



MANAGEMENT PLAN for RED-CRESTED POCHARD (*Netta rufina*) 2007 –2009

Directive 79/409/EEC on the conservation of wild birds

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Executive summary

The Red-crested Pochard *Netta rufina* is listed on Annex II/2 of the EU Birds Directive as a species for which hunting is permitted in two EU Member States only, France and Spain. In these countries, it is a relatively marginal quarry species. The Red-crested Pochard has been identified as having a favourable conservation status within Europe and the EU, having recovered from declines experienced during 1970-1990. However, the trend of its most important EU population, in Spain, is unknown, that of its second most important, in France, is poorly known but thought to be stable, while the other two most important European populations outside Russia, in Romania and Turkey, are in continuing significant decline.

This Management Plan outlines management prescriptions to consolidate the positive trends within the EU and understand fluctuations elsewhere. It is aimed at all 17 Member States with breeding, staging or wintering populations of Red-crested Pochard. It is the responsibility of the relevant authorities of each Member State to decide how to implement the management prescriptions of this plan. This plan outlines the actions to be taken in the period 2006 - 2009. It is the responsibility of the relevant authorities in each Member State to carry into effect the Activities listed in the plan. It should be followed by new versions with revised objectives that take into account the results achieved during the first phase.

The Red-crested Pochard is a Palearctic diving duck species, whose breeding distribution extends from the British Isles to China. Some 25-49% of the global population breeds in Europe, 16-20% of which breeds regularly or occasionally in 16 countries of the European Union. The size of the European population is 27,000-59,000 breeding pairs, with 4,200-12,000 in the EU. Some 60-83% of the EU population breeds in Spain, with 7-15% in France and 5-10% in Germany

Trends are variable between countries. An eastward range extension and apparent increases are reported from most central and eastern EU Member States except for the small populations in Poland and Hungary where numbers are stable and in decline, respectively. Numbers are stable in Italy and France but the trend is unknown in the major breeding population in Spain. Further east, significant declines are reported from the large populations in Turkey and Romania, that winter partly in the southeastern EU. However, the difficulty of conducting breeding counts makes real trends impossible to assess.

The Red-crested Pochard is a partial migrant, wintering mainly between the latitudes of 30° and 50° north in most of Eurasia. Traditionally, three discrete wintering groups are recognized in the western Palearctic. Only the westernmost (Central European/ Western Mediterranean) population is of high relevance to most EU Member States. Its size is estimated at ca. 50,000 birds recently and in the late 1970s, against 20-25,000 in the 1980s. The Black Sea and Eastern Mediterranean wintering group (20,000 – 43,500 birds) is marginally relevant in the current EU context (limited wintering numbers in Greece and Cyprus), but it is highly relevant to several accession countries.

The key threats for the species in the EU are estimated to be, in the following order of importance:

1. Habitat loss / degradation / fragmentation
2. Disturbance
3. Hunting
4. Lead poisoning
5. Others (diseases, introduction of exotic species, natural, global warming...)

Recognising that the current population level (BirdLife International 2004a) represents a minimum, the plan aims to

Maintain the European population size and distribution of red-crested pochard at no less than the levels in 2004¹ ensuring the declining trends in Hungary, Romania and Turkey are reversed by 2009.

To reach this target the Action Plan identifies nine operational objectives or Results that have to be achieved during its 3- year running period. These are:

- (1) Red-crested Pochard hunting in EU Member States is set at sustainable levels, as defined by the results of studies to be undertaken under Result n° 10 below.
- (2) No red-crested Pochards are hunted in EU Member States during spring migration or during the end of the breeding season
- (3) All wetlands and other habitats with breeding, moulting, staging or wintering Red-crested Pochard are identified, conserved, wisely used and managed to ensure no loss of Red-crested Pochard numbers and distribution
- (4) Within SPAs of international importance for wintering or moulting/ staging Red-crested Pochard, the species can benefit from sufficient disturbance-free areas to accomplish its vital activities.
- (5) The potential impact of disturbance created by the various socio-economic activities is assessed and where it is shown to be significant, mitigation measures are adopted by mutual agreement with the relevant stakeholders.
- (6) The distribution, key sites and population size of the Red-crested Pochard within the EU and accessing countries are permanently monitored, and their changes/ shifts rapidly assessed on an international scale.
- (7) In key breeding areas, local breeding population sizes and trends are assessed in a reliable way that takes into account recent results on the detection probability of breeding birds, and annual productivity is measured.
- (8) Large-scale population units are clearly identified, and annual mortality of Red-crested Pochard is estimated.
- (9) The relative importance of hunting as a mortality cause for Red-crested Pochard is assessed, as well as the sustainability of current harvest rates.

¹ BirdLife International (2004a) *Birds in Europe: population estimates, trends and conservation status*. Cambridge, UK: BirdLife International. (BirdLife Conservation Series No. 12).

0. Introduction

The Red-crested Pochard *Netta rufina* is listed on Annex II/2 of the EU Birds Directive as a species for which hunting is permitted in two EU Member States only, France and Spain. It has recently recovered to favourable conservation status both in the European Union and at a pan-European level (BirdLife International, 2004a, b).

It is important to assess its current conservation status and available research information in order to appraise the current effectiveness of conservation actions, identify reasons for the observed trends and recommend options for future management. Hence, this plan will focus upon the full implementation of the provisions of the Birds Directive as these apply for this species.

The overall format of this action plan follows a new Single Species Action Plan format developed by BirdLife International for UNEP/AEWA Secretariat (AEWA 2002). However, some parts of the plan including some tables have been modified to make it meet the specific need of a plan that covers a relatively widespread species with several populations occurring in the EU.

The first chapter of the Action Plan briefly presents key information on the Eurasian Red-crested Pochard populations. The second chapter provides more detailed information on the populations that occur in Europe with a focus on the 25 EU Member States. Chapter 3 analyses the threats that are believed to be the causes of declines or fluctuations while chapter 4 lists the policies and legislation relevant for Red-crested Pochard management in Europe.

Chapter 5 evaluates the status of Red-crested Pochard in the EU and sets out long-term and immediate objectives for its future management.

Chapter 6 describes the actions to be taken for the period 2006-2009. These activities cover 15 of the 25 EU countries, where the species occurs regularly in significant numbers, or is known to have bred in recent decades: Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Hungary, Italy, the Netherlands, Poland, Portugal, Slovakia, Slovenia and Spain. The activities do not currently cover the UK as its small wild population is not naturally occurring.

It is the intention that this management plan shall be revised in 2009.

1. Biological Assessment

General information	<p>The red-crested Pochard is a Palearctic species (Cramp & Simmons, 1977) of Sarmatic origin (Voous 1960). Its breeding distribution extends approximately between the latitudes 35° and 55° north, in continental, temperate and Mediterranean climatic regions, from the British Isles to China (Scott & Rose 1996). It is a partial migrant, wintering mainly between the latitudes of 30° and 50° north (appendix 1).</p> <p>Mayaud (1966), and later Schneider-Jacoby & Vasic (1989) and Tamisier <i>in</i> Yeatman-Berthelot & Jarry (1991) have traced the history of the red-crested pochard in Europe. The Red-crested Pochard is a relatively marginal quarry species in the part of its wintering range where it may be hunted (France and Spain only).. It is listed on Annex II/2 of the EU Birds Directive as a species for which hunting is permitted in these three countries.</p> <p>The Red-crested Pochard has recently recovered since the marked declines of 1970-1990 (Tucker & Heath 1994) to a favourable conservation status in Europe and the EU (BirdLife International 2004 a, b). Although the species declined in a few countries during 1990-2000, many populations, including the Russian stronghold, increased or were stable, and it underwent a moderate increase overall. The increase probably outweighs the earlier decline and thus the species is provisionally evaluated as Secure (BirdLife International 2004 a).</p>
Taxonomy	The Red-crested Pochard is monotypic.

Populations

The Red-crested Pochard is a Palearctic diving duck species, whose breeding distribution extends from the British Isles to China. Some 25-49% of the global population breeds in Europe, 16-20% of which breeds regularly or occasionally in 16 countries of the European Union.

Traditionally, three discrete wintering groups are recognized in the western Palearctic, plus a fourth one in tropical (south) Asia (Monval & Pirot 1989, Perennou *et al.* 1994, Scott and Rose 1996). The first one (below) is almost completely discrete both in breeding and wintering ranges (Map 1). The two other Palearctic groups show a substantial overlap in breeding areas, but their quite distinct wintering ranges justify that for conservation purposes, they are treated separately:

- **The Central European/ Western Mediterranean wintering group**

This group is by far the most relevant in the EU context. The majority of birds west of Russia, breed in Spain, but the species also breeds locally and regularly in Austria, Croatia, Czech Republic, Germany, France, Hungary, Italy, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Switzerland, Turkey and Ukraine.

Its winter range covers western Europe, from Germany and (marginally) the Czech Republic, to Switzerland, France and the Iberian peninsula. Smaller numbers reach Morocco (Delany *et al.* 1999) and, exceptionally, Africa south of the Sahara, e.g. in the Niger basin (Perennou 1991).

Its breeding and moulting sites and wintering concentrations are very patchily distributed (Keller 1999, 2000). Both ringing data (Defos du Rau 2002) and recent genetic analysis (Gay *et al.* 2004) show numerous exchanges of individuals between sub-populations among this group, as well as significant isolation from populations breeding further east in central Asia. This argues strongly for considering this group as a true population.

It likely originates from a recent (i.e. late 19th century) colonization from birds of central Asian origin, as indicated by a combination of historical, demographic and genetic data (Gay *et al.* 2004). The very recent genetic results indicate that this population does not constitute an Evolutionary Significant Unit, but instead a Management Unit as defined by Moritz (1994). It implies that this population has to be managed separately as it cannot be supplemented efficiently by natural immigration from Central Asian birds (Gay *et al.* 2004).

- **The Black Sea and Eastern Mediterranean wintering group**

Birds breed from the north Caspian Sea basin (where they overlap with those belonging to the next group) to countries around the Black Sea and Azov Sea, mainly in the Danube Delta (Romania, Ukraine) and in Turkey. They winter along the western and southern Black Sea shores and in the eastern Mediterranean. This group is marginally relevant in the current EU context, with only a few dozen birds wintering in the eastern EU (Greece and Cyprus). However, it is highly relevant to several accession countries.

- **The west-central Asia/ southwest Asia wintering group**

By far the largest of all groups, its breeding distribution extends from western Mongolia to Central Asia and the Caspian Sea basin, between the latitudes of 35°N and 55°N. Kazakhstan and neighbouring countries are the heartland for the species; in particular the Volga Delta is traditionally used by high densities of breeding pairs (Krivenko *in* Tucker & Heath 1994). The wintering range covers the central Asian republics, Iran and in Europe, only Azerbaijan and Armenia. This group thus falls entirely outside the EU and accession countries.

- **The south Asia wintering group**

Its breeding distribution largely overlaps with the previous one (of which it may simply be a sub-group). Birds winter from Afghanistan to India and southern China. This group is irrelevant in both a European and EU context, and will not be discussed any further.

In addition to these four groups, the population occurring in the United Kingdom is feral and of no conservation significance (Berndt *in* Hagemeyer & Blair 1997, Robinson, pers. com., Scott & Rose 1996, Cranswick pers. com.).

<p>Population developments</p>	<p>The current geographical distribution of the species has not changed significantly since the maps drawn up by Cramp & Simmons (1977), and has the following main characteristics:</p> <ul style="list-style-type: none"> - a very patchy and sporadic distribution in Central Europe from Switzerland to Denmark and to Slovakia , - a more uniform and continuous distribution around the Western Mediterranean from Portugal to the Camargue, with the highest densities recorded along the Eastern Spanish coast, - a large population along the coasts of the Black Sea basin and especially in Romania, Russia, Turkey and Ukraine. <p>• Breeding population</p> <p>The Red-crested Pochard breeds regularly or occasionally in 16 countries of the European Union (Table 1). Estimates of breeding pairs have been produced for most European countries (Tucker & Heath 1994, Heath et al. 2000, BirdLife International, 2004a), but for some countries discrepancies exist depending on sources (Table 2).</p> <p>The size of the breeding population in the countries of the European Union is 4,200-12,000 with variable trends depending on the country (BirdLife International 2004 a, b) :</p> <ul style="list-style-type: none"> - Over 60-83% of the population of the European Union breeds in Spain but the difficulty of conducting counts and the absence of any coordinated monitoring scheme make trends impossible to assess. The population estimates (Saez-Royuela <i>in</i> SEO/BirdLife 1997) need updating. - An increase in the number of sites used in Central and Eastern Europe, together with an eastward range extension in Hungary where breeding was first recorded in 1986 (Gorman 1996), Poland where breeding was first proved in 1968 (Tomialojc 1990), and the Balkans (Slovenia, Croatia) where breeding was first confirmed in 1987 (Schneider-Jacoby & Vasic 1989) and is increasing (Radovic et al. 2003).. - Apparent increases in Austria, Czech Republic, Germany, the Netherlands, Portugal, Russia, Slovakia, Switzerland, Ukraine and the United Kingdom feral population. - Recent appearance in Belgium and Denmark (where it is still an irregular breeder). - Stability in Italy and France. - Sporadic breeding in Greece before 1984 (Handrinos & Akriotis 1997) - Significant declines from the large populations in Turkey and Romania (BirdLife International 2004 a), the smaller population in Hungary and extinction of the Bulgarian population. <p>Therefore, overall the trend of the most important EU population, in Spain, is unknown, that of its second most important, in France, is poorly known but thought to be stable, while the other two most important European populations outside Russia, in Romania and Turkey, are in continuing significant decline.</p> <p>However, it is likely that some national estimates, especially in countries with significant breeding populations, may be severely underestimated, and that published trends have to be considered with caution, as suggested by a recent key study in the Camargue, south France. The study showed that many pairs and broods remain undetected when using conventional censusing methods. As a consequence, the local estimate increased from 80-100 breeding pairs to 600-700 pairs (Defos du Rau et al., 2003) when this low detection probability was corrected for.</p> <p>• Outside the breeding season</p> <p>The population of the Central European/ western Mediterranean wintering group is estimated at 50,000 (Delany & Scott, 2002).</p> <p>Winter data from mid-winter IWC census suggest that a decline occurred in the 1980s, down from an all-time record of nearly 50,000 in 1979, 89% of them in Spain (Monval and Pirot 1989). The population was then revised downwards at 20,000-25,000 up to the mid-</p>
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	<p>1990s (Scott & Rose 1996), then 25-30,000 (Keller 2000). Data suggest a recent increase to 50,000 (Delany & Scott, 2002), of which ca. 37,000 were counted in 1999 (Gilissen et al. 2002). This increase is especially noticeable in Central Europe, where Switzerland and Germany have been hosting high numbers only since ca. 1990 (Keller 2000). It is only partly offset by a parallel decline of wintering numbers in the western Mediterranean (Delany et al. 1999), which probably reflects a redistribution of birds within the overall region, as ringing studies had already suggested in the past (Keller 1999, 2000).</p> <p>The population of the Black Sea and Eastern Mediterranean wintering group is estimated at between 20,000 – 43,500 (Delany & Scott, 2002). The trend for the period 1987 – 96 has been a significant decrease, but it is not know whether part of it can be explained by a shift of wintering birds to Central Europe (Delany et al. 1999).</p> <p>The population of the west-central Asia/ southwest Asia wintering group is now estimated at 250,000 birds (Delany & Scott, 2002), mainly concentrated in winter in Azerbaijan (where 179,000 were counted in five sites in February 1996; Paynter et al. 1996), Turkmenistan, Kyrgyzstan and Kazakhstan (Perennou et al. 1994, Delany et al. 1999). It is presumed to be stable (Delany & Scott, 2002).</p> <p>- The south Asia wintering group For the sake of completeness, this group is estimated at 25,000 - 100,000 individuals (Perennou et al. 1994; Delany & Scott 2002).</p>
<p>Distribution throughout the annual cycle</p>	<p>The breeding distribution extends across Eurasia from Mongolia to Portugal between the latitudes of 35°N and 55°N.</p> <p>At the end of summer and in autumn, males and immatures group together in dense flocks to moult their plumage (Cramp & Simmons 1977). In Western Europe, the moulting movements are often northbound (Szijj 1975, Van Impe 1985). The moulting sites in Western and Central Europe are well known (Schneider-Jacoby <i>et al.</i> 1993), and are located in Germany, Spain, Switzerland and the Netherlands. These sites are sometimes used and then abandoned over time scales of one or more decades, the changes in habitat use and site occupation in Europe being very complex (Szijj 1975, Keller 1999, 2000). The Bodensee is currently a very important moulting site for the species (Schuster <i>et al.</i> 1983, Schneider-Jacoby 1999). In the Netherlands 50-75% of the males moult in the breeding areas (Dirksen & van der Winden 2003)</p> <p>Large moulting flocks have also been described in Central Asia and especially in western Mongolia (Nowak 1970).</p> <p>After moulting, birds migrate further to their winter quarters, which may in some cases be identical to moulting areas (e.g. the Bodensee currently). From 1977 until 1981, central and western European birds mainly wintered in Gallocanta lagoon in northern Spain. The abandonment of this site was followed by an increased use of lakes in Central Europe and other Spanish sites, with the most important ones being: Albufera de Valencia, Marismas del Guadalquivir and Ebro Delta in Spain, the Lac de Neuchâtel and Lac Léman in Switzerland, the Bodensee on the German-Swiss border and the Camargue in France (Keller, 2000; Barbalat 1999 to 2003).</p> <p>The populations of the Black Sea basin winter in the countries of the eastern Mediterranean and especially in Turkey. Up until 1980-89, Greece harboured several thousand wintering birds, but most of the wetlands then used have been drained (Handrinos & Akriotis 1997).</p> <p>Eastern populations winter in the Indian sub-continent, the largest concentrations being in</p>

	Pakistan and India, and around the Caspian Sea in Azerbaijan, Iran, Kazakhstan, Turkmenistan and Uzbekistan (Roberts 1991, Perennou <i>et al.</i> 1994, Scott & Rose 1996, Paynter <i>et al.</i> 1996, Lopez & Mundkur 1997).
Survival and productivity	<p>There are no European-wide monitoring schemes to measure <u>annual mortality</u> of Red-crested Pochard. Some states gather bag statistics on specific species and others have ringing schemes, which generate recoveries from which annual estimates might be generated. There is very little published data on annual survival of Red-crested Pochard in western Europe. The studies of Juan Amat (1982, 1985) in the Coto Doñana in Andalucia and of Llorente and Ruiz (1985) in the Ebro Delta are the most complete but the demography of the species and especially its survival rate are poorly known throughout its distribution range, including EU countries.</p> <p>There are no European-wide monitoring schemes to measure <u>annual productivity</u> of Red-crested Pochard. Some states monitor their own breeding numbers to some extent, but there is no attempt to monitor the state of wetlands utilised by Red-crested Pochard or to sample the output per female on a broad geographical scale.</p> <p>Some information is available on clutch sizes, hatching and fledging dates and occasionally, indices of breeding success (e.g. number of young raised per female) for some years. However, these indices cannot usually be interpreted in a standard way because they include broods of variable age, and therefore with variable survival rate until fledging. Nevertheless a few studies from Catalunya (Spain) and Germany have given an average size of between 5.5 – 6.8 ducklings for broods surviving till ca. 2 weeks old, and between 4.3 – 4.4 for broods surviving till just before independence of the fledglings (Muntaner <i>et al.</i>, 1984; Llorente & Ruiz 1985 ; Bauer & Glutz 1969).</p>

Life history	As with most duck species, formation of pairs starts in winter, but most attachments resulting in strong bonds probably develop gradually during spring migration. The pair-bond is monogamous and of seasonal duration. Sexual maturity is reached at the age of one year though some birds probably do not first breed until the second year (Cramp & Simmons 1977).																																																							
Breeding	<p>The species breeds as isolated pairs or in loose colonies. It sometimes nests among colonies of other species, e.g. Black-winged stilt <i>Himantopus himantopus</i>, in which case their breeding success can be significantly higher (Amat 1982). Intraspecific nest parasitism is quite common, and reached up to 30% of nests in southern Spain (Amat 1982).</p> <p>The average clutch size is 8-10 eggs, the extremes being 6 and 14 eggs (Snow & Perrins 1998). Mean clutch sizes recorded in Europe in different populations/ years were quite variable :</p> <table border="1"> <thead> <tr> <th>mean</th> <th>site</th> <th>Years</th> <th>sample size</th> <th>reference</th> </tr> </thead> <tbody> <tr> <td>10.2</td> <td>Germany</td> <td>-</td> <td>27</td> <td>Bauer & Glutz 1969</td> </tr> <tr> <td>6.7</td> <td>Rhône valley</td> <td>1990-91</td> <td>-</td> <td>Rioux 1992</td> </tr> <tr> <td>7.3</td> <td>Camargue</td> <td>1990-91</td> <td>24</td> <td>Rimbert 1990, Gaillardin 1991</td> </tr> <tr> <td>6.8</td> <td>Forez (France)</td> <td>1980-84</td> <td>50</td> <td>Trouvilliez in Boutin 1994</td> </tr> <tr> <td>5.9</td> <td>Forez</td> <td>1992-97</td> <td>175</td> <td>Badin 1997</td> </tr> <tr> <td>6.4</td> <td>Italy (Sardinia)</td> <td>-</td> <td>11</td> <td>Brichetti 1992</td> </tr> <tr> <td>10.2</td> <td>Ebro Delta (Spain)</td> <td>1980-82</td> <td>16</td> <td>Llorente & Ruiz 1985</td> </tr> <tr> <td>7.75</td> <td>Guadalquivir</td> <td>1998</td> <td>16</td> <td>EBD unpublished</td> </tr> <tr> <td>9.9</td> <td>Guadalquivir</td> <td>-</td> <td>48</td> <td>Amat (1982)</td> </tr> <tr> <td>12.5</td> <td>Netherlands</td> <td>-</td> <td>21</td> <td>Hellebrekers & Voous (1964)</td> </tr> </tbody> </table>	mean	site	Years	sample size	reference	10.2	Germany	-	27	Bauer & Glutz 1969	6.7	Rhône valley	1990-91	-	Rioux 1992	7.3	Camargue	1990-91	24	Rimbert 1990, Gaillardin 1991	6.8	Forez (France)	1980-84	50	Trouvilliez in Boutin 1994	5.9	Forez	1992-97	175	Badin 1997	6.4	Italy (Sardinia)	-	11	Brichetti 1992	10.2	Ebro Delta (Spain)	1980-82	16	Llorente & Ruiz 1985	7.75	Guadalquivir	1998	16	EBD unpublished	9.9	Guadalquivir	-	48	Amat (1982)	12.5	Netherlands	-	21	Hellebrekers & Voous (1964)
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9.9	Guadalquivir	-	48	Amat (1982)																																																				
12.5	Netherlands	-	21	Hellebrekers & Voous (1964)																																																				

	<p>This table could suggest that breeding variables vary between years, possibly depending on the ecological conditions on the nesting sites, but variations may simply be due to non-standardised methods of data collection.</p> <p>Hatching takes place after 26-28 days of incubation as early as the start of April (Broyer & Daléry 2000) but the peak of hatching occurs in June and July (Boutin <i>in</i> Yeatman-Berthelot & Jarry 1994, and see for example Rioux 1992). However, breeding is not synchronised throughout Europe, or even within a given breeding site, so that for example the fledging date varies from mid-June to September in the Camargue (Boutin <i>in</i> Yeatman-Berthelot & Jarry 1994) and in the Dombes (Broyer 1994). Young are capable of flight from the age of 45 to 50 days (Cramp & Simmons 1977, Boutin <i>in</i> Yeatman-Berthelot & Jarry 1994).</p> <p>In France, the timing of breeding was monitored in the Camargue in 1990, 1991 and 1998 (Rimbert 1990, Gaillardin 1991, Bourbier 1998), in the Forez in 1992, 1993 and 1998 (Broyer 1994) and in 1998 in the Dombes (Broyer & Daléry 2000). It varied from one year to another and from one site to another. On 15 August 1990, 46% of broods were still not fledged in the Camargue, compared to 40% on the same date and same site in 1992 and between 5% and 10% in 1998. In the Forez, 7% were incapable of flight on 15 August 1992 and all broods had fledged by this date in 1993. The breeding season of the red-crested pochard can therefore last into late summer. These inter-annual and inter-regional differences suggest that local and /or between years variations in weather patterns can be determining factors in the timing of hatching.</p> <p>In the Dombes (France), ca. 40% of breeding pairs have been estimated to be successful in the early breeding season using the method of monitoring spring groups of non-breeders (Broyer 1994, Broyer & Daléry 2000). Further breeding success figures in the Netherlands are provided by Dirksen & Van der Winden 1996 and Dirksen et al. (unpubl).</p> <p>In short, the breeding biology of the red-crested pochard is unusual in several aspects, particularly the following:</p> <ul style="list-style-type: none"> - a great excess of males compared to females in autumn and winter (Cramp & Simmons 1977), - a strong tendency for brood parasitism in clutches of other species (Hellebrekers & Voous 1964, Cramp & Simmons 1977, Amat 1985), Brood parasitism is in The Netherlands not likely and historical reports about brood parasitism could be attributed to human interference in incubating ducks (Van der Winden & Dirksen in prep). - - a production of fledged young that would apparently be slightly lower on average than that of other Anatidae (Broyer 1994), - a relatively long breeding season extending from spring until autumn.
Feeding	<p>During the breeding season, the red-crested pochard is mainly a herbivore feeding on beds of macrophytes (especially <i>Characaea</i>) underwater and at the surface (Cramp & Simmons 1977, Snow & Perrins 1998). In the Netherlands, the determining importance of the charophyte <i>Nitellopsis obtusa</i> on the breeding grounds has been demonstrated by van der Winden <i>et al.</i> (1994) and Ruiters <i>et al.</i> (1994).</p> <p>Outside the breeding season, Llorente <i>et al.</i> (1986) and Allouche <i>et al.</i> (1988) analysed the autumn diet of the Red-crested Pochard, in the Ebro Delta and the Camargue respectively. It mainly comprised seeds of Cyperaceae (<i>Scirpus littoralis</i>), Najadaceae (<i>Naias marina</i>) and rice (<i>Oryza sativa</i>). At the start of the wintering period, the species therefore seems able to adapt to a mainly seed diet. It can extensively use ricefields, as do 43% of wintering birds in</p>

	<p>the Ebro Delta (Llorente <i>et al.</i> 1986). The species also consumes aquatic macrophytes including charophytes in lagoons and lakes, both during the moult and in winter. Macrophytes of the genera <i>Potamogeton</i> and <i>Ruppia</i> are also consumed in abundance as has been shown in the Camargue by Allouche <i>et al.</i> (1988). The red-crested pochard can also feed in the sea and in estuaries where it has been reported to feed on <i>Zostera noltii</i> (Llorente <i>et al.</i> 1988).</p>
Outside the breeding season	<p>The red-crested pochard is very gregarious both during the moulting period and in winter, at least on its day roosts where it rests and conducts its mating displays. Moulting movements start as early as June (Hauri 1973). They are complex and have varied greatly in recent decades (Szijj 1975), at least for the westernmost population that is also the best known. Moulting traditions have changed rapidly, perhaps due to new environmental constraints (see Keller 1999). For example, water pollution leading to the disappearance of food plants and especially charophytes such as <i>Nittelopsis obtusa</i>, which fixes sulphate and calcium, and whose consumption favours the regrowth of feathers after the moult, led to the abandonment of moulting sites on the Bodensee and in the Netherlands in the 1960s. Instead, birds turned mainly to Spanish sites (Rüger <i>et al.</i> 1986, Berndt <i>in</i> Hagemajjer & Blair 1997), especially the Gallocanta lagoon in Zaragoza, Aragon (Lucientes 1977, 1978). Thereafter, the water shortage and occasional complete drying of the Gallocanta lagoon and the improvement of the water quality in Central Europe that favoured the re-appearance of charophyte beds (Lecocq 1997), was accompanied by a switch to new moulting (and subsequently wintering) sites along the eastern coast of Spain in the 1980s, then towards Swiss and German lakes (Bodensee, Lacs Léman and de Neuchâtel) from the 1990s onward (Keller 1999; Parbalat, 2002, 2003).</p> <p>Migration towards wintering areas in the Camargue starts in September and October and culminates in November/ December (Tamisier <i>in</i> Blondel & Isenmann 1981, Boutin <i>in</i> Yeatman-Berthelot & Jarry 1994).</p> <p>The return migration toward the breeding sites takes place mainly in February and March throughout Europe.</p>

Habitat requirements	
Breeding habitat	<p>For nesting, the Red-crested Pochard prefers eutrophic ponds and lakes bordered by emergent halophytes and with beds of submerged macrophytes. It will also nest on slow-flowing reaches of rivers. According to the literature, reedbeds of <i>Phragmites australis</i> seem to be a favourable habitat that is used at least for nesting and sheltering the ducklings. Ponds and marshes bordered with <i>Phragmites</i> reedbeds are the most frequently mentioned in Europe as breeding habitat (Llorente & Ruiz 1985, Schneider-Jacoby & Vasic 1989, Heiser 1992, Boutin <i>in</i> Yeatman-Berthelot & Jarry 1994, Snow & Perrins 1998, Dehorter & Rocamora <i>in</i> Rocamora & Yeatman-Berthelot 1999). Clearings of open water or shrubby islands are preferred nesting sites within these reedbeds (Jauch 1952, Bersot 1979, Hauri 1983).</p> <p>Table 5 (Section 2, below) summarizes the available information for some countries; it should be noted that it mainly presents diurnal habitat requirements, nocturnal habitat requirements and notably feeding ones, being probably different.</p> <p><i>Phragmites</i> stands are not the only macro-habitats used; <i>Typha</i> spp. stands are preferred in the Forez and Dombes (Broyer & Daléry 2000), stands of <i>Juncus maritimus</i> are mainly used in the Ebro Delta (Llorente & Ruiz 1985) and salt scrub of <i>Arthrocnemum glaucum</i> is used in the Marismas of the Guadalquivir (Amat 1982). Salt scrub of <i>Arthrocnemum</i> spp. and of <i>Suaeda fruticosa</i> bordering brackish water were the main nesting sites in the Camargue until about 1980 (Blondel & Isenmann 1981, Isenmann 1993, Boutin <i>in</i> Yeatman-Berthelot & Jarry 1994) before almost the entire breeding population changed its habitat selection toward freshwater marshes with reedbeds.</p>

	<p>It was suggested that this sudden change in habitat, that occurred over a decade by a breeding population of a few hundred adults, was caused by the large increase in the local numbers of yellow-legged herring gulls <i>Larus cachinnans</i> (Boutin <i>in</i> Yeatman-Berthelot & Jarry 1994) and therefore a probable increase in predation on clutches and broods in the brackish water areas that are preferred by herring gulls. It therefore seems that the habitat requirements of the species are mostly determined by the absence of excessive predation and/or disturbance and that the water salinity and vegetation structure are not limiting factors (but see Broyer & Daléry 2000). However, the exact influence of these factors remains to be described and compared at different geographical scales and especially between breeding regions.</p> <p>Brackish, alkaline and saline lakes and lagoons are used for breeding particularly along the coasts of the Baltic Sea and in Central Asia (Berndt <i>in</i> Hagemeyer & Blair 1997, Snow & Perrins 1998).</p> <p>In some regions, the area of water bodies and of <i>Typha</i> spp. stands seem to be factors positively influencing the choice of nesting sites (Broyer & Daléry 2000). The area of <i>Phragmites australis</i> reedbeds and open water, plus the water depth at various stages in the breeding season could also be influential criteria (Bourbier 1998).</p> <p>Being a herbivorous feeder, the presence of dense macrophyte beds and especially of <i>Chara</i> spp. is frequently mentioned in Europe and Central Asia as a key criterion influencing the choice of breeding (Boutin <i>in</i> Yeatman-Berthelot & Jarry 1994), moulting and wintering sites (Cramp & Simmons 1977 and Weise 1993 (for a complete review, Tamisier <i>in</i> Blondel & Isenmann 1981, Allouche <i>et al.</i> 1988, Kiss <i>et al.</i> 1997). In the Netherlands, the determining importance of a charophyte <i>Nitellopsis obtusa</i> on both the breeding and moulting grounds has been demonstrated by van der Winden <i>et al.</i> (1994) and Ruiters <i>et al.</i> (1994).</p>
Moult	<p>During the period when they renew their plumage, the birds briefly become flightless and seek out large areas of open water (Van Impe 1985, Amat <i>et al.</i> 1987), probably for reasons of tranquility and safety. These bodies of water may be coastal or inland, brackish or fresh. The immediate proximity of food, i.e. mainly beds of charophytes, can also act as a limiting factor (Amat <i>et al.</i> 1987) because of the heavy physiological requirements during the moult.</p>
Winter	<p>Lagoons, lakes and ponds used as daytime roosts can be fresh or slightly saline, can be inland or on the coast and preferentially have marginal vegetation that can be used as shelter (Boutin 1986, Tamisier <i>in</i> Yeatman-Berthelot & Jarry 1991).</p> <p>Key habitat requirements include the lack of disturbance, a large area, and safety (Boutin 1986). Sites with no hunting are chosen preferably, or exclusively (Keller 1999, Schneider-Jacoby 2000). Proximity to sufficient feeding resources (see above “Feeding”) is also vital : the presence of macrophyte beds and particularly charophytes can act as a limiting factor, as has been observed in Switzerland (Lang 1981, Burri 1995, Schmieder 1998).</p>

Table 1. *Geographical distribution of Red-crested Pochard during the year (EU 25 only)*

Breeding	Migrating <i>(September – November & February – April/May)</i>	Non breeding visitor <i>(October – March)</i>
<ul style="list-style-type: none"> • Austria • (Belgium) • Czech Republic • (Denmark) • France • Germany • (Greece) • Hungary • Italy • (Latvia) • Netherlands • Poland • Portugal • Slovakia • • Spain • United Kingdom (non-native) 	<p>Principally all EU Member States except Ireland, Malta , and most Baltic countries. The following have areas of particular importance for staging Red-crested Pochard during migration:</p> <ul style="list-style-type: none"> • France • Germany • Poland • Spain 	<ul style="list-style-type: none"> • (Austria) • (Belgium) • (Cyprus) • (Czech Republic) • France • Germany • (Greece) • (Hungary) • Italy • (Netherlands) • Portugal • (Slovenia) • Spain

(..) : irregular as a breeding bird, or occasional in winter (a few dozen birds at most)

2. Available key knowledge

In a number of tables this chapter provides a summary of up-to-date knowledge on the biology, distribution and trends of the populations of Red-crested Pochard that occur in the EU. It also gives information on the hunting status in the Member States, including the states that have become members in 2004.

A major problem for the development of an Action Plan for the Red-crested Pochard is that the knowledge of the bag statistic and the year-to-year variation in the number of Red-crested Pochard taken throughout Europe is simply inadequate to assess the extent, variation and potential impact of hunting pressure. What is available on open seasons and annual bags is shown in Table 9.

Table 2. European breeding population of Red-crested Pochard *Netta rufina* (BirdLife International., 2004a).

States	Breeding population min - maximum	years	trend
Armenia	80-330	1997-2002	+
Austria	150-250	1998-2002	+
Azerbaijan	300-3,000	1996-2000	(0)
Belgium	1- 1	2001-2002	+
Bulgaria	0-0	1996-2002	-
Croatia	10-20	2002	+
Czech Rep.	200-250	2000	+
Denmark	0 – 1	1998-2001	0
France	650-850	2000-2002	0
Georgia	present	2003	?
Germany	420-540	1995-1999	+
Greece	(0-5)	1995-2000	(F)
Hungary	20-50	1995-2002	(-)
Italy	40-60	2003	0
Latvia	(0-5)	2002	?
Macedonia	3-9	1990-2000	(0)
Netherlands	120-170 180-200	1998-2000 2003	+ R van Beusekom in litt
Poland	15-20	1995-2000	0
Portugal	(40-100)	2002	(+)
Romania	(500-600)	2000-2002	(-)
Russia	20,000-40,000	1990-2000	+
Serbia & Montenegro	0-2	1990-2002	+
Slovakia	10-30	1980-1999	+
Spain	(2,500-10,000)	1998-2002	?
Switzerland	50-100	1998-2002	+
Turkey	1,800-2,800	2001	-
Ukraine	150-200	1990-2000	
United Kingdom	50*	?	
Total	27,000-59,000		

* : Tucker & Heath 1994 (feral population)

+ increasing

0 overall stable

- decreasing

F fluctuating

? unknown (no trend data)

Data quality

Bold: reliable quantitative data

Normal: generally well known)

Bracketed: poorly known, with no quantitative data available

Table 3. *Wintering population numbers of Red-crested Pochard Netta rufina in Europe.*

Country	Mid-winter Counts (IWC)			additional data
	1997	1998	1999	
Albania	2226	172	527	
Austria	18	43	134	
Azerbaijan	431	236	-	
Belgium	7	4	2	
Bosnia-Herz.	0	-	-	
Bulgaria	360	8	25	
Croatia	0	1	2	
Cyprus	2	0	1	
Czech Rep	0	1	1	
Denmark	0	0	0	
Estonia	0	0	0	
Finland				
France	1386	2015	1257	3830 (2002) fluctuation over 20 years period** 981 (2003)*** 2388 (2004)*** 4679 (2005)***
Georgia	-	4	-	
Germany	4006	10890	12186	
Greece	29	3	33	
Hungary	0	8	0	
Ireland	0	0	0	
Italy	51	102	148	
Latvia	0	0	0	
Lithuania	0	0	0	
Luxembourg	0	0	0	
F.Y.R.O.M.	564	2845	3196	
Netherlands	19	11	15	
Norway	0	0	0	
Poland	0	0	0	
Portugal	261	15	600	
Romania	66	1150	266	
Russia	0	0	0	
Serbia-Montenegro	0	20	4	
Slovakia	0	0	0	
Slovenia	0	0	1	
Spain	12655	11904	14403	7912-19448*
Sweden	0	0	0	
Switzerland	9211	3766	8733	
Turkey	61	-	6228	
Ukraine	0	5	9	
UK	97	75	85	P Newbery in litt
Totals	31353	33203	47771	

- : no data available that year

* for the period 1990-2001, representing 96% of the Western Mediterranean population (Marty Del Moral, 2002)

** Deceuninck(2004)

***Data from network ONCFS/FNC/FDC

All other data from the IWC synthesis by Gilissen et al. 2002

Table 4. Regional numbers of wintering Red-crested Pochard *Netta rufina*

Results from the International Waterbird Census (Gilissen et al 2002)

	1997	1998	1999
Baltic and Nordic Area	0	0	0
Central European area	13235	14702	21052
East Mediterranean & Black Sea area	3313	4208	10292
Northwest European area	147	529	312
West Mediterranean area	14232	13528	16115
Total *	30927	32967	47771

** Slight discrepancies with totals in Table 3 come from the fact that Azerbaijan, although part of Europe, is considered by Gilissen et al. (2002), following Perennou et al. (1994), to belong to the range of the of south-west Asian wintering group*

Table 5 : Habitats used by Red-crested Pochard in some EU member states in the breeding, wintering and migration seasons

Member State	water body	vegetation	characteristics	Ref.
Austria	lakes and reservoirs	reedbeds		15
Belgium • breeding	ponds			1
• wintering, migration	ponds, reservoirs, gravel pits			1
Denmark	lagoons, bays	reedbeds	depth <2m, freshwater	23
France • breeding	fish ponds, marshes, rivers	reedbeds, <i>Typha</i> stands	large areas of fresh water	21
• wintering	lagoons, marshes	macrophyte beds	large areas of fresh or brackish water during day, smaller water bodies including ricefields at night	20
Germany	ponds	reedbeds		27
Greece	lakes, reservoirs, lagoons			24
Italy • breeding	coastal lagoons, rivers	various macrophytes, reedbeds, <i>Typha</i> , <i>Scirpus</i>	freshwater	3, 4, 6
• wintering, migration	coastal lagoons, rivers, reservoirs, lakes canals	reedbeds	freshwater	3, 4, 6
Luxembourg	ponds gravel pits, rivers	reedbed	area 200 ha, depth 2 to 5 m	8
Netherlands	lakes	reedbeds, charophytes, macrophytes, <i>Typha</i> stands*	fresh water, small islands with marshy edges*	12
Portugal	coastal lagoons, rivers, reservoirs	not abundant, marginal reedbeds	fresh and brackish water, moderate area, sandy or sandy clay substrate.	7
Spain				
<u>Andalucia</u>	Lagoons estuaries	reedbeds		28
<u>Valencia region</u>	canals, ponds, salines	reedbeds		28
Castilla La Mancha	endorheic lagoons,	reedbeds		28
Extramadura	reservoirs			28
Ebro Delta • breeding	ponds, lakes, canals	reedbeds	salt marshes	17
• wintering, migration	lakes, coastal rivers		fresh and brackish waters, ricefields in winter	17
United Kingdom • breeding	lakes, gravel pits ponds	abundant macrophytes, reedbeds	depth 2 to 4 m	10
• wintering	lakes, gravel pits ponds			

References : as for Table 2 above (P. 19) * (DIRKSEN & VAN DER WINDEN, 2002)

Table 6. *Migration & Wintering sites of importance in Europe*

Sites meeting the 1% population criterion : 500 birds in the central Europe/ West Mediterranean population ; 320 in the Black Sea – east Mediterranean ; 2,500 in Azerbaijan ; Delany & Scott 2002. Season = P (Passage) or W (Winter).

Country	Sites of international importance for Red-crested Pochard	Average counts	Max. count (year)	Season	IBA n°	Protection status		Research/ Monitoring (<i>other than IWC</i>) carried out in the last 5 years
						Nat'l	Intern'l	
<i>Austria</i>	Southern Seewinkel & Zitzmannsdorfer Wiesen	500-800		P	003	Partial	High	
<i>Azerbaijan</i>	Aggel (Ah Göl) Lake Kirov Bay & Kizil Agach Sarysu (Sarasuy) Lake Sangachal Bay	10,000 165,000	2800 35,893 (1996) 220,000 (1993) 5000	W W W P	030 048 032 039	Partial Partial None None	None High None None	
<i>France</i>	Camargue	3642 (1991) 2249 (1999-2003)		W	234,235, 239,245	Partial	High	<i>Hunting bag estimates; breeding estimates taking detectability into account; local estimate of lead-shot prevalence</i>
<i>Germany/ Austria/ Switzerland</i>	Bodensee / Lake Constance (total)	5500	10,803 (1998)	W P	G 231 Sw 013, 014,015	G High Sw High	G High Sw None	
<i>Hungary</i>	Lake Fertő	800		P	003	High	High	
<i>Macedonia</i>	Ohrid Lake	3613	7000 (1990)	W	005	Partial	High	
<i>Poland</i>	Luknajno lake	900+		P	021	High	High	
<i>Romania</i>	Danube Delta		7900 (1988)	W	001	High	High	

<i>Spain</i> ²	Albufera de Valencia	7516		W	159	High	High	<i>Hunting bag estimates; detailed annual breeding census</i>
	Ebro Delta	3878		W	148	Partial	Partial	
	Laguna de Manjavacas	576		W				
	Marismas del Guadalquivir	1942		W	259	Partial	Partial	
	Vedados de Sueca	1700		W				
	River Ebro Dam	3000-5000		P	023	None	None	
<i>Switzerland</i>	Lac de Neuchâtel	3452	9730 (2001)	W	010, 011	Partial	Partial	
	Geneva (Léman) Lake	1907	4079 (2002)	W	007-8-9	Partial	Partial	
<i>Turkey</i>	Hirfanli baraji	594	3560 (1996)	W	054	None	None	
	Beysehir Gölü		603 (1996)	W	067	High	None	
	Egirdir Gölü	382	1503 (1992)	W	031	High	None	
	Koycegiz Gölü		528 (1996)	W	024	None	High	
	Isikli (Civril) Gölü	404	1060 (1992)	W	020	None	None	
	Burdur Gölü	750+	2814	W	030	High	High	
	Sultansazligi		17,000	P	052	High ³	Partial	
<i>Ukraine</i>	Sivash		1400-1600 (1998)	P				

Based on the International Waterfowl Census results (Scott & Rose 1996) and on the European IBAs Inventory (Heath & Evans 2000), completed for Switzerland with count data from Barbalat (1999, 2000, 2002a, 2002b, 2003) : average and maxima for mid- January counts in 1999 – 2003.

Only counts from the 1990's or 2000's are taken into account, except for :

(i) figures for which no year is provided in the source reference,

(ii) the Danube Delta, where the last full aerial survey was in 1988. Later surveys in the 1990's were terrestrial only. They have revealed at most 5422 birds (in 1992), but may be incomplete.

* :

² in Spain more sites than indicated may actually be classified as IBAs than indicated, but differences in site names used in the IWC and IBA inventory precludes a clear identification

³ Nevertheless highly threatened due to hydraulic works upstream

Table 7. Breeding sites of importance in the EU

Sites supporting important breeding numbers and thus meeting IBA criteria (Heath & Evans 2000). All data from this latter source except for the Camargue (Defos du Rau et al., 2003), Forez (Badin 1997, ONCFS unpublished), and Delta del Ebro 2003 (Bigas & Vidal 2004).

Country	Breeding sites of importance for RCP	Recent breeding population (pairs)	Year	IBA n°	Protection status :	
					National	International
<i>Austria</i>	Neusiedler See	100-200	1994	004	High	High
<i>Czech Republic</i>	Trebonsko	20-40	1996	008	High	High
	Nové Mlýny Middle reservoir	20-30	1996	009	High	High
	Lednice fishponds	20-30	1996	011	High	High
<i>France</i>	Camargue	600-700	2001	234,235, 239,245	Partial	High
	Dombes	80-120	1997	159	None	None
	Plaine du Forez	60	1997	167	Low	None
<i>Spain</i>	Albufera de Valencia	104-114	1996	159	High	High
	Santa Pola saltpans	321	1995	166	High	High
	Ebro Delta	1500-2000	1996	148	Partial	Partial
		2214	2003			
	Alcazar de San Juan- Quero endorreic lagoons	338	1996	195	None	Partial
	Tablas de Daimiel, Vicario & Gasset reservoirs, Malagon lake	237-1150	1996	197	Low	Partial
Marismas del Guadalquivir	70		259	Partial	Partial	
El Moro marshes	119	1996	156	None	High	

3 Threats

This chapter gives an overview of current human activities that are believed to have a negative impact on the Central European/western Mediterranean and the Black Sea/ eastern Mediterranean wintering groups of Red-crested Pochard. The limiting factors influencing Red-crested Pochard populations in the countries of the E.U. and more generally in Europe have been identified by Tucker (1996). On a national basis, they are summarized as per existing literature and national correspondents in Table 8, which confirms that habitat loss and habitat change (degradation, pollution etc) are by far the most serious threats for the species. Another adverse factor is disturbance, whilst hunting and lead-poisoning are of more questionable importance and other factors may have only a local impact.

For each population, the importance of each human activity is assessed according to the following ranking system:

- Critical: a factor causing or likely to cause **very rapid declines** (>30% over 10 years);
- High: a factor causing or likely to cause **rapid declines** (20-30% over 10 years);
- Medium: a factor causing or likely to cause relatively **slow, but significant, declines** (10-20% over 10 years);
- Low: a factor causing or likely to cause **fluctuations**;
- Local: a factor causing or likely to cause negligible declines;
- Unknown: a factor that is likely to affect the species but it is unknown to what extent

Special note for interpretation: stating that for a given population, the importance of a given factor is e.g. High **does not imply** that it has **currently** a High impact, but simply that the population is highly sensitive to this factor, which may or may not be currently under control.

1. Habitat loss/ degradation/ fragmentation

Habitat loss and major habitat transformations in the 20th century are considered to be responsible for local and regional declines of the breeding populations in Europe, and especially in the Black Sea (Paspaleva *et al.* 1984, Munteanu 1996, Kiss, pers. com.) and Caspian Sea basins (Russanov, pers. com., Krivenko *in* Tucker & Heath 1994)

Breeding habitat loss and degradation, especially in Central and Eastern Europe, result from wetland drainage, transformation of wetlands into reservoirs and climatic change. For example, during the period 1980-89, 16% of the area of the Danube Delta was transformed into agricultural land, forest or fish farms (Munteanu 1996). The habitats used in the European Union have also been destroyed or degraded, e.g. through fragmentation. In the Camargue, 40,000 hectares of natural habitats have disappeared in the last 50 years (Grillas & Tamisier 1994). In Greece, it seems that the drainage of some wetlands has been clearly responsible for the drastic decline in the wintering numbers of Red-crested Pochard (Handrinos & Akriotis 1997); in fact 61% of Greek wetlands have disappeared in the last 70 years (Handrinos 1992).

Water pollution, a particular type of habitat degradation, also seems to be a limiting factor for the species as shown by the changes in the breeding numbers in Austria, Denmark and Switzerland. In Austria and Switzerland, the occurrence and abundance of charophytes that are related to water quality seem to be essential factors that influence habitat use by the Red-crested Pochard (Aubrecht & Winkler 1997, Schneider-Jacoby *in* Heine *et al.* 1999, Keller 1999). In Denmark, pollution from urban sewage and agricultural fertilisers has led to eutrophication of the marshes used for breeding by the species and has led to the destruction of the aquatic invertebrate fauna and macrophytes while favouring the occurrence of botulism that kills birds (Jørgensen 1995). In the Netherlands, eutrofication phenomena in 1970-1980s have led to algal blooms and disappearance of *characea*, coinciding with minimum

numbers of Red-crested Pochards in the late 1980s (Dirksen & Van der Winden, 2002). However there have been no specific studies to quantify or explain the true impact of this habitat factor on the population of the Red-crested Pochard.

The extent of the decline in the Black Sea basin is unknown because of the imprecision in the estimate of the total population and its trends, so that most authors are unable to fully explain this decline (Munteanu 1996). The workshop "Anatidae 2000" on Anatidae habitat management and restoration (Strasbourg, France, December 1994) highlighted the need to identify the critical factors determining the habitat requirements of Anatidae (Pienkowski & Larsson 1996).

Importance of habitat loss/modification

- For **breeding areas** in the EU (almost exclusively bird belonging to the central European/ western Mediterranean wintering group) the importance of habitat loss/ degradation/ fragmentation is set at High/ Critical.
- For the EU **winter areas** of the central European/ western Mediterranean wintering group), the importance of habitat loss/ degradation/ fragmentation is set at High/ Critical.
- For the marginal **winter areas** of the Black Sea and Eastern Mediterranean wintering group, which fall within the EU (Greece and Cyprus only), the importance of habitat loss/ degradation/ fragmentation is set at High/ Critical.

2. Disturbance

Summer/staging

There is virtually no published data relating to the levels of disturbance to Red-crested Pochard in summer from any European states. Red-crested Pochards are the first to take flight in mixed diving duck flocks in reaction to watersports activities at Gouwzee moult/staging site. It is very sensitive to disturbance especially during moult (Krijgveld et al., 2004), but knowledge about the effects of disturbance effects are still sparse. In heavily recreated areas in the Netherlands birds respond to this by nocturnal feeding, requiring sufficient cover along lakes edges to roost by day.

Wintering

The disturbance caused by hunting or water sports around areas where the species congregates can be important. This is particularly acute on the Bodensee where hunting increases the flight distance and therefore the disturbance to flocks of ducks when approached by all humans whether hunters or not (Schneider-Jacoby 2000).

The creation of reserves of international importance for aquatic birds where hunting is prohibited and access for water sports restricted, has been of crucial importance for the extension of wintering flocks on the Bodensee (Schneider-Jacoby *in* Heine *et al.* 1999, Schneider-Jacoby 2000)

Importance

- For **breeding areas** in the EU (virtually exclusively birds belonging to the central European/ western Mediterranean wintering group) the importance of disturbance is set at Unknown.
- For the **winter areas** in the EU (virtually exclusively birds belonging to the central European/ western Mediterranean wintering group) the importance of disturbance is set at Medium/ High.

- For the Black Sea and Eastern Mediterranean wintering group, the importance of disturbance is set at Unknown. (*only very marginal wintering areas are in the EU, namely Greece and Cyprus*).

3. Hunting

Low population size and high fragmentation accentuate the western European populations' sensitivity to hunting (Gay et al. 2004). On the other hand, duck shooting is in many wetlands an economic or social activity that helps maintain vital breeding or wintering areas as wetland habitat, alongside other socio-economic activities (e.g. reed harvesting, cattle grazing, fish-farming, ecotourism etc). Therefore when dealing with this activity, the challenge is to not place more constraints than this activity can withstand, whilst ensuring however that proven detrimental effects on the Red-crested Pochard can be mitigated, when they are critical for the species demography.

Although the specific impact of hunting as a limiting factor for the Red-crested Pochard is difficult to assess in the absence of data on hunting bags in most areas, it seems that habitat degradation and hunting could act as a "chain reaction". For instance, in the Dombes (central-east France), agricultural intensification from the 1970s profoundly changed the habitat and impacted the populations of terrestrial game species, which led to a shift in hunting pressure toward aquatic species such as diving ducks, including Red-crested Pochard.

The information on hunting is provided for each of the countries of the E.U. in Table 9 below. The Red-crested Pochard can be legally hunted in only 2 countries of the European Union: Spain and France.

Aebischer *et al.* (1999) pointed out that in addition to a ringing program, it is essential to monitor the hunting bag if a complete integrated analysis of the population dynamics of a population of waterfowl is to be made with the aim of introducing sustainable management and exploitation. An unpublished study by ONCFS on the Camargue hunting bag is apparently the first reliable approach to this essential factor affecting the population dynamics of this uncommon game species.

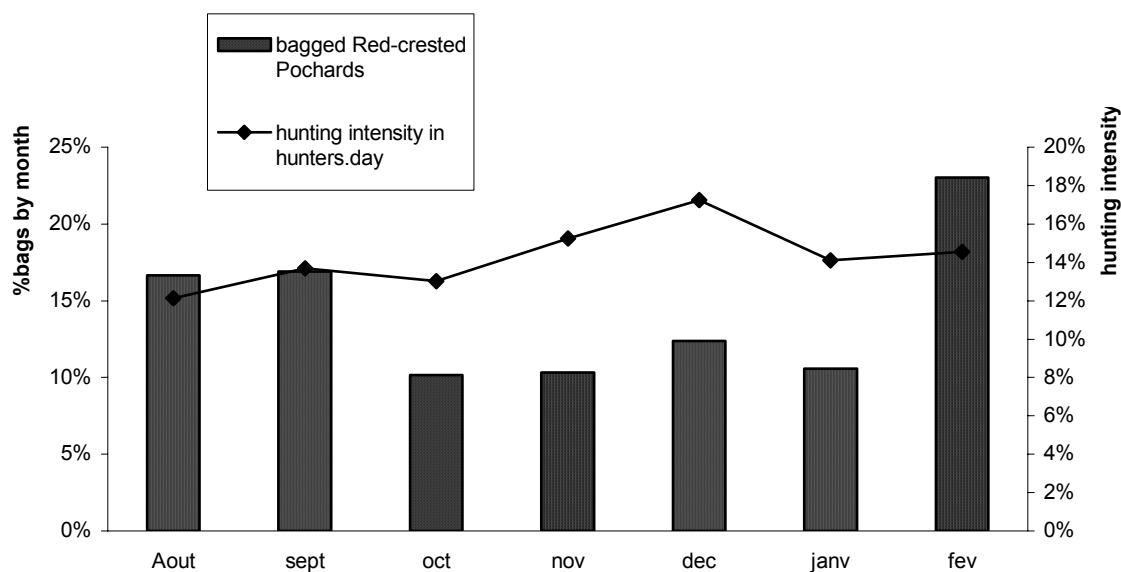
Breeding/staging

Little or nothing is known about the extent or effect of hunting on most breeding and staging grounds of the species. Within the Member States, hunting does occur in many breeding areas in the 3 countries where it may be legally hunted, but the impact on the breeding population is unknown. Hunting starts between mid-August and mid-September in France (Table 9), and could theoretically affect late broods: Gaillardin (1991) noted in the Camargue that late broods in 1991 did not fledge until the third week of September. However in recent years (late 1990s – early 2000s) it seems that breeding was always completed earlier in this area, largely before the opening of the hunting season for this species, on 15th September (P. Defos du Rau, pers. comm.). In other EU countries, hunting of other species on wetlands where the Red-crested Pochard breeds or stops during migration/ moulting could also indirectly affect this species, but evidence is lacking. In summary, although some impact is possible on some late broods in some areas, no evidence hints at its being of high importance for the population conservation overall.

In the Camargue, the birds shot in August and September (see Fig. 1 below), which account for 34% of the total local bag for the species, are mostly local breeders⁴. This mortality within the local Camargue population is therefore estimated at 300-1000 birds for both these months, which can be compared to a post-breeding population of ca. 3000-3500 birds (based on an estimate of 600-700 breeding pairs; Defos du Rau et al., 2003). So, hunting mortality in the first autumn would lie between 10 - 30% of the local population. This wide range illustrates the crucial need to combine population monitoring of game species with hunting bag studies.

⁴ *Tamisier* (in *Blondel & Isenmann 1981, in Yeatman-Berthelot 1991*) state that the post-breeding migration start in the Camargue in September and October and culminates in November and December, as also assumed by *Boutin* (in *Yeatman-Berthelot & Jarry 1994*) and *Scott & Rose (1996)* for the Western Palearctic.

Figure 1: Distribution over the hunting season of numbers of Red-crested Pochard shot in the Camargue (ONCFS unpublished)



Hunting bags distribution for *Netta rufina* (n=1220) on 12 hunting domains in Camargue (France) between 1947 and 1992 (ONCFS unpublished).

In the same area, the higher numbers shot in February coincide both with the end of the wintering season and with the start of the return spring migration (Cramp & Simmons 1977, Tamsier in Yeatman-Berthelot 1991, Tamsier & Dehorter 1999, Dehorter & Rocamora in Rocamora & Yeatman-Berthelot 1999).

Still in the Camargue, an attempt to quantify age and sex-ratios of birds shot in the early hunting season took place in 1990-91 (Gaillardin 1991), leading to the following results (most birds were not precisely identified and are discounted):

Juvenile		Adults	
Males	Females	Males	Females
36	28	5	12

However these figures should be taken with caution and as purely indicative, as they relied mainly on hunters' declarations and refer to a season (late summer) when identification is most difficult.

Winter

There are very few reliable data in the 3 EU countries where the Red-crested Pochard is a quarry species, because there are no specific national enquiries on the hunting bag for this species. The annual hunting bag in the European Union was estimated at 8000 birds by Shedden in 1986, 700 of which were shot in France and the rest in Spain. This should be revised upwards (9-11,000 birds at least) as in the Camargue alone an estimated 1000 to 3000 birds might be shot (ONCFS, unpublished; see also Dehorter & Tamsier 1998), to be compared with an average 3,600 mid-winter count. The study relied on the proportion of Red-crested Pochard in the total bag of ducks for the Camargue.

The only other quantitative data are of regional rather than national scope. In France outside the Camargue, studies by Lebreton and Rochette (1965) on duck hunting bags in the Dombes gave an estimated 0.25% of the total bag for Red-crested Pochard, a quantity that was deemed too low to be

interpreted. In Spain, the provincial administrations sometimes collect data on the hunting bag, but the figures come from hunting estates that provide information irregularly and partially (SEO/BirdLife unpublished). Recent data on the hunting bag in Spain cannot currently provide any reliable, national picture. However, from 1993 to 2000, regular monitoring conducted in the Ebro Delta Park provided an estimate of the average annual bag of Red-crested Pochard, which was of the order of 600 birds shot (range 300-1200 birds) (PNDE 2000, unpublished), to be compared with an average 3,900 mid-winter count).

Outside the EU, hunting takes a large number of birds in Azerbaijan and is a major source of disturbance for Anatidae, but it is also a crucial means of subsistence (Paynter et al. 1996). Further east in Central Asia, Prydatko (pers. com.) and Prydatko & Grachov (1989) estimated that Red-crested pochards in Kazakhstan represented between 1 and 6% of the total wildfowl bag of 190,000 - 790,000 Anatidae. Despite this imprecision in the hunting bag, if the number of birds shot in Central Asia is indeed so high, hunting could have an influence on this regional population dynamics. In Uzbekistan, the annual bag is estimated to be 2000 birds (Cadastre references book on hunting game animals of Uzbekistan 1992).

The specific impact of tourist hunting is unknown and needs to be monitored in the Black Sea basin and in Central Asia. In particular, the Danube and Volga deltas are heavily used by tourist hunters. The economic impact of this form of tourism is potentially favorable for the conservation of natural habitats in these deltas (Finlayson 1992), but it must then be practised in a sustainable manner and some species of Anatidae, such as the Red-crested Pochard, could currently be threatened by hunting (B.Kiss, *pers. com.*).

Importance

- For the central European/ western Mediterranean wintering group, the importance of hunting is provisionally set at Medium.
- For the Black Sea and Eastern Mediterranean wintering group, the importance of hunting is Unknown. (*only very marginal wintering areas are in the EU, namely Greece and Cyprus*).

4. Lead poisoning

The prevalence of lead poisoning cannot be assessed precisely in the Red-crested Pochard because of the low number of birds shot compared to other Anatidae species, and because only in one area apparently (the Camargue, S. France) has there been a systematic search for lead pellets in all waterfowl species shot, in one estate only. In the Camargue, in the 5 winters between 1998-99 and 2002-03, only one in 18 Red-crested Pochard shot had at least one lead shot pellet in its gizzard (Mondain-Monval et al., 2002 ; Olivier, 2003). This is towards the lower limit of the prevalence range of between 4 - 36% found for other Anatidae species analysed in the same study. It may suggest that the Red-crested Pochard may be less exposed to the risk of lead-poisoning than most Anatidae; however the small sample size precludes any hasty conclusion, and data is required from more hunting seasons, and if possible from more areas where the species is hunted.

Importance

- For birds belonging to the central European/ western Mediterranean wintering group the importance of lead poisoning is provisionally set at Low (but based on a very low sample size and one local study only).
- For the other wintering groups the importance of lead poisoning is set at Unknown.

5. Others

A number of other factors (see Table 9) such as diseases (e.g. botulism), introduction of exotic species, natural factors (droughts etc) are of a lesser importance at EU scale, although they can play locally an important role: botulism in Denmark, alien species in some Italian regions and so on.

Global warming (e.g. through drought, flooding or sea-level rise) could potentially affect in the long term the breeding success and distribution of the species across Europe.

Table 8. Threats importance at national level in EU countries for which data is available for the Red-crested Pochard *Netta rufina*

Countries Factors	Au	Dk	Esp: Valenc.	Esp: Castilla	Esp: Andal.	Fr : repro.	Fr : hiver.	Ge	Gr	It: Sardinia	It: Sicily	It: other sites	P	UK
Habitat loss	A	B			B	B	C		A	C	C	B	B	C
Habitat change/ agricultural intensification, pollution	A	A	A	A	A	B	C	A ?	A/B	B	C	B	B	C
Habitat change/fish farming		B/C ?			C	A			C	A	C	A		C
Pond and marsh management						B	C				B			
Poisoning (pesticides, lead)		B			B	C	C			C	B	A	C	C
Disease (e.g. botulism)		A				C				C	C	C	C	C
Predation		C				B?				C	C	C	C	C
Poaching		C				C			C	C	B	A	C	C
Hunting		C	A	B	B	A	A	B ?		C			C	C
Human activities (disturbance)		C	C	C	B	C	C	A ?		A	B	A	B	B
Climate													C	
Accidents		C								C	C	C	C	C
Introductions of species, hybridisation		B ?								C	C	A		C
Other factors: over-exploitation of groundwater				A	B									
Other factors: drought			C	B	B									
Other factors: infrastructure			B	B	C									

A: High importance B: Medium importance C: Low importance

Table 9. Information on hunting (status, period, bag) in the EU Member States, for the Red-crested Pochard *Netta rufina*

Member State	Status	Hunting season (national)	Hunting season (regional)	Annual bag	Ref.
Austria	P				15
Belgium	P				1
Czech Republic	P (E)				
Cyprus	P (E)				
Denmark	P				23
Estonia	P (E)				
France	H	01/09 – 31/01		1500-4000?	22
Germany	P (E)				
Greece	P				24
Hungary	P (E)				
Italy	P				3, 6
Latvia	P (E)				
Lithuania	P (E)				
Luxembourg	P				8
Malta	P (E)				
Netherlands	P				12
Poland	P (E)				
Portugal	P				7
Spain	H	Mid/ Late Oct – Early Feb.		?	28
- Comunidad Valenciana	H			declining	16
- Ebro Delta	H			80-120; stable	17, 28
				300-1200 (aver. 600)	45
Slovakia	P (E)				
Slovenia	P (E)				
Sweden	P				18
United Kingdom	L			very low	10

Legend: C: species that can be hunted with a fixed open season
P: species protected by national legislation
P (E) : species protected at least by EU Bird Directive (no information on national legislation)
L: protected species that can be killed by government exemption/authorisation

Reference numbers : as for Table 2 above

4. Policies and legislation relevant for management

Table 10. *International conservation and legal status of the Red-crested Pochard.*

World Status ⁵	European Status ⁶		SPEC category ⁷		EU Birds Directive Annex	Bern Convention Annex	Bonn Convention Annex	AEWA Agreement	CITES
	1994	2004	1994:	2004:					
Not listed	Declining	Favorable	3	NON-SPEC	II/2	Annex III	Annex II	Annex II	Not listed

Member States / Contracting parties obligations

Red-crested Pochard is listed on Annex II/2 in the EU Birds Directive, which imply that it can be hunted only in those Member States for which it is mentioned (namely in this case : France and Spain).

⁵ BirdLife International/ IUCN Red List assessment.

⁶ From Tucker & Heath (1994)/ BirdLife International, 2004b

⁷ From Tucker & Heath (1994)/ BirdLife International, 2004a: SPEC 3 = Species whose world populations are not concentrated in Europe, but which have an unfavourable conservation status in Europe.

5. Framework for Action

Priority statement/evaluation

The Red-crested Pochard is a relatively uncommon waterfowl species in most of its range in Europe, and a marginal quarry species in the only three countries where it is legally hunted. Over recent decades (1990-2000), the species appears as stable with marked fluctuations or increasing. This is reflected both in wintering numbers (Delany et al. 1999) and in breeding numbers in the countries with the largest populations (BirdLife International, 2004a). However caution is required, as even in the best-known, westernmost population, it may actually be impossible to detect any true trends (Keller 1999), especially because of the difficulty in assessing breeding population sizes accurately (Defos du Rau et al., 2003).

Little is known about the reasons for declines in the eastern European population, but habitat loss in its breeding grounds (outside the EU) is believed to be of major importance. These losses are due to both wetland drainage and climatic changes affecting its key breeding sites, like the Volga delta in Russia (Krivenko, in Tucker & Heath 1994).

Its highly concentrated wintering distribution makes it highly vulnerable to disturbance, or chance events like accidental pollution. On the other hand, the species has shown over recent decades a flexibility to adapt quickly to changing environmental conditions, similar to that of waterbird species living in arid areas: it can quickly shift its main moulting or wintering areas as a response to local limiting factors.

Overall, efforts should therefore be addressed at minimising wetland habitat loss, degradation and pollution, reducing disturbance at key sites, increasing knowledge on key gap areas (e.g. real breeding population sizes; hunting bags etc), and ensuring that protection measures are applied in a co-ordinated fashion throughout the flyway.

Purpose of the action plan

The Red-crested Pochard appears to be stable (although fluctuating) or increasing in most EU member states where it occurs. However it has been declining further east, in populations that winter in the eastern EU (marginally) and several Accession Countries (prominently). Recognising that the current (2005) population level represents a minimum, the plan aims to:

Maintain the European population of red-crested pochard at no less than the levels in 2004⁸ ensuring the declining trends in Hungary, Romania and Turkey are reversed by 2009

Results for the period 2006-2009

This section outlines the Results to be achieved during the first 3-year period of Red-crested Pochard management within the EU. The Results outlined below (and the corresponding

⁸ BirdLife International (2004a) *Birds in Europe: population estimates, trends and conservation status*. Cambridge, UK: BirdLife International. (BirdLife Conservation Series No. 12).

activities in Part 3) are targeted at the authorities responsible for the implementation of the provisions of the Birds Directive in the Member States. The Results listed below aim to initially address the most urgent issues to safeguard the Red-crested Pochard population in the EU but at the same time restrict the corresponding activities to be carried out in the 3 year period to a realistic level. It is the responsibility of the relevant authorities of each Member State to decide how to implement the management prescriptions of this plan.

It is anticipated that the objectives have been achieved when the running period of the Action Plan ends in 2009. It is furthermore an underlying assumption that this first Action Plan will be followed by versions with revised objectives that take into account the results achieved during the first phase, other new information etc. In the Logical Framework Analyses (LFA) table on page 41 and 47 the Results with corresponding Activities, verifiable indicators, means of verification and assumptions are outlined.

Some factors affecting the achievements of the long-term management objectives are not included among the objectives/activities of this plan. This includes for instance the water pollution and lead-poisoning issues.

Water pollution has been shown to have an impact at least on breeding areas. Clearly the improvement of water quality is out of the scope of a single-species Action Plan. However, it should be emphasised that the EU, through the adoption of the Water Framework Directive 60/2000, has undertaken a most significant move that can only benefit the Red-crested Pochard in the mid- to long-term.

Similarly, lead-poisoning is of a much broader scope than a single-species Action Plan; however measures are currently under preparation at EU level.

The Results to be accomplished by the first European Red-crested Pochard Action Plan period (2006 – 2009) are listed below.

Policy and legislative actions

There is a need to assess the sustainability of current hunting practices, and notably:

- the sustainability of current harvest rates,
- the opening and closing date for the hunting season in the EU Member States, so as to avoid effects on the late hatching Red-crested Pochard broods and on spring migration.

Results of the implementation of this Action Plan should therefore be that by 2009:

- (1) Red-crested Pochard hunting in EU Member States is set at sustainable levels, as defined by the results of studies to be undertaken to reach Result n° 10 below.
- (2) No red-crested Pochards are hunted in EU Member States during spring migration or during the end of the breeding season

Management of breeding, staging and wintering populations

Spain holds the majority of the EU breeding population of Red-crested Pochard. The trend of the Spanish population is unknown. In Europe, major factors reported to have caused declines or to be limiting populations include habitat loss and modification.

Furthermore, the Red-crested Pochard is highly concentrated in winter. Most of its important wintering resorts in the EU have some level of protection, but habitat degradation remains a threat in many of them.

Results of the implementation of this Action Plan should therefore be that by 2009:

- (3) Identification, conservation, wise-use and management of wetlands and other habitats with breeding, moulting, staging or wintering Red-crested Pochard is supported to ensure no loss of Red-crested Pochard numbers and distribution.

Management of human activities

In order to achieve conservation of vital habitats, the continuation of socio-economic activities is important (see below). However, the Red-crested Pochard is considered to be quite sensitive to disturbance by humans, and efforts should therefore be made to ensure that these activities have minimal adverse effects on the species. Results of the implementation of this Action Plan should therefore be that by 2009:

- (4) Within SPAs of international importance for wintering or moulting/ staging Red-crested Pochard, the species can benefit from sufficient disturbance-free areas to accomplish its vital activities.
- (5) The potential impact of disturbances created by the various socio-economic activities is assessed and where it is shown to be significant, mitigation measures are proposed in collaboration with the relevant stakeholders.

International co-operation

In view of (i) the rapid shifts of moulting/wintering areas and (ii) population fluctuations over recent decades, there is a need to maintain a permanent knowledge about staging and wintering population numbers and the distribution of the population groups in Europe. By 2009 the following result should be achieved:

- (6) The distribution, key sites and population size of the Red-crested Pochard within the EU and accessing countries are permanently monitored, and their changes/ shifts rapidly assessed on an international scale.

Research and monitoring

Beyond censuses, adequate monitoring of key parameters of Red-crested Pochard populations is vital to ensure maintenance of favourable conservation status. This must be done at local, national and international level. In the case of the Red-crested Pochard there is a need to better understand the limits of population units including their degree of isolation or interconnection, local population sizes in major breeding areas taking into account detection probability, annual productivity and annual mortality, and the relative importance of mortality causes, including harvesting. Ringing schemes and analyses of existing ringing/recovery information (including hunting bags) can help better define the status of population units within the Western Palearctic

and specifically the EU Member States. Results of the implementation of this Action Plan should therefore be that by 2009:

- (7) In key breeding areas, (i) local breeding population sizes and trends are assessed in a reliable way that takes into account recent results on the detection probability of breeding birds, and (ii) annual breeding productivity is measured.
- (8) Large-scale population units are clearly identified, and annual mortality of Red-crested Pochard is estimated.
- (9) The relative importance of hunting as a mortality cause for Red-crested Pochard is assessed, as well as the sustainability of current harvest rates.

6. Activities

6.1 Policy and legislative actions

To achieve the Result that Red-crested Pochard hunting in EU Member States is sustainable, and especially does not affect birds on spring migration or late breeding birds the relevant administrative body in the 3 Member States where hunting is legal shall take action to:

- (1) Ensure that the results of the studies on the sustainability of current harvest rates (see Result (10) above) are translated, if needed, into appropriate legislation in the relevant countries.
- (2) Ensure that national hunting seasons are in accordance with information on breeding period as defined in “Period of Reproduction and Prenuptial migration of Annex II Bird Species in the EU” (Annex I of this Action Plan).

6.2 Management of breeding, staging and wintering populations

To achieve the Result (3) that by 2009 all wetlands and other habitats with breeding, moulting, staging or wintering Red-crested Pochard are identified, conserved, wisely used and managed to ensure no loss of Red-crested Pochard numbers and distribution, the relevant administrative bodies of the Member States must:

- (3) Produce and disseminate clear management guidelines⁹ for the species based on the most recent knowledge, targeting key land-users or managers of sites harbouring the species (protected areas, fish-farms, hunting estates etc)
- (4) Support the wise use and management of wetlands with breeding, staging or wintering Red-crested Pochard in a way that stops habitat degradation and secures access to feeding opportunities. In particular, a great emphasis should be placed upon ensuring that sustainable socio-economic activities (e.g. fish-farming, reed harvesting, cattle grazing, hunting, ecotourism etc) can be maintained, with minimal constraints placed upon them, since their profitability ensures that vital habitats for the Red-crested Pochard are maintained, and not converted to non-wetland habitat.
- (5) Ensure that all staging and wintering sites within their country supporting more than 1 % of the relevant population of Red-crested Pochard, as well as all important breeding sites, are designated as SPAs.

6.3 Management of human activities

To achieve the Results (4) that in staging/moulting areas and in the winter quarters in the EU Red-crested Pochard can rest and feed with minimal disturbance, and (5) that the potential

⁹ E.g. like those currently under production in France as part of the “Cahiers d’Habitats” for the implementation of the Birds Directive.

impact of disturbance created by the various socio-economic activities is assessed and where it is shown to be significant, mitigation measures are adopted by mutual agreement with the relevant stakeholders, the following steps must be taken by 2009 by all Member States with SPAs of international importance for staging and/or wintering Red-crested Pochard:

- (6) Establish a minimum of two disturbance-free zones within each such SPA, in consultation with local stakeholders so as to reduce the constraints for the socio-economic activities that contribute to maintaining these areas as wetland habitat.
[Member States with SPAs of international importance for staging and/or wintering Red-crested Pochard]
- (7) Support studies aimed at assessing whether socio-economic activities present in key wetlands for the Red-crested Pochard cause any significant disturbances; and where it does, promote consultation with local users so as to ensure that this disturbance can be mitigated without impacting the activity in an unacceptable way.

6.4 International co-operation

To achieve the Result (6) that by 2009 distribution, key sites and population size of the Red-crested Pochard within the EU and accessing countries are permanently monitored, and their changes/ shifts rapidly assessed on an international scale., the authorities responsible for the implementation of the Birds Directive in the Member States must take the following action:

- (8) Support annual moult/migration and mid-winter census in all areas of international importance for wintering Red-crested Pochard within the EU, co-ordinated by Wetlands International as part of the International Waterfowl Census, and assist their rapid publication.

6.5 Research and monitoring

To achieve the Results that (7) key breeding areas of Red-crested Pochard are adequately monitored and their productivity assessed, (8) population units of Red-crested Pochard are identified, as well as the annual mortality, and (9) that the relative importance of hunting as a mortality cause for Red-crested Pochard is assessed, as well as the level of sustainability of current harvest rates, by 2009 the Member States with important breeding numbers of Red-crested Pochard must take the following actions :

- (9) Support or develop breeding monitoring schemes aiming at assessing (i) local population sizes, taking into account recent results on detection probability in key breeding areas (e.g. see Defos du Rau et al., 2003), and (ii) productivity.
- (10) Support or develop national ringing schemes on breeding, staging and wintering areas, as well as analyses of existing ringing data aiming at (i) identifying large-scale population units and (ii) providing annual estimates of Red-crested Pochard mortality.
- (11) Support the collection of national bag statistics (including age and sex ratios and monthly totals) and their analysis in terms of (i) hunting impact on the Red-crested Pochard and (ii) sustainability of current harvest rates (*in all Member States where the Red-crested Pochard is legally hunted*).

Table 11. *Actions in all countries in the EU with breeding, moulting or wintering population of Red-crested Pochard (the scale for Priority and Time Scale is given on page 46).*

<i>Result</i>	<i>Priority</i>	<i>National activities</i>	<i>Time scale</i>	<i>Means of verification</i>
1. Red-crested Pochard hunting in EU Member States is set at sustainable levels, as defined by the results of studies to be undertaken to reach Result n° 9 below.	High	Ensure that the results of the studies on the sustainability of current harvest rates (see Result (9) above) are translated, if needed, into appropriate legislation in the relevant countries	Medium	Publication/web-side with official hunting prescriptions in Member State available by 2007.

<p>2. No Red-crested Pochards are hunted in EU Member States during spring migration or during the end of the breeding season</p>	<p>High</p>	<ul style="list-style-type: none"> • Ensure that national hunting seasons are in accordance with information on breeding period as defined in “Period of Reproduction and Prenuptial migration of Annex II Bird Species in the EU” 	<p>Medium</p>	<p>Publication/web-side with official hunting season in Member State available by 2009.</p>
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<p>4. Within SPAs of international importance for wintering or moulting/ staging Red-crested Pochard, the species can benefit of sufficient disturbance-free areas to accomplish its vital activities.</p>	<p>High</p>	<ul style="list-style-type: none"> Establish a minimum of two disturbance-free zones within each such SPA, in consultation with local stakeholders so as to reduce the constraints for the socio-economic activities that contribute to maintaining these areas as wetland habitat. 	<p>Short</p>	<p>Publication/web-side of relevant national authority in Member States and report to Commission by national Ornis Committee delegate.</p>
<p>5. The potential impact of disturbances created by the various socio-economic activities is assessed and where it is shown to be significant, mitigation measures are proposed in consultation with the relevant stakeholders.</p>	<p>Medium</p>	<ul style="list-style-type: none"> Support studies aiming at assessing whether socio-economic activities present in key wetlands for the Red-crested Pochard cause any significant disturbances; and where it does, promote consultation with locals users so as to ensure that this disturbance can be mitigated without impacting the activity in an unacceptable way. 	<p>Medium</p>	<ul style="list-style-type: none"> Reports of recent disturbance studies provided by relevant national authority in Member States Protocols (MoUs...) signed with relevant stakeholders provided by relevant national authority in Member States
<p>6. The distribution, key sites and population size of the Red-crested Pochard within the EU and accessing countries are permanently monitored, and their changes/ shifts rapidly assessed on an international scale.</p>	<p>High</p>	<ul style="list-style-type: none"> Support annual moult/migration and mid-winter census in all areas of international importance for wintering Red-crested Pochard within the EU, co-ordinated by Wetlands International as part of the International Waterfowl Census, and assist their rapid publication. 	<p>Short</p>	<ul style="list-style-type: none"> Data for annual Red-crested Pochard mid-winter counts from all sites of international importance in Member States are present in IWC database. A similar database on moulting/ migration counts is set up

7. In key breeding areas, local breeding population sizes and trends are assessed in a reliable way that takes into account recent results on the detection probability of breeding birds, and annual breeding productivity is measured.	High	<ul style="list-style-type: none"> Support or develop breeding monitoring schemes aiming at assessing (i) local population sizes, taking into account recent results on detection probability in key breeding areas, and (ii) productivity. 	Medium	<ul style="list-style-type: none"> Publication/web-site of relevant national authority in Member States includes annual data from these monitoring schemes
8. Large-scale population units are clearly identified, and annual mortality of Red-crested Pochard is estimated.	High	<ul style="list-style-type: none"> Support or develop national ringing schemes on breeding, staging and wintering areas, as well as analyses of existing ringing data aiming at (i) identifying large-scale population units and (ii) providing annual estimates of Red-crested Pochard mortality. 	Medium	<ul style="list-style-type: none"> Publications /web-site of relevant national authority in Member States includes annual data from monitoring schemes A scientific publication reviewing all existing data and identifying exact population (or Management Units) limits
9. The relative importance of hunting as a mortality cause for Red-crested Pochard is assessed, as well as the sustainability of current harvest rates.	High	<ul style="list-style-type: none"> Support the collection of national bag statistics (including age and sex ratios and monthly totals) and their analysis in terms of (i) hunting impact on the Red-crested Pochard and (ii) sustainability of current harvest rates <i>(all Member States where the Red-crested Pochard is legally hunted).</i> 	Medium	<ul style="list-style-type: none"> Publications /web-site of relevant national authority in Member States includes annual data from hunting bags for the species Scientific publications produced, documenting new information re. sustainability of harvest rates

The **Priority** of each Result is given, according to the following scale:

- Essential: an action that is needed to prevent a large decline in the population, which could lead to species or subspecies extinction.
- High: an action that is needed to prevent a decline of more than 20% of the population in 20 years or less

- Medium: an action that is needed to prevent a decline of less than 20% of the population in 20 years or less
- Low: an action that is needed to prevent local population declines or which is likely to have only a small impact on the population across the range.

The **Time scales** attached to each Activity use the following criteria:

- Immediate: completed within the next year.
- Short: completed within the next 1-3 years
- Medium: completed within the next 1 – 5 years.
- Long: completed within the next 1 – 10 years
- Ongoing: an action that is currently being implemented and should continue.
- Completed: an action that was completed during the preparation of the Action Plan.

Table 12. Summary of objectives/ results and activities of the Red-crested Pochard Action Plan 2006-2009.

<i>DESCRIPTION</i>	<i>VERIFIABLE INDICATORS</i>	<i>MEANS OF VERIFICATION</i>	<i>ASSUMPTIONS</i>
<p>Purpose: Maintain the European population of Red-crested Pochard at no less than the levels in 2004¹¹ ensuring the declining trends in Hungary, Romania and Turkey are reversed by 2009.</p>	<p>The European population of the Red-crested Pochard population in maintained and restored.</p>	<p>Wetlands International’s IWC publications BirdLife International’s European Bird Database (with breeding numbers)</p>	<p>- Red-crested Pochard Management Plan approved and supported by EU and Member States. - Causes accessible to research using reasonable means</p>
<p>Results 2004-2007:</p> <p>1. Red-crested Pochard hunting in EU Member States is set at sustainable levels, as defined by the results of studies to be undertaken to reach Result n° 9 below.</p> <p>2. No red-crested Pochards are hunted in EU Member States during spring migration or during the end of the breeding season</p> <p>3. All wetlands and other habitats with breeding, moulting, staging or wintering Red-crested Pochard are identified, conserved, wisely used and managed to ensure no loss of Red-crested Pochard numbers</p>	<p>1. The results of the studies on the sustainability of current harvest rates (see Result (9) below) are translated, if needed, into appropriate legislation in the relevant Member States</p> <p>1b. This legislation is implemented by the relevant Member States</p> <p>2. Hunting season is not conflicting with “Period of Reproduction and Prenuptial migration of Annex II Birds Species in the EU”.</p> <p>3. All breeding, staging and wintering sites, which regularly supports internationally important numbers of Red-crested Pochard (see Tables 9 & 10) are designated as SPAs.</p>	<p>1. Publication/web-side with official hunting prescriptions in Member State available by 2009.</p> <p>1b. No official complaint is received by the EU re. non-implementation</p> <p>2. Publication/web-site with official hunting seasons in Member States available by 2008.</p> <p>3. List of SPAs proposed to the European Commission by EU Member States</p>	<p>All EU Member States have adequate resources and commitment to take responsibility for Red-crested Pochard management in accordance with the Birds Directives requirements.</p>

¹¹ BirdLife International (2004a) *Birds in Europe: population estimates, trends and conservation status*. Cambridge, UK: BirdLife International. (BirdLife Conservation Series No. 12).

and distribution

4. Within SPAs of international importance for wintering or moulting/ staging Red-crested Pochard, the species can benefit of sufficient disturbance-free areas to accomplish its vital activities.

5. The potential impact of disturbances created by the various socio-economic activities is assessed and where it is proven as being significant, mitigation measures are proposed in concertation with the relevant stakeholders.

6. The distribution, key sites and population size of the Red-crested Pochard within the EU and accessing countries are permanently monitored, and their changes/ shifts rapidly assessed on an international scale.

7. In key breeding areas, local breeding population sizes and trends are assessed in a reliable way that takes into account recent results on the detection probability of breeding birds, and annual breeding productivity is measured.

8. Large-scale population units are clearly identified, and annual mortality of Red-crested Pochard is estimated.

4. In each Member State with Red-crested Pochard staging or wintering in numbers of int. importance according to information published by Wetlands Int., at least two disturbance-free areas are established by 2009.

5.a. Recent studies on the impact of disturbance are published

5.b. Where studies have concluded to a significant impact, protocols/ MoUs are passed with relevant stakeholders so as to reduce the identified disturbance

6. Annual mid-winter counts from all sites which supports more than 1% of the relevant Red-crested Pochard population are carried out.

7. Annual breeding counts from all important sites for breeding Red-crested Pochard population (see Table 7) are performed

8. New information on Red-crested Pochard population units and mortality in Europe, and specifically within the EU Member States, is available.

4. Publication/web-side of relevant national authority in Member States and report to Ornis Committee by national delegate no later than 2009.

5. Reports of recent disturbance studies, and protocols (MoUs...) signed with relevant stakeholders, provided by relevant national authority in Member States

6. Data for annual Red-crested Pochard mid-winter counts from all sites of international importance in Member States are present in the International Waterbird Census (IWC) database managed by Wetlands International by 2009.

7.a. Papers and/or reports produced documenting new information, using methods that take into account the detection probability .

7.b. Annual breeding data from all important sites centralized in a database run by an organization to be agreed (e.g. Wetlands International Duck Specialist Group ?).

8. Papers and/or reports produced documenting new information.

<p>9. The relative importance of hunting as a mortality cause for Red-crested Pochard is assessed, as well as the sustainability of current harvest rates.</p>	<p>9.a. National bag statistics (including age and sex ratios and monthly totals) are available for the three EU Member States where the Red-crested Pochard is a legal quarry species, 9.b. These statistics are analysed in terms of (i) hunting impact on the species and (ii) sustainability of current harvest rates</p>	<p>9. Papers and/or reports produced documenting new information.</p>	
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DESCRIPTION	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
<p>Activities:</p> <ol style="list-style-type: none"> 1. All Member States must ensure that the results of the studies on the sustainability of current harvest rates (see Activity 11. below) are translated, if needed, into appropriate legislation in the relevant countries 2. Ensure that national hunting seasons are in accordance with information on breeding period as defined in “Period of Reproduction and Prenuptial migration of Annex II Bird Species in the EU”. 3. Produce and disseminate clear management guidelines for the species based on the most recent knowledge, targeting key land-users or managers of sites harbouring the species (protected areas, fish-farms, hunting estates...) 	<p>Progress and actions taken by Member State are reported to the Commission at annual Ornis Committee meetings</p>	<p>Minutes from Ornis Committee meetings and annual reports from Member States.</p>	<p>All Member States have commitment and adequate resources to implement the actions for Red-crested Pochard management in accordance with the Bird Directive requirements.</p>

4. Support the wise use and management of wetlands with breeding, staging or wintering Red-crested Pochard in a way that stops habitat degradation and secures access to feeding opportunities. In particular, a great emphasis should be placed upon ensuring that sustainable socio-economic activities (e.g. fish-farming, reed harvesting, cattle grazing, hunting, ecotourism...) can be maintained, with minimal constraints placed upon them, since their profitability ensures that vital habitats for the Red-crested Pochard are maintained, and not converted to non-wetland habitat.

5. The relevant administrative body in all Member States must ensure that all staging and wintering sites supporting more than 1 % of the relevant population of Red-crested Pochard, as well as all important breeding sites, are designated as SPAs., and

6. Establish a minimum of two disturbance-free zones within each such SPA, in concertation with local stakeholders so as to reduce the constraints for the socio-economic activities that contribute to maintaining these areas as wetland habitat.

7. The authorities responsible for the implementation of the provisions of the Birds Directive in the Member States must support studies aiming at assessing whether socio-economic activities present in key wetlands for the Red-crested Pochard cause any significant disturbances; and where they do, promote concertation with locals users so as to ensure that this disturbance can be mitigated without impacting the activity in an unacceptable way,

8. Support annual moult/migration and mid-winter census in all areas of international importance for wintering Red-crested Pochard within the EU, co-ordinated by Wetlands International as part of the International Waterfowl Census, and assist their rapid publication,

9. Support or develop breeding monitoring schemes aiming at assessing (i) local population sizes, taking into account recent results on detection

<p>probability in key breeding areas, and (ii) productivity,</p> <p>10. Support or develop national ringing schemes on breeding, staging and wintering areas, as well as analyses of existing ringing data aiming at (i) identifying large-scale population units and (ii) providing annual estimates of Red-crested Pochard mortality,</p> <p>11. Support the collection of national bag statistics (including age and sex ratios and monthly totals) and their analysis in terms of (i) hunting impact on the Red-crested Pochard and (ii) sustainability of current harvest rates</p>			
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7. References

- Aebischer, N.J., Potts, G.R. & Rehfisch, M. 1999. Using ringing data to study the effect of hunting on bird populations. *Ringing & Migration* 19 (suppl.) 67-81
- Allouche, L., Roux, P. & Tamisier, A. 1988. Position trophique des nettes rousses (*Netta rufina*, Pallas) hivernant en Camargue. *Rev Ecol* 43 : 167-175
- Amat, J.A. 1982. The nesting biology of ducks in the Marismas of the Guadalquivir, South-Western Spain. *Wildfowl*, 33 : 94-104
- Amat, J.A. 1985. Nest parasitism of Pochard *Aythya ferina* by Red-crested Pochard *Netta rufina*. *Ibis* 127: 255-262
- Amat, J.A., Lucientes, J. & Ferrer, X. 1987. La migracion de muda del pato colorado (*Netta rufina*) en Espana. *Ardeola*, 34 : 79-88
- Arik, B.M., Balkiz, Ö., Gem, E., Kurt, B., Onmus, Ö. & N.Özbagdatli. 2004. Türkiye'nin önemli kusalari, 2004 güncellemesi. *Doga Dernegi (BirdLife Turkey)*, Ankara, 232 pp.
- Aubrecht, G. & Winkler, H. 1997. Analysis of the international waterbird census (IWC) in Austria 1970-1995 – trends and numbers. *Biosystematics and Ecology Series n°13*, Osterreichische Akademie der Wissenschaften, Wien
- Baatsen, R.G. 1990. Red-crested Pochard *Netta rufina* in the Cotswold water park. *Hobby* 16 : 64-67
- Baccetti, N., Dall'Antonia P., Magagnoli, P., Melega, L., Serra, L., Soldatini, C. & Zenatello, M. 2002. Risultati dei censimenti degli uccelli acquatici svernanti in Italia: distribuzione, stima e trend delle popolazioni nel 1991-2000. *Biologia e Conservazione della Fauna* 111: 1-240.
- Badin, T. 1997. Suivi de la reproduction des canards dans le département de la Loire. rapport non publié, Fédération départementale des Chasseurs de la Loire Barbalat (2000). Recensements internationaux d'oiseaux d'eau en Suisse Romande : novembre 1998 & janvier 1999. *Nos Oiseaux* 47 : 195-199.
- Barbalat, A. 2000. Recensements internationaux d'oiseaux d'eau en Suisse Romande : novembre 1998 & janvier 1999. *Nos Oiseaux* 47 : 195-199.
- Barbalat, A. 2001. Recensements internationaux d'oiseaux d'eau en Suisse Romande : novembre 1999 & janvier 2000. *Nos Oiseaux* 48 : 133-139.
- Barbalat, A. 2002a. Recensements internationaux d'oiseaux d'eau en Suisse Romande : novembre 2000& janvier 2001. *Nos Oiseaux* 49 : 37-42.
- Barbalat, A. 2002b. Recensements internationaux d'oiseaux d'eau en Suisse Romande : novembre 2001 & janvier 2002. *Nos Oiseaux* 49 : 149-158.

- Barbalat, A. 2003. Recensements internationaux d'oiseaux d'eau en Suisse Romande : novembre 2002 & janvier 2003. Nos Oiseaux 50 : 191-198.
- Barbalat, A. 2004. Recensements internationaux d'oiseaux d'eau en Suisse Romande : novembre 2003 & janvier 2004. Nos Oiseaux 51 : 149-155.
- Bauer, K.M. & U.N. Glutz. 1969. Handbuch der Vögel Mitteleuropas. Vol. 3. Akademische Verlagsgesellschaft. Frankfurt, 504 pp.
- Berndt, R.K. 1997. *Netta rufina* in Hagemeijer, W.J.M. & Blair, M.J. The EBCC Atlas of European Breeding Birds. Their distribution and abundance. POYSER T & A.D., London
- Bersot, E. 1979. Reproduction de la Nette rousse *Netta rufina* au lac de Neuchâtel en 1978. Nos Oiseaux 35 : 22-24
- Bigas, D. & F. Vidal. 2004. Cens de cabussons, ànecs I fotges nidificants. Soldo, Informatiu del Parc Natural del Delta de l'Ebre 22 : 4.
- Bino, T. 1998. L'avifaune aquatique du système lagunaire méditerranéen de Karavasta (Albanie) et sa conservation. Thèse de Doctorat, Université de Montpellier II Sciences et Techniques du Languedoc
- Blondel, J. & Isenmann, P. 1981. Guide des oiseaux de Camargue. Delachaux & Niestlé, Neuchâtel, Paris
- Bourbier, J. 1998. Chronologie de la reproduction d'oiseaux d'eau et plus particulièrement de la Nette rousse (*Netta rufina*) sur les marais du Plan du Bourg (Camargue). rapport de stage BTA Gestion de la Faune Sauvage, Vendôme.
- Boutin J. 1986. Comportement diurne de la Nette rousse, *Netta rufina* P., pendant son hivernage en Camargue. Rev. Ecol., 41 : 261-269
- Boutin, J. 1994. Nette rousse in Yeatman-Berthelot D., & Jarry, G., Nouvel Atlas des Oiseaux nicheurs de France 1985-1989. S.O.F., Paris.
- Brichetti, P. 1992. Fistonie Turco in Brichetti, P., De Franceschi, P. & Bacetti, N. (Eds.) Fauna d'Italia. Aves. I Gaviidae - Phasianidae. Vol XXIX Edizioni Calderini Bologna.
- Broyer, J. 1994. The red-crested pochard in France. In Proceedings of the Conference on the importance of the Mediterranean basin for migratory avifauna, Carcassonne 22-24 April 1994. pp. 32-35
- Broyer, J. & Daléry, G. 2000. L'habitat de la Nette rousse *Netta rufina* sur les étangs piscicoles de l'est de la France en période de reproduction. Alauda 68 (3) : 185-191
- Burkhardt, M. & V.Keller. 2003. Rapport 2003 de la Station Ornithologique Suisse pour l'Association des Amis de la Station Ornithologique », 34 pp.
- Burri, J. 1995. Entwicklung der Makrophyten im Luzerner Teil des Vierwaldstättersees. Mitteilungen der Naturforschenden Gesellschaft Luzern 34 : 187-205
- Cadastre references book on hunting game animals of Uzbekistan. 1992. Tashkent, "FAN", 102 p.

- Caswell, F.D., Hochbaum, G.S. & Brace, R.K. 1985. The effect of restrictive regional hunting regulations on survival rates and local harvests of southern Manitoba Mallards. *Trans. N. Amer. Wildl. Natur. Resour. Conf.* 50 : 549-556
- Centre Ornithologique Rhône-Alpes. 1995. Proposition de création d'une réserve cynégétique et faunistique sur le domaine public fluvial du département de l'Ardèche. Rapport non publié.
- Clark, R.G., Sugden, L.G., Kent Brace, R. & Nieman, D.J. 1988. The relationship between nesting chronology and vulnerability to hunting of dabbling ducks. *Wildfowl* 39 : 137-144
- CORA. 2003. Les oiseaux nicheurs de Rhône-Alpes. CORA Editeur, 336 pp.
- Cramp, S. & Simmons, K.E.L. (Eds). 1977. *The Birds of the Western Palearctic*. Vol. 1. Oxford Univ. Press.
- Deceuninck, B., Dronneau, C., Kérautret, L. & R. Mahéo. 2002. Dénombrement des anatidés et foulques hivernant en France en janvier 2001. *Ornithos* 9 : 89-100.
- Deceuninck, B. 2004. Anatidés et Foulques hivernant en France: bilan de 20 années de dénombrement (1983-2002). *Ornithos* 11: 2-13.
- Deceuninck et al. 2004. Dénombrements d'Anatidés et de foulques hivernant en France à la mi-janvier 2003. WI / LPO /2004. 39 pp.
- Defos du Rau, P. 2002. Elements for a red-crested pochard (*Netta rufina*) management plan. *Game and Wildlife Science* 19 : 89-141.
- Defos du Rau, P., Barbraud, C. & J-Y Mondain-Monval. 2003. Estimating breeding population size of the red-crested pochard (*Netta rufina*) in the Camargue (southern France) taking into account detection probability : implications for conservation. *Animal Conservation* 6 : 379-385.
- Dehorter, O. & Rocamora, G. 1999. Nette rousse *Netta rufina*, in Rocamora, G. & Yeatman-Berthelot, D. Oiseaux menacés et à surveiller en France. Listes rouges et recherche de priorités. Populations. Tendances. Menaces. Conservation. Société d'Etudes Ornithologiques de France/LPO Paris
- Delany, S., Reyes, C., Hubert, E., Pihl, S., Rees, E., Haanstra, L. & van Strien, A. 1999. Results from the International Waterbird Census in the Western Palearctic and Southwest Asia 1995 and 1996 Wetlands International publication n°54
- Delany, S. & D.A. Scott. 2002. Waterbird population estimates (3rd edition). Wetlands International, Global Series n° 12, Wageningen (NL), 226 pp.
- Del Hoyo, J., Elliot, A. & Sargatal, J. 1992. *Handbook of the Birds of the World*. vol. 1, Ostrich to Ducks. Barcelona, Lynx.
- Den Boer, T. 2000. Beschermingsplan Moerasvogels 2000-2004. Vogelbescherming Nederland, rapport Directie Natuurbeheer nr. 47, Wageningen
- Dirksen, S. & Van der Winden, J. 2002. Krooneend *Netta rufina*. pp.134-135 in: SOVON Vogelonderzoek Nederland 2002, Atlas van de Nederlandse Broedvogels 1998-2000. -

Nederlandse Fauna 5. Nationaal Natuurhistorisch Museum Naturalis, KNNV Uitgeverij,
European Invertebrate Survey-Nederland, Leiden.

- Dvorak, M., Ranner, A. & Berg, H.M. (Eds.) 1993. Atlas der Brutvögel Österreichs. Umweltbundesamt, Wien
- El Agbani, M. A. 1997. L'Hivernage des Anatidés au Maroc : principales espèces, zones humides d'importance majeure et propositions de mesure de protection. Thèse de doctort d'Etat ès-Sciences, Faculté des Sciences, Rabat : 186pp
- Flint, P.L., Grand, J.B. & Rockwell, R.F. 1998. A model of Northern Pintail productivity and population growth rate. *J. Wildl. Manage.* 62 : 1110-1118
- Finlayson, C.M. (Ed.) 1992. A Strategy and Action Plan to conserve the wetlands of the lower Volga. IWRB, Slimbridge
- Fremuth, W., Bino, T., Bego, F., Jorgo, G., Micevski, B., Anastevski, V., Tzvetkov, P., Hristov, I., Schneider-Jacoby, M. & Shumka, S. Four years of simultaneous wintering waterbird census at the Ohrid and Prespa lakes 1997-2000. in prep.
- Gaillardin, C. 1991. La reproduction de la Nette rousse en Camargue. rapport de stage BEPA cynégétique, Vendôme
- Gay, L., Defos du Rau, P., Mondain-Monval, J-Y & P.A. Crochet. 2004. Phylogeography of a game species : the red-crested pochard (*Netta rufina*) and consequences for its management.
- Gilissen, N., Haanstra, L., Delany, S., Boere, G. & W.Hagemeijer. 2002. Numbers and distribution of wintering waterbirds in the Western Palearctic and Southwest Asia in 1997, 1998 and 1999. Results from the International Waterbird Census Wetlands International Global Series n°11, 182 pp.
- Gorman, G. 1996. The Birds of Hungary. Christopher Helm, Londres
- Hagemeijer, W.J.M. & Blair, M.J. 1997. The EBCC Atlas of European Breeding Birds. Their distribution and abundance. Poyser T & A.D., London
- Handrinos, G.I. 1992. Wetlands loss and wintering waterfowl in Greece during the 20th century: a first approach. In *Managing Mediterranean wetlands and their birds*, ed. M. Finlayson, T. Hollis & T. Davis. IWRB Spec. Publs. n°20: 183-188
- Handrinos, G.I. & Akriotis, T. 1997. The Birds of Greece. C. Helm & A.C. Black. London.
- Hauri, R. 1973. Zum brutvorkommen der Kolbenente *Netta rufina* in der Aarelandschaft suedlich von Bern. *Ornithol. Beob.* 70 (2) : 57-66
- Hauri, R. 1983. Zum Vorkommen der Kolbenente *Netta rufina* in der Aarelandschaft südlich von Bern und am Thunersee, 1973-1982. *Orn. Beob.* 80: 119-126
- Heath, M.F., Borggreve C. & Peet N. 2000. European Bird populations. Estimates and trends. Cambridge, UK, 160 pp. BirdLife Conservation Series n°10.

- Heath, M.F & M.I. Evans. 2000. Important Bird Areas in Europe. Priority sites for conservation. 2 vol., Cambridge, UK. BirdLife Conservation Series n°8, 1600 p.
- Heiser, F. 1992. Breeding of the Red-crested Pochard in Swabia, southwest-Bavaria. *Ornithol. Anz.* 31 (3): 159-161
- Hellebrekers, W.P.H. & Voous, K.H. 1964. Nestparasitisme van de Krooneend. *Limosa* 37: 5-11
- Heredia, B., Rose, L. & Painter, M. 1997. Les oiseaux mondialement menacés : situation en Europe. Plans d'action. Ed. du Conseil de l'Europe, Strasbourg
- Hückler, U. 1966. Ringfunde der Kolbenente (*Netta rufina*). *Auspicium* 2 : 248-258
- Isenmann, P. 1993. Oiseaux de Camargue. The Birds of Camargue. Société d'Etudes Ornithologiques, Brunoy
- Isenmann, P. & Moali, A. 2000. Les Oiseaux d'Algérie/The Birds of Algeria. SEOF, Paris, France. 336 pp.
- IUCN Species Survival Commission. 2000. IUCN Red List of Threatened Species (<http://www.redlist.org/>)
- Jauch, W.A. 1952. Probleme der Kolbenentenforschung. *Vögel der Heimat* 23: 1-7
- Jørgensen, H. E. 1995. Rødlistede fugle i Storstrøms amt 1995. Storstrøms amt, Nykøbing, Falster. 108 pp. [Red listed birds in Storstrøm county] – in Danish.
- Keller, V. 2000a. Winter distribution and population change of red-crested pochard *Netta rufina* in southwestern and central Europe. *Bird Study* 47 : 176-185.
- Keller, V. 2000b. Winterbestand und Verbreitung der Kolbenente *Netta rufina* in der Schweiz und im angrenzenden Ausland. *Ornithol. Beob.* 97: 175-190.
- Keller, V. (in prep.). Population size and trends of the Red-crested pochard *Netta rufina* in southwest / central Europe. In: Boere, G.C; Galbraith, C; Scott, D; Stroud, D, A and Underhill, L.G. (Eds.). 2005. Waterbirds Around the World. Proceedings of a global conference on waterbird flyways, Edinburgh, April 2004.
- Keller, V. & Antoniazza, M. 2001. L'importance des réserves d'oiseaux d'eau sur le lac de Neuchâtel pour la Nette rousse *Netta rufina* et d'autres espèces hivernantes. *Nos Oiseaux Suppl.* 5 : 81-90.
- Keller, V. & M. Burkhardt. 2003. Monitoring Überwinternde Wasservögel: Ergebnisse der Wasservogelzählungen 2001/02 in der Schweiz./Monitoring hivernal des oiseaux d'eau: Résultats des recensements des oiseaux d'eau 2001/02 en Suisse. Schweiz. Vogelwarte/Station ornithologique suisse, Sempach. 51 S.
- Keller, V. & Burkhardt, M. 2004. Monitoring Überwinternde Wasservögel: Ergebnisse der Wasservogelzählungen 2002/03 in der Schweiz./Monitoring hivernal des oiseaux d'eau: Résultats des recensements des oiseaux d'eau 2002/03 en Suisse. Schweiz. Vogelwarte/ Station Ornithologique Suisse, Sempach.

- Kiss, J.B., Rekasi, J., Sterbetz, I. & Torok, Zs. 1997. Data about feeding activity of some species of Anseriformes in Danube Delta, North Dobrogea Romania, Acta Cinegetica Romaniae, Studies and Communication 77– 88.
- Koop, B. 1998. Die Bestände von Möwen, Seeschwalben und mit ihnen vergesellschafteten Wasservögeln auf den Möweninseln im Binnenland Schleswig-Holsteins. Bericht im Auftrag des Ministeriums für Umwelt, Natur und Forsten des Landes Schleswig-Holstein.
- Kraus, M. & Krauß, W. 2000. Vorkommen und Brutbestand der Kolbenente *Netta rufina* im Fränkischen Weihergebiet und weitere neue Brutplätze in Nordbayern. Orn. Anz. 39 : 175-186
- Kreuzberg-Mukhina, E.A., Kashkarov, D.Y., Lanovenko, Y.N., Nazarov, O.P. & Shernazarov, E.S. Review on anatidae species and their key sites in Uzbekistan. in prep.
- Krijgsveld, K.L., Van Lieshout, S.M.J., Van der Winden, J., Dirksen, S. 2004. Verstoringsgevoeligheid van vogels. Bureau Waardenburg rapport 03-187, Vogelbescherming Nederland.
- Krivenko, V.G. 1994. Red-crested Pochard in Tucker, G.M. & Heath, M.F. Birds in Europe, their conservation status. Birdlife Conservation Series n° 3.
- Krivenko, V.G. 1996. Wildfowl (Anatidae) in the former USSR in Proc. Anatidae 2000 Conference, Strasbourg, France, 5-9 december 1994. M. Birkan & al, eds. Gibier Faune Sauvage, 13 : 303-317.
- Lang, G. 1981. Die submersen makrophyten des Bodensees – 1978 im Vergleich mit 1967. Ber. Int. Gewässerschutzkomm. Bodensee 26. Internationale Gewässerschutzkommission für den Bodensee 64 S
- Lebreton, P. & Rochette, P. 1965. Statistiques cynégétiques sur les Anatidés de la Dombes. Alauda 38 : 84-130
- Lecocq, A. 1997. Observations des stationnements et des comportements alimentaires de la Nette rousse *Netta rufina* en baie d'Yvonand VD, lac de Neuchâtel. Du rôle des characées. Nos Oiseaux 44 : 83-95
- Llorente, G.A. & Ruiz, X. 1985. Datos sobre la reproducción del Pato Colorado *Netta rufina* (Pallas 1773) en el Delta del Ebro. Misc. Zool. 9 : 315-323
- Llorente, G.A., Ruiz, X. & Serra-Cobo, J. 1986. Alimentation automnale de la Nette rousse (*Netta rufina*, Aves, Anatidae) dans le delta de l'Ebre, Espagne - Vie Milieu, 36 : 97-107
- Lopez, A. & Mundkur, T. (Eds.) 1997. The Asian Waterfowl Census 1994-1996. Results of the Coordinated Waterbird Census and an Overview of the Status of Wetlands in Asia. Wetlands International, Kuala Lumpur
- LPO-Wetlands International. 2004. Base de données des dénombrements d'oiseaux d'eau « Wetlands International » réalisés à la mi-janvier. LPO - BirdLife France, Rochefort.
- Lucientes, J. 1977. La migración de muda del Pato Colorado en la laguna de Gallocanta. IV Jorn. Ornit. Esp. (Barcelona)

- Lucientes, J. 1978. El enigma del Pato Colorado. Trofeo 96: 28-31
- Mädlow, W. & Model, N. 2000. Vorkommen und Bestand seltener Brutvogelarten in Deutschland 1995/96. Vogelwelt 121 : 189-205
- Marti, R. & Del Moral, J.C. (Eds). 2002. La invernada de aves acuáticas en España. Dirección General de conservación de la Naturaleza – SEO/BirdLife. Ed. Organismo Autónomo Parques Nacionales, Ministerio de Medio Ambiente. Madrid.
- Martí, R. & Del Moral, J. C. (Eds.) 2003. Atlas de las aves reproductoras de España. Dirección General de Conservación de la Naturaleza - Sociedad Española de Ornitología. Madrid.
- Mayaud, N. 1966. Contribution à l'histoire de *Netta rufina* Pallas, la Nette à huppe rousse en Europe occidentale. Alauda 34 : 191-199
- MNHN – ONC. 1989. Répartition et chronologie de la migration pré-nuptiale et de la reproduction en France des oiseaux d'eau gibier. Secrétariat d'Etat chargé de l'Environnement/Muséum National d'Histoire Naturelle/Office National de la Chasse
- Monval, J.Y. & Pirot, J.Y. 1989. Results of the IWRB International Waterfowl Census. 1967-1986. IWRB Spec. Publ. 8.
- Mondain-Monval, J-Y, Desnouhes, L. & J-P Taris. 2002. Lead-shot ingestion in the Camargue (France). Game and Wildlife Science 19 : 237-246.
- Moritz, V. 1994. Defining “Evolutionary Significant Units” for conservation. Trends in Ecology and Evolution 9 : 373-375.
- Muntaner, J., Ferrer, X. & A. Martínez-Vilalta. 1984. Atlas dels ocells nidificants de Catalunya I Andorra. Ketres Editora, Barcelona.
- Munteanu, D. 1996. Changes and trends in Anatidae populations in Romania after the second world war in Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994, M. Birkan, J. van Vessem, P. Havet, J. Madsen, B. Trolliet & M. Moser, eds. Gibier Faune Sauvage, Game Wildl., 13 973-974
- Musil P. 2001. The long-term trends in the breeding waterfowl populations in the Czech republic. OMPO & Institute of Applied Ecology, Kostelec nad Cernými lesi, 120 pp.
- Nowak, E. 1970. The waterfowl of Mongolia. Wildfowl, 21 : 61-68
- Ogilvie, M. & The Rare Breeding Bird Panel. 1999. Non-native birds breeding in the United Kingdom. British Birds, 92 : 176-182
- Olivier, A. 2003. Rapport d'activités du groupe cynégétique de la Tour du Valat. Saison 2003/2004. Rapport interne Station Biologique de la Tour du Valat. 8 p.
- Paspaleva, M., Kiss, J.B. & Tâlpeanu, M. 1984. Sur la dynamique de quelques espèces d'oiseaux dominants dans le Delta du Danube. Trav. du Mus. d'Hist. Nat. "Gr. Antipa". 25 : 312 – 329.

- Paynter, D., Aarvak, T. & Sultanov, E. 1996. Conservation of wetland reserves in Azerbaijan. Norsk Ornitologisk Forening/Wildfowl & Wetlands Trust, rapport non publié
- Perennou, C. 1991. Les Recensements Internationaux d'Oiseaux d'Eau en Afrique Tropicale. IWRB Special Publication No 15, Slimbridge, UK, 140pp.
- Perennou, C., Mundkur, T., Scott, D.A., Follestad, A. & Kvenild, L. 1994. The Asian Waterfowl Census 1987-91: Distribution and Status of Asian Waterfowl. IWRB publication n°24, IWRB, Slimbridge, UK; 372 pp.
- Pienkowski, M. & Larsson, T. 1996. Conclusions and recommendations of the Workshop "Habitat management and restoration" in Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994, M. Birkan, J. van Vessem, P. Havet, J. Madsen, B. Trolliet & M. Moser, eds. *Gibier Faune Sauvage, Game Wildl.*, 13 973-974
- Preuss, N.O. & Harild, P.A. 1980. Fugle ringmaerket i Danmark 1964-1968. Zoologisk Museum og Fredningsstyrelsen, Miljøministeriet
- Prydatko, V. & Grachov, Y. 1989. The main results of experiment on using tails feather of shooted waterfowl for research of autumn hunting process in Southern Kazakhstan/Modern problems of hunting game. Moscow, CSLHG104-109
- Quenault, F. 1997. Synthèse bibliographique sur la Nette rousse *Netta rufina*. OMPO, Paris
- Rac, P., 1998. Poznámky k práci "Vtáky slovenského úseku Dunaja a Žitného ostrova ("Birds of Slovak section of the Danube River and Žitný ostrov island"). *Tichodroma* 11: 217 - 243
- Rimbert, S. 1990. Eco-éthologie de la Nette rousse en Camargue. rapport de stage BEPA cynégétique, Charleville-Mézières
- Rioux, C. 1992. La reproduction de la Nette rousse (*Netta rufina*) dans la vallée du Rhône. Bulletin Mensuel de l'Office National de la Chasse 168 : 14-16
- Roberts, T.J. 1991. The Birds of Pakistan. vol. 1, Oxford University Press Karachi
- Rocamora, G. 1994. Les Zones Importantes pour la Conservation des Oiseaux en France. Birdlife International, LPO.
- Rose, P. & Taylor, V. 1995. Ducks, Swans & Coot (*Fulica atra*) in Rose, P. M. (Ed.) Western Palearctic and South West Asia Waterfowl Census 1994. IWRB Publ. 35
- Rose, P.M. & Scott, D.A. 1997. Waterfowl Populations Estimates. 2nd Edition. Wetlands International Publ. 44, 106 p.
- Rüger, A., Prentice, C., Owen, M. 1986. Results of the IWRB International Waterfowl Census 1967-1983. IWRB Special Publication n°6
- Ruiters, P.S., Noordhuis, R. & Van den Berg, M.S. 1994. Kranswieren verklaren aantalsfluctuaties van Krooneeden *Netta rufina* in Nederlands. *Limosa* 67: 147-158
- Saez-Royuela, R. 1997. Pato Colorado in SEO/BirdLife Atlas de las Aves de España (1975-1995). Lynx Edicions, Barcelona

- Salomonsen, F. 1968. The moult migration. *Wildfowl* 19 : 5-24
- Schlenker, R. 1979. Ringfunde der Kolbenente (*Netta rufina*). *Auspicium* 6 : 417-420
- Schmid, H., M. Burkhardt, V. Keller, P. Knaus, B. Volet & N. Zbinden. 2001. Entwicklung der Vogelwelt in der Schweiz / L'évolution de l'avifaune en Suisse. Avifauna Report Sempach 1 Annex. Schweiz. Vogelwarte / Station ornithologique suisse, Sempach. 440 S.
- Schmieder, K. 1998. Submerse Makrophyten der Litoralzone des Bodensees 1993 im Vergleich mit 1978 und 1967. *Ber. Int. Gewässerschutzkomm. Bodensee* 46. 171 S
- Schneider-Jacoby, M. & Vasic, V.F. 1989. The Red-crested Pochard *Netta rufina* breeding and wintering in Yugoslavia. *Wildfowl*, 40 : 39-44
- Schneider-Jacoby, M., H.-G. Bauer & W. Schulze 1993. Untersuchungen über den Einfluß von Störungen auf den Wasservogelbestand im Gnadensee (Untersee/Bodensee). *Orn. Jh. Bad.-Württ.* 9: 1 - 14.
- Schneider-Jacoby, M. 1998-99. Kolbenente – *Netta rufina* (S. 273 – 279). In: Heine, G., H. Jacoby, H. Leuzinger & H. Stark: Die Vögel des Bodenseegebietes. *Orn. Jh. Bad.-Württemberg.* 14/15: 847 Seiten (eine Publikation der Ornithologischen Arbeitsgemeinschaft Bodensee).
- Schneider-Jacoby, M. 2000. Freizeit und Entenschutz am Wasser – Sicherung der Brut- und Rastgebiete von Kolbenente und Moorenten in Deutschland. *Schriftenr. Landschaftspflege Naturschutz* 60: 81-93
- Schneider-Jacoby, M. 2003. Lack of Ferruginous Duck protection in Croatia - A reason for the decline in Central Europe? In: Petkov N., B. Hughes & U. Gallo-Orsi (editors). *Ferruginous Duck from Research to Conservation, Conservation Series No 6 BirdLife International – BSPB – TWSG, Sofia: 44 - 53.*
- Schuster, S., Blum, V., Jacoby, H., Knötsch, G., Leuzinger, H., Schneider, M., Seitz, E., & Willi, P. 1983. *Die Vögel des Bodenseegebietes.* Ornithologische Arbeitsgemeinschaft Bodensee, Konstanz.
- Scott, D.A. & Rose, P.M. 1996. *Atlas of Anatidae Populations in Africa and Western Eurasia.* Wetlands International Pub. n° 41, Wetlands International, Wageningen, The Netherlands.
- SEO/BirdLife. 1997. *Atlas de las Aves de España (1975-1995).* Lynx Edicions, Barcelona
- Serra, L., Magnani, A., Dall'Antonia, P. & Baccetti, N. 1997. Risultati dei censimenti degli uccelli acquatici svernanti in Italia, 1991-1995. *Biol. Cons. Fauna* 101: 1-312
- Shedden, C.B. 1986. Status of European quarry species. *The British Association for Shooting and Conservation*
- Snow, D.W. & Perrins, C.M. 1998. *The Birds of the Western Palearctic.* Vol. 1, Oxford Univ. Press.
- Spencer, R. & The Rare Breeding Birds Panel. 1993. Rare Breeding Birds in the United Kingdom in 1990. *British Birds*, 86 : 62-90

- Sudfeldt, C. et al. 2003. Brütende und überwinternde Wasservögel in Deutschland. *Corax* 19 (2) : 51-81.
- Szjij, J. 1975. Probleme des Anatidenzuges, dargestellt an den Verlagerungen des europäischen Kolbenentenbestandes. *Ardeola* 21 : 153-171
- Tamisier, A. 1991. Nette rousse in Yeatman-Berthelot, D. & Jarry, G. Atlas des oiseaux de France en hiver - Société Ornithologique de France, 116-117
- Tamisier, A. & Grillas, P. 1994. A review of habitat changes in the Camargue : an assessment of the effects of the loss of biological diversity on the wintering waterfowl community. *Biological Conservation* 70 : 39-47
- Tamisier, A. & Dehorter, O. 1999. Camargue, canards et foulques. Centre Ornithologique du Gard, Nîmes
- Thévenot M., Vernon, R.. & Bergier, P. 2003. The Birds of Morocco. BOU Checklist series n°20, Tring, UK. 594 pp.
- Tomialojc L. 1990. The Birds of Poland - their distribution and abundance. 2-nd edition. PWN Warszawa.
- Tucker, G.M. & Heath, M.F. 1994. Birds in Europe, their conservation status. Birdlife Conservation Series n° 3.
- Tucker, G.M. 1996. EU Annex II species with an unfavorable conservation status. Ecoscope, Final report, 04/10/1996
- Van der Winden, J., Hagemeyer, W., Hustings, F., & Noordhuis, R., 1994. Hoe vergaat het Krooneend *Netta rufina* in Nederland ? *Limosa* 67 : 137-146
- Van Impe, J. 1985. Contribution à la mue des rémiges chez la Nette à huppe rousse, *Netta rufina* (Pallas) en Espagne du Nord. *Alauda* 53 : 1-10
- Vlaamse avifauna commissie 1989. Vogels in Vlaanderen voorkomen en verspreiding. IMP, Bornem
- Volet, B. & M. Burkhardt. 2002. Übersicht über das Brutgeschehen und andere ornithologische Ereignisse 2001 in der Schweiz. *Ornithol. Beob.* 99: 277-288.
- Volet, B. & M. Burkhardt. 2003. Übersicht über das Brutgeschehen und andere ornithologische Ereignisse 2002 in der Schweiz. *Ornithol. Beob.* 100: 323-334.
- Voous, K.H. 1960. Atlas of European Birds. Nelson, Edinburgh
- Wahl, J. et al. 2003. Überwinternde Wasser- und Watvögel in Deutschland: Bestandsgrößen und Trends ausgewählter Vogelarten für den Zeitraum 1990-2000. *Ber. Vogelshutz* 40: 91-103.
- Weise, R. 1993. Nahrung und Nahrungserwerb der Kolbenente *Netta rufina*. *Der Ornithologische Beobachter* 90 67-74
- Yésou, P., Trolliet, B. & South, M. 1983. Anatidés et Zones humides de France métropolitaine. *Bull. Mens. ONC, Numéro spécial scientifique et technique.*

Annex 1 : Period of Reproduction and Prenuptial migration of Annex II Bird Species in the EU” (referred to in Action 6.1)

Prenuptial migration

➔ Difficulty in identifying the beginning of the period of return to the rearing grounds?

Member State	YES	NO	References
FI		X	1, 2, 3, 4
SE		X	1, 3
DK		X	1, 2, 3, 4
UK		X	1
IE		X	1, 3
DE		X	1
NL		X	37
BE		X	1, 2, 3, 4, 5
LU	Small numbers		
AT		X	3
FR		X	2, 4, 6
ES		X	2, 4
PT		X	2
IT		X	1, 2, 3, 4, 5
GR	Little data on counts, phenology and migration		1, 2, 3, 5

	J	A	N	F	E	B	M	A	R	A	P	R	M	A	Y	J	U	N	J	U	L	A	U	G	S	E	P	O	C	T	N	O	V	D	E	C
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IT - the beginning of the return movements coincides with the third decade of January; the number of recoveries then shows an increase in February, to peak at the beginning of March. The country is crossed by large numbers of birds of Russian origin; birds ringed in the NL are also well represented.

Comments and conclusions

- 1) The beginning of the prenuptial migration is not difficult to identify.
- 2) Arrival of first migrants in northern countries (DK, SE, FI), or departure from wintering grounds in the other countries, corresponds to the beginning of the prenuptial migration.

