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# Annex I

## Revised population estimates for some Anatidae in Western Eurasia

### MUTE SWAN *Cygnus olor*

Monval & Pirot (1989) worked with three populations of *Cygnus olor* in the Western Palearctic but divided the west and Central European population into sub-populations for the purpose of midwinter count data analysis. This approach is continued and extended to the selection of key sites, but the Central Europe, North Sea and Baltic Sea sub-populations are combined as one population of 210,000 individuals for the purpose of key site selection.

#### WESTERN AND CENTRAL EUROPEAN POPULATION

New Population Estimate = **240,000**

Using January count data from the winters of 1966/67 – 1985/86 Monval & Pirot (1989) estimated that 180,000 *C. olor*, divided into five sub-populations, winter in western and Central Europe. The sub-populations were (i) Baltic/Scandinavia with 127,000 individuals, (ii) North Sea areas of Germany, Netherlands, Belgium and France with 14,500 individuals, (iii) Central Europe with 13,500 individuals, (iv) Great Britain with 18,000 and (v) Ireland with 7,000 individuals. Rose (1995) calculated annual indices for *C. olor* which show that the western sub-populations have been increasing at 4.81% per annum, and the Central sub-population at 2.47% per annum, since the last estimate was made in 1986.

The total western and Central European population is now estimated to number 240,000 individuals divided between sub-populations as follows.

#### Baltic/Scandinavian sub-population

New Sub-population Estimate = **170,000**

In 1993, the most complete January count of the Baltic region was undertaken. This count led to an estimate of 160,000 *C. olor* wintering in the Baltic in this year (Pihl 1994). In addition there are a further 8,000 more inland in Poland (Wieloch 1991) and up to 1,000 in Norway resulting in a new increased estimate of 170,000 for this sub-population. Due to the recent succession of mild winters in the Baltic the number of *C. olor* is probably at a maximum and might be expected to fall dramatically in the next harsh winter.

#### Great Britain sub-population

New Sub-population Estimate = **25,000**

There was a full survey of the Great Britain population in

1990 (Delany *et al.*, 1992) which gave an increased estimate of 25,748 birds, here rounded to 25,000 for the purpose of international population estimates.

#### North Sea Germany/Netherlands/Belgium/France sub-population

New Sub-population Estimate = **20,000**

In the absence of a dramatic increase in completeness of counts for this region a new population estimate of 20,000 individuals is suggested on the basis of the 4.81% per annum increase in the population since 1986. This is not contradicted by the recent maximum simultaneous count of 17,350 individuals.

#### Central European sub-population

New Sub-population Estimate = **16,000**

As for the North Sea sub-population a new estimate of 16,000 is suggested through the application of the 2.47% per annum increase to the 1986 estimate of 14,500. The recent maximum simultaneous count was of 14,000 and the estimation of missing counts for the purpose of trend analysis lead to a prediction of 17,000 for the total population in this year. These are both in accordance with the preferred new estimate of 16,000.

#### Irish sub-population

New Sub-population Estimate = **10,000**

Shepherd (1993) gives full justification for this new sub-population estimate, which agrees quite closely with the 9,000 that results from applying the predicted increase of 2.47% per annum since 1986 (Rose 1995) to the 1986 sub-population estimate of 7,000 (Monval & Pirot, 1989).

#### BLACK SEA/EAST MEDITERRANEAN

New Population Estimate = **45,000**

Monval & Pirot (1989) estimated an increasing population of approximately 20,000 individuals but had very little census data on which to base their estimate. They noted the exceptionally high counts of unidentified swans in the Sea of Azov (30,000 and 48,000) and predicted that these were probably *C. olor*. The increased numbers now known to be in the northern Black Sea amount to between 10,000 and 15,000 birds. The increase can also now be measured at 3.79% per annum.

The 3.79 % per annum increase since the Monval & Pirot (1989) estimate of 20,000 would give an extrapolated population size of 26,000 in 1993, the final year of the recent population trend analysis (Rose, 1995). Adding the 10,000–15,000 resulting from better coverage of the Ukrainian Black Sea gives an estimate of 35,000–40,000, which is only marginally lower than the 45,000 estimated from the maximum count in 1994. Korzyukov *et al.* (1991) estimated the Azov-Black Sea population at over 50,000 birds.

It is concluded that the total of 45,000 arising from the most comprehensive survey in 1994 seems to be the best estimate.

#### CASPIAN

New Population Estimate = **250,000**

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 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, 100 pairs in Uzbekistan and 50 pairs in Turkmenistan. It now seems likely that substantial numbers of birds from the Caspian population move to the Black Sea region during severe winters. This may, to some extent, account for the recent very high counts (40,000+) in the Black Sea (in recent harsh winters).

#### WHOOPEL SWAN

##### *Cygnus cygnus*

#### ICELAND, UK & IRELAND

New Population Estimate = **16,000**

Cranswick *et al.* (in press) give full justification for this estimate. Trends calculated for this population (Monval & Pirot, 1989; Rose, 1995) are misleading due to a change in distribution of the population between wintering sites. The population is probably currently in slight decline (Cranswick *et al.*, in press).

#### NORTHWEST CONTINENTAL EUROPE

New Population Estimate = **40,000**

Ruger *et al.* (1986) give the northwest Continental European population as 25,000 individuals. The results of a special mid-winter yellow-billed swan survey during January 1995 yielded totals of 27,500 in Denmark and Sweden alone. The final results of this survey are not yet known (Beekman, in press) so a minimum estimate of 40,000 is taken based on the results from Denmark and Sweden.

#### BLACK SEA/EAST MEDITERRANEAN

Population Estimate = **17,000**

Monval & Pirot (1989) estimated the population at 17,000 birds, but very few of these were ever counted. The rate of decrease since the Monval & Pirot (1989) estimate has not been significant and it is still very difficult to know how *C. cygnus* are divided between the Black Sea and the Caspian. The importance of the Sea of Azov and the Aral Sea region for wintering birds is also unknown.

It is concluded that the existing estimate of 17,000 cannot yet be improved upon even though it is not supported by good data.

#### CASPIAN

New Population Estimate = **20,000 (10,000–25,000)**

Rusanov (1987) gives an average count of 13,900 in the north Caspian from 1970–1980 and an average of 85,000 swans of mixed species from 1980–1984. The 1993 and 1994 counts from the southern Caspian and wetlands between the Caspian and Aral Seas give a maximum of 5,880 birds in January 1994. The existing estimate of under 25,000 (Rose and Scott 1994) is consequently still valid, but the range 10,000–25,000 would seem to be more realistic with 20,000 as the best guess of the real population size.

Krivenko (1989) estimated the west Siberian population in late summer from 1971–86 at an average of 52,000 birds. Ravkin (1991) estimated the breeding population on the west Siberian plain at 316,000 birds, on the basis of extrapolation of counts from aerial transects. This estimate has not been taken into account as it is generally considered to be an over-estimate.

#### COMMON SHELDUCK

##### *Tadorna tadorna*

#### NORTHWEST EUROPE

New Population Estimate = **300,000**

Monval & Pirot (1989) estimated the population size at 250,000 birds, of which 66% were counted annually.

A rate of increase of between 1.95% per annum and 3.51% per annum since 1986 (Rose 1995) would give an extrapolated population size of between 290,000 and 320,000 in 1993.

Meltofte (1994) uses the maximum Wadden Sea estimate of 254,000 birds from November 1980 to which he adds the numbers estimated for the UK, France and the Dutch Delta to give a minimum estimate of 320,000 birds in 1980. Removing estimation and taking the November 1980 counts alone gives 285,000 birds but this total is made at a time when many birds are moving from the Wadden Sea to the other wintering areas and consequently could be subject to double counting. Although not disagreeing with the 1980 estimate of

320,000 *T. tadorna* as a possibility, the precautionary approach has been preferred throughout this report. If the 1980 estimate were however to be adopted, current increases in the population (Rose, 1995) would predict that the population was now over 400,000 individuals.

It may of course be that the trend analysis is at fault and the increase has been much smaller. Missing counts and gaps in geographical coverage are accounted for by Rose (1995), but improvements in counting technique are not.

Ignoring population trends, the 1980 estimate of 320,000 is very similar to the the maximum mid-winter count of 286,690 counted in 1994 and the extrapolated estimate of 290,000–320,000 from mid-winter count data.

Breeding data can be found in the European Bird Census Council database, and gives a maximum of only 125,000 birds, suggesting that breeding numbers are substantially underestimated, or that over 50% of the population is comprised of non-breeding birds.

In conclusion, an estimate of 300,000 arising from the most complete full survey of 286,690 in January 1994 and predicted by applying trend analysis results to the Monval & Pirot estimate of 250,000 in 1986 is preferred.

#### BLACK SEA/MEDITERRANEAN

New Population Estimate = **75,000**

This population is very difficult to monitor. Harsh weather redistribution is very large and frequent, nothing is known about some very important areas, counting is inconsistent in many others, and the movements of the birds are very poorly understood. Monval & Pirot (1989) did not split the east and west Mediterranean, but gave a combined estimate of 75,000. In the west 15,000–20,000 were estimated based on Walmsley (1987) plus around 60,000 in the east.

The recent data indicate much larger numbers in North Africa than anticipated, and far fewer birds in those parts of the northern Black Sea that have recently been surveyed. The new minimum estimates of 35,000 for the west Mediterranean and 25,000–35,000 for the east Mediterranean are however rather similar in total to the 75,000 that has existed since the 1970s, so no change is recommended.

In the west Mediterranean the new estimate is based on the maximum count of 35,000 in 1993, when over 20,000 *T. tadorna* were counted in Algeria. A great deal of variability in the counts is caused by the difficulty in obtaining comparable coverage between years in North Africa. *T. tadorna* are opportunistic in their ability to adapt to varying water levels, and can exploit the ephemeral wetlands of North Africa to their fullest, making census very difficult. Trend analysis is virtually impossible and probably unadvisable under these conditions, but the increasing counts at most key sites since 1986 suggest a real increase. If more complete and consistent monitoring of *T. tadorna* in the west Mediterranean could be achieved there are signs that a

population of over 50,000 individuals could probably be confirmed.

In the east, there are still problems in achieving full and regular coverage in the Black Sea and Sea of Azov, but there are no significant gaps for *T. tadorna* other than the Sea of Azov and Egypt. The only possibility for estimating population size in these regions is to guess 5,000 wintering in the Sea of Azov based on the density of wintering birds in the Ukrainian Black Sea and use 1,000–6,000 in Egypt (Urban, 1993).

For other east Mediterranean countries, the highest simultaneous count was of 18,795 birds in 1993 when excellent geographical coverage was achieved. In 1993, only 10,098 birds were counted in regularly counted countries which held over 15,000 birds between them in 1989. In conclusion, the regularly counted countries of the east Mediterranean and southern Black Sea support at least 10,000–15,000 wintering birds to which a further 10,000 can be added from occasionally counted countries to give a minimum estimate of 20,000–25,000 based on IWC counts alone. This gives a total of 25,000–35,000 when the estimates for the Sea of Azov and Egypt are added. Much of the discrepancy with the 60,000 estimated by Monval & Pirot (1989) is probably due to an earlier over-estimation of the numbers of birds in Ukraine and Russia in winter.

#### EURASIAN WIGEON *Anas penelope*

##### NORTHWEST EUROPE

New Population Estimate = **1,250,000**.

In 1994, over 1,150,000 *A. penelope* were counted simultaneously. When the total 1994 count from the Netherlands is available, the real figure will be higher.

A rate of increase of 7.48% per annum since the Monval & Pirot (1989) estimate of 750,000 would give an extrapolated population size of 1,350,000 in 1994 which is very similar to the actual count of 1,150,000 and the proposed estimate of 1,250,000.

Between 250,000 and 350,000 pairs breed in Europe (European Bird Census Council data), accounting for some 750,000–1,000,000 individuals in mid-winter. It seems likely that all of the birds breeding in northern Europe winter in northwest Europe along with many birds breeding further east in northwestern Siberia.

#### BLACK SEA/MEDITERRANEAN

New Population Estimate = **560,000**

*A. penelope* wintering in this region are thought to originate from breeding grounds in western and Central Siberia (Cramp *et al.*, 1977; Monval & Pirot, 1989). The mid-winter waterfowl census data indicate that by mid-January, very few individuals are left in Central Europe and on the northern Black Sea coasts. At this time, the

main concentrations of *A. penelope* are on the Mediterranean coasts and in Egypt.

Monval & Pirot (1989) estimated that 600,000 *A. penelope* winter in the Mediterranean, with approximately 220,000 in the Black Sea/east Mediterranean sub-region and 380,000 in the west Mediterranean sub-region.

In the west Mediterranean counts are now about 20,000 individuals less than they were when Monval & Pirot (1989) estimated 380,000, hence the new estimate of 360,000. The adjustment of 100,000 to account for birds at sites never counted (Monval & Pirot, 1989) has been continued for consistency but seems rather high and is not consistent with the approach taken for most other species. This is consequently one of the only sub-regional population estimates that could conceivably be too high. An absolute minimum estimate from IWC data alone would be 260,000 based on the 1994 maximum count and the recent average adjusted for inconsistent coverage (missing counts).

In the east, Monval & Pirot (1989) estimated a population of approximately 220,000 wintering *A. penelope*. This included 128,280 from counts plus an estimation of uncounted countries. The current average (1989–1993), including a correction for irregular coverage (imputed values) is virtually identical at 130,000 and new statistical techniques support the earlier calculations of Monval & Pirot (1989).

There remains the question of estimating the number of *A. penelope* wintering in the uncounted or irregularly counted countries of the east Mediterranean. Monval & Pirot (1989) estimated 90,000 to give the estimate of 220,000.

New data allow the number of *A. penelope* wintering in relatively unknown areas to be assessed rather more accurately, as follows:

- i. In the northern Black Sea, an aerial survey of the Ukrainian coasts in 1994 revealed 1,250 *A. penelope* which is consistent with the densities encountered in Bulgaria and Romania. It is also reasonable to assume that the same sort of number might be found around the Russian Black Sea/Sea of Azov coasts. This would suggest a population of perhaps 5,000–10,000 birds for the northern Black Sea and Sea of Azov in mid-winter, of which only 1,250 are counted.
- ii. On the eastern shores of the Mediterranean, up to 1,000 *A. penelope* winter in Israel, and probably the same sort of number in Syria (450 counted in 1993) and Jordan (100 counted in 1992). This suggests that approximately 3,000 *A. penelope* winter on the far eastern shores of the Mediterranean.
- iii. A full survey of Albanian coastal wetlands was conducted for the first time in February 1993, and revealed a total of 7,000 *A. penelope*. From this figure a wintering population of approximately 10,000 can be estimated. This figure urgently needs verification, as February 1993 was exceptionally cold with almost unprecedented harsh weather movements recorded in many species of waterfowl. The number of *A. penelope*

wintering in Albania during an average winter is therefore unknown.

- iv. For Egypt, Monval & Pirot (1989) estimated a wintering population of 31,000 based on historic data. Since then, an aerial survey has been undertaken during the winter of 1989/1990 revealing 33,800 *A. penelope* (Meininger and Atta, 1991). Based on these figures, an estimated 40,000–70,000 *A. penelope* are thought to winter in Egypt (Urban, 1993).

In conclusion, it can be estimated that irregularly counted countries account for 60,000–90,000 wintering *A. penelope* that are excluded from most years of IWC data. This leads to the new population estimate of 200,000 for the Black Sea/east Mediterranean region.

Count coverage in the Mediterranean still needs to be improved before population estimates and trends for *A. penelope* can be substantiated. It seems probable that the number of birds wintering in the east Mediterranean is declining but a similar decline in numbers is not apparent in the west Mediterranean. The current estimate of 560,000 is very consistent with the estimate of 600,000 by Monval & Pirot (1989). The difference is due mainly to a more cautious estimation of population size, and does not indicate a real decline in numbers. A change is proposed because we should be giving a minimum estimate of population size and we are already adding a guess of 150,000–200,000 birds from uncounted or irregularly counted areas. This is a similar number to that added by Monval & Pirot despite major increases in coverage. To be consistent with other species, we should give a minimum estimate based on maximum counts in the absence of any better data by which to estimate population size. This would reduce the estimate to 460,000 which is not thought to be realistic at present.

## GADWALL *Anas strepera*

European breeding birds probably account for virtually all of the birds wintering in northwest Europe and most if not all of those wintering in the Black Sea/Mediterranean region. Counts of wintering birds would suggest that there are approximately 100,000–200,000 birds breeding in Europe. In fact considerably more are estimated from European atlas studies (225,000–350,000) so there could be some considerable under-estimates on the wintering grounds. As over 90,000 birds are actually counted in these regions with many major coverage gaps in the east, a total population of 225,000–350,000 in northwest Europe and the Black Sea/Mediterranean region could be possible.

### NORTHWEST EUROPE

New Population Estimate = **30,000**

Monval & Pirot (1989) give an estimate of 12,000 of which 50% were counted annually. The peak count at

that time was of 8,910 in January 1983. Since 1986, there is thought to have been a doubling of the population through an increasing trend of 9.97% per annum (Rose, 1995) and a maximum count of 26,363 in 1993 which excluded some data from countries that only counted a reduced site list. A population estimate of 30,000 is proposed based on the maximum count. This assumes that Monval & Pirot (1989) underestimated a little in 1986 by 1,000–2,000 birds which is inevitable when mean counts are used to estimate the size of a rapidly increasing population and stresses the need for regular calibration of estimates against counts when significant increases or decreases are taking place.

Estimates of breeding populations in northwest Europe suggest that there might be as many as 40,000–50,000 birds in the population. Birds breeding in the United Kingdom, Ireland, the Netherlands, France and Belgium are probably resident (10,000–13,000). These are joined in winter by birds breeding in Iceland and the Baltic (Poland, Germany, Sweden), which amount to 30,000–35,000 individuals. Some birds may also reach western Europe from west-central Russia (Cramp *et al.*, 1977).

#### BLACK SEA and MEDITERRANEAN

New Population Estimate = **75,000–150,000 (100,000)**

Monval & Pirot (1989) estimated that 75,000 *A. strepera* winter in the Mediterranean/Black Sea region, but only 35% were counted and most of these were in the west Mediterranean. With a little more information it is now possible to raise the estimate with approximately 25,000–100,000 in the east and 60,000 in the west. For the purpose of population estimation this is rounded to a range of 75,000–150,000 individuals. No increase is inferred, only an increase in knowledge hence the continuity of the lower limit with the estimate of Monval & Pirot (1989). For the purpose of selecting key sites a population estimate of 100,000 is preferred.

In 1986, counts from the east amounted to only 720 birds annually yet between 8,000 and 30,000 birds were estimated to winter (Monval & Pirot, 1989), indicating the importance of major gaps in coverage for the northern Black Sea and Romania. Counts are still quite low, but in 1971 and 1988 aerial surveys in the Danube Delta give higher totals. This indicates that without full coverage of this site, no reliable estimate of the numbers of *A. strepera* in the east Mediterranean/Black Sea region is possible. In 1971 and 1988, the total counts were 26,000 and 12,500 respectively, from which 36,000 and 14,000 birds were estimated after accounting for gaps in coverage. Neither of the aerial surveys was complete, and much of the difference between the two counts is probably due to differences in coverage. It is believed that the actual number of *A. strepera* in the Danube Delta was probably considerably higher in both years.

On the basis of these two mid-winter counts alone, it is now estimated that there are between 25,000 and 100,000 birds wintering in the Black Sea/east

Mediterranean for which the population trend is unknown.

The total count in the west Mediterranean and Central Europe in 1994 was 59,768 birds with 53,963 of these in the west Mediterranean. In Central Europe, maximum estimated numbers have been up to 15,000. These figures are higher than those available to Monval & Pirot (1989) mainly because of large numbers of *A. strepera* found wintering in Algeria. Allowing for gaps in coverage, it is now estimated that the wintering population in the west Mediterranean and Central Europe is a minimum of 60,000 birds.

Cramp *et al.* (1977) suggest that Russian breeding birds (165,000–255,000) winter in the east Mediterranean and Black Sea along with some 20,000–50,000 resident breeding birds, but this completely neglects the 60,000 birds wintering in the west Mediterranean where only about 3,000–5,000 breed. West Mediterranean wintering birds must therefore originate from east European breeding stocks. The recently emerging importance of Algeria (30,000 in harsh weather) suggests movement through the Balkans from the east, and links the west Mediterranean with more easterly breeding populations which obviously mix with the western population in harsh weather.

It is concluded that the IWC misses a large number of birds wintering in the northern half of the Black Sea. This is supported by the infrequent aerial surveys in the Danube Delta and the very substantial numbers appearing in Algeria during harsh weather. It is therefore possible that the majority of the Russian breeding birds are here and in the Sea of Azov.

#### COMMON TEAL *Anas crecca*

##### NORTHWEST EUROPE

New Population Estimate = **400,000**

Monval & Pirot (1989) estimated 400,000 wintering birds from a sum of five year means equal to 250,000 and a 1983 maximum count of 208,000. Despite a more strategic approach to monitoring, recent counts have only been marginally higher. From the reduced site list, an estimated 250,000 birds is obtained allowing for gaps in coverage. The actual counts from this sample are usually only about 75% of the complete coverage counts, so 350,000 can be safely assumed as a minimum population size and the maximum likely to be counted by the current IWC network. The original estimate of 400,000 is consequently still very appropriate allowing for 50,000 birds in uncounted areas which for a species as widely dispersed as the *A. crecca* is minimal. The actual size of the population is likely to be considerably higher as indicated by breeding season data.

Breeding estimates are not very useful because of their variability. European Bird Census Council data give a massive 775,000–1,170,000 breeding pairs in European

Russia based on data from Krivenko, and yet Krivenko published 370,000 pairs for the same area in 1984. The new breeding estimate would lead to 2,500,000–3,500,000 *A. crecca* breeding in European Russia as opposed to just over 1,000,000 estimated in 1984. There are, however, 600,000–750,000 *A. crecca* breeding in Finland and a further 100,000–150,000 pairs further west. These western breeding birds give rise to at least 300,000–450,000 wintering birds in northwest Europe, and presumably some birds from Finland and Russia can be added to these.

### BLACK SEA/MEDITERRANEAN

New Population Estimate = **750,000–1,350,000 (1,050,000)**

Monval & Pirot (1989) estimated that 1,000,000 *A. crecca* winter in the Mediterranean and Black Sea divided between the west Mediterranean and Central Europe (250,000) and the east Mediterranean/Black Sea (750,000). Over half of these birds (500,000–600,000) were guessed to winter in unsurveyed areas of the northern Black Sea which remain relatively unknown and could potentially be unimportant as a wintering ground. Improvements in the quality of the data and a slight non-significant increase now lead to an estimate of 350,000 wintering *A. crecca* in the west Mediterranean and Central Europe. The uncertainty over the northern Black Sea, in addition to recently shown declines in the wintering numbers in Turkey cast doubt on the Black Sea/east Mediterranean population estimate and lower it from 750,000 to 375,000–1,000,000

The new estimate for the whole region is consequently 750,000–1,350,000.

Between 1989 and 1993, an average, after correcting for missing counts, of 308,000 *A. crecca* wintered in the west Mediterranean and 20,000 wintered in Central Europe to give a combined total of 328,000. The maximum count was 280,000 birds in 1989 from which a potentially exaggerated 440,000 can be estimated when uncounted wetlands are accounted for. It is concluded that the 1989–1993 average of 328,000 for the west Mediterranean/Central Europe is an absolute minimum. From this an estimate of 350,000 seems appropriate for the whole west Mediterranean/Central Europe to allow a little for birds on never surveyed wetlands. This is higher than the 220,000 minimum available to Monval & Pirot (1989) due to improved analytical technique, coverage improvements and possibly a slight non-significant population increase.

Data are now available from Ukraine where a complete aerial survey of the coast yielded only 130 *A. crecca*. However, these aerial surveys are conducted from helicopter which will cause *A. crecca* to take flight at a very great distance. Under these circumstances, it might be safer to assume that the numbers of *A. crecca* are still unknown in this region, and that the Monval & Pirot estimate of 500,000–600,000 remains valid.

Other gaps in coverage are on the eastern shores of the Mediterranean. About 10,000–15,000 *A. crecca* are

known to winter in Israel, and Albania has recently been shown to support up to 8,000 birds. The wintering population in Egypt has been estimated at 5,000–15,000 birds (Urban, 1993). It is concluded that the irregularly counted countries in the east Mediterranean account for 25,000–40,000 *A. crecca*. To these can be added the further 500,000–600,000 guessed for the northern Black Sea and Sea of Azov coasts but not found in recent aerial surveys.

Countries for which data are available were also difficult for Monval & Pirot (1989) to assess because of the lack of recent data from Turkey. This meant that the average total count available to them for this region was of only 57,200 wintering *A. crecca*. Extensive counts were made in Turkey in the period 1967–1972, but were then discontinued until the 1980s. During the early period, over 300,000 and up to 350,000 *A. crecca* were counted in the regularly covered countries of the east Mediterranean. Allowing for irregularities in coverage, this gives estimates of up to 900,000 and an average of 500,000. In the late 1980s and 1990s counts resumed in Turkey but the maximum counts had dropped to around 150,000 and the coverage adjusted estimate was only 300,000 birds. Allowing for missed birds at very small wetlands a current total of 350,000 is preferred for the regularly counted countries of the east Mediterranean. This is considerably less than the numbers in the late 1960s and early 1970s

The total estimate for the Black Sea and east Mediterranean is therefore 350,000 in regularly counted countries, plus 25,000–40,000 in occasionally counted countries and between nil and 600,000 in the northern Black Sea, giving 375,000–1,000,000 as opposed to 550,000–1,500,000 in the late 1960s and early 1970s.

As there are only about 15,000 pairs of *A. crecca* breeding in the Black Sea/east Mediterranean region, it can be assumed that the majority of wintering birds come from Finland and Russia.

### MALLARD *Anas platyrhynchos*

New Population Estimates

**5,000,000** NW Europe (wintering)  
**1,000,000** W Mediterranean (wintering)  
**2,250,000** Black Sea/E Mediterranean (wintering)

As total midwinter counts for any species as widely dispersed as *A. platyrhynchos* are never likely to be very useful in estimating population size, more emphasis must be placed on population trends. As recent trends in northwest Europe have been relatively stable and a justification for the existing estimate of 5,000,000 has recently been produced (Pihl, 1995), no change is recommended.

Similarly there is no evidence to suggest a change in numbers in the Mediterranean and Central Europe but for the purposes of conservation, two populations are

suggested on the basis of population trends (Rose, 1995). There is a particularly apparent decline in wintering numbers present in the east of Central Europe that is visible throughout the east Mediterranean. This contrasts with the situation in the west Mediterranean where the population appears stable.

To create new population estimates, the IWC data from 1967–1986 was used to calculate the relative abundance of *A. platyrhynchos* in the east and west Mediterranean after adjusting for inconsistencies in coverage. The ratio of abundance was then applied to the Monval & Pirot (1989) estimate of 4,000,000 for the whole region to give new estimates of 1,000,000 for the west Mediterranean and 3,000,000 in the east Mediterranean. Population trends since 1986 can then be used to create new 1993 estimates of 1,000,000 for the west Mediterranean and 2,250,000 for the east Mediterranean.

## NORTHERN PINTAIL *Anas acuta*

### NORTHWEST EUROPE

New Population Estimate = **60,000**

Monval & Pirot (1989) estimated 70,000 individuals based on a mean of 63,035 between 1983 and 1986. Recent analyses, using only a selected sample of wetlands, support this calculation. A maximum count of 61,000 in 1983 has been recorded from the reduced site list and from this maximum count, 70,377 was estimated to account for gaps in coverage. The reduced site list supported an average of 46,844 birds from 1983–1986 adjusted to 54,254 to account for missing counts.

Trends have been non-significant for this population but a combination of slow declines, smaller counts and a 1989–1993 estimate of only 45,000 birds wintering on all reduced sites contribute to a lower estimate of 60,000 rather than 70,000. This is indication of a true decline, but it is probably well within the limits of natural fluctuation. This opportunity is taken to adjust the estimate slightly, as under current proposed schedules of update this will not be possible for another nine years unless rapid changes take place outside of the level of natural fluctuation. It is suggested that future revisions are not made unless the population moves outside of the 50,000–75,000 range.

### BLACK SEA/MEDITERRANEAN/WEST AFRICA

New Population Estimate = **1,200,000**

Monval & Pirot (1989) estimated that 300,000 *A. acuta* winter in the Mediterranean and Black Sea, but gave no indication of how *A. acuta* were divided between the Black Sea/east Mediterranean and west Mediterranean/Central European sub-regions. They also separated West African wintering birds which they estimated to number approximately 1,000,000. Analyses of IWC data from

1967–1993 indicate that the wintering population of *A. acuta* in the Black Sea/ Mediterranean region is probably lower than estimated by Monval & Pirot, due to an erroneous 50,000 to 75,000 assumed to be in the northern Black Sea plus an ongoing decline. New data would suggest that 225,000 to 260,000 would have been a better estimate for the 1982–1986 period, and there are now 190,000–230,000 giving rise to an estimate of 200,000. A peak count of 180,000 in 1991 seems to support the estimate of 200,000

### Black Sea/east Mediterranean

New Sub-population Estimate = **125,000 (110,000–150,000)**

Many countries in this region have never submitted representative waterfowl count data as part of the IWC scheme, but only Libya is within the major wintering range of *A. acuta*. In Libya, there seem to be suitable coastal lagoons which, based on counts from similar habitat in southern Tunisia, might be expected to support up to 10,000 wintering *A. acuta*. Alternatively, no more than half the numbers in Egypt would be expected, based on available habitat comparisons, and in Egypt there are only an estimated 1,000–5,000 birds (Urban, 1993). In conclusion, Libya probably supports from 0–10,000 *A. acuta* in mid-winter and most likely around 1,000–3,000 birds.

Other countries have provided data to the IWC but not regularly. In the northern Black Sea, aerial survey of the Ukrainian coasts in 1994 revealed 565 *A. acuta*, which is consistent with the densities encountered in Bulgaria and Romania. It is also reasonable to assume that the same sort of number might be found around the Russian Black Sea/Sea of Azov coasts. This would suggest a population of perhaps 1,000–1,500 birds for the northern Black Sea and Sea of Azov in mid-winter. If the delta regions of Azov are equal in importance to the Danube, up to 4,000 more might winter, giving an overall estimate of only 1,000–5,000.

On the eastern shores of the Mediterranean, up to 351 *A. acuta* have wintered in Israel in recent years (351 in 1992, 200 in 1993) compared to a mean of 670 in earlier years (Monval & Pirot, 1989). Probably the same sort of number winter in Syria (800 during the IWC in 1993) and Lebanon (190 from five sites in 1975). This suggests that there are approximately 2,000 *A. acuta* wintering on the far eastern shores of the Mediterranean.

Much larger numbers (over 15,000) occur in Iraq, but these are most likely to be a part of the Southwest Asian population, in view of the low numbers of *A. acuta* in the far eastern Mediterranean.

A full survey of Albanian coastal wetlands was conducted for the first time in February 1993, revealing a total of 747 *A. acuta*. From this figure, a wintering population of approximately 1,000 can be estimated. This figure urgently needs verification, as February 1993 was exceptionally cold with almost unprecedented harsh

weather movements being recorded in many species of waterfowl. The number of *A. acuta* wintering in Albania during an average winter is therefore unknown.

For Egypt, Monval & Pirot (1989) made no estimate, but suggested that Egypt was primarily a staging area for *A. acuta* on migration to and from the Sahel. Urban (1993) estimates a wintering population of 1,000–5,000 *A. acuta* based on historic counts.

In conclusion 5,000–23,000 *A. acuta* are probably accounted for by unknown or sporadically counted countries.

The 50,000–75,000 suggested for the northern Black Sea by Monval & Pirot (1989) almost certainly refers to late autumn concentrations which leave the area by mid-January.

The sum of five year means, including imputed values, for the 1982–1986 period is equal to 78,615. If the estimated 5,000–23,000 in relatively unknown areas is added, an estimate of approximately 85,000–100,000 is obtained for the 1982–1986 period. Monval & Pirot (1989) added 60,000–80,000 *A. acuta* to the whole Mediterranean to account for missed birds. This decision is followed for consistency, assuming 20,000 in the west and 40,000–60,000 in the east to reflect the difference in coverage of the two regions. The final Black Sea/east Mediterranean estimate for 1982–1986 is therefore 125,000–160,000.

Applying the same process to the 1989–1993 period gives the sum of five year means as 64,494 and an overall estimate of 110,000–150,000. This result reflects the slow population decline in the area.

#### West Mediterranean

New Sub-population Estimate = **80,000**

Monval & Pirot (1989) gave a sum of five year means for *A. acuta* in this region as 47,690, from which they gave no sub-regional population estimate. The sum of five year means including imputed values for the same period is equal to 77,820 for the west Mediterranean plus approximately 500–1,000 for Central Europe giving a total of circa 80,000 *A. acuta* and an estimate of 100,000 to account for missed birds.

Applying the same process used to compare the recent analysis of 1982–1986 data to the Monval & Pirot (1989) analysis, the 1989–1993 period gives the sum of five year means as 58,759 for the west Mediterranean and Central Europe, and an estimate of circa 80,000 to account for missed birds. This result indicates the possibility of recent decline in the area.

#### West Africa

New Sub-population Estimate = **1,000,000**

No extensive surveys have been carried out since the 1980s, from which a tentative estimate of 1,000,000 was made. This could now be much lower if declines seen in the Mediterranean sub-region are apparent throughout the

flyway. Another survey is urgently required to substantiate population size and identify population trends.

#### SOUTHWEST ASIA/EAST AFRICA

New Population Estimate = **700,000**

Nothing has changed since the five year analysis of Asian Data so the estimate is still valid. This becomes 700,000 with those wintering in East Africa.

#### NORTHERN SHOVELER *Anas clypeata*

The distinction of populations in this species is difficult. There is an almost continuous wintering range at Mediterranean latitudes from the Atlantic coasts to east Asia with divergences into northwest Europe and Sahelian Africa. The breeding range is equally uniform across the whole of Eurasia. The European population breeding north of 55 degrees is thought to winter in northwest Europe, while birds south of this line winter throughout the Mediterranean. The east Mediterranean also harbours birds from Western Siberia that winter in the Black Sea, east Mediterranean and Caspian. This population is also probably contributing birds to the Egyptian and African populations (Cramp *et al.*, 1977).

#### NORTHWEST EUROPE

Population Estimate = **40,000**

Up to 20,000 birds have been counted from a reduced sample of sites in 1983 and from this 33,000 were estimated to account for gaps in coverage. Between 1982 and 1986 the sum of five year means was 26,520 from which a population size of 40,000 was estimated (Monval & Pirot, 1989). The reduced site list supported an average of 15,165 birds during this period adjusted to 22,652 to account for missing counts. There is nothing to cast doubt on the 40,000 estimate of Monval & Pirot (1989).

Trends have been non-significant for this population, and data from 1989–1993 are very comparable with those from 1982–1986. No adjustment to the estimate is therefore necessary.

The birds wintering in northwest Europe are thought to originate from Iceland, Scandinavia and northern European Russia east to 60°E. European Bird Census Council data indicate a total of 40,000–50,000 birds breeding in northwest Europe which agrees quite closely with wintering estimates.

#### BLACK SEA/MEDITERRANEAN/ WEST AFRICA

New Population Estimate = **450,000 (400,000–470,000)**

In the east Mediterranean, regularity of midwinter counting has been difficult to achieve and very rarely has

complete geographical coverage been accomplished. Monval & Pirot (1989) estimated that 200,000 *A. clypeata* winter in the east Mediterranean/Black Sea and 175,000 in the west Mediterranean, with a further 15,000 in sub-Saharan West Africa.

Monval & Pirot (1989) gave independent estimates for the east and west Mediterranean but in summary defined one population of 375,000 individuals and separated the 15,000 in West Africa. Rose & Scott (1994) split the Mediterranean into two regions to conform to Monval & Pirot (1989) and added the West African wintering birds to the east Mediterranean population to give 220,000. On the basis of recent analyses, the original decision of Monval & Pirot (1989) to recognize only one population in the Mediterranean (of about 375,000 birds) is supported, but the West African birds should probably be added.

Very few *A. clypeata* are counted in the east Mediterranean/Black Sea and the estimation of numbers in irregularly counted or unknown areas accounts for 83% of the total. Despite these difficulties, there is now a lot more information than there was at the time of the last estimate of 200,000 and 150,000 is suggested now from a range of 100,000–170,000. There may have been a slight decline, but the estimate is adjusted through a more exact knowledge of the relatively unknown wintering areas.

The west Mediterranean estimate of 175,000 is increased to 280,000 based on a real increase and more exact data for North Africa. There have been no new data for West Africa, but the 15,000 estimated by Monval & Pirot (1989) was updated to 20,000 following a more thorough investigation of the data by Perennou (1991).

Those birds breeding in most of European Russia and Central and southeast Europe winter in the Mediterranean Basin south to North Africa and in West Africa. Their number is estimated at 200,000–300,000 from breeding bird censuses. This is quite consistent with the new winter estimate as some western Siberian breeding birds must surely also winter in the Mediterranean.

#### **Black Sea/east Mediterranean**

New Sub-population Estimate = **150,000 (100,000–170,000)**

Monval & Pirot (1989) = 200,000

Many countries in this region have never submitted representative waterfowl count data as part of the IWC scheme, but only Libya is within the major wintering range of *A. clypeata*. In Libya, there seems to be suitable coastal lagoons which from similar habitat in Tunisia might be expected to support up to 8,000 birds. Alternatively, we would expect approximately half the numbers in Egypt based on available habitat comparisons and this figure would be much higher. In conclusion, Libya probably supports around 8,000 *A. clypeata*. There

are no mid-winter waterfowl counts from Bosnia Herzegovina, Georgia or Moldova, but these countries are unlikely to support more than a few *A. clypeata* because of the severity of the winters.

Other countries have provided data to the IWC but not regularly. In the northern Black Sea, aerial survey of the Ukrainian coasts in 1994 revealed only 50 *A. clypeata* – fewer than might be supposed from the densities encountered in Bulgaria and Romania but consistent with the dwindling of numbers northwards in the Black Sea. It is reasonable to assume that the same sort of low numbers exist around the Russian Black Sea/Sea of Azov coasts. This would suggest a negligible population for the Sea of Azov in mid-winter. If the delta regions of the Sea of Azov are comparable to the Danube Delta, up to 5,000 might winter in exceptional years, but fewer than 1,000 are more likely.

On the eastern shores of the Mediterranean, up to 22,000 *A. clypeata* have wintered in Israel in recent years, with a 1989–1993 five-year mean of 18,345 compared to a mean of 17,500 in earlier years (Monval & Pirot, 1989). Overall, 20,000 seems a reasonable total. Fewer seem to winter in Syria (500 IWC 1993) and Lebanon (251 from five sites in 1975). This suggests that approximately 20,000–25,000 *A. clypeata* winter on the far eastern shores of the Mediterranean.

A full survey of Albanian coastal wetlands was conducted for the first time in February 1993, and revealed a total of 2,893 *A. clypeata*. From this figure a wintering population of approximately 3,000–5,000 can be estimated. This figure urgently needs verification, as February 1993 was exceptionally cold with almost unprecedented harsh weather movements recorded in many species of waterfowl. The number of *A. clypeata* wintering in Albania during an average winter is therefore unknown.

For Egypt, Monval & Pirot (1989) only had data from 1979 and 1980, but now there are also counts from 1990. The counts from 1979 and 1980 are 64,761 and 75,532 respectively, while in 1990, 40,964 were counted. Urban (1993) estimates a wintering population of 50,000–100,000 *A. clypeata* based on historic counts, but there may have been a decline in numbers during the 1980s. This seems to be the most reasonable estimate.

The average counts for the entire Black Sea/east Mediterranean region over the 1982–1986 period are 16,693 from which a total of 34,226 is calculated allowing for gaps in coverage. This is identical to the 34,000 five-year mean given by Monval & Pirot (1989). If the 80,000–145,000 in relatively unknown areas is added, an estimate of 115,000–180,000 is obtained for the 1982–1986 period. Consequently 150,000 may have been a more appropriate estimate than 200,000. The differences in population estimation are solely attributable to the estimation of unknown areas which account for up to 83% of the total. Clearly the quantity of data must be increased for this species as a matter of urgency.

Applying the same process to the 1989–1993 period gives the sum of five year means as 25,539 and an estimate of 100,000–170,000 adding the proportion from unknown areas.

#### West Mediterranean

New Sub-population Estimate = **280,000**  
Monval & Pirot (1989) = 175,000

Monval & Pirot (1989) gave a sum of five-year mean for *A. clypeata* in this region as 143,140 with a peak count of 147,180 in 1985, from which they estimated 175,000 individuals. The average adjusted for gaps in coverage for the same period is equal to 212,515 for the west Mediterranean plus approximately 1,500 for Central Europe giving a total of about 215,000 and an estimate of about 250,000 to account for missed birds. Applying the same process to the 1989–93 data gives a coverage adjusted count of 255,000 and an estimate of 280,000 to account for missed birds. This result indicates the effect of the recent significant increase of 2.48% per annum and an addition of 75,000 birds as a result of increased knowledge of North African wetlands.

#### West Africa

New Sub-population Estimate = **20,000**

No extensive surveys have been carried out since the 1980s from which a tentative estimate of 15,000 was made (Monval & Pirot, 1989) and updated to 20,000 by more extensive analysis of the same data (Perennou, 1991). High counts have included 34,250 in the Senegal Delta, 6,000 in the Central Niger Delta and 12,500 at Lake Chad. Counts are highly variable and peak at 40,000 in 1987. The variability is probably due to exchange of birds with the Mediterranean, so estimates are based on mean rather than peak values.

#### SOUTHWEST ASIA/EAST AFRICA

New Population Estimate = **400,000 (250,000–500,000)**

The previous estimate of 300,000 from the five year analysis of Asian waterfowl census data (Perennou *et al.*, 1994) is clearly too low. Counts in Southwest Asia have amounted to 50,000 in recent years and 100,000 in the 1970s with no coverage in Iraq which is a key wintering area for this species. At least 150,000 and probably nearer 250,000 *A. clypeata* can be assumed to winter in Southwest Asia. Urban (1993) estimated the total population wintering in eastern Africa (excluding Egypt) to be 100,000–240,000 birds; high counts in recent years have included over 25,000 in Ethiopia (in 1994), a dry season minimum of 22,000 in Kenya, mainly at Lake Naivasha, and over 15,000 in Tanzania (in 1995). Combining the Southwest Asian and African figures suggests a total population of about 400,000 from a range of 250,000–500,000.

## RED-CRESTED POCHARD *Netta rufina*

The northwest European wintering population was not considered by Monval & Pirot (1989) because of its small size and disputed feral origin. The population remains small; the birds are resident and quite discrete from those in Central Europe. The total breeding population is estimated at 100–125 pairs, with 10–25 pairs in the Netherlands, 30–40 pairs in Poland, 50 pairs in the UK and a few pairs in France and Germany. This suggests a total population of 300–375 individuals. This northwest European group is still not considered because of its disputed feral origins.

#### CENTRAL EUROPE/WEST MEDITERRANEAN

New Population Estimate = **25,000 (24,000–50,000)**

On average, about 4,000 birds have been counted in Central Europe in recent years, rising to a peak of 9,500 in 1994. Adding this rapidly increasing population to the slowly declining population of the west Mediterranean gives a minimum estimate of 25,000. This is not indicative of an increase but rather a redistribution of birds and better data. The total number is thought to have remained relatively constant.

This is a minimum estimate. If the large fluctuations in the west Mediterranean can be understood, the estimate could rise to about 35,000 based on average counts, or 50,000 if maximum counts are representative of the real population size.

Because of the very rapid increase in the Central European population, the apparent ongoing redistribution and the huge, poorly understood fluctuations in the size of the Spanish population, it is recommended that this population is monitored very closely, and that estimates of population size are adjusted every three years until confident estimates are produced and the population has stabilised.

#### Central Europe

New Sub-population Estimate = **4,000 (1994 peak of 9,500)**

When Monval & Pirot (1989) discussed the status of Western Palearctic wintering populations of *N. rufina*, there was a small wintering population in Central Europe similar in size to the resident population in northwest Europe. Monval & Pirot (1989) estimated this Central European population at 200 birds. The northwest European population is still not of sufficient size to influence whole population trends, but the Central European population has undergone an exponential and statistically significant increase since 1986. The rate of increase from 1984–1993 has been 57.23% per annum. This rate predicts that this small population is nearly 100 times the size it was in 1984. The mean count for the five-year period 1989–93 was only 2,500. However, 9,500

birds were counted in January 1994. This very high total brings the mean count for the five-year period 1990–94 to 3,654. For other populations, mean counts have been used to create population estimates, but in this exceptional circumstance, this approach would clearly give a very low estimate. Because key sites are selected through mean counts, to avoid overshoot of the real population size and to remain consistent with other population estimates for the region, an estimate of 4,000 is recommended based on the mean count from 1990–1994. Obviously, with such a high rate of increase in the population, this estimate is almost immediately out of date. It is therefore recommended that the estimate be amended every three years until the rate of increase slows down, i.e. the population increases by less than 20% over the three year period since the last estimate.

Only 320–595 pairs or 1,000–2,000 individuals are thought to breed in Central Europe. This would be consistent with the wintering population in 1990 or thereabouts, and might be low because it is already out of date with such a rapidly increasing population.

#### West Mediterranean

New Sub-population Estimate = **21,000 (20,000–75,000)**

Monval & Pirot (1989) estimated the west Mediterranean population at 20,000 birds, but acknowledged that the average counts from Spain alone exceeded this figure (23,670). Despite the fact that the *N. rufina* is extremely concentrated in winter, the counts of this species are extremely variable, and the effects of the peaks and troughs are visible for a number of years. There is no instant recovery. Some of the troughs can be associated with the drying out of key wetlands such as Gallocanta in Spain, and may therefore represent real declines and peaks. The fluctuations in numbers are still no better understood than in 1989 when Monval & Pirot decided that caution was prudent and endorsed the earlier estimate of 20,000. This estimate is based on the counts made during the lowest points of the cycles. The combined west Mediterranean and Central European count of approximately 18,500, made during the last low point of the cycle in 1992, is consistent with this estimate. Until the reasons for the fluctuations are understood, it is recommended that this cautious approach to the estimation of population size be retained.

The last four troughs occurred in 1982, 1983, 1988 and 1992 when estimates, adjusted for coverage, were all in the region of 21,000 individuals. Adopting the minimum estimate principle of Monval & Pirot (1989) in the absence of better data leads to a new estimate of 21,000 for the west Mediterranean. The highest count was in 1979 when nearly 50,000 were counted. Estimates around this year ranged from 70,000–75,000 when gaps in coverage were taken into account. Counts from 1982 to 1986 averaged 21,000, and gave an

estimated average total of about 35,000, while counts during the period 1989–1993 averaged 16,000, and gave an estimated total of about 30,000.

In conclusion, our understanding of the trends in the population and our ability to assess the completeness of counts have both improved but lead to only a very small adjustment of the 1989 estimate from 20,000 to 21,000 as these are based on minimum estimates which have remained very constant. There has been a reduction in average counts of approximately 5,000 since the last estimate.

Recent breeding estimates suggest that there are 5,700–8,990 pairs breeding in the region or 17,000–27,000 wintering individuals, which agrees well with the minimum estimate of 21,000.

#### BLACK SEA/EAST MEDITERRANEAN

New Population Estimate = **50,000**

Monval & Pirot (1989) estimated the east Mediterranean/Black Sea population at 50,000 birds. Breeding data for the eastern European region suggest 7,642–17,240 pairs or 23,000–52,000 wintering individuals. The middle of this range is consistent with the recent dramatic decline in the total counts in mid-winter. The population in the east Mediterranean and Black Sea has been fairly consistently counted since 1987, but more years are needed before the suspected declining trend can be substantiated. The very low numbers counted in the Danube Delta since 1986 and the lower numbers counted in Turkey concur with Monval & Pirot (1989), who concluded that this population might have undergone a decline. More precise monitoring is needed in the eastern Black Sea, particularly the Danube Delta and eastern Sea of Azov, before any further conclusions can be drawn. With so much uncertainty until more data can be collected a population of 50,000 is retained with the proviso that it could be as low as 23,000 if based on minimum breeding estimates and that it is very unlikely to be higher than 50,000.

Monval & Pirot (1989) thought that the northern Black Sea area supported about 5,000 birds; this is probably a maximum if recent counts are indicative of true numbers. The Danube Delta is crucial for this species with up to 75% of the population estimated to winter at this single site. The equally large delta regions in the southeast Sea of Azov are completely unknown in mid-winter, but are reported to be important for *N. rufina* and could conceivably support very large wintering concentrations. As no aerial surveys of the Danube delta have been carried out since 1988 and the Sea of Azov is still unknown, there is no possibility for updating the rather unsubstantiated estimate of 50,000. This could be rather high as the 1988 Danube survey revealed only 7,900 birds as opposed to 31,800 in 1970. Recent maximum counts have also been low, i.e. 5,422 in 1992, 4,356 in 1993 and 3,000 in 1994.

## COMMON POCHARD *Aythya ferina*

### NORTHWEST EUROPE

New Population Estimate = **350,000**

Trend analysis shows that there has been virtually no change in this population since the analysis of Monval & Pirot (1989). There were higher numbers in the late 1970s, with perhaps up to 450,000 birds.

The sum of the five year mean from 1982–1986 was 243,000.

The average total count from 1982–1986 when Monval & Pirot (1989) estimated 350,000 was approximately 175,000. Total counts have been higher recently 174,677 in 1992, 242,354 in 1993 and 221,928 in 1994 but this is thought to be due to better count coverage and hence the stable trend.

Breeding estimates indicate that there are 89,420–128,455 pairs or approximately 250,000–400,000 individuals in northwest Europe. The *A. ferina* wintering in northwest Europe presumably originate from the breeding grounds in northern Europe, but some of the *A. ferina* from these areas also winter in Central Europe and the west Mediterranean. About 90,000–100,000 pairs or 250,000–300,000 individuals are believed to breed in European Russia. If it is assumed that one third of these birds winter in northwest Europe (100,000) a further 250,000 birds must breed in northwest Europe leaving 0–150,000 for the west Mediterranean plus the remaining 200,000 from European Russia and the majority from further south and east.

The estimate of 350,000 might be a little high, but 250,000 have been counted, so 300,000 must be the absolute minimum. Changes are recommended in the future if the number is suspected to have fallen under 250,000 or risen over 400,000. This is based on a 20% change in either direction from a current slightly high estimate, and corresponds to the extreme limits of current population size.

### CENTRAL EUROPE/BLACK SEA/ MEDITERRANEAN

New Population estimate = **1,000,000**

Monval & Pirot (1989) estimated that 1,250,000 *A. ferina* winter in the Central Europe/Mediterranean/Black Sea region, with most in the Black Sea/east Mediterranean sub-region for which no five-year mean could be given and for which most birds were thought to winter in poorly surveyed regions. An assessment of population trends was felt to be inappropriate in 1986 for the Black Sea/east Mediterranean, but was conducted for Central Europe and the west Mediterranean, where a steady increase from 1967 to the late 1970s was followed by a sharp and continuing decline.

There is no evidence of any significant change in numbers since Monval & Pirot (1989) estimated

1,250,000 as most of the decline had already taken place. There has been the development of new statistical techniques and improvements in census coverage that account for the new lower estimate of 1,000,000. There has also been some further minimal decline in numbers, mainly in the east.

### Black Sea/east Mediterranean

New Sub-population Estimate = **600,000**

Moldova, Georgia and the Sea of Azov could be significant gaps in the census coverage of wintering *A. ferina*. Moldova borders the Romanian Danube Delta, and contains a small proportion of the northern edge of this vast wetland complex. As the Romanian Danube Delta has been known to support over 50% (up to 369,000 in 1971) of the *A. ferina* thought to be wintering in the Black Sea/east Mediterranean, it is not unreasonable to expect that large numbers might winter in Moldova. Similarly, the most suitable wetlands in Georgia and Sea of Azov are situated on the opposite shores of the Black Sea at approximately the same latitude as the Danube Delta, so might also provide ideal wintering grounds for *A. ferina*.

Because of the presence of completely unknown and potentially very important wintering areas for *A. ferina* in the Black Sea and Sea of Azov, the best that can be achieved is to provide a minimum estimate for this sub-population.

The coverage of the region was most complete in January 1993 when weather conditions were also extremely harsh pushing many waterbirds south and towards the coast from traditional wintering grounds. As the IWC has better coverage in the south of the region and on the Mediterranean and Black Sea coasts, it is likely that the total number of *A. ferina* counted in January 1993 might be close to the best minimum estimate for the region. This total came to 277,187, with the only major gap being the Russian Black Sea and Sea of Azov. There were, however, indications from the first counts received from Albania and Syria that some areas of the former Yugoslavia and the far eastern Mediterranean shores could support substantial numbers. If the Russian Black Sea and Sea of Azov support an equal number of birds to the Ukrainian shores, then a further 65,000 can be added. In addition, there are an estimated 10,000–20,000 *A. ferina* wintering in Egypt (Urban, 1993), giving a total of 350,000.

To this could be added a guess for birds in completely unknown areas to give a total of perhaps 400,000, and a further 150,000 found in the Danube Delta during the 1988 aerial survey, give a total of 550,000.

The coverage adjusted average for this region from 1989–1993 amounts to approximately 300,000 birds. Because of the large fluctuations and irregular counts, this figure is a best estimate but rather dangerous as it could conceivably be an over-estimate. To this figure should be added the 300,000 estimated to winter in

areas counted only occasionally, areas not counted at all and the Danube Delta, to give 600,000. This is rather similar to the minimum estimate of 550,000, and probably quite appropriate.

In conclusion the Black Sea/east Mediterranean wintering population of *A. ferina* is now estimated at 600,000 for the 1989–1993 period. Trends are unknown, and no comparison can be made with Monval & Pirot (1989). Recent total counts have been 222,534 in 1992, 256,187 in 1993, 265,459 in 1994.

To reflect the uncertainty in this estimate, changes are proposed only if the population falls to below 350,000 (the minimum size at present) or rises to above 700,000.

### West Mediterranean

New Sub-population Estimate = **250,000**

Monval & Pirot (1989) gave a sum of five-year mean for *A. ferina* in this region and Central Europe as 314,000, with an average total count of 236,000, but gave no sub-regional population estimate. The coverage adjusted average count for the same period is equal to 324,077, with 139,276 in Central Europe and 184,801 in the west Mediterranean. This suggests close agreement with the earlier analyses.

Applying the same process used to compare the recent analysis of 1982–1986 data to the Monval & Pirot (1989) analysis, the 1989–1993 period gives an average coverage adjusted count of 309,832 for the west Mediterranean and Central Europe, indicating a slow decline since the 1982–1986 analyses as expected from a recent analysis of population trends. The decline is not significant and not sufficient to warrant a change in population estimates.

In the west Mediterranean, a peak count of 225,000 was made in 1978, and a coverage adjusted estimate of 400,000 individuals existed for a number of years.

Total counts of 54,364 (without Spain) in 1992, 74,554 (without Spain) in 1993, and 98,146 (with 5,385 in the Guadelquivir) in 1994 have been much lower, mainly due to the absence of Spanish data, so cannot be used to estimate population size. The coverage adjusted counts give a minimum estimate of 175,000 from average counts of just 95,000. The reduced list estimates have been about 116,000 individuals.

Applying the same sort of adjustments as made in northwest Europe for missed birds yields estimates of approximately 250,000 individuals.

### Central Europe

New Sub-population Estimate = **150,000**

Monval & Pirot (1989) gave a sum of five-year mean for *A. ferina* in this region and the west Mediterranean as 314,000, but gave no sub-regional population estimate. The coverage adjusted average count for the same period is equal to 324,077 with 139,276 in Central Europe and 184,801 in the west Mediterranean. This suggests close agreement with the earlier

analyses. The good coverage of Central European wetlands for *A. ferina* suggests 150,000 is probably a good sub-regional population estimate.

Recent total counts have been 77,273 in 1992, 78,840 in 1993, 111,386 in 1994. Applying the same adjustments for missed birds as in northwest Europe gives estimates of 130,000 from a reduced site list estimate of 67,000, and 160,000 from recent maximum counts. These are very consistent with the total count coverage adjusted estimate of 150,000.

### BREEDING NUMBERS

If two-thirds of the birds breeding in European Russia, plus up to 150,000 from northwest Europe, all winter in Central Europe and the west Mediterranean, this accounts for 200,000–350,000 wintering birds. In addition, 43,904–68,608 pairs or 150,000–200,000 birds breed within the region, giving a combined total of 350,000–550,000 wintering birds. This is marginally higher than the estimate from winter counts, but considering that the proportional split between the Mediterranean and northwest Europe is a total guess, the combined estimate is very close.

If the estimate of 350,000 wintering birds in northwest Europe is correct, a further 450,000–750,000 European breeding birds remain. These almost certainly winter in the Mediterranean Basin or Black Sea region. Therefore a recruitment of 200,000–500,000 from breeding grounds in Asia is necessary to equal the new wintering estimates for the region.

Only 30,000 *A. ferina* are thought to breed in Central Siberia, but western Siberia might be expected to support 500,000–800,000 breeding birds if breeding densities are comparable to those in Europe. This would give a total of 550,000–850,000 wintering birds. Subtracting the 200,000–500,000 moving into the Mediterranean and Black Sea leaves up to 650,000 for Southwest Asia and South Asia in winter. Perennou *et al.* (1994) estimate that there are at least 700,000 *A. ferina* wintering in these two regions, an estimate which agrees well with the predicted number.

### TUFTED DUCK *Aythya fuligula*

#### NORTHWEST EUROPE

New Population Estimate = **1,000,000**

347,746 *Aythya fuligula* were counted from the reduced site list in 1993, giving an estimate of 562,695 after adjusting for coverage gaps. In 1994, a maximum 525,293 was counted from the reduced site list, but no coverage adjusted estimate is available yet. The maximum total count was of 743,000 in 1993. This was mainly due to the extensive efforts in the Baltic where 600,000 (550,000–650,000) are estimated to winter (Pihl, 1994). In 1993, a further 385,000 were counted outside the Baltic to give an estimate of 985,000 excluding any additional

birds that were uncounted in non-Baltic regions. The overall estimate should therefore be 1,000,000

Central Europe is an area of comparable or better coverage and similar dispersion and here 60% of the total estimate is represented by the reduced site list. If this proportional representation of the reduced list is assumed to be the same in northwest Europe, a total population of about 850,000 is estimated before any addition of birds from completely uncounted areas. Monval & Pirot estimated 750,000 from a five-year mean of 650,000, adding 100,000 birds from uncounted areas. Adding this 100,000 to the coverage adjusted estimate of 850,000 gives 950,000 individuals in total.

An increasing trend of 3.33% per annum (Rose, 1995) since Monval & Pirot (1989) estimated 750,000 also leads to a 1993 population estimate of 950,000.

In conclusion, an estimate of 1,000,000 based on the results of the best coverage of this species in 1993 is the most appropriate estimate and is supported by very comparable estimates of 950,000 from trend analysis extrapolation and also from a calculated adjustment to the reduced site list estimate to allow for uncounted birds.

#### CENTRAL EUROPE/BLACK SEA/ MEDITERRANEAN

New Population Estimate = **600,000 (600,000–850,000)**

*A. fuligula* wintering in this region are thought to breed in Central Europe, Central European Russia and northwestern Siberia (Cramp *et al.*, 1977; Monval & Pirot, 1989). This breeding range overlaps extensively with the area from which birds wintering in the adjacent flyways of northwest Europe and Southwest Asia/northeast Africa are thought to originate.

Monval & Pirot (1989) estimated that 600,000 *A. fuligula* winter in the Mediterranean with approximately 200,000 in the Black Sea/east Mediterranean sub-region and 400,000 in the Central Europe/west Mediterranean sub-region. This assumed that approximately 70% of the population was counted annually in Central Europe/west Mediterranean, and that the sum of the five year means for each site in this sub-region represented approximately 95% of the estimated total number of birds. This makes the estimate rather more conservative than for other species.

An assessment of population trends was felt to be inappropriate in 1986 for the Black Sea/east Mediterranean but was conducted for Central Europe and the west Mediterranean, where a steady increase followed by what appeared to be the start of stabilisation in 1983 was apparent (Monval & Pirot, 1989).

There is no evidence of any significant change in numbers since Monval & Pirot estimated 600,000 as most of the increase had already taken place. There has been a continuing increase in the west Mediterranean sub-region

but the number of birds involved is not enough to influence the whole population.

#### Central Europe

New Sub-population Estimate = **330,000**

Monval & Pirot (1989) gave a sum of five-year means for *A. fuligula* in the west Mediterranean and Central Europe as 375,750, from which they estimated a population of approximately 400,000.

Coverage adjusted estimates from recent analyses give an average estimate of 285,791 for 1986 and 286,199 for 1989–1993, indicating the stability of this major portion of the Central Europe/west Mediterranean population. This makes the combined west Mediterranean/Central European coverage adjusted 1986 estimate of 324,251 unexpectedly lower than the 375,750 sum of five-year means given by Monval & Pirot (1989). The combined estimate for 1989–1993 is 338,434, indicating overall stability. The differences are not large enough to suggest changes from the 400,000 estimated by Monval & Pirot, and are consistent with the maximum annual coverage adjusted totals of 330,000 in Central Europe and 70,000 in the west Mediterranean.

#### Black Sea/east Mediterranean

New Sub-population Estimate = **200,000–450,000**

Moldova borders the Romanian Danube Delta and contains a small proportion of the northern edge of this vast wetland complex. As the Romanian Danube Delta has been known to support up to 90% of the *A. fuligula* thought to be wintering in the Black Sea/east Mediterranean, it is not unreasonable to expect that large numbers might winter in Moldova. Similarly wetlands in Georgia are situated on the opposite shores of the Black Sea at the same latitude as the Danube Delta so might also provide ideal wintering grounds, as might the offshore areas of the Ukrainian Black Sea and all of the Sea of Azov. These areas are relatively or completely unknown. It is therefore not safe to even guess the number of *A. fuligula* wintering in completely unknown areas of this region. The best that can be achieved is to provide a minimum estimate for this sub-population.

Other countries have provided data to the IWC, but not to the extent necessary for trend analysis. Most countries harbouring large numbers of wintering *A. fuligula* are included in this category. The only exception is Romania and perhaps Turkey as well, which have been reasonably consistently counted. However, the Danube Delta in Romania is the single most important wintering site, and its vast size and inaccessibility have inevitably resulted in inconsistent coverage.

The coverage of the region was most complete in January 1993 when weather conditions were also extremely harsh, pushing many waterbirds south and towards the coast from traditional wintering grounds. As the IWC has better coverage in the south of the region and on the Mediterranean and Black Sea coasts, it is likely that the

total of *A. fuligula* counted in January 1993 might be close to the best minimum estimate for the region. This total came to 184,731, and the only major gaps were the Russian Black Sea/Sea of Azov and Egypt. If the Russian Black Sea and Sea of Azov areas supported an equal number of birds to the Ukrainian shores, then a further 15,000 can be added, plus 7,000–15,000 in Egypt to give a total of 210,000. This is very similar to the estimate of Monval & Pirot (1989).

If statistical techniques are used to impute missing values which are then used to calculate a sum of five year means for each site, the irregularities of counts, high proportion of missing values and wild fluctuations in numbers are all indications that the results given might be misleading and in particular might give rather high population estimates. The sum of all imputed counts in 1993 plus counts from other countries amounts to a maximum of 450,000, which probably represents an absolute upper limit to the population.

In conclusion, the Black Sea/east Mediterranean wintering population of *A. fuligula* is now estimated at 200,000 with an upper limit of 450,000 for the 1989–1993 period. Trends are unknown, and this figure is an adjustment of the figure given by Monval & Pirot (1989) in the light of new information.

#### West Mediterranean

New Sub-population Estimate = **70,000**

A maximum count of 30,000 in 1976 yields an estimate of 70,000 when adjustments have been made for gaps in coverage.

The average of coverage adjusted estimates for 1982–1986 is equal to 38,460 as opposed to 52,235 for the period 1989–1993. In conclusion, an estimate of 40,000 seems most appropriate for the 1982–1986 period which, following an increase, is now 55,000. To remain comparable with Monval & Pirot (1989), the maximum annual estimate of 70,000 is taken.

A very similar figure of 67,500 would be obtained by applying the same sort of adjustments as made in northwest Europe for missed birds (adding 20% to the five year average estimate)

#### BREEDING CENSUSES

Recent figures from BirdLife International suggest a European breeding population of 620,000–840,000 pairs which would be expected to give a wintering population of 1,900,000–2,500,000 birds. If western Siberia supports equivalent numbers to Central Siberia as might be expected, a further 500,000 should be added to give 2,400,000–3,000,000 wintering birds concentrated in Western Eurasia. From wintering surveys, Perennou *et al.* (1994) estimated 200,000 in Southwest Asia; the results presented here suggest that there are 200,000–450,000 *A. fuligula* wintering in the Black Sea/east Mediterranean region and 400,000 in Central Europe and the west Mediterranean. Northwest Europe supports a further 1,000,000 wintering birds to give an overall total of 1,800,000–2,100,000, somewhat lower

than the 2,400,000–3,000,000 birds expected from breeding censuses.

### COMMON GOLDENEYE *Bucephala clangula*

#### NORTHWEST EUROPE

Population Estimate = **300,000**

Recent analyses suggest the following breakdown of the wintering population of *B. clangula* in this region. 210,000 in the Baltic (Pihl *et al.*, 1995) plus 31,500 in UK and Ireland (Cranswick & Waters, 1995), plus 10,000 in the Netherlands plus 6,000 in Germany plus 3,500 France and Belgium, plus 18,000 Norway (Nygard, 1988) to give 279,000 based on recent IWC data. If we decide to split southern Germany and Switzerland from the Danube catchment we add another 22,000 to give 301,000 which is quite near to the listed 300,000 of Monval & Pirot (1989).

#### CENTRAL EUROPE/ADRIATIC/BALKANS (MIDDLE DANUBE)

New Population Estimate = **75,000**

New data from the Balkans and Danube catchment indicate that Monval & Pirot (1989) greatly underestimated the number of birds in this region to the extent that an entire new wintering population now needs to be added. It seems sensible to split Switzerland and Southern Germany as part of northwest Europe to leave a Danube catchment and Adriatic wintering population which is probably a mix of birds coming from both east and west. Based on the analysis of IWC data (Rose, 1995) and estimation of missing counts, it would number 73,000 birds here rounded to 75,000. The breakdown of national estimated wintering totals are as follows: Austria 3,000, Czech Republic 2,000, Slovakia 3,000, Hungary 50,000 and the former Yugoslavia and the Adriatic 15,000.

Looking at breeding data gives 250,000 pairs in Europe with 150,000 pairs in Finland alone. There are 500,000 birds in Central Siberia going to the Himalayas, so Europe must receive the Western Siberia breeding birds in winter as well. Breeding estimates consequently far exceed wintering numbers.

#### BLACK SEA WINTERING POPULATION

Population estimate = **20,000** (Monval & Pirot, 1989)

The Black Sea wintering population of *B. clangula* is probably largely outside of the geographical coverage of the IWC which at present does not extend as far as the extreme northeastern limits of the Black Sea. Between 1989 and 1993, expansion of the census in other areas of the Black Sea (particularly Ukraine) has taken place and up to 9,016 birds (1991) have been recorded with an annual average (1989–1993) of 2,694 *B. clangula* counted. Trends are still not possible to estimate for this region.

## CASPIAN WINTERING POPULATION

Population Estimate = <25,000

### SMEW

#### *Mergellus albellus*

## NORTHWEST/CENTRAL EUROPE WINTERING

New Population Estimate = 30,000 (Pihl & Laursen, in press)

The *M. albellus* population wintering in northwest Europe is difficult to monitor for many reasons. The two most important are (i) there are significant numbers of individuals in maritime areas best surveyed by aerial survey and (ii) the large maritime and lagoon wintering proportion of the population seems to be very prone to extremely large scale cold weather movements. For these reasons, the three major wintering areas for the species were excluded from trend analysis. These are the coast of Rostock in Germany, the IJsselmeer and Markermeer in the Netherlands and Szczecin Lagoon on the German/Polish border. Only when all these regions are counted thoroughly and simultaneously can an estimate of population size be made.

Only in Poland is there information from a more complete count of inland rivers which alone suggests a population of 2,400 wintering *M. albellus*. This is seven times the number represented by the sites used for trend analysis (320). Although coverage might be better in Germany, Netherlands, Belgium and France it is still probably reasonable to assume that there are at least double the 3,000 *M. albellus* accounted for in these countries (6,000 minimum + 2,500 in Poland). This should be added to the 17,500 in the Baltic Sea and the variable number in the IJsselmeer (10,000–20,000) to give 35,000–45,000 birds. Until more counts of Szczecin Lagoon are made it is impossible to ascertain the extent to which birds are included twice, at this site and at the IJsselmeer. This information is essential for a more accurate population estimate.

In Northwest Europe, Szczecin Lagoon on the Polish/German border has recently been discovered to support sufficiently large concentrations of wintering *M. albellus* to account for the fluctuations in annual totals presented by Monval & Pirot (1989). A simultaneous count of 25,000 individuals in January 1992 and a count of 30,000 in the early winter also suggests that the estimate of 15,000 of Monval & Pirot (1989) is much too low.

## EAST MEDITERRANEAN/BLACK SEA WINTERING

Population Estimate = 65,000 (Monval & Pirot, 1989)

In the East Mediterranean/Black Sea, the IWC can account for only 5,000 wintering *M. albellus*. Key areas are the Danube Delta and the Danube catchment in the region of Yugoslavia. Neither of these areas are very well known and there are clearly many potentially important areas of the

Black Sea coast, particularly in the East, that have never been censused. The occasional occurrence of internationally important numbers at very southerly locations in the East of the region (Israel and Iraq) also support the theory that many birds might be wintering further North in the eastern Black Sea.

## GOOSANDER

### *Mergus merganser*

## NORTHWEST AND CENTRAL EUROPE (EXCLUDING ICELAND) WINTERING

New Population Estimate = 200,000

The new total estimate for Northwest and Central Europe = 200,000 (170,000 in the Baltic, 15,000 in the Netherlands/Germany/France/Belgium, 5,000–8,000 in the United Kingdom, 3,000 in Norway and 10,000 in Central Europe).

Monval & Pirot (1989) give the Northwest and Central European wintering population as 150,000. This was considered to be too low by Rose & Scott (1994).

From seaduck surveys, Pihl *et al.* (1995) estimate 170,000 (140,000–200,000) wintering individuals in the Baltic. This includes an unexpected 35,000–40,000 found wintering on Szczecin Lagoon during recent surveys. The number at this site could easily be added to the total of Monval & Pirot (1989) to give an overall estimate of 190,000 as they had no idea of its existence when making their population estimate.

In the Netherlands numbers of *M. merganser* are very variable (8,000 in good years; 5,248 from reduced site list), non-Baltic Germany has 3,892 from the reduced site list, France has 1,145 from the reduced site list and a maximum count of 1,200 while Belgium has 171 from the reduced site list and 200 maximum count. From this a wintering total of 15,000 is estimated.

*M. merganser* appears to be relatively sedentary in the United Kingdom with a possible influx from the northwest and an exodus of males to moult in Norway (Little & Meek, 1996). In the United Kingdom there is a breeding population of about 2,700 pairs that could be expected to give a wintering population of approximately 8,100 individuals if they were all resident. Extrapolation of winter atlas information for the United Kingdom gives an estimated population of 8,900. The very complete mid-winter census in the United Kingdom only accounts for an estimated wintering population of 3,500 individuals. Obviously if the IWC is missing an equal proportion of the population in northwest Europe, the population estimates should be raised substantially.

Central Europe has 9,593 from the total list and 4,322 from reduced site list. In Central Europe, coverage is very good and the reduced site list comprises approximately 50% of the total list which can be assumed to be almost complete. For this region there are 10,000 estimated wintering *M. merganser*.