria, and the lack of recent records from Morocco suggests that little if any such movement occurs.

The birds in Tunisia and Algeria are probably also isolated from populations further east. There is no indication of movement between Turkey and Tunisia, and there have been few counts of more than a few hundred birds in Tunisia. Anstey (1989) thought it most likely that the wintering population in Tunisia included the small resident Tunisian population and a substantial number of winter visitors from breeding areas in neighbouring Algeria (especially El Kala National Park). No wintering *O. leucocephala* were recorded at El Kala between 1972 and 1977, but since the major decline in numbers wintering in Tunisia in the mid-1970s, the El Kala winter counts have increased (Anstey, 1989). Boumezbeur (1992) also suggested that there was some post-breeding dispersal of *O. leucocephala* from El Kala to Tunisia. With the disappearance of a breeding population in south-central Europe (which may have contributed some birds to the Tunisian wintering population), and in the absence of direct evidence to suggest that any of the small numbers of birds wintering in Tunisia are immigrants from Asia, it would seem better, from a conservation standpoint, to treat the North African birds as a discrete

WHITE-HEADED DUCK *Oxyura leucocephala*



population. This 'discreteness' may be a recent phenomenon resulting from range contraction and fragmentation.

Further east, where the species undertakes much longer migrations, the presence of discrete sub-populations is less clear. The small population of about 300 to 500 birds in southwestern Iran appears to be largely sedentary, the birds concentrating at a few large wetlands in winter, and dispersing to smaller wetlands in the southern Zagros Mountains to breed. This group has traditionally been included within the main Southwest Asian population, and this approach is adopted here, although treatment as a separate population may be more appropriate. Similarly, the small population wintering in Pakistan is likely to be a discrete population, breeding at the extreme eastern limit of the species' range in the region of Novosibirsk. Birds occurring in Seistan, on the Iran/Afghanistan border, may belong to this population, or may be stragglers from the main Southwest Asian population. This eastern population, now believed to number only about 300 birds (Perennou *et al.*, 1994), is outside the geographical limits of the present study.

Thus three populations are recognized in Western Eurasia: (1) a small population in Spain; (2) a small population in Algeria and Tunisia; (3) a large population breeding from Romania, Turkey and Iran to Kazakhstan and wintering mainly in Turkey and the Caspian region.

#### Population size:

- **West Mediterranean (Spain): 700. 1% level 7.**

The Spanish population of about 400 in 1950 had declined to only 22 birds in 1977, but with protection of breeding areas, the population recovered to a total of 786 in January 1992 (Torres *et al.*, 1994a). Subsequent high counts have included 697 in October 1993, 552 in January 1994 and 665 in October 1995 (J.A. Torres Esquivias, *in litt.*). Tucker and Heath (1994) give the Spanish breeding population as 50–100 pairs, while A. Green (*in litt.*) suggests that the population currently numbers about 700 individuals.

- **North Africa (Algeria and Tunisia): 400. 1% level 4.**

Boumezbeur (1992) estimated the Algerian population (in El Kala National Park) at over 210 birds in March 1992. A. Green (*in litt.*) suggests that the total population in Algeria and Tunisia currently numbers about 400 individuals.

- **Southeast Europe/Turkey/Southwest Asia: 8,000–15,000. 1% level 115.**

As recently as the early 1990s, the population of *O. leucocephala* in southeast Europe and Southwest Asia was thought to number about 17,000 birds (Green & Anstey, 1992). Krivenko (1993) gives an estimate of 15,000 for the total population at the end of the breeding season in Kazakhstan and the Caspian region. Some 15,500 birds were counted during the International Waterfowl Census in 1991, with most of the birds at Burdur Golu (10,927) in Turkey and Aggel (Ah Gol) Lake (3,100) in Azerbaijan. However, only 3,010 were located at Burdur Golu during a comprehensive survey in the winter of 1992/93, and only 566 were found elsewhere in Turkey (Green *et al.*, 1993). A. Green (*in litt.*) has suggested that while the population in the late 1980s/early 1990s probably reached 17,000 in good years, it could have been as low as 11,000 in poor years. Furthermore, there may have been a substantial further decline in numbers within the last few years, following the degradation of Burdur Golu (Green *et al.*, 1993). A conservative estimate of 8,000–15,000 is therefore considered more appropriate than the former 17,000 which represents a maximum population size in good years rather than the average population size (Green & Yazar, 1996; Green & Hunter, 1996). The possibly isolated population in southwestern Iran is thought to contain 300–500 birds; recent mid-winter counts have included up to 455 at Lake Parishan, 285 at Izeh and Sheiko Lakes, 230 at Harm Lake and 173 at the Helleh Delta.

#### Habitat/ecology:

*Oxyura leucocephala* prefers freshwater or brackish, alkaline, eutrophic lakes, which often have a closed basin hydrology and, in the case of breeding sites, are frequently semi-permanent or temporary (Green & Hughes, 1995). Breeding sites have dense emergent vegetation around the fringes, and are small or are enclosed areas within larger wetland systems. Outside the breeding season, the species generally occurs on larger and deeper lakes and lagoons, often with little emergent vegetation. *O. leucocephala* has a polygamous mating system (Torres *et al.*, 1984), with nesting occurring in dense reed-beds and sometimes on top of old coot nests.

In Kazakhstan, males leave the breeding grounds during the breeding cycle, and gather to moult on larger lakes (Cramp & Simmons, 1977). A flightless moult occurs twice a year, during the post-breeding season and in late winter (Anstey, 1989). The autumn departure from the breeding grounds begins in

late September, and the northern breeding grounds are deserted by mid-October. Numbers in the east Caspian, Azerbaijan and Turkey increase during the second half of October and November. The return passage begins in February, and in Kazakhstan, the main spring passage occurs at the end of April and in early May.

#### Conservation status:

*Oxyura leucocephala* is a globally threatened species, listed as 'vulnerable' by Collar *et al.* (1994) and Green (1996). The status and conservation of *O. leucocephala* have been described in some detail by Anstey (1989), Green & Anstey (1992), Green (*in* Tucker & Heath, 1994) and van Vesseem (1994), and an Action Plan for the species in Europe has been compiled by Green & Hughes (1995).

The west Mediterranean population is currently increasing after a long period of decline. This population was on the verge of extinction in the early 1970s, but has since increased from a low of 22 in 1977 to a peak of 786 in January 1992 and 665 in October 1995 (Torres *et al.*, 1994a; J.A. Torres Esquivias, *in litt.*). The North African population appears to have been stable in recent years, after a sharp decline in the mid-1970s. The southeast European/Southwest Asian population is thought to have been relatively stable during the 1970s and 1980s. Krivenko (1993) reports only a slight decline in numbers in Kazakhstan and the Caspian region between 1972 and 1989, and some local increases have been reported, e.g. in Greece and Azerbaijan. However, numbers are probably now decreasing rapidly with the serious deterioration in the condition of Burdur Golu in Turkey. The small, possibly isolated population in southwestern Iran appears to have been relatively stable since at least the early 1970s.

*Oxyura leucocephala* has undergone a considerable decline in range and population size this century that is almost certainly continuing. According to Green & Hughes (1995), the former world population of the species probably exceeded 100,000 individuals. By the early 1990s, the population had fallen to an estimated 19,000 birds (1,000 in the west Mediterranean, 13,000 in the east Mediterranean/Black Sea region, and 5,000 wintering in countries further east). Poslavski (1992) has documented a major decline in the wintering population on the Caspian coast of Turkmenistan from an estimated 47,000 in 1932 to less than 200 in recent years. The dramatic decline in numbers has been attributed to the destruction and degradation of habitat, especially on the breeding grounds in the former USSR and on the wintering areas in Pakistan and Turkey, and by excessive disturbance from hunting and fishing on the wintering areas. The species is very easy to shoot, making hunting a much more significant threat than for most other waterfowl.

In recent years, it has become clear that the spread of the introduced *Oxyura jamaicensis* in western Europe poses the most severe threat to *O. leucocephala*, because of the free hybridization between the two species (Green *et al.*, 1993; Torres *et al.*, 1994b; Green & Hughes, 1995). Hybridization with *O. jamaicensis* has already affected the Spanish population; hybrids were first seen in Spain in 1991, and at least 49 had been shot by the end of 1994, including some that were at least second generation hybrids (Callaghan & Green, 1993; J.A. Torres Esquivias, *in litt.*). The eradication of hybrids and pure *O. jamaicensis* (at least 17 shot by the end of 1994) appears to have proved successful; the population of *jamaicensis* has declined rapidly since 1992.

#### Network of key sites:

As for all globally threatened species, all sites regularly used by an appreciable number of individuals are of international importance. Many major sites for the species are listed by Green & Hughes (1995), Anstey (1989) and Green & Anstey (1992). Moreno *et al.* (1994) provide a list of 86 sites at which the species is known to have occurred in Spain, including 21 sites at which there have been no records of the species since 1982. More recently, J.A. Torres Esquivias *et al.* (*in litt.*) have listed 87 sites in Spain at which the species has occurred since 1987. Handrinos (1995) lists the known sites in Greece and Annex 2 provides an extensive key sites listing for the Algeria/Tunisia and southeast Europe/Turkey/Southwest Asia populations. In southeast Europe/Turkey/Southwest Asia few key sites can be identified outside of winter. In autumn concentrations have been found in Turkey (300 at Sodah Gol and 500 Moulting at Kulu Golu) and in Russia (1000 at Manych-Godilo Lakes) but more sites surely exist. The maximum breeding concentrations appear to be small colonies of up to 20 pairs in Turkey and Turkmenistan but very little is known about breeding densities in the major areas to the North of the population range. In winter 48 sites in southeast Europe/Turkey/Southwest Asia have supported up to 100 birds and 30 key sites over 100 birds. Until recently, Kizil Agach and Aggel (Ah Gol) Lake in Azerbaijan plus Burdur Golu in Turkey have accounted for virtually the entire wintering population but the recent demise in numbers wintering at Burdur Golu now leaves over 50% of the winter population unaccounted for. In Algeria and Tunisia *O. leucocephala* can be found in important concentrations

throughout the year but its occurrence is unpredictable. Consequently, very few key sites support the species on a regular basis. Concentrations thought to comprise virtually the entire population have been recorded sporadically on five key sites and concentrations of over 10% of the population on many others.

**Protection status of key sites:**

Most of the important sites in Spain are protected, but two of the important sites in Algeria and Tunisia are unprotected and many others are of unknown protected status. All of the main breeding areas in the Black Sea region and Turkey are unprotected but although all of the extremely important wintering areas are protected there are still many important unprotected key sites. An important site in Azerbaijan (Kizil Agach) and many of the important sites in Iran are protected, but elsewhere in Southwest Asia, most sites are unprotected.

# MACCOA DUCK

## *Oxyura maccoa*

### Subspecies:

Monotypic.

### Distribution:

Confined to the Afrotropical Region, occurring from Ethiopia south to northern Tanzania, Rwanda, Burundi and eastern Zaire, and from Zimbabwe and Namibia south to Cape Province, South Africa. Its range in southern Africa, lying mainly within the 65°F (18.3°C) isotherm, suggests that temperature may be a limiting factor in its distribution (Snow, 1978).

### Movements:

Largely sedentary, undertaking only small-scale dispersive movements. Some local movements have been observed in South Africa, with birds concentrating on large waters during the non-breeding season, and the species is said to be locally migratory in Transvaal (Brown *et al.*, 1982), but no regular migrations have been reported (Snow, 1978). In Witwatersrand, Transvaal, it is present all year, with the greatest numbers in summer (the breeding season) coinciding with the rains, and the lowest numbers in winter (the dry season) occurring when non-breeding birds move to large waters in Orange Free State.

### Population limits:

The birds inhabiting the highlands of eastern and northeastern Africa are widely separated from the population of southern Africa (by about 1,500 km), and there would seem to be ample justification for treating the southern African birds as a separate population. Callaghan and Green (1993) recognized these two 'sub-populations': an eastern population in Ethiopia, Kenya, Tanzania, Zaire, Sudan, Uganda and Rwanda, a southern population in Mozambique, Malawi, South Africa, Botswana, Lesotho, Zimbabwe and Namibia. However, there also appears to be a break in distribution between the birds in the Ethiopian highlands and the birds in the East African highlands. As *O. maccoa* is primarily a species of the highlands in eastern and northeastern Africa, and as it appears to be largely sedentary, the broad belt of unsuitable lowland habitat in southeastern Sudan, southern Ethiopia and northern Kenya probably acts as a barrier to interchange between the East African and Ethiopian birds. For this reason, the Ethiopian population is tentatively split off as a separate population. Thus, three populations are recognized: one in southern Africa (north to the Zambezi); one in East Africa; and one in the Ethiopian highlands. Within the East African population, there may be very little mixing between the birds inhabiting the highlands of Kenya and northeastern Tanzania, and those in the highlands of western Uganda, Rwanda, Burundi and eastern Zaire, as there are very few records of birds in the intervening lowlands of the Lake Victoria basin. However, very little information is available on the western group, and for the time being at least, it would seem best to treat these birds as part of a wider East African population.

### Population size:

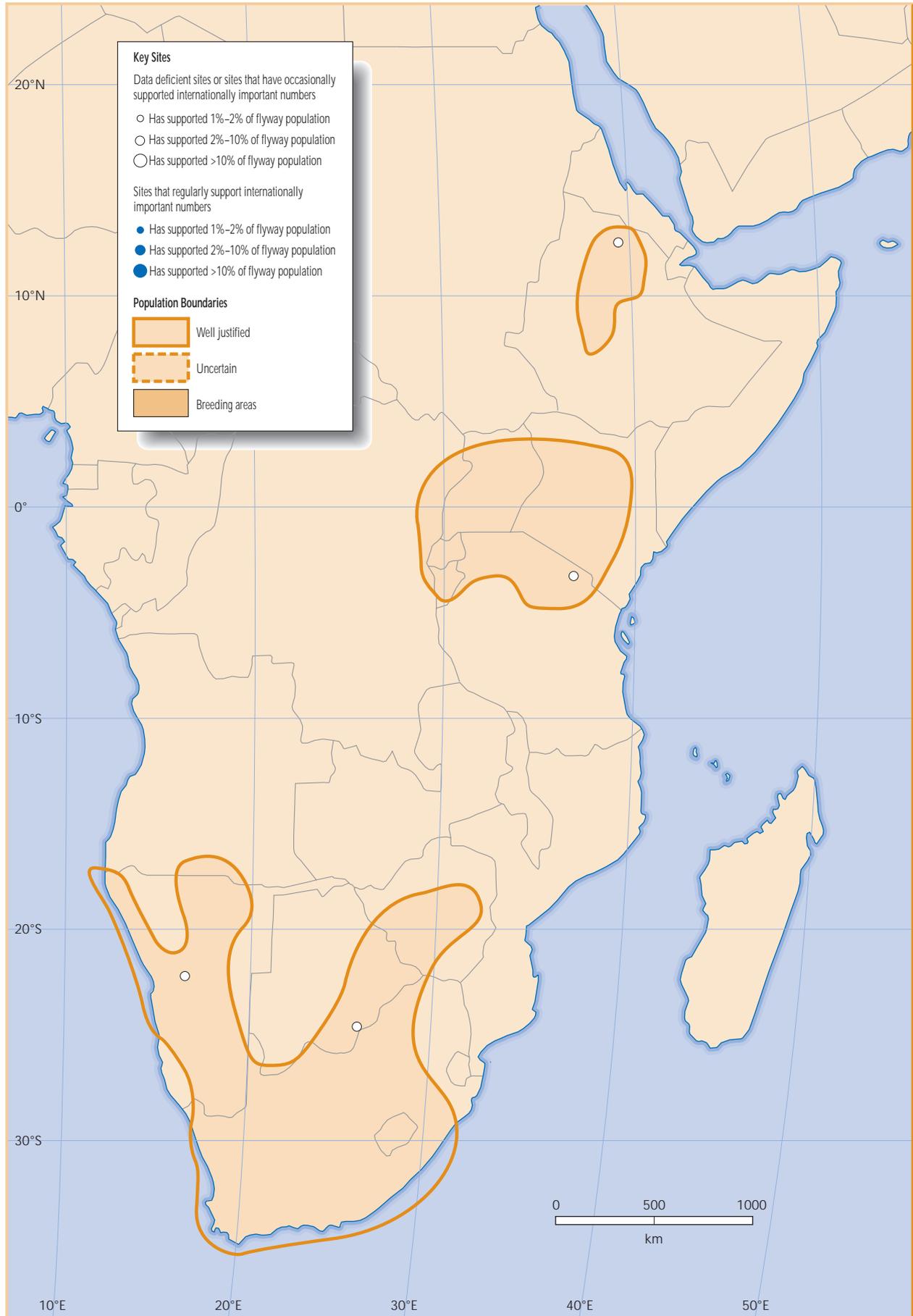
- **Ethiopian highlands: 1,000–5,000. Provisional numerical criterion 30.**

Said to be common to locally abundant in Ethiopia (Urban & Brown, 1971), but not known from Somalia. One hundred and twenty-one were recorded during the African Waterfowl Census in January 1994 but this was very incomplete.

- **East Africa: 15,000–25,000. Provisional numerical criterion 200.**

Locally numerous on inland lakes in Kenya and northern Tanzania, especially when alkaline, but rare in coastal regions. *O. maccoa* was formerly common at Lake Nakuru and Lake Naivasha, but there have been no recent records from Nakuru and only small numbers now occur at Naivasha (L. Bennun, *in litt.*). Up to 1,000 occur seasonally on strongly alkaline lakes in Arusha National Park. A total of 427 was recorded at wetlands in Tanzania in January 1995. There are no recent records from Uganda, and the species is said to be uncommon in Malawi. The maximum count during the African Waterfowl Census (1991–94) in East Africa was 215 in January 1994.

MACCOA DUCK *Oxyura maccoa*



- **Southern Africa (north to Zimbabwe): 15,000–25,000. Provisional numerical criterion 200.**

Said to be fairly common in southeastern Botswana, uncommon in Lesotho and Zimbabwe, and apparently not recorded from Mozambique, but common to locally abundant in other parts of its range in southern Africa, except in arid and semi-arid zones and coastal Natal. The population in Zimbabwe was estimated to be in the hundreds in the 1970s (Ewbank, 1993), and in Lesotho there are an estimated 10–100 individuals (Callaghan & Green, 1993). A total of 899 was counted in Namibia in July 1992. The total population in Cape Province, South Africa, is estimated at 2,400. A concentration of 1,024 birds was observed on Strandfontein Sewage Works in the Cape Town area, South Africa, in May 1980 (Callaghan & Green, 1993). The highest count during the African Waterfowl Census (1991–94) in southern Africa was 1,116 in 1992.

Callaghan and Green (1993) state that the total population “seems certain to exceed 10,000 individuals”.

#### Habitat/ecology:

*Oxyura maccoa* prefers shallow, nutrient-rich lakes and ponds with extensive emergent vegetation. In eastern Africa, it is mainly a highland duck, recorded up to 3,000 m in the Bale Mountains in Ethiopia. In South Africa, it occurs from sea level to 2,150 m. Sedentary birds in southwest Cape Province moult their remiges twice yearly; in January and June.

#### Conservation status:

The species is thought to be decreasing in eastern Africa, but is probably increasing in southern Africa (Callaghan & Green, 1993). Numbers have declined markedly in Kenya in recent years (L. Bennun, *in litt.*); this decline in numbers has been attributed to the widespread illegal use of gill nets (Callaghan & Green, 1993). In southern Africa, the species is adaptable, colonizing artificial dams and reservoirs, and is subject to little hunting pressure. In South Africa and Namibia, numbers may have increased following the widespread construction of dams and sewage settlement lagoons. The situation in Zimbabwe is unclear; Ewbank (1993) suggests that numbers have increased in recent years, while D.V. Rockingham-Gill (*in litt.*) reports that numbers are decreasing. Trends in the small Ethiopian population are unknown.

#### Network of key sites:

No network of key sites can be identified for any of the three populations of *O. maccoa*. There is no seasonal pattern in the appearance of large concentrations and it is possible that many more key sites remain to be identified.

#### Protection status of key sites:

Arusha National Park Alkaline Lakes in Tanzania and Phakalane Sewage Ponds in Botswana are protected but no protected status information is available for Ashange Lake in Ethiopia and Swakoppoort Dam in Namibia.

# MUTE SWAN

## *Cygnus olor*

### Subspecies:

Monotypic.

### Distribution:

Palaearctic; patchily distributed but locally common across temperate regions of the Palaearctic, mainly between 40° and 60°N, from western Europe to northeast China. Introduced in North America, South Africa and Australasia. In Western Eurasia, *C. olor* breeds widely in western and central Europe, and more locally in southeast Europe, the Black Sea and Caspian regions and central Asia east to about 90°E; in winter it occurs south to the Mediterranean Sea and the southern shores of the Caspian Sea. It is only a rare winter visitor to North Africa (mainly Egypt) and Iraq. It has been introduced into eastern Cape Province, South Africa, where there is a population of a few hundred birds.

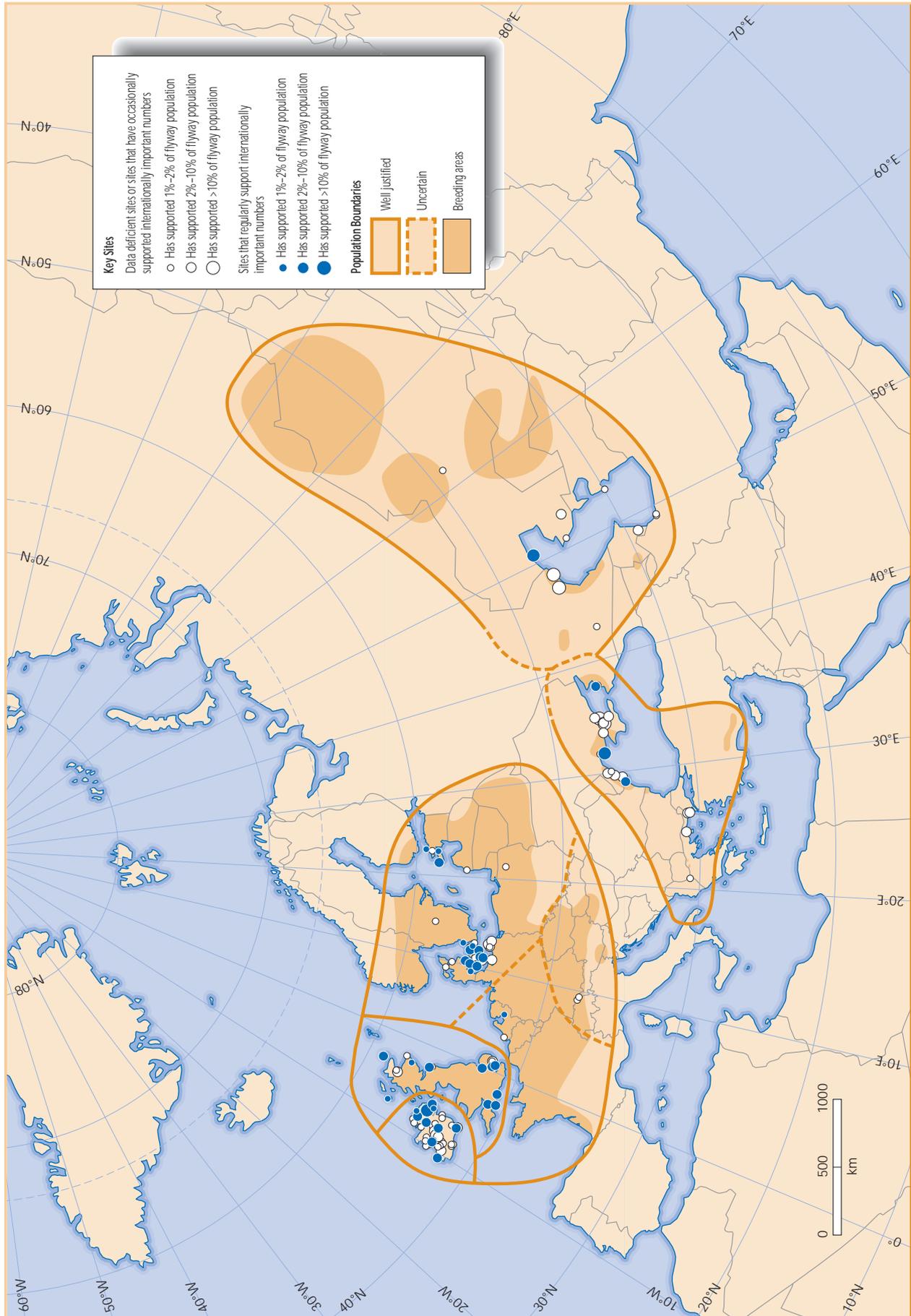
### Movements:

*Cygnus olor* breeding in Ireland, Britain, the Low Countries, France and central Europe are very largely sedentary, with movements seldom exceeding some tens of kilometres. Recoveries of several thousand birds ringed in Britain and Ireland have shown that these populations are almost entirely sedentary. Very few of the movements recorded within Britain have exceeded 50 km, and there is no migration to or from the mainland of Europe, except in very cold winters (Atkinson-Willes, 1981). There is a small winter movement of Scottish swans into Northern Ireland, and there have been recoveries of birds from the north of England and the Isle of Man in Ireland, but remarkably few Irish swans cross the Irish Sea to Britain (O'Halloran *et al.*, 1995).

*Cygnus olor* breeding in eastern Europe are mostly migratory or nomadic. Most swans breeding in Finland, Sweden, the Baltic countries, Poland, northern Germany and Denmark leave inland lakes to winter along the coasts of the Baltic Sea. Ringing recoveries have shown that birds breeding in Estonia, Latvia and Lithuania winter mostly in the countries bordering the south and southwest shores of the Baltic Sea (Denmark, Sweden, eastern Germany and Poland). Swans breeding in Poland formerly wintered mostly on the Danish and Rugen coasts, but an increasing number of Polish swans are now migrating southwest or south to winter in eastern Germany, the Czech Republic, the Slovak Republic, Austria and Hungary. The bulk of the Baltic population remains in the Baltic Sea even in severe winters (when mortality may be very high), but some birds leave the area to winter around the southern North Sea and in central Europe. In recent years in which winters have been particularly mild, there has been an increasing tendency for birds in Sweden and the eastern Baltic to remain throughout the year in their breeding areas. Numbers wintering in Estonia have increased rapidly in recent years from none in the 1960s to about 12,000 in 1993, the numbers depending on the severity of the winter (Kuresoo, 1991; S. Pihl, *in litt.*), while in Lithuania, about 1,000 birds have remained throughout the winter in recent years (S. Svazas *et al.*, 1995).

Most *C. olor* breeding in the Black Sea and Sea of Azov region undertake only limited migratory movements, leaving inland breeding areas to winter on the coasts of the Black Sea. However, small numbers migrate to the south, to the Danube Delta, the Balkan peninsula, Greece, Turkey and even as far as southern Italy especially during severe winters. Swans ringed in the Black Sea Reserve in Ukraine have been recovered in Romania (6), Bulgaria (2), Greece (1) and Turkey (1) (Ardamatskaya & Korzyukov, 1991).

*Cygnus olor* breeding in the Caspian region and central Asia also show limited migratory movements. A recent analysis of recoveries of swans ringed and colour-marked in the Volga Delta has shown that the greater part of the Volga Delta population remains throughout the year within the limits of the Caspian Sea and lakes adjoining it. Birds breeding in the Volga Delta return to the delta after wintering on the Caspian Sea, and there is no evidence that birds regularly change their breeding grounds. Most young birds also winter in the Caspian Sea, mainly in warm waters along the west coast. The more severe the winter, the further south they go. In particularly severe winters, a mass migration of swans occurs from the Caspian Sea to the interior lakes of Azerbaijan and Dagestan (Krivonosov, 1991b). In Azerbaijan, the wintering population fluctuates between 1,000–2,000 in mild winters and as



many as 11,000–12,000 in cold winters (Patrikeev, in prep.). Exceptionally, over 10,000 swans, mainly immatures, winter in the south Caspian region of Iran, with stragglers reaching Iraq.

#### Population limits:

Most authors recognize three main groups in Western Eurasia: a northwest and central European population, a Black Sea/Sea of Azov population, and a Caspian Sea/west-central Asian population. On the basis of ringing data and various national studies, Atkinson-Willes (1981) divided the northwest and central European population of *Cygnus olor* into seven groups, each of which was thought to be more or less independent.

- 1) Scandinavia-Baltic Group – Finland, Baltic Republics, Poland, Sweden, eastern Germany, Schleswig-Holstein and Neidersachsen in western Germany, Denmark and Norway.
- 2) Netherlands Group – Netherlands, Nordrhein-Westfalen in Germany, Belgium and northwest France.
- 3) Central European Group – Czech Republic, Slovak Republic, Austria, central and southern Germany, Switzerland, southeast France and Italy.
- 4) England and Wales Group
- 5) Scotland (mainland and Orkneys) Group
- 6) Scotland (Hebrides) Group
- 7) Irish Group

Ruger *et al.* (1986) and Monval & Pirot (1989) lumped the two Scottish groups with the birds in England and Wales and thus recognized five groups. Wieloch (1991) argued for the existence of a further group, the west Ukrainian-Hungarian group, which has recently become established in Ukraine, Hungary and the former Yugoslavia as a result of the eastward and southward spread of swans from the Scandinavian-Baltic and central European groups. However, because of the recent expansions in range, there is increasing contact between individuals from the different groups on the wintering and moulting areas (Wieloch, 1991), and sub-division of the populations in northwest and central Europe, at least on the mainland of Europe, is now doubtfully valid.

Exchange between the northwest/central European population and the Black Sea/Sea of Azov population is also becoming increasingly likely as a result of the recent increase in numbers and expansion in ranges in both these populations. *C. olor* of the Scandinavian-Baltic and central European groups have expanded their ranges towards the south and east, establishing breeding populations in the former Yugoslavia, Hungary and particularly Ukraine, and moving closer to those breeding in the lower Danube Valley (Black Sea population). By the late 1980s, birds in the central European group and birds in the Black Sea population were nesting at the same latitude and separated by only some 150 km (Wieloch, 1991).

Further east, the increase in numbers and range expansion have been even more marked, and the distribution of *C. olor* is now almost continuous between the Black Sea and Caspian Sea. Ringing recoveries have shown that some interchange is now occurring between the Caspian and Black Sea populations. Seven young birds ringed in the Volga Delta in 1977, 1978 and 1983 were found in their first winter after ringing in the Black Sea region and north Caucasus, and colour-marked individuals have been sighted in the Black Sea region two years and five years after ringing (Krivonosov, 1991b). This interchange appears to be a recent phenomenon related to the massive increase in the Caspian population since the 1970s.

Despite the evidence for interchange between the Caspian and Black Sea populations, and the increasing likelihood of interchange between the Black Sea and northwest/central European populations, these three main groups are retained in the present analysis, primarily for practical purposes. Sub-division of the northwest/central European population into separate groups may no longer be possible on the mainland of Europe because of range expansions, but there remain strong grounds for treating the 'closed' British and Irish populations as separate units.

#### Population size:

- **Northwest mainland and central Europe: 210,000 (see Annex 1). 1% level 2,100.**
- **Britain: 25,750 (Delaney *et al.*, 1993; see Annex 1). 1% level 250.**
- **Ireland: 10,000 (Shepherd, 1993; see Annex 1). 1% level 100.**

Ruger *et al.* (1986) and Monval & Pirot (1989) estimated the total population in northwest and central Europe (including Britain and Ireland) at 180,000, while Wieloch (1991) gave a figure of 175,000 for the population in 1989, based on breeding season counts of 28,400 pairs and mid-winter counts totalling

152,500 individuals. Substantial increases have occurred in almost all regions since then, and recent counts suggest that the total population in northwest and central Europe (excluding Britain and Ireland) is now in the region of 210,000 birds (see Annex 1). The present estimates for the three main sub-groups are as follows:

- Scandinavia/Baltic sub-group: 170,000
- Netherlands sub-group: 20,000
- Central European sub-group: 16,000

Extrapolation from tetrad counts during the 1988–91 atlas project in Britain and Ireland suggests that there may be a much higher population in Ireland (19,000–20,000 birds) than has generally been supposed (M. Ogilvie and S. Delany in Gibbons *et al.*, 1993).

- **Black Sea/east Mediterranean: 45,000 (see Annex 1). 1% level 450.**

Ruger *et al.* (1986) estimated the Black Sea/east Mediterranean population at only 20,000 birds, and this figure was repeated by Monval & Pirot (1989) and Rose & Scott (1994). However, Korzyukov *et al.* (1991) estimated the Azov-Black Sea population at over 50,000 birds. The population is currently estimated at 45,000 birds (see Annex 1).

- **West-central Asia/Caspian region: 250,000. 1% level 2,500.**

The current estimate of 250,000 is derived from a comprehensive census of *C. olor* in the Caspian region, Kazakhstan, Uzbekistan and Turkmenistan in 1987. A census of *C. olor* throughout the former USSR in spring 1987 revealed that there had been a massive increase in the numbers of swans in the Caspian region since the previous census in the 1970s, and suggested that the total population in the central Asian republics and Caspian region was about 250,000 birds (Krivonosov, 1991a). This total included 13,370 pairs and 215,900 non-breeding birds in the north Caspian (mainly the Volga Delta), 4,000 pairs and 11,000 non-breeding birds in Kazakhstan, 600 pairs and 900 non-breeding birds in the north Caucasus, 100 pairs in Uzbekistan and 50 pairs in Turkmenistan. Krivenko (1993) gives an estimate of 200,000 for the population in Kazakhstan and the Caspian region in the late 1980s.

#### Habitat/ecology:

*Cygnus olor* occurs in a variety of lowland freshwater habitats, including marshes, lakes, lagoons, rivers and canals, and also on estuaries and in sheltered coastal sites. During hard winters, most of the swans wintering in the Baltic move to marine areas. The species has adapted to living in close proximity to man, and now occupies many artificial water bodies such as park lakes, reservoirs and gravel pits, often in urban environments. Because of this adaptability and its tolerance of most human activities, *C. olor* is far less threatened by loss of habitat than most other species of Anatidae. Although usually territorial during the breeding season, the swans often form large flocks during the moult (July and August) and in winter, sometimes numbering thousands of birds, especially in the southwest Baltic, the northern Black Sea and the Volga Delta. The largely sedentary populations in Britain, Ireland, France, the Netherlands and central Europe are much less gregarious outside the breeding season than other populations, but form moulting concentrations in some areas. The swans are flightless for 6–8 weeks during the wing moult. Migratory populations in northwest Europe return to their breeding areas in March. Most of the swans breeding in the Black Sea and Caspian regions move to these seas to moult and spend the winter.

#### Conservation status:

The northwest European population of *C. olor* has undergone a slow but significant increase that has accelerated in recent years. The rate of increase suggests that the population size increased by 60% over the ten-year period to 1993 (Rose, 1995). This increase in numbers has been associated with an expansion in the breeding range. Increases have been recorded in almost all areas and have been especially marked in the Scandinavian/Baltic sub-group. However, numbers in the Netherlands sub-group seem to have stabilized in recent years, and may now be decreasing slightly (Pirot & Fox, 1990; Wieloch, 1991). In central Europe, numbers were relatively stable during the 1970s and 1980s, but have shown a slight increase within the last few years (Rose, 1995). In Britain, numbers of *C. olor* increased quite rapidly in the 1950s, and then went through a period of fluctuation in the 1960s, 1970s and early 1980s, with some local rapid declines associated with lead poisoning caused by the ingestion of anglers weights (Sears and Hunt, 1991), but since then there have been widespread increases (M. Ogilvie and S. Delany in Gibbons *et al.*, 1993). Trends in the Irish population are unknown.

In the Black Sea/east Mediterranean region, mid-winter counts suggest that there was a slight increase during the period 1984–1993 (Rose, 1995). However, substantial increases have been reported in the Black Sea area and the northern Caucasus (Rostov region, Krasnodar and Starmopol) in recent years (Krivonosov, 1991a).

In west-central Asia and the Caspian region, *C. olor* has expanded its range north and east into areas which were formerly occupied by swans, and this expansion is continuing. The number of breeding pairs in the Caspian Sea area tripled between 1978 and 1987 to 13,370 pairs, while the number of non-breeding birds increased eight-fold to 215,900 (Krivonosov, 1991a). Further east in Kazakhstan, only a slight increase was reported during the same period (Krivonosov, 1991a).

#### **Network of key sites:**

The Black Sea/east Mediterranean population has a good key sites network. In the breeding season, large colonies occur in the two major delta sites (Danube and Dnestr), and likewise the major breeding concentration for the Caspian population is in the Volga Delta. Almost all of the Caspian population moult in the northeast Caspian shallows. More than 10% of the Black Sea breeding population moult in Karkinitiski Bay (Ukraine), and it is likely that other key moulting sites exist in the Black Sea/Sea of Azov. In winter, up to 70% of the Black Sea/east Mediterranean population can potentially be accounted for by a network of 18 key sites, but in the Caspian region only six key wintering sites can be identified accounting for only 10% of the population. Key site information for the Irish and British populations is only listed and plotted for January concentrations. In January, more than 25 key sites can be identified in Ireland, but these only account for about 20%–25% of the population indicating its very dispersed nature. Similarly, 17 key sites in Britain account for approximately 20% of the population.

In mainland northwest Europe 29 key wintering sites are listed plus 17 key moulting and passage sites. These are predominantly in the Baltic region which is representative of the situation in mild winters, but in harsh winters many of these birds can die and some move south, stressing the importance of more southerly key sites to this population. A large proportion of the population spends the winter and breeds in small groups that do not qualify as key sites.

#### **Protection status of key sites:**

In the Black Sea region nearly all of the major key sites are protected or partially protected in contrast to the Caspian population where many major sites are not protected or have unknown protected status. Most key sites in mainland northwest Europe are protected.

# WHOOPE SWAN

## *Cygnus cygnus*

### Subspecies:

Monotypic.

### Distribution:

Palaearctic; breeds widely at northern latitudes, mainly between 55° and 70°N, from Iceland to the Bering Sea, and winters south to western Europe, the Black Sea, the Caspian Sea, central China and Japan. *C. cygnus* formerly bred in Greenland, but has long been extinct there. In Western Eurasia, it breeds in Iceland, Norway, Sweden, Finland and northern Russia, and winters south to Britain, Ireland, Belgium, northern France, the northern Black Sea and the Caspian Sea, with small numbers of birds penetrating much further south during severe winters. Small numbers have also bred in Latvia, Lithuania and northeastern Poland in recent years. It is only a rare winter visitor to North Africa (Algeria, Tunisia and Egypt).

### Movements:

Almost entirely migratory, although some birds (500–1,300) remain throughout the winter in Iceland. The bulk of the Icelandic population winters in Britain and Ireland, with only a small number continuing on to southern Scandinavia (southern Norway and Jutland) and the Netherlands.

*Cygnus cygnus* breeding in Scandinavia and western Russia (west of the Urals) are thought to winter mainly in Denmark, Schleswig-Holstein and Mecklenburg (Germany), while birds breeding east of the Urals in western and central Siberia winter around the northern parts of the Black Sea and Caspian Sea. The migration routes of *Cygnus cygnus* throughout the Western Palaearctic have been summarized by Mathiasson (1991). The extent to which birds from continental northwest Europe reach Britain and Ireland in winter remains uncertain. Gardarsson (1991b) has suggested that as many as 3,000 of the *C. cygnus* wintering in Britain and Ireland may originate from the continent of Europe, but there is little evidence to support this. There have been no recoveries of continental birds in Ireland, and it is now known that many of the birds wintering in southeast England are of Icelandic origin. However, in the recent cold winter of 1995/96, at least 22 Finnish neck-banded birds from more than four families were observed in southeast England, and another neck-banded bird, probably of Scandinavian origin, was reported in Scotland (J. Bowler & B. Lambeth, *in litt.*).

The species is subject to extensive hard weather movements, both in northwest Europe and in the Caspian region. Numbers wintering in the Baltic fluctuate widely according to the severity of the winter, with traditional wintering haunts in Sweden and the eastern Baltic being mostly deserted during severe winters. In the Caspian region, large numbers of *C. cygnus* reach the Caspian lowlands in northern Iran during severe winters.

### Population limits:

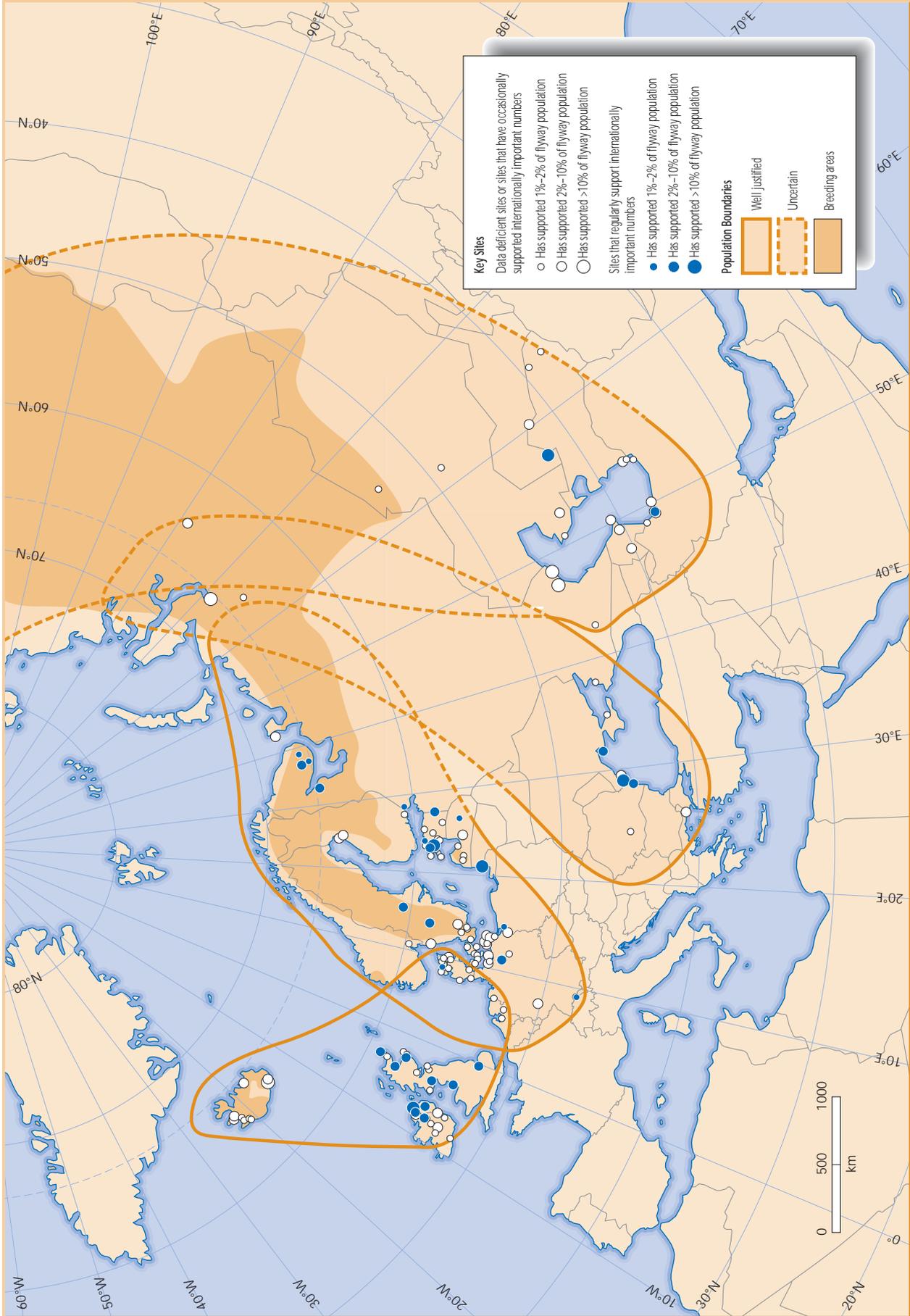
Four populations are recognized in Western Eurasia: (1) a population which breeds in Iceland and winters mainly in Britain, Ireland and Iceland; (2) a population which breeds in Fennoscandia and northwest Russia (east to the Urals) and winters in northwest continental Europe; (3) a population which breeds in western Siberia and winters in the Black Sea and east Mediterranean; (4) a population which presumably breeds in western and central Siberia and winters in Southwest Asia from the Caspian Sea east to the region of Lake Balkash. The precise origins of the flocks wintering around the Black Sea and Caspian Sea are unknown, but it seems unlikely that they come from the same general breeding areas. Mathiasson (1991) studied *C. cygnus* in Sweden, and found that different wintering flocks, even those having winter quarters close to one another, may have different geographical origins and migration routes. There would seem ample justification, therefore, for treating the widely separated wintering flocks of the Black Sea and Caspian Sea regions as separate populations.

### Population size:

- **Iceland/UK and Ireland: 16,000 (Cranswick *et al.*, in press). 1% level 160.**

The Icelandic breeding population has recently been estimated at 1,500–2,500 pairs (Koskimies, 1993), while the total population in Iceland in October has been estimated at 14,000, with about 6,000 in the east and 8,000 in the west (Gardarsson, 1991b). The 'population' of *C. cygnus* wintering in Iceland,

WHOOPEL SWAN *Cygnus cygnus*



Britain and Ireland is currently estimated at 16,000 birds (Cranswick *et al.*, in press). The estimate for this wintering population has traditionally been used as the estimate for the Iceland/UK/Ireland population, and this approach is adopted here, although it has been suggested that perhaps as many as 3,000 of the birds wintering in Britain and Ireland are of continental origin (Gardarsson, 1991b).

• **Northwest continental Europe: 40,000 (B. Laubek, *in litt.*). 1% level 400.**

Ruger *et al.* (1986) estimated the northwest continental European population at 25,000 individuals, and this estimate was retained by Monval & Pirot (1989) and Rose & Scott (1994). However, mid-winter counts during the period 1988 to 1993 indicated that the population was in the region of 35,000–40,000 birds (Laubek, 1995), while Pihl *et al.* (1995) estimated that there were about 28,000 in the Baltic region alone in January 1993. A major coordinated census of yellow-billed swans throughout northwest Europe in mid-January 1995 gave a total of about 40,000 for the northwest continental European population of *C. cygnus* (B. Laubek, *in litt.*). Some 27,500 *C. cygnus* were located in Denmark and Sweden alone. Gardarsson (1991b) has noted that as many as 600 of the birds wintering in northwest continental Europe may be from the Icelandic breeding population. The total breeding population in Europe (excluding Iceland) has been estimated at only 4,800–6,300 pairs. As with other swan populations, the estimates of breeding populations seem low in relation to total population size, presumably because of the high proportion of non-breeding birds in the population.

• **Western Siberia/Black Sea/east Mediterranean: 17,000 (Ruger *et al.*, 1986). 1% level 170.**

Ruger *et al.* (1986) roughly estimated the population at 17,000 birds, and this figure was retained by Monval & Pirot (1989) and Rose & Scott (1994). In the absence of any better information on numbers wintering in the Black Sea, the estimate of 17,000 is retained here.

• **Western Siberia/Caspian region: Provisional estimate 20,000. Provisional numerical criterion 200.**

Rusanov (1987) gives an estimate of 13,900 for the wintering population in the north Caspian between 1970 and 1980. A further 6,000 were recorded elsewhere in the region during the Asian Waterfowl Census between 1987 and 1991, and 5,880 were counted in the south Caspian region and at wetlands between the Caspian and Aral Seas in January 1994. These figures suggest a total population of about 20,000 birds.

#### Habitat/ecology:

*Cygnus cygnus* breeds on northern pools and lakes of shallow fresh water, often in wooded country but also in open country (e.g. in Iceland) and peatlands; also occasionally on slow-flowing rivers and sheltered coasts, but only rarely on open tundra. It winters on freshwater lakes and marshes, and in western Europe especially on low agricultural land, generally not far from the coast. Concentrations of moulting birds are formed near the breeding grounds from the end of July until early September, often in shallow coastal waters. The swans are flightless for a period of 5–6 weeks during the wing moult. They depart from the breeding grounds in mid- to late September in northern Russia and in mid-October in Scandinavia. Birds arrive on their winter quarters in northern Germany and Denmark in October and November. Departure from the winter quarters takes place between mid-March and early May, the birds arriving on the breeding grounds in mid- to late May. Icelandic birds leave their breeding grounds between late September and November; the first birds arrive in Ireland in the third week of September, and the peak immigration occurs later in October. Birds leave their wintering grounds in Britain and Ireland in late March and the first week of April.

#### Conservation status:

The Icelandic breeding population is believed to be approximately stable (Gardarsson, 1991b), although there has been some indication of an increase in the last ten years (A. Gardarsson, *in litt.*). The wintering population in Britain and Ireland was thought to be increasing (Rose, 1995) but by far the most exhaustive analysis by Cranswick *et al.* (in press) shows a 12% decline since 1991.

The wintering population in northwest continental Europe is increasing rapidly, and has doubled since 1974 (Rose, 1995). *C. cygnus* has been extending its breeding range southwards in Fennoscandia in recent decades. In Sweden, it now breeds throughout the country, although as recently as 30 years ago it was restricted to the far north (L. Nilsson, *in litt.*). In Finland, the species has increased in numbers by an average of 11% per year since 1950, and has generally expanded its range. It has recently colonized Latvia, where there are now some 20–30 pairs (A. Stipniece, *in litt.*), and also now breeds in small numbers in Lithuania and northeastern Poland.

Numbers wintering in the Black Sea/east Mediterranean region appear to be declining. Counts since 1984 have been decreasing, and if counts in the late 1960s and early 1970s are included in the trend analysis, the decrease is statistically significant (Rose, 1995). Further east, in the Southwest Asian region, the numbers of *C. cygnus* are probably also now declining. According to Rusanov (1987), the average count of *C. cygnus* wintering in the northern Caspian increased 7.5 fold from 1,850 during the period 1955–1969 to 13,900 during the period 1970–1980, following a shooting ban on swans in 1956 and a reduction in numbers wintering in the southern Caspian. More recently, however, Krivenko (1993) reports a slight decline in numbers at the end of the breeding season in the middle regions of the former USSR, and Perennou *et al.* (1994) indicate a decline in the wintering areas.

#### Network of key sites:

There are only a few key sites identifiable in the breeding season. There are some very large concentrations recorded from northern Russia (28,500 individuals at the Mouth of the River Ob in summer) but it is unclear to which population(s) these birds belong or whether they were non-breeding, pre-breeding or post-breeding individuals. There is consequently a strong likelihood that many more important key breeding season sites remain to be identified.

Throughout the range, enormous concentrations occur during spring and autumn passage. Early autumn and moulting concentrations in the far north of the range in Iceland, the northern Baltic and Russia tend not to be so large and it is possible that there are many more to identify for the northwestern Europe wintering population. In Iceland, nine key autumn staging and moulting sites are known to support approximately 20% of the population. From the limited information available, an extremely similar key sites network (eight key sites supporting up to 20% of the population) can be identified for the northwestern European wintering population in autumn. The Icelandic breeding population stages in the north of the United Kingdom and the Republic of Ireland where all key sites are well known but are not listed as the key sites analysis was conducted using mid-winter data alone. For the northwestern Europe wintering population, key passage sites exist throughout the Baltic, especially in spring (21 key spring staging sites), and some of these can support enormous percentages of the whole population (100% at Matsalu Bay in Estonia, 10% in Kursiu Lagoon/Nemunas Delta in Lithuania). Neither the migration routes nor the key passage sites are well known for the Black Sea wintering and Caspian wintering populations. Some key sites can be identified towards the southern end of the flyway around and between the Sea of Azov and the northeastern Caspian but these could be key sites for either or both populations.

In winter, *C. cygnus* is much more dispersed with concentrations rarely exceeding 10% of the population. Most key wintering sites are known for all four populations. Key wintering sites in the United Kingdom and the Republic of Ireland support over 50% of the population based on average counts. Exactly the same percentage of the northwestern European wintering population (based on maximum and average counts) is accounted for by the 37 key wintering sites known for this population. The Black Sea and Caspian wintering populations are more concentrated in winter. Ten key wintering sites in the eastern Black Sea and northeastern Greece support up to 45% of the population based on maximum counts and 20%–30% of the population usually winters in the Danube Delta (Romania and Ukraine). Up to 35% of the Caspian wintering population is found on 18 key wintering sites in the southern Caspian and the Amu-Darya Valley in Turkmenistan/Uzbekistan.

#### Protection status of key sites:

Not many of the important breeding, moulting or wintering areas of the Icelandic population are protected. Most of the important wintering areas for the northwestern European wintering population are protected, but most of the important staging areas are unprotected. A notable exception is in Denmark, where all key passage sites known are protected. Several important breeding areas in Scandinavia are protected, but the situation in northern Russia is unclear. Nearly all key wintering sites known for the Black Sea wintering population are protected but very few key wintering sites for the Caspian wintering population are known to be protected. Most key sites for the Caspian wintering population are of unknown protected status.

# BEWICK'S SWAN (TUNDRA SWAN)

## *Cygnus columbianus*

### Subspecies:

Polytypic. Three subspecies have been described: the nominate form (Whistling Swan) in North America, *C. c. bewickii* in Western Eurasia and *C. c. jankowski* in eastern Asia. The validity of *jankowski* has been questioned because of the the lack of any clear division between this and *bewickii*.

### Distribution:

Holarctic, breeding in Alaska, northern Canada and Arctic Russia and wintering south to the USA, northwest Europe, the Caspian Sea, China and Japan. Only the subspecies *bewickii* occurs in Western Eurasia. This breeds from the Pechenga River, near the Fenno-Russian border, east to about the Lena Delta. The main wintering areas are in the coastal lowlands of northern Europe, but small numbers also winter in the Camargue, southern France, and there is a regular wintering population in the south Caspian region. As many as 50 have been recorded in the Black Sea area of the Ukraine during severe winters (Ardamatskaya & Korzyukov, 1991), and small flocks occasionally turn up in winter in Austria (maximum 6), Bulgaria (maximum 20), Greece (maximum 10), Turkey (62 in January 1994), Romania (maximum 4) and Switzerland (maximum 6) (Tucker & Heath, 1994). *C. columbianus* is only a rare straggler to North Africa (Algeria and Libya), Iraq and the Arabian Peninsula (Oman and United Arab Emirates).

### Movements:

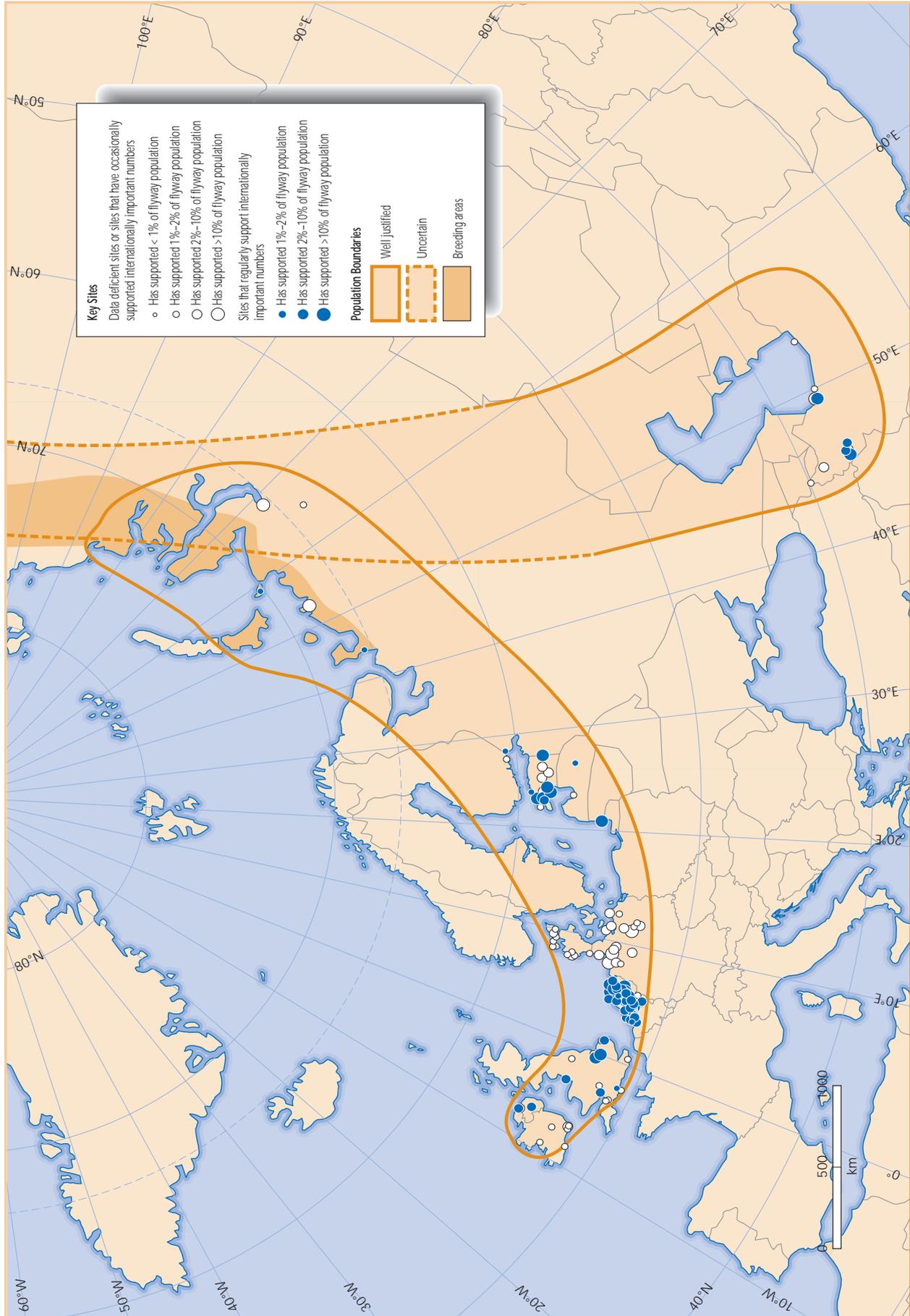
Migratory; wintering in temperate areas, sporadically in more southern latitudes during cold winters. Birds breeding west of the Taymyr Peninsula mainly migrate southwest through the White Sea and the Baltic to winter mainly in Denmark, the Netherlands, Britain and Ireland. The spring migration follows a similar route to that in autumn, although some birds also pass further north through central Sweden and southern Finland. A big change occurred in the winter distribution of this species in the 1950s and 1960s, with the appearance of large numbers in several areas of England, virtual abandonment of meadows along the lower Rhine and Waal, and a corresponding increase around the IJsselmeer and in southern Ireland (Atkinson-Willes, 1981).

A small population of *bewickii* winters in the Caspian region and formerly around the Aral Sea. The origin of these birds is unknown, but it is tempting to suppose that they come from the eastern extremity of the breeding range in the Taymyr Peninsula, where the breeding population in the late 1970s was estimated at a maximum of 260 pairs (Rogacheva, 1992), a figure consistent with the known wintering population in the Caspian. Ravkin (1991) recorded up to 200 in the forested steppe zone of the western Siberian plain during the spring migration and small numbers have been seen in spring migrating north along the Urals east of Syktyvkar in the Komi District (Y. Mineyev, *in litt.*).

Rees (1991) and Rees & Bacon (in press) have summarized recoveries and re-sightings, within the former USSR, of 1,511 *C. columbianus* ringed and colour-marked in Britain. Birds wintering at Slimbridge and Welney migrate along the Baltic coast, traverse Karelia and Vologda on a broad front, and follow the north coast of Russia to their breeding grounds. Two birds were recovered well outside this range: one in Perm on the west side of the Ural Mountains, and the other in Astrakhan in the north Caspian. This suggests that there may be some interchange between the population that winters in northwest Europe and the group that winters on the Caspian Sea. Such interchange also seems likely because of the frequency of occurrence of small parties of *C. columbianus* in intervening areas, especially in the Black Sea region.

### Population limits:

Two populations are recognized: a large population breeding in arctic northeast Europe and northwest Siberia and wintering in northwest Europe (south in small numbers to the south of France), and a much smaller population which presumably breeds further to the east and winters in the Caspian region south to Iran. In January, almost the entire northwest European population is concentrated at a limited number of sites: along the west coast of Jutland, in the Netherlands, in southern England and in eastern Ireland (Tucker & Heath, 1994). It is thought unlikely that the tiny numbers which occasionally winter in central and southeast Europe belong to one or more separate populations; it



seems more likely that they are individuals or family parties from one or other of the main populations which have joined up with larger flocks of *C. cygnus*.

#### Population size:

- **Western Siberia/northwest Europe: 17,000 (Rose & Scott, 1994). 1% level 170.**

Ruger *et al.* (1986) estimated the northwest European population at 18,000 birds; three years later, Monval & Pirot (1989) revised the figure to 17,000. Four major international censuses of *C. columbianus* in northwest Europe during the 1980s gave totals of 15,350–15,850 (1982/83), 16,300 (1983/84), 16,910 (1985/86) and 14,600–15,950 (1986/87), suggesting a rather stable population of about 16,000–17,000 birds (Dirksen & Beekman, 1991). There are indications that the population has increased since then. Even after two rather poor breeding seasons, as many as 18,600 were counted in the Netherlands alone in November 1993, and 17,791 were counted in January 1994 (SOVON Ganzen- en Zwanenwerkgroep, 1995). An even higher count of 19,399 was obtained in January 1995 (SOVON Ganzen- en Zwanenwerkgroep, 1996), and 17,500 were recorded during the spring migration at Audru Polder in Estonia (A. Kuresoo and L. Luigujoa, *in litt.*). These recent high counts suggest that in some years the total population may be as high as 25,000 (P.L. Meininger, *in litt.*). According to the European Bird Database (1994), between 3,000 and 3,500 pairs breed in European Russia, an estimate which is consistent with a European wintering population of 17,000 birds. However, Mineyev (1991) estimated the population on the breeding grounds in northeastern European Russia to be 30,000 to 36,000 individuals. This figure is the result of an extrapolation of aerial counts of parts of the tundra between the White Sea and the Urals. In an attempt to account for this discrepancy, Dirksen and Beekman (1991) have suggested that either many of the birds from northeastern European Russia may winter in the Caspian region or elsewhere to the southeast in hitherto unknown areas, or that extrapolation from aerial censuses may have led to great over-estimation. However, an equally likely explanation for at least a part of the discrepancy is that the estimate of 17,000 for the northwest European wintering population is far too low.

- **Northern Siberia/Caspian region: 500. 1% level 5.**

Counts of *C. columbianus* in northern Iran suggest a total wintering population in the south Caspian of less than 500 birds. Some 843 were counted in Iran in 1969, but since then, counts have never exceeded 322 (in 1994). The estimate of 100 given by Perennou *et al.* (1994) would seem to be far too low, while the figure of 6,500 given by Rose & Scott (1995) is erroneous and was intended as 500.

#### Habitat/ecology:

*Cygnus columbianus* breeds in the vicinity of shallow lakes and pools on the Arctic tundra, preferring sedge-grass and moss-lichen tundra with numerous small lakes; it winters on shallow freshwater lakes, marshes, flooded grasslands or agricultural fields, often in coastal regions. Much of its traditional winter habitat has been lost, and it is increasingly using arable land and wet pastures, sometimes conflicting with farming interests. Birds are present on the breeding grounds from late May until mid-October. Moulting and post-breeding flocks gather in shallow bays with abundant aquatic vegetation from late June to early September. The birds are flightless for around 30 days during the wing moult. Autumn migration in the Baltic occurs between early October and mid-November. Peak numbers appear in the Netherlands in December and in Britain and Ireland in January. The majority of birds leave their main wintering areas by mid-March and pass through the Baltic region until the second half of May.

#### Conservation status:

The population wintering in northwest Europe appears to have been more or less stable (at about 17,000 individuals) during the 1980s, although there was some shift of wintering birds from the Netherlands to Britain (Monval & Pirot, 1989; Pirot & Fox, 1990). Very high counts within the last few years suggest that the population has increased considerably since then, but a recent trend analysis of the data to 1993 has proved inconclusive (Rose, 1995). Krivenko (1993) reports an increase in numbers at the end of the breeding season on the tundras of western and central Siberia between 1972 and 1989.

The status of the population wintering in the Caspian region is poorly known. However, the population breeding in the Taymyr Peninsula (and the most likely source of the birds wintering in the Caspian) was reduced by about one third during a period of 12–13 years between 1966 and 1978/79 (Rogacheva, 1992).

**Network of key sites:**

It seems likely that there are more important moulting, breeding and staging areas than are currently known, particularly in the north of the range, and that there may be major shifts in the distribution of moulting flocks between years. *C. columbianus* migrates in small groups and family parties, and probably requires more stop-over sites, spaced at shorter distances, than are indicated on the map. Thus many more sites are probably essential for the species, although most of these may hold far fewer than the 1% threshold, and for only short periods of time. Despite the possibility of more key staging sites existing for the northwestern European wintering population, 49 can already be identified, covering the entire flyway from the Netherlands in the South to the massive moulting site at the Pechora Delta (Russia) in the north. Some of these key passage sites can hold over 50% of the population at a single moment in time.

In winter the northwestern European wintering population is concentrated on 77 known key sites which together constitute a relatively complete key wintering sites network.

For the Caspian wintering population, nothing is known of the migratory route and no key sites are known for seasons other than winter when 16 key sites in the southern Caspian support most of the estimated 500 individuals in concentrations sometimes exceeding 50 birds.

**Protection status of key sites:**

A very large percentage of the important wintering areas for the northwestern European wintering population are protected. However, the species is increasingly utilizing arable fields for feeding in winter, and most of these sites are unprotected. In contrast, only 11 of the 49 key staging sites for this population are known to be fully protected and most are of unknown protected status. Most of the wintering sites in Iran are also protected. The largest known moulting area in the Pechora Delta is only partially protected.

# PINK-FOOTED GOOSE

## *Anser brachyrhynchus*

### Subspecies:

Monotypic. Formerly considered a subspecies of *Anser fabalis*, with which it forms a superspecies.

### Distribution:

Confined to the Western Palearctic and Greenland, breeding in Greenland, Iceland and Svalbard, and wintering in northwest Europe south to Britain, the Netherlands and Belgium.

### Movements:

Migratory, wintering at temperate latitudes; sporadically in more southern latitudes during cold winters. Birds breeding in east Greenland and Iceland winter almost entirely in Scotland and England, while birds breeding in Svalbard winter mainly in Denmark, the Netherlands and Belgium. Birds breeding in Greenland stage in the interior of Iceland, while birds breeding in Svalbard stage on Bear Island (autumn only) and on islands off the north Norwegian coast. Judging from ringing recoveries, there is only slight interchange of individuals between the two populations (Madsen, 1991).

### Population limits:

The existence of two almost entirely discrete populations of *A. brachyrhynchus* (one breeding in Greenland and Iceland, and one breeding in Svalbard) has been well documented (Ogilvie, 1978; Madsen, 1987 & 1991).

### Population size:

- **East Greenland/Iceland/UK: 225,000 (Madsen et al., 1996). 1% level 2,250.**

Counts over the five-year period to 1994/95 give an average population of 225,000 birds. The Icelandic breeding population has been estimated at 15,000–25,000 pairs (Koskimies, 1993) and the Greenland population at 2,500–5,000 pairs (European Bird Database, 1994).

- **Svalbard/northwest Europe: 34,000 (Madsen et al., 1996). 1% level 340.**

Counts over the five-year period to 1994/95 give an average population of 34,000 birds.

### Habitat/ecology:

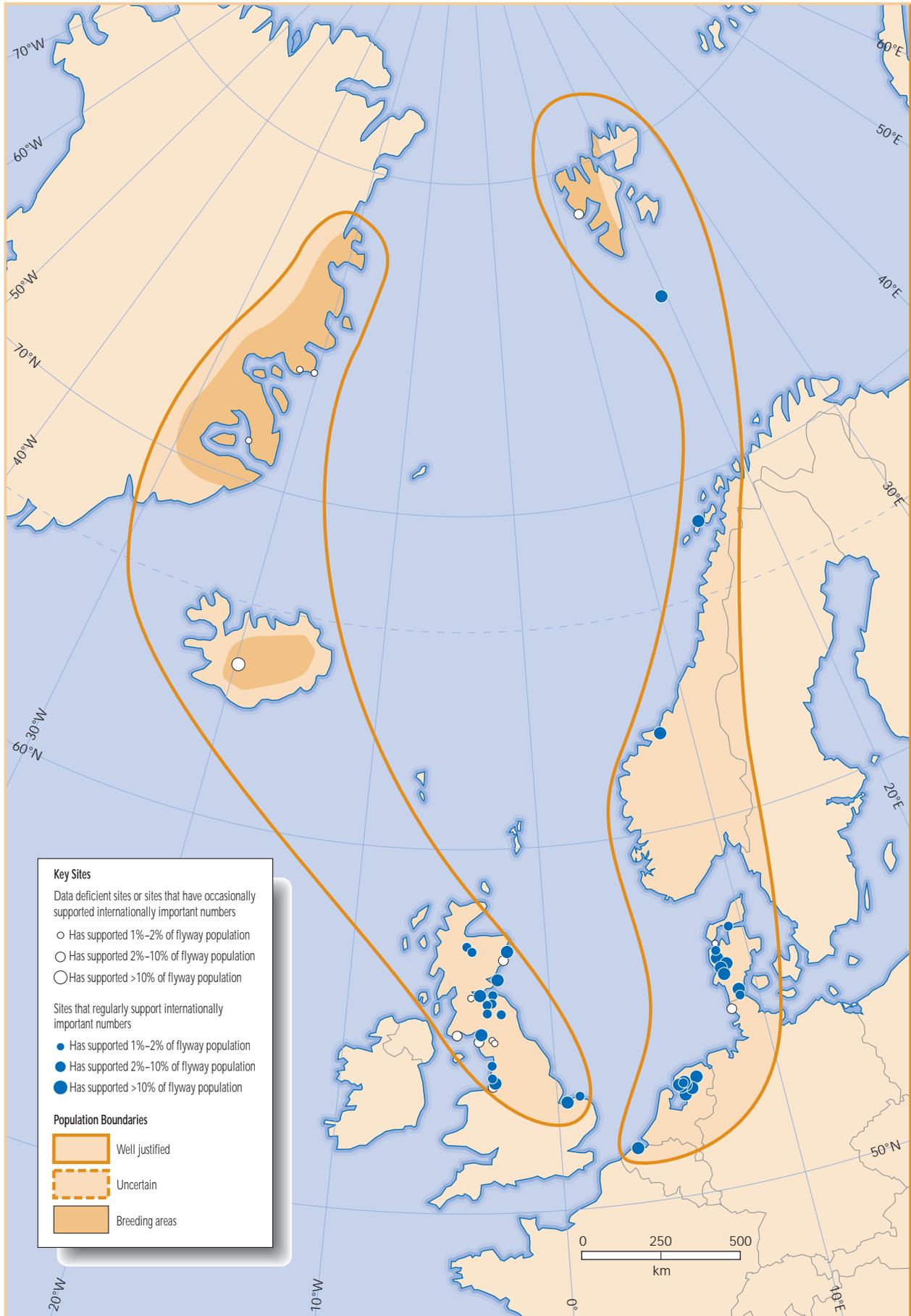
*Anser brachyrhynchus* breeds on *palsas* (tundra hummocks), rocky outcrops, crags and gorges in very open Arctic tundra, and winters on coastal estuaries and on agricultural land. Svalbard breeding birds moult near their breeding grounds in July and August, when they are flightless for 25 days. Autumn migration begins at the end of August; birds stop over on Bear Island and in Nordland (Norway) during September and early October, and the main arrival in Denmark occurs in October. From there they move to the Netherlands, where peak numbers are present in November, and also Belgium, where peak numbers occur in December and January. Return to Denmark may occur as early as January, depending on the weather, and by April almost the entire population is back in Denmark. The main departure from Denmark occurs at the end of April. Probably the entire population stages for 3–5 days on islands in Nordland before making the direct crossing to Svalbard, where the main arrival is during the last ten days of May.

*Anser brachyrhynchus* breeding in Greenland and Iceland moult near their breeding grounds, while non-breeding birds from the Icelandic group migrate to east Greenland in June to moult there. The main departure of birds from Greenland to the interior of Iceland takes place during the first half of September; from there, the main migration to Britain is in the first half of October, but up to 50% of the population can be in Scotland before the end of September in some years (S. Newton, *in litt.*). Birds then disperse from key arrival sites to southwest Scotland, Lancashire and Norfolk. The return passage to Iceland is in April and May. The timing of the movement of birds from Iceland to Greenland in spring is uncertain, but the first eggs have been recorded in Greenland in the last week of May.

### Conservation status:

Both populations have been increasing since at least the 1950s, probably because of increased protection of sites and reduction of hunting. The population breeding in east Greenland and Iceland has increased

PINK-FOOTED GOOSE *Anser brachyrhynchus*



steadily from only 30,000 in 1950/51 to 172,000 by 1987/88 and an average of 225,000 in recent years (Madsen, 1991; Wetlands International Goose Specialist Group). The Svalbard population has increased from 10,000–12,000 in the 1950s to a relatively stable level of 25,000–30,000 in the 1980s and an average of 34,000 in recent years (Madsen, 1991; Wetlands International Goose Specialist Group).

**Network of key sites:**

No key breeding sites are known except for one site in Iceland (Thjorsarver) which supports 30,000 breeding individuals. Both populations moult in or near the breeding grounds in small groups rarely exceeding the 1% threshold. Key staging sites for the Svalbard breeding population are very few but hold almost the entire population. In winter the population is more widely dispersed but over 50% can still be found on key wintering sites in Denmark. In harsh weather this population can be forced to move south, sometimes as far as Belgium and many key harsh weather refuges exist at these times in Netherlands and Belgium. The Greenland/Iceland breeding population stages in interior Iceland and then on relatively few key sites in the United Kingdom which are well known but are not listed as the key sites analysis for the United Kingdom was conducted using mid-winter data alone. Like the Svalbard breeding population, these birds then also disperse in winter, but a large proportion can still be found on key sites in the United Kingdom.

**Protection status of key sites:**

Several important breeding and moulting areas are protected for both populations, but other very important sites are unprotected, especially in Iceland. Most of the important wintering areas of both populations are protected, but few of the passage sites are adequately protected.

# BEAN GOOSE

## *Anser fabalis*

### Subspecies:

Polytypic. Five subspecies have been described: *A. f. fabalis* of northern Europe; *A. f. rossicus* of northern Russia east to northwest Siberia; *A. f. johanseni* of north-central Asia; *A. f. middendorfi* of eastern Asia; and *A. f. serratirostris* of northeastern Asia. The validity of the central Asian *johanseni* has been questioned (e.g. by Burgers *et al.*, 1991).

### Distribution:

Palaearctic, breeding widely across northern Eurasia and wintering south to southern Europe, the central Asian republics, China and Japan. Three subspecies occur in Western Eurasia. *A. f. fabalis* breeds in the taiga zone from northern Scandinavia and northwest Russia to the west Siberian lowlands east of the Ural Mountains, and winters on the coasts of Poland and eastern Germany, and in southern Sweden, Denmark and the Netherlands. *A. f. rossicus* breeds in the tundra zone of northern Siberia from Kanin to the Taymyr Peninsula and winters mainly in western and central Europe, occasionally reaching Morocco and Algeria. This form has straggled to Egypt. *A. f. johanseni* breeds in the taiga and forested tundra zones of north-central Asia from the Urals to Lake Baikal, and winters from Turkmenistan in the central Asian republics to western China. Some birds assignable to this subspecies have been recorded in central Europe. (*A. f. middendorfi* and *A. f. serratirostris* breed in the taiga and tundra zones, respectively, of eastern Asia and winter south to China and Japan).

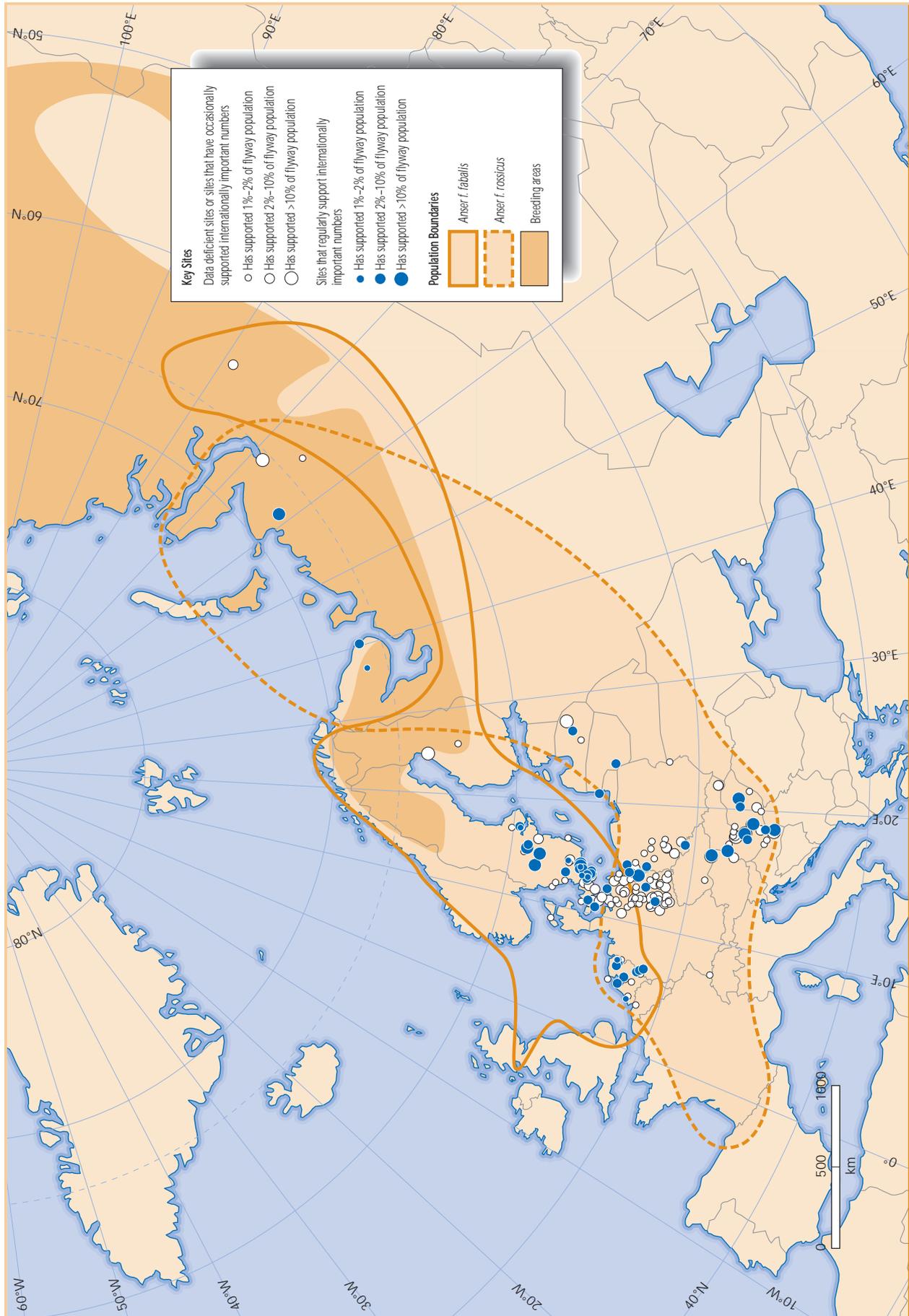
### Movements:

Migratory, wintering mostly at temperate latitudes, sporadically at more southern latitudes during cold winters. *A. f. rossicus* migrates south of the Baltic Sea to staging areas in eastern Germany and Poland, from which one group moves on to wintering areas in the Netherlands, western Germany and rarely France, and another group migrates to the central European floodplains of Hungary, the Czech and Slovak Republics and Austria (Madsen, 1991). Perhaps as many as 200,000 *rossicus* wintered in Spain until the 1940s, mainly in the Duero basin, but only some 5,000–10,000 were present in the 1960s, and since then numbers have dwindled to a few tens of birds in recent years (Persson & Urdiales, 1995). *A. f. fabalis* breeding in Fennoscandia spend the autumn in southern Sweden and leave at the onset of cold weather to winter mainly in Denmark and the Netherlands. Up to 400 individuals regularly winter in the Yare Valley in East Anglia, England, and about 120 in the Carron Valley in Scotland. *A. f. fabalis* breeding in western Siberia winter mainly along the Baltic coast in eastern Germany; during severe weather, these birds move west to the Netherlands, where they may then far outnumber the Fennoscandian birds (Burgers *et al.*, 1991). These authors analyzed recoveries of *A. fabalis* ringed in the Netherlands, and found that birds wintering in the Netherlands originate from at least three different breeding areas: *A. f. rossicus* from the Malozemel'skaya and Bolshemel'skaya tundras west of the Urals in northern European Russia; *A. f. fabalis* from Fennoscandia; and *A. f. fabalis* from the west Siberian lowlands east of the Urals. Some 96% of all recoveries east of the Urals were of *fabalis*-type birds, with one coming from 71°E and one from the Altai region of southern Siberia at 93°E. *A. f. fabalis* wintering in the Netherlands in mild winters originated mainly from Fennoscandia, while most *fabalis* wintering in the Netherlands in cold winters came from much further east. All of the recoveries of Dutch-ringed birds in France, Spain, Italy and central Europe were of birds resembling *A. f. rossicus*, while the great majority of recoveries from Sweden, Finland and western Siberia were of birds resembling *A. f. fabalis*. Both forms were recovered in Germany, Poland, the Baltic States and central Russia. However, in eastern Germany, recoveries of *fabalis* were concentrated mainly along the coast, while recoveries of *rossicus* were more frequent inland. There was no indication that any *A. f. fabalis* from the wintering areas in the Netherlands visit southeast Europe (Burgers *et al.*, 1991).

### Population limits:

Two populations are generally recognized in Western Eurasia, corresponding to the two subspecies (e.g. Madsen, 1987 & 1991; Pirot *et al.*, 1989). Madsen (1991) noted that although some authors considered the two subspecies as doubtfully valid, from a population management and conservation point of view, it appeared relevant to separate the two forms into populations as they show morphological, ecological

BEAN GOOSE *Anser fabalis*



and distributional differences. Burgers *et al.* (1991) provide strong support for the existence of two subspecies amongst the *A. fabalis* wintering in the Netherlands, and found considerable differences in the locations of recovery between the two types. Neck-banding studies have revealed that there is some interchange of individuals between the western European and central European wintering groups of *A. f. rossicus*, even within the same winter, and it would therefore seem best to treat these two groups as a single population (Madsen, 1991; Burgers *et al.*, 1991). However, Burgers *et al.* (1991) thought that there was very little interchange between the *A. f. fabalis* breeding in Fennoscandia and those breeding in western Siberia. It is possible, therefore, that these two groups of the nominate form are sufficiently discrete to merit treatment as separate populations.

#### Population size:

- **Northwest Europe (*fabalis*): 80,000 (Pirost *et al.*, 1989). 1% level 800.**
- **Central and southwest Europe (*rossicus*): 300,000 (Pirost *et al.*, 1989). 1% level 3,000.**

Madsen (1991) notes that counts of *A. fabalis* to date have been incomplete, and that the current population estimates are very imprecise and almost certainly too low. Some authors have suggested that the population of *rossicus* may be as high as 500,000, and that of *fabalis* about 100,000 (Pirost & Fox, 1990; Madsen, 1991).

#### Habitat/ecology:

*Anser fabalis* breeds on lakes, pools and rivers in the high Arctic and taiga zones, and winters in open country, on marshes or on agricultural land. After breeding, large moulting concentrations are formed near open water. Major concentrations of moulting birds are found on the tundras of European Russia, mainly on low-lying sea coasts with an abundance of lakes (Mineyev, 1990). The moult takes place in July and August, when birds are flightless for about a month. *A. f. rossicus* begins the autumn migration during the first half of September; peak numbers occur on passage in Estonia in late September, and the birds arrive on their winter quarters in Poland, Germany and the Netherlands in November and December. Peak numbers occur in the Netherlands in January. In Hungary, large numbers of *rossicus* arrive on the wintering grounds in October, and numbers peak in November. Birds begin to leave the Netherlands as early as February, returning to Germany and Poland and also reaching central Europe. There is a rapid departure from these areas in March; spring passage in Estonia peaks in mid-April, and the birds reach their breeding grounds in late April. Peak numbers of *A. f. fabalis* occur at the staging areas in Sweden in October and March, and at the winter quarters in southern Sweden, Denmark and the Netherlands in January and February.

#### Conservation status:

The numbers of *A. f. fabalis* are increasing (Madsen, 1991). The population of *fabalis* staging in southern Sweden in autumn increased from about 20,000 in the early 1960s to 50,000–70,000 in the 1970s and 1980s (Madsen, 1991). The status of *A. f. rossicus* is uncertain; some increases have been reported on the wintering grounds in western Europe, but sharp declines have been reported on the breeding and staging areas in Russia (Flint & Krivenko, 1990; Krivenko, 1993). There has also been contraction of the wintering range in Italy between 1950 and 1980 (N. Baccetti, *in litt.*). The almost complete disappearance of the large wintering population in Iberia since the 1940s may be a result of short-stopping, but whether this was due to deterioration of conditions in Spain, or improvements at wintering areas further north is not known (Persson & Urdiales, 1995). The number of *A. fabalis* wintering in the Netherlands increased during the 1980s, but it is not known if a shift from more eastern wintering areas contributed to this increase (Nilsson, 1988; Madsen, 1991). In recent years, numbers in the Netherlands have been more or less stable, except for massive influxes during cold spells (L. Nilsson, *in litt.*).

#### Network of key sites:

It is very unlikely that *A. f. fabalis* occurs in concentrations exceeding the 1% threshold in the breeding season and, although one area of the Kola Peninsula, and perhaps many more areas, exceed the 1% criteria for breeding *A. f. rossicus*, it will never be possible to account for a large percentage of the breeding population unless the key sites are extremely large.

*A. f. fabalis* does, however, occur on many key sites during passage and in the winter. Twenty eight key spring passage sites and 28 key autumn passage sites are known, mainly in Sweden but also in Denmark and Finland. Five of these key passage sites have been known to hold over 10% of the population at one time and Tåkern in Sweden often supports over 10% of the population in both autumn and

winter plus over 5% in spring. Thirty-nine key wintering sites are known from Denmark and Sweden that together support much of the population in most winters, but many other very important key sites exist in Germany, Poland and the Netherlands particularly during harsh winters. Problems arise in identifying these sites due to mixing with the more numerous *A. f. rossicus* form.

In autumn, 31 key passage sites can be identified for *A. f. rossicus*, from Hungary in the south of the flyway to Russia in the north. Of these 31 key sites, five can be used by flocks exceeding 10% of the population size and a maximum of 80,000 individuals occurred at Novy Mlyny Reservoir in the Czech Republic. Many fewer key spring staging sites (11) are known for *A. f. rossicus* and these tend to be further east. Much less information is available from the east of the *A. f. rossicus* flyway leading to speculation that the many spring staging sites remain to be discovered here. Over 100 key wintering sites are plotted and listed for *A. f. rossicus* and over 13 of these have supported over 30,000 individuals. This list must provide an excellent basis for a key sites network.

#### **Protection status of key sites:**

Many of the important wintering and staging areas for *A. f. fabalis* and *A. f. rossicus* are protected. In many areas the geese feed mainly on arable land which is unprotected. Several of the important staging areas in eastern Europe are unprotected, and the status of other possible staging areas is poorly known. Neither of the two very important moulting areas for *A. f. rossicus* in Russia are protected.