



# Convention on the Conservation of Migratory Species of Wild Animals

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### INTERNATIONAL SPECIES REVIEW FERRUGINOUS DUCK *Aythya nyroca*

*(Introductory note prepared by the Secretariat)*

Under this cover is reproduced a review report on the status of the Ferruginous Duck *Aythya nyroca*, compiled within the Concerted Action for the species in collaboration with AEWA.

The CMS Scientific Council at its tenth meeting (Edinburgh, May 2001) has approved in principle the funding by the Convention of a project aimed at compiling a status report and extending the geographic scope the existing European Action Plan for the species.

The drafting of the report was carried out to BirdLife International. The document has been compiled by Dr. James Robinson (RSPB, UK) and Dr. Baz Hughes (WWT, UK).

A first draft of the report was circulated at the 11<sup>th</sup> Meeting of the Scientific Council (Bonn, September 2002) for information. The draft was subsequently tabled and reviewed at the International Workshop 'Ferruginous Duck: from Research to Conservation', held in Sofia, 11-14 October 2002, with financial support from CMS and AEWA.

The present final version incorporates input from the workshop and from further subsequent consultations. The report has provided the basis for the compilation of the International Single Species Action Plan for the Ferruginous Duck *Aythya nyroca*, reproduced under the cover CMS/ScC.13/Inf.5.

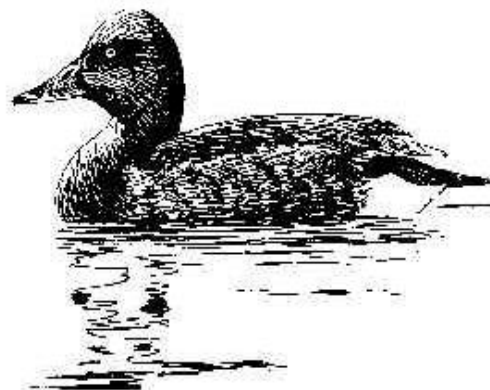




**Convention on Migratory Species**



**African-Eurasian Migratory Waterbird Agreement**



**International Species Review  
Ferruginous Duck *Aythya nyroca***



**Final version**



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**Geographical scope**

This species review refers to information collected in the following range states of the Ferruginous Duck *Aythya nyroca*: Afghanistan, Albania, Algeria, Armenia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Bhutan, Bosnia and Herzegovina, Bulgaria, Cameroon, Central African Republic, Chad, China, Croatia, Cyprus, Czech Republic, Egypt, Eritrea, Ethiopia, France, Gambia, Georgia, Germany, Greece, Hungary, India, Iran (Islamic Republic of), Iraq, Israel, Italy, Jordan, Kazakhstan, Kenya, Latvia, Lebanon, Libyan Arab Jamahiriya, Lithuania, Macedonia (former Yugoslav Republic of), Mali, Malta, Mauritania, Moldova (Republic of), Mongolia, Morocco, Myanmar, Nepal, Netherlands, Niger, Nigeria, Oman, Pakistan, Poland, Portugal, Romania, Russian Federation, Saudi Arabia, Senegal, Slovakia, Slovenia, Spain, Sudan, Switzerland, Syrian Arab Republic, Tajikistan, Thailand, Tunisia, Turkey, Turkmenistan, Ukraine, United Arab Emirates, Uzbekistan, Viet Nam, Yemen, and Yugoslavia.

**Credits**

The compilers wish to thank the following staff from BirdLife International who provided data and support during the production of this review: Des Callaghan, David Capper, Umberto Gallo-Orsi, Melanie Heath, Martin Sneary and Ali Stattersfield. We also wish to thank Marco Barbieri from CMS who provided support during the preparation of this review, especially during the workshop.

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## Executive summary

The Ferruginous Duck *Aythya nyroca* is listed as Near Threatened on the IUCN Red List of Threatened Animals (BirdLife International 2000). The species nearly qualifies for listing under criteria A1c and 2c because the global population has declined markedly over recent decades. It is also listed on Annex I of the European Union Directive on the Conservation of Wild Birds (79/409/EEC) (Birds Directive), on Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), and on Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). This International Species Review for the Ferruginous Duck is an essential companion document to the International Single Species Action Plan for the species.

The Ferruginous Duck is a little studied, partial migrant, widely distributed in Europe, Asia and Africa. During the first quarter of this century, it was described as one of the most plentiful Anatidae species over a great part of its range. Since then, it has undergone a large, long-term decline globally. The species is regularly recorded in 77 countries and in at least 22 others as a vagrant. Simply adding the national population estimates for the 32 countries with data on numbers of breeding pairs resulted in an estimated global breeding population of 11,000-21,000 pairs. Assuming winter numbers = breeding pairs x 3, this would equate to a wintering population of 33,000-63,000. Such calculations are fraught with difficulty, and taking into account recent winter counts of 70,000 birds in Pakistan, 30,000 in Mongolia, 21,000 in Turkmenistan, and 14,000 in Mali, it does seem that the global population is somewhat higher than the previous estimate of 50,000 birds. A minimum of at least 70,000 birds seems likely, but the true value may be even higher.

The Ferruginous Duck is thought to breed in 42 countries worldwide. Of those countries with trend data, no estimate of population trend was available for 17 (37%) countries. Most (16 or 62%) of the remaining 26 countries had decreasing numbers of breeding Ferruginous Ducks over the last seven year period and only one (Italy) had increasing numbers. Eight countries (31%) experienced declines of at least 50%, and eight (31%) declines of 20-49%. In six countries (23%) breeding numbers were stable and in three (12%) numbers fluctuated with changes of at least 20%, but no clear trend since 1995. Trends in wintering numbers are unclear. Of 74 countries thought to hold wintering Ferruginous Ducks, no estimate of population trend was available for 56 (77%) countries. Of the 17 countries for which data were available, 10 countries (59%) had fluctuating numbers. Of the seven remaining countries, two experienced declines of at least 50%, three declines of 20-49% and two an increase of 20-49%. A global population decline of 30-50% over the last 10 years seems likely.

The principal known threats to the Ferruginous Duck are habitat loss, habitat degradation, and harvesting. Others include accidental mortality, pollution, natural disasters (drought), changes in native species dynamics (interspecific competition), and human disturbance. The Ferruginous Duck was only recognised officially as globally threatened in 1994, and partly as a consequence it has received little international conservation action. Of the 185 Important Bird Areas identified by BirdLife International for the Ferruginous Duck, less than 9% of these are known to be protected fully and just over 16% have management plans prepared. The status of the species is poorly known in many countries within the range and it has received little international conservation action.

# 1. Biological assessment

## 1.1. Taxonomy

### 1.1.1. Specific taxonomy

Phylum: *Chordata*  
Class: *Aves*  
Order: *Anseriformes*  
Family: *Anatidae*  
Species: *Aythya nyroca* (Güldenstädt 1770)  
Synonym: *Nyroca nyroca*

Monotypic. Considered by some to form superspecies with *A. australis*, *A. baeri* and *A. innotata* (del Hoyo *et al.* 1992). Hybridisation recorded with various species of *Aythya*, *Anas* and *Netta* (del Hoyo *et al.* 1992, Gillham & Gillham 1996).

## 1.2. Population development

The Ferruginous Duck has declined severely in population size and range in many countries (Table 1). However, there are few data available for many countries in the range. Simply adding the national population estimates for the 32 countries with data (numbers were unknown in 8 countries) results in an estimated global breeding population of 11,000-21,000 pairs. Assuming winter numbers = breeding pairs x 3 (after Meininger *et al.* 1995), this equates to a wintering population of 33,000-63,000. Such calculations are fraught with difficulty, and taking into account recent winter counts of 70,000 birds in Bangladesh, 50,000 in Pakistan, 30,000 in Mongolia, 21,000 in Turkmenistan, and 14,000 in Mali, it does seem that the global population is somewhat higher than the previous estimate of 50,000 birds (Scott & Rose 1996). A minimum of at least 70,000 birds seems likely, but the true value may be even higher (Wetlands International 2002).

The most important known countries for breeding birds are Romania (2,000-6,000 pairs), Azerbaijan (3,000 pairs), Croatia (1,000-3,000 pairs), and Ukraine (1,000 pairs). In winter, significant numbers of birds have been counted in Bangladesh (70,000 birds), Mongolia (>30,000 birds), Turkmenistan (21,000 birds), Mali (<14,300 birds), Kazakhstan (>7,500 birds), Uzbekistan (>7,000 birds), Sudan (5,000 birds), Egypt (7,500 birds), and Azerbaijan (1,000-9,000 birds).

The Ferruginous Duck was thought to breed in 42 countries worldwide. Of these those countries with trend data, no estimate of population trend was available for 17 (37%) countries. Most (16 or 62%) of the remaining 26 countries had decreasing numbers of breeding Ferruginous Ducks over the last seven year period and only one (Italy) had increasing numbers. Eight countries (31%) experienced declines of at least 50%, and eight (31%) declines of 20-49%. In six countries (23%) breeding numbers were stable and in three (12%) numbers fluctuated with changes of at least 20%, but no clear trend since 1995.

Trends in wintering numbers are unclear. Of 74 countries thought to hold wintering Ferruginous Ducks, no estimate of population trend was available for 56 (77%) countries. Of the 17 countries for which data were available, 10 countries (59%) had fluctuating numbers. Of the seven remaining countries, two experienced declines of at least 50%, three declines of 20-49% and two an increase of 20-49%.

Given these trend data, it seems likely that the global population has probably declined by 30-50% over the last ten years. Additional data collected in a more standardised manner are, however, required to enable more reliable estimates of the size and direction of the global population trend to be calculated in the future.



**Table 1. Numbers and trends for the Ferruginous Duck *Aythya nyroca* in individual range states** (in alphabetical order). (Grey cells represent periods when the species is probably not present in the country).

Country	Breeding Season						Winter					Ref.
	No. Breeding (pairs)	Quality	Year(s) of Estimate	Trend	Quality	Year(s) of Estimate	No. Migrating or Non-breeding (indivs)	Quality	Year(s) of Estimate	Trend	Quality	
Afghanistan	?	-	-	?	-	-	>100	3	2002	?	-	1
Albania	100-300	2	1994	-2	2	1970-90	100-2,000	3	-	?	3	2
Algeria	>600	3	2002	?	-	-	<2,000	1	2002	?	-	1,24
Armenia	5-30	1	1985	F	1	1990-2000	>500	1	1990-2000	?	?	3
Austria	50-150	1	1999	-2	2	1970-90	0-5	1	1992-93	?	-	4,28
Azerbaijan	3,000	2	1998	0	2		1,000-9,000	-	1996	?	-	5,6,31
Bangladesh							70,000	2	2002	?	-	7
Belarus	50-200	2	1991-2001	-1	2	1970-90						8
Belgium							0-1	1	1985	F	2	4
Bhutan							1-3	2	1996-2002	?	-	9
Bosnia and Herzegovina	150-500	3	1996	?	-	-	0-500	3	1997	?	-	10
Bulgaria	125-230	2	1998-2002	0	2	1990-2000	0-50	2	1998-2002	F	2	11,29
Cameroon							<100	3	2002	?	-	1
Central African Republic							<100	3	2002	?	-	1
Chad							3,800	3	2000	?	-	12
China	?	-	-	?	-	-	>2,000	3	2002	?	-	1
Croatia	1,000-3,000	2	1976-96	0	2	1970-90	0-200	2		F	2	4,10
Cyprus							1-100	1	1992-93	?	-	13
Czech Republic	0-3	1	1985-95	-1	1	1970-90	5-10	1	1992-93	?	-	4
Egypt							7,500	3	1996	?	-	13
Eritrea							<100	3	1996	?	-	13
Ethiopia							<100	3	1996	?	-	13
France							5	1	1989	F	1	4
Gambia							<100	3	2002	?	-	1
Georgia	10-1,000	3	1997	?	-	-	100-200	3	1997	?	-	10
Germany	1-5	2	1999-2000	-2	3	1970-90	20-100	2	1992-93	F	2	4,32
Greece	130-250	2	1976-96	0	3	1970-90	50-300	2	1987-91	F	2	4,33
Hungary	585-675	2	1997	0	2	1970-90	1	1	1991	?	-	4,34
India	?	-	-	?	-	-	>3,000	3	2002	?	-	14,35
Iraq							>1,000	3	2002	?	-	1
Islamic Republic of Iran	<5	?	1998-2002	?	-	-	1,000-1,300	2	1998-2002	?	-	36
Israel							150-300	2	2002	?	-	1

Country	Breeding Season						Winter					Ref.
	No. Breeding (pairs)	Quality	Year(s) of Estimate	Trend	Quality	Year(s) of Estimate	No. Migrating or Non-breeding (indivs)	Quality	Year(s) of Estimate	Trend	Quality	
Italy	50-100	2	1983-2002	1	2	1983-2002	100-400	2	1983-2002	2	2	15,42
Jordan							?	-	-	?	-	
Kazakhstan	>500	3	2002	?	-	-	>7,500	3	2002	?	-	1
Kenya							<50	-	1996	?	-	13
Latvia	?	-	-	?	-	-						
Lebanon							<100	3	2002	?	-	1
Libyan Arab Jamahiriya							?	-	-	?	-	
Lithuania	10-100	3	1985-88	0	3	1970-90						4
Mali							7,800-14,300	2	1999-2001	?	-	12
Malta							<100	3	2002	?	-	1
Mauritania							30-80	2	1998-2001	?	-	16
Mongolia	?	-	-	?	-	-	>30,000	2	1999	?	-	31
Morocco	?	-	-	?	-	-	>30	3	2002	?	-	1
Myanmar							>1,000	2	1995	?	-	1
Nepal							?	-	-	?	-	
Niger							200-300	-	2003	?	-	44
Nigeria							>2,000	2	1999-2000	?	-	16
Oman							10-40	3	1995-96	?	-	1
Pakistan							1,000-2,000	2	?	?	-	1,14,31
Poland	30-40	2	1996-2002	-2	2	1970-2002	5-300	2	1980-98	F	2	4,37
Portugal	>2	2	2002	?	?	?	1-10	1	1991	?	-	1,4
Republic of Moldova	20-100	2	1976-96	-2	1	1980-2000	300-1,000	2	1997	?	-	17
Romania	2,000-6,000	2	1976-96	-2	2	1970-90	1,000-4,000	2	1992-93	-1	2	4,43
Russian Federation	500-700	2	2002	-1	2	2000-01	350-570	2	2002	?	-	2,27,38
Saudi Arabia	1-3	3	1994	?	?	-	95	2	1991	?	-	14,18
Senegal							10-50	2	1999-2001	?	-	12
Slovakia	3-10	2	2002	-2	2	1970-90	5-15	2	2002	F	2	19,39
Slovenia	5-15	2	1992-93	-1	2	1970-90	0-5	2	1992-93	?	-	4
Spain	0-4	2	1976-96	-1	1	1970-90	1-40	2	1992-93	-2	2	4
Sudan							5,000	?	2002	?	-	20
Switzerland	0-1	1	1991	F	1		10-30	1	1981-91	F	1	4
Syrian Arab Republic							>320	2	2002	?	?	1
Tajikistan	?	-	-	?	-	-	?	-	-	?	-	
Thailand							<100	3	2002	?	-	1
The Former Yugoslav Republic of Macedonia	3-5	2	1997	-1	3		?	-	-	?	-	10,21,22
The Netherlands				F	2	1970-90	12-55	1	1989-1998	F	1	23
Tunisia	80	-	1998-2002	?	-	-	10-60	2	1998-2002	1	2	24
Turkey	600-700	2	2002	-1	2	1970-90	1,000-1,500	2	2002	-1	2	4,31

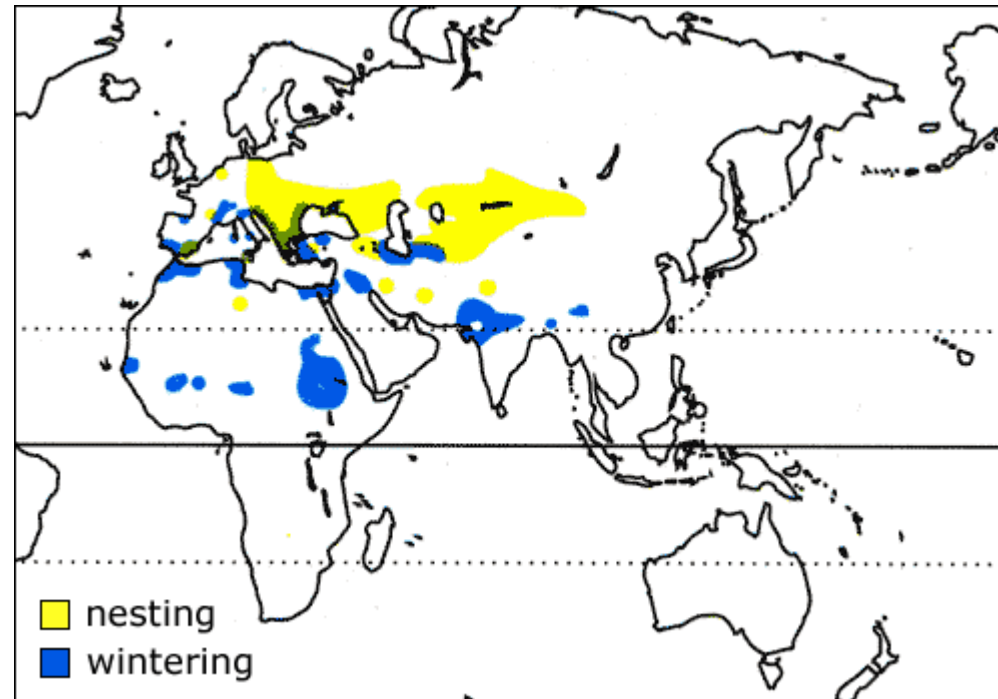
Country	Breeding Season						Winter					Ref.
	No. Breeding (pairs)	Quality	Year(s) of Estimate	Trend	Quality	Year(s) of Estimate	No. Migrating or Non-breeding (indivs)	Quality	Year(s) of Estimate	Trend	Quality	
Turkmenistan	?	-	-	?	-	-	21,000	3	2002	?	-	1,30
Ukraine	1,000	2	2000-02	-1	1	1970-90	15-20	2	1988	-2	2	4,40
United Arab Emirates							<10	3	2002	?	-	1
Uzbekistan	>30	2-	1997	-2	2	1997	>7,000	3	1992	?	-	25,41
Viet Nam							?	-	-	?	?	
Yemen							40-60	1	1995-2002	-1	3	26
Yugoslavia	150-1,500	2	1997	?	-	-	500-1,000	2	1997	?	-	21,22

**Quality:** Data quality is assessed by assigning one of the following categories: **1** Reliable quantitative data (e.g. atlas data or monitoring data) are available for the whole period and region in question; **2** Species generally well known, but only poor or incomplete quantitative data available; and **3** Species poorly known, with no quantitative data available.

**Trend:** Trend in numbers is assessed by assigning to one of the following categories: **+2** Large increase of at least 50% between 1995 and 2002; **+1** Small increase of 20-49% between 1995 and 2002; **0** Stable, with overall change less than 20% between 1995 and 2002; **-1** Small decrease of 20-49% between 1995 and 2002; **-2** Large decrease of at least 50% between 1995 and 2002; and **F** Fluctuating with changes of at least 20%, but no clear trend since 1995.

**References:** **1** Compilers' interpretation of available information; **2** Tucker & Heath 1994; **3** L. Balian *pers. comm.* 2002; **4** BirdLife International World Bird Database; **5** Patrikeev 1996; **6** Sultanov 2003; **7** Ul-Haque & Halder 2002; **8** L. Vergeichyk *pers. comm.* 2002; **9** P. Spierenburg *pers. comm.* 2002; **10** Callaghan 1999; **11** N. Petkov *pers. comm.* 2003; **12** Trolliet 2003; **13** Scott & Rose 1996; **14** del Hoyo *et al.* 1992; **15** M. Gustin *pers. comm.* 2002.; **16** Schricke *et al.* 1999; **17** N. Zubkov *in litt.* 1998; **18** Yahya 1994; **19** P. Kaouch *pers. comm.* 2002; **20** C. Papaconstantinou *in litt.* 1997; **21** B. Micevski *in litt.* 1997; **22** Hagemeyer & Blair 1997; **23** C. Borggreve *pers. comm.* 2002; **24** Azafzaf 2003; **25** Kashkarov & Mukhina 1997; **26** O. Al-Saghier *pers. comm.* 2002; **27** Dzhmirzoev *pers. comm.* 2002; **28** M. Dvorak *pers. comm.* 2002; **29** Petkov 2000; **30** D. Capper *pers. comm.* 2002; **31** Eriyas 2003; **32** Schneider-Jacoby 2003a; **33** Zogaris & Handrinos 2003; **34** Szabo & Vegvari 2003; **35** Zafar-ul Islam 2003; **36** Mansoori 2003; **37** Wieloch 2003; **38** Morozov 2003; **39** Pacenovsky 2003; **40** Zhmud 2003; **41** Kreuzberg-Mukhina 2003; **42** Melega 2003; **43** Munteanu *et al.* 2002; **44** Brouwer & Mullié 2001.

**Figure 1. Global distribution of the Ferruginous Duck *Aythya nyroca*.** Reproduced with kind permission from del Hoyo *et al.* (1992).



### 1.3. Distribution throughout the annual cycle

Palaearctic, with a fragmented breeding distribution extending east from western Europe to western China (Xinjiang and northern Szechuan) and western Mongolia, and north from Iran to Lithuania (Figure 1). Southern breeding areas overlap with the winter range, which extends east from west Africa to south-east Asia and north from sub-Saharan Africa to southern Europe (Figure 1). The geographical distribution of the Ferruginous Duck during the breeding and non-breeding seasons is shown in Table 2. It is primarily a migratory species, although some southern breeding birds are thought to be resident (Scott & Rose 1996). Movements are poorly understood since there are few ringing data, and migration routes are yet to be accurately delimited.

Scott & Rose (1996) made arbitrary divisions of the population in Africa and Western Eurasia and identified three groups the ranges of which have been modified to follow current thinking on geographical delimitation. It was suggested that a population of birds that breed in the West Mediterranean and North Africa wintered mainly in West Africa and contained 10,000 birds (Perrenou 1991). Another population that breeds in eastern Europe was thought to overwinter in the Black Sea/East Mediterranean region south to Egypt and contained 10,000-50,000 birds (Callaghan 1999). However, wintering birds in the Sahelian region are now thought to be part of this population, which is now estimated at 40,000-65,000 birds (Wetlands International 2002). The North and West African population has been estimated recently at 2,000-3,000 birds (Wetlands International 2002). A third population breeds in Southwest Asia and winters through the Arabian Peninsula to Northeast Africa. This population contains 25,000-100,000 birds (Wetlands International 2002). In the Asian-Pacific region, a Central Asian population that winters in southern and eastern Asia and numbers more than 100,000 birds has been identified (Wetlands International 2002).

### **1.3.1. West Mediterranean (bre)/North and West Africa (non-bre)**

The numbers of Ferruginous Ducks breeding in North Africa seem to have been under-estimated in the past. Boumezeur (1992) recorded 1,360 birds in El Kala National Park in Algeria in April 1992, and estimated that there were over 600 breeding pairs in the park, mainly at Lac Tonga. The species also breeds in the lower Toukos in Morocco and at least seven sites in Tunisia (Azafzaf 2003). This population is currently estimated at 2,000-3,000 birds (Wetlands International 2002).

### **1.3.2. Eastern Europe (bre)/Eastern Europe, East Mediterranean, Black Sea and Sahelian Africa (non-bre)**

Tucker & Heath (1994) estimated the European breeding population at 11,000-25,000 pairs. More contemporary information, which includes estimates from additional countries, e.g. Azerbaijan, Bosnia and Herzegovina, Georgia, former Yugoslav Republic of Macedonia, and Yugoslavia, suggested that the population was 13,000-24,000 pairs (Callaghan 1999). The species has declined in most countries, but most acutely in the Ukraine where during the 1950s the population was estimated at 70,000 pairs, but numbers currently 1,000 pairs (>98% decline – Zhmud 2003). Also, numbers breeding in Spain have declined from about 500 pairs earlier this century (Valverde 1960) to the verge of extinction currently (0-4 pairs annually), and in Moldova breeding numbers have declined from 1,000-1,300 pairs in the 1980s to 20-100 pairs currently. In Poland, the breeding population was estimated at 400-500 pairs at 80 sites in the 1980s and 40 pairs at 20 sites in the 1990s (Wieloch 1998, 2003).

Numbers of birds wintering in Europe also seem to have declined markedly. For example, in 1967, 18,000 individuals were counted in the Black Sea region of Ukraine (Rüger *et al.* 1986), but only up to 1,500 between 1979 and 1988 (Ardamatskaya & Sabinevsky 1990). Also, in six zones of the Danube Delta (covering ca. 20% of the delta area), August counts declined from 979 in 1978 to 89 in 1982 (Paspaleva *et al.* 1984). Monval & Pirot (1989) estimated the population wintering in Sahelian Africa to be around 10,000 birds, about half of which were present in Mali. After a probable decline, Perennou (1991) revised the population estimate to 7,000-10,000. The highest mid-winter count in the 1980s was 6,450 (in 1985) with consistently high counts (ca. 4,500) in the Niger Basin and 0-2,200 in the Chad Basin. Flocks of up to 1,000 birds were recorded between Sokoto and Lake Chad in Nigeria (Elgood 1982) while Louette (1981) recorded several hundred at Waza, Cameroon, in January 1981. Up to 230 birds were recorded in the Senegal Delta in the 1970s, but a maximum of 30 were recorded in 1990-95 (P. Yésou *in litt.*). During the late 1980s and 1990s, lower numbers were recorded in Sahelain Africa, with a maximum of 128 in 1994. However, coverage of key sites was poor. Since then, 17,000 have been recorded in Sahelian Africa with 14,000 in Mali, 4,000 in Chad and up to 300 in Niger (Trolliet & Girard 2001; Brouwer 2003). Recent estimates suggest that only tens of birds are now present in Senegal and Mauritania (Schricke *et al.* 1999). The most contemporary regional totals suggest that the estimated number of birds in North and West Africa should be increased to at least 15,000 wintering birds (Trolliet & Girard 2001).

Total numbers remaining to winter in Europe seem to have been over-estimated in the past. Monval & Pirot (1989) estimated numbers wintering in the Black Sea-Mediterranean region were about 50,000 individuals, but noted that this figure had not been confirmed by midwinter counts, and considered that it might be an over-estimate. Total counts between 1982 and 1986 averaged only 700, while typical counts since 1990 have included 832 in 1992 and 762 in 1994 (Scott & Rose 1996). Around 3,000-14,000 individuals are thought to winter in Europe (Callaghan 1999). However, since the wintering birds from the Sahelian region have been included within this population, the most recent estimate stands at 40,000-65,000 birds (Wetlands International 2002).

### **1.3.3. South-west Asia and North-east Africa (bre)/West Asia and South-west Asia (non-bre)**

This population has been estimated to contain 25,000-100,000 birds (Perennou *et al.* 1994; Wetlands International 2002), yet numbers are poorly known. Up to 6,000 birds were recorded during the 1970s (with as many as 5,000 at Kelifskiye Lakes in Turkmenistan in 1974), but only 2,407 in 1994. Slight declines in post-breeding numbers were also recorded in Kazakhstan and the Caspian region between 1972 and 1989 (Krivenko 1993). Patrikeev (1996) stated that the wintering population in Azerbaijan was unlikely to exceed 3,000-5,000 birds, although this estimate was based on counts made in the 1960s. More recent data suggest the number of birds in Azerbaijan is more likely to be around 3,000 (Sultanov 2003). It is possible that many birds in this population winter well to the

east of the Caspian Sea and are not counted by the International Waterfowl Census. Recent counts, for example 21,000 birds in Turkmenistan (D. Capper *pers. comm.* 1999) suggest that numbers of birds in this population may be higher than originally suspected.

In the 1990s, it was estimated that 100-600 birds wintered in eastern Africa (excluding Egypt), with 10-500 birds in Sudan (Urban 1993; Perennou 1992). Brown *et al.* (1982) suggested that numbers wintering in Northeast Africa have declined in recent decades. However, more contemporary information suggests that at least 5,000 birds winter in the Sud region alone (C. Papaconstantinou *in litt.*). Smaller numbers (<100) probably occur in Eritrea and Ethiopia, although data from these countries is sparse, and in Kenya. Given this sparsity of data, trends are difficult to determine.

Recent irrigation projects in Saudi Arabia have resulted in the creation of man-made wetlands that have attracted small numbers of breeding and wintering Ferruginous Ducks in once arid areas (Yahya 1994). Data collected from a group of seven lakes in southwestern Uzbekistan indicate that a few dozen pairs breed in the country (Mukhina & Lanovenko 1998).

#### **1.3.4. Central Asia to West China and West Mongolia (bre)/Southern, Eastern, and South-eastern Asia (non-bre)**

This population was estimated to contain around 10,000 birds (Perennou *et al.* 1994), yet reliable data to justify this estimate were sparse. Wetlands International suggests that the population now contains between 25,000 and 1,000,000 birds (Wetlands International 2002). Given that over 70,000 birds have recently been recorded wintering at the Haor Basin in Bangladesh (Ul Haque & Halder 2002) and 30,000 at Wuliangsu Hai, Inner Mongolia (D. Capper, *pers. comm.* 1999), it is likely that this population estimate is indeed much larger than that suggested by Perennou *et al.* (1994). Large winter concentrations have also been recorded at the Caohai Nature Reserve in China (2,000 birds), and at Minhla-Nyaung Lake (719) and Mongpai Lake (1,000) in Myanmar by the Asian Waterfowl Census. Information from breeding areas is particularly poor and population trends are difficult to identify. However, there is some indication that numbers in India may be declining (Yahya 1994).

**Table 2. Geographical distribution of the Ferruginous Duck *Aythya nyroca* during the annual cycle (v – vagrant only). Note country names follow those used by the International Organization for Standardization (ISO).**

<b>Breeding season</b>		<b>Non breeding season</b>
Afghanistan	Afghanistan	Luxembourg (v)
Albania	Albania	Maldives (v)
Algeria	Algeria	Mali
Armenia	Armenia	Malta
Austria	Azerbaijan	Mauritania
Azerbaijan	Bahrain (v)	Mongolia
Belarus	Bangladesh	Morocco
Belgium (formerly)	Belgium	Myanmar
Bosnia and Herzegovina	Benin (v)	Nepal
Bulgaria	Bhutan	Niger
China	Bosnia and Herzegovina	Nigeria
Croatia	Bulgaria	Norway (v)
Czech Republic	Burkina Faso (v)	Oman
Georgia	Cameroon	Pakistan
Germany	Cape Verde (v)	Poland
Greece	Central African Republic	Portugal
Hungary	Chad	Qatar (v)
India	China	Republic of Moldova
Islamic Republic of Iran	Croatia	Romania
Israel	Cyprus	Russian Federation
Italy	Czech Republic	Saudi Arabia
Kazakhstan	Denmark (v)	Senegal
Latvia	Egypt	Seychelles (v)
Lithuania	Eritrea	Sierra Leone (v)
Mongolia	Ethiopia	Slovakia
Morocco	Finland (v)	Slovenia
Poland	France	Spain
Portugal	Gambia	Sudan
Republic of Moldova	Georgia	Sweden (v)
Romania	Germany	Switzerland
Russian Federation	Ghana (v)	Syrian Arab Republic
Saudi Arabia	Greece	Tajikistan
Slovakia	Hong Kong (v)	Thailand
Slovenia	Hungary	The Former Yugoslav Republic of Macedonia
Spain	India	The Netherlands
Switzerland	Iraq	Togo (v)
Tajikistan	Ireland (v)	Tunisia

Breeding season		Non breeding season
The Former Yugoslav Republic of Macedonia	Islamic Republic of Iran	Turkey
The Netherlands (formerly)	Israel	Turkmenistan
Tunisia	Italy	Uganda (v)
Turkey	Japan (v)	Ukraine
Turkmenistan	Jordan	United Arab Emirates
Ukraine	Kazakhstan	United Kingdom (v)
Uzbekistan	Kenya	Uzbekistan
Yugoslavia	Kuwait (v)	Viet Nam
	Lebanon	Yemen
	Libyan Arab Jamahiriya	Yugoslavia
	Liechtenstein (v)	

#### 1.4. Survival and productivity

Given the paucity of ringing information there are no data on survival rates. Productivity data are also sparse. In Bulgaria, 2-3 ducklings per pair survive to fledging (Petkov 1998), but there are no data on recruitment to the breeding population.

#### 1.5. Life history

##### 1.5.1. Breeding

The species forms monogamous pair bonds of seasonal duration. Pairs form late, from January onwards, and most birds arrive on breeding grounds already paired (Petkov 2000). Arrival occurs from early March in southern Europe (Handrinos & Acrotis 1997; Radovic *et al.* 1998; Petkov & Mittev 2001; Szabo & Vegvari 2003; Szabo & Sandor 2003) to mid March and into May further north (Dementiev & Gladkov 1952; Cramp & Simmons 1977; Wieloch 1998).

The nest is usually located on the ground close to water, or above water or on floating rafts of dense reeds and other aquatic vegetation (Gec 1996; Kashkarov & Mukhina 1997; Petkov 2003a). Rarely, birds may also nest in cavities at the base of trees (D. Callaghan *pers. comm.*) or in the trunks of old White Willows (Schneider-Jacoby 2003b). Occasionally, nests are located within gull or tern colonies, such as at Milicz Fishponds in Poland (Stawarczyk 1995; Wieloch 2003), at Lake Engure in Latvia (Opermanis 2003) and in the Ukrainian Danube Delta (Zhud 2003), or in close proximity to other *Aythya* species, such as at Sacele Fishponds in Romania (Szabo & Sandor 2003).

A single clutch is laid usually, totalling 7-10 eggs (range = 2-19), with larger clutches probably containing dumped eggs (Cramp & Simmons 1977; Kiss 1980; Gec 1996; Koshelev *et al.* 2001; Zhud 2003). Incubation begins from late May to late June in southern Europe (Radovic *et al.* 1998), and up to a month later further north. Eggs hatch after 25-28 days and young are cared for by the female (the male usually leaves the female during incubation). Only one brood is reared per year, although replacement clutches can be laid if eggs are lost (Cramp & Simmons 1977). In Uzbekistan, brood size varies from 3-12 ducklings with a mean of 6.3 (Kreuzberg-Mukhina 2003), whilst in Croatia it ranges from 1-14 with a mean of 6.8 (n = 85) (Radovic *et al.* 1998). Fledging takes 55-60 days, and young become independent at or just before fledging (June-September, depending on latitude). Individuals are sexually mature at one year (Dementiev & Gladkov 1952; Cramp & Simmons 1977).



### 1.5.2. Feeding

The species is omnivorous, but plant material predominates in analyses of stomach contents (e.g. 22% aquatic insects and 78% shoots and seeds of aquatic plants in Uzbekistan during the breeding season; Kashkarov & Mukhina 1997). In Bulgaria, birds feed chiefly on seeds and other parts of aquatic plants, such as pondweeds *Potamogeton* spp., sedges *Carex* spp., hornworts *Ceratophyllum* spp., wood club-rushes *Scirpus* spp., and naiads *Najas* spp., and macroalgae, such as stoneworts *Chara* spp. (Petkov 2000). However, animal material can predominate locally and temporarily, and includes invertebrates such as chironomids *Chironomidae*, snails *Gastropoda* and beetles *Coleoptera*, and also small fish (typically 2-7 cm) and frogs (Phillips 1923; Dementiev & Gladkov 1952; Sterbetz 1969; Cramp & Simmons 1977; Amat & Soriguer 1982; Kiss *et al.* 1984; Paspaleva *et al.* 1984; Ponyi 1994; Green 1998a; Patrikeev 1996). Daily food intake is probably <100 g (*contra* Paspaleva *et al.* 1984).

Areas of shallow water (about 30-100 cm) close to dense littoral vegetation are favoured feeding areas (Green 1998a; Kreuzberg-Mukhina 2003; Petkov 2003a). A substantial cover of floating vegetation (e.g. Fringed Water-lily *Nymphoides peltata*, European Water Chestnut *Trapa natans* and White Water-lily *Nymphaea alba*) also seems to characterize feeding sites in many areas. Nevertheless, the Ferruginous Duck does feed in open water, in areas with high biomass of benthic invertebrates (Petkov 2003a). Food is taken by dabbling at the surface, swimming with head submerged or up-ending, and by diving (Sterbetz 1969; Cramp & Simmons 1977; Amat & Soriguer 1982; Dvorak *et al.* 1997; Green 1998b). At Palude Brabbia Regional Reserve, northern Italy, over 90% of birds dived for food during the breeding season (Saporetti 2000). Birds generally dive to <10 m and remain under water for up to 40 seconds (Isakov 1952; Green 1998a).

### 1.5.3. Post-breeding

Males undergo a complete, post-breeding, flightless moult during June-August, and the female likewise, but four to six weeks later. A partial, autumn/winter moult of body feathers is undertaken also, which often overlaps with the post-breeding moult (Cramp & Simmons 1977). Moult movements are poorly understood, but large flocks of moulting individuals gather regularly, often in several larger deltas of eastern Europe (e.g. Volga, Dnestr and Danube) (Szabo & Sandor 2003; *contra* Cramp & Simmons 1977). A number of Croatian fishponds support post-breeding flocks of several hundred to thousands of birds.

Departure from breeding localities begins in September and peaks in October or November (Dementiev & Gladkov 1952; Cramp & Simmons 1977; Handrinos & Acriotis 1997; Radovic *et al.* 1998; Szabo & Vegvari 2003). The first birds arrive back in the wintering areas south of the Sahara in late October (Scott & Rose 1996).

## 1.6. Habitat requirements

Concentrated in lowland, continental middle latitudes, extending to high altitudes only sporadically (up to 1,800 m in Azerbaijan; Sultanov 2003).

During the breeding season, the species prefers fairly shallow expanses of water, rich in submergent and floating vegetation, fringed by dense stands of emergent plants (Green 1998b; Wieloch 1998; Saporetti 2000; Puzovic & Tucakov 2003; Szabo & Sandor 2003; Szabo & Vegvari 2003; Zogaris & Handrinos 2003). In Bulgaria, it nests in eutrophic to hyper-eutrophic wetlands, often in an advanced stage of succession, with an average depth of 1 m and with 65-70% coverage of submerged and emergent vegetation (Petkov 1998; Petkov & Mittev 2001; Petkov 2003a). Oligotrophic conditions appear to be favoured in the Ukraine (Zhmud 2003). Typical marginal plants in these habitats include Common Reed *Phragmites australis*, Bulrush *Typha latifolia*, Lesser Bulrush *T. angustifolia*, sea club-rush *Bolboschoenus* spp., club-rush *Schoenoplectus* spp., sedges *Carex* spp. and rushes *Juncus* spp. Dominant floating and submerged plants include pondweeds *Potamogeton* spp., Fringed Water-lily *Nymphoides peltata*, Greater Bladderwort *Utricularia vulgaris*, Rigid Hornwort *Ceratophyllum demersum*, Frogbit *Hydrocharis morsus-ranae*, Water-pepper *P. hydropiper*, Common Water-crowfoot *Ranunculus aquatilis*, Holly-leaved Naiad *Najas marina*, European Water Chestnut *Trapa natans*, duckweed *Lemna* spp., White Water-lily *Nymphaea alba*, Yellow Water-lily *Nuphar lutea* and Amphibious Bistort *Persicaria amphibia*.

At the Louros Floodplain in Greece, the Ferruginous Duck tends to occur on small water bodies, averaging 20 m x 100 m in size with areas of deeper water (Zogaris & Handrinis 2003). Birds appear to use these small food-rich ponds in preference to the extensive, seasonally brackish areas of the adjacent Rodia reed-swamp, which have a poorer selection of aquatic plant and invertebrate fauna.

Large river deltas often support substantial numbers of breeding birds, as do open floodplains with numerous oxbows, shallow lakes/ponds and wide channels (Szabo & Vegvari 2003; Szabo & Sandor 2003). In some areas, saline, brackish or alkaline wetlands are commonly utilised for breeding, for example in Hungary (Sterbetz 1969), Romania (Kiss *et al.* 1984; Weber 1994) and Turkey (Green 1998a). In central and eastern Europe, extensively managed fishponds are an important breeding habitat, which are similar in character to natural floodplain wetlands (e.g. oxbows). In Bulgaria, 49% of the breeding population (150-200 pairs) was recorded on fish-ponds, 36% on natural marshes, 8.5% on reservoirs, 4% on natural lakes, 1.5% on lagoons and 1% on estuaries (Petkov 1998; Petkov 2003a). These results suggest that, in Bulgaria at least, over half of the breeding population depend on man-made wetlands. In Poland, 60% of the breeding population were recorded on fishponds, 20% on natural lakes, 15% on reservoirs and 10% on rivers (Wieloch 2003). In Serbia and Croatia, more than 80% of Ferruginous Ducks breed on fishponds (Radovic *et al.* 1998; Puzovic & Tucakov 2003; Schneider-Jacoby 2003b).

When birds moult in late summer, they tend to spend most of their time resting, either in secluded pools surrounded by reeds, on bank sides, or in large flocks in open water (Petkov & Mittev 2001; Petkov 2003a).

During the winter, habitat choice is similar to that during the breeding season, although coastal waters, inland seas and large, open lagoons are also frequented (Cramp & Simmons 1977; Amat & Soriguer 1982; Petkov 1998). At Sidi Bou Ghaba in Morocco, birds were recorded in open expanses of water surrounded by emergent vegetation, e.g. Lesser Bulrush *Typha angustifolia*, Round-headed Club-rush *Scirpus holoschoenus*, Common Reed *Phragmites australis* and Hispid Sedge *Carex hispida*, using a zone from 0-20m from the fringe (Green 1995). In Sahelian and Sudanian areas, conditions are determined by rainfall patterns, with highest rainfall occurring between June and September (Trolliet 2003). Rainfall re-activates vegetation cycles and food chains and inundate large catchment basins (Trolliet 2003). The flood often occurs some time after the peak rainfall, e.g. in January in the Inner Niger Delta and Lake Chad. Many of the wetlands created by flooding are temporary or semi-permanent.

A summary of the habitats used by the Ferruginous Duck is shown in Table 3. The habitats listed in Table 3 have been classified under the Global Land Cover Characterization (GLCC) developed by the US Geological Survey's (USGS) Earth Resources Observation System (EROS) Data Center and the Joint Research Centre of the European Commission (see <http://edcdaac.usgs.gov/glcc/glcc.htm>), and adopted by IUCN Species Survival Commission in the SIS Habitats Authority File.

### **1.7. Gaps in knowledge**

Although there have been great advances in our understanding of the ecology of the Ferruginous Duck in recent years, there are many key questions still to be answered of which many should be a priority for research given that they will be important in understanding how best to conserve this species.

Conservation of bird populations requires that their numbers are monitored to ascertain the health of populations and identify deleterious trends. Improving the methods used to survey the species and by expanding coverage across the range, will help to ensure that numbers and trends can be followed more accurately in the future.

However, the ability to provide conservation solutions requires an understanding of causation of worrying trends, so that conservation action can be targeted appropriately. Data on productivity, survival and movements are required to identify relevant aspects of the environment affecting population size. Unfortunately, there are few demographic data for the Ferruginous Duck other than those collected prior to fledging and even less information on movements

given the paucity of ringing studies. Therefore, it is impossible at the present time to identify those demographic parameters that are driving the decline in numbers globally.

Once the periods of the life cycle limiting population recovery have been identified, there is then a need to assess the extrinsic drivers of demographic processes and therefore to tackle the causation of population change. Given that habitat loss and deterioration are presumed to be the key causes of the decline in the Ferruginous Duck, identifying those habitats used and why they are used will be important for managing known habitats and informing habitat creation in the future. Although a large amount of research has focused on the habitats *used* by the Ferruginous Duck in central Europe and the Mediterranean, there are few data indicating specific habitat requirements of the species (cf. Zogaris & Handrinos 2003), and none on how these relate to demographic processes. There is also a paucity of data on habitat use and requirements in the breeding areas outside of Europe and on the wintering areas.

**Table 3. Habitats used by the Ferruginous Duck *Aythya nyroca* during the breeding and non-breeding seasons.** The number in parenthesis after each descriptor is the GLCC classification number (<http://edcdaac.usgs.gov/glcc/glcc.html>).

Habitat	Breeding	Non-breeding
<b>5. Wetlands (inland)</b>		
5.1. Permanent Rivers/Streams/Creeks [includes waterfalls]	‡	‡
5.2. Seasonal/Intermittent/Irregular Rivers/Streams/Creeks	‡	‡
5.3. Shrub Dominated Wetlands	‡	‡
5.4.2. Marsh Wetland (45)	‡	‡
5.5. Permanent Freshwater Lakes [over 8 ha]	‡	‡
5.6. Seasonal/Intermittent Freshwater Lakes [over 8 ha]	‡	‡
5.7. Permanent Freshwater Marshes/Pools [under 8 ha]	‡	‡
5.8. Seasonal/Intermittent Freshwater Marshes/Pools [under 8 ha]	‡	‡
5.9. Freshwater Springs and Oases	‡	‡
5.13. Permanent Inland Deltas	‡	‡
5.14. Permanent Saline, Brackish or Alkaline Lakes	‡	‡
5.15. Seasonal/Intermittent Saline, Brackish or Alkaline Lakes and Flats	‡	‡
5.16. Permanent Saline, Brackish or Alkaline Marshes/Pools	‡	‡
5.17. Seasonal/Intermittent Saline, Brackish or Alkaline Marshes/Pools	‡	‡
<b>9. Sea</b>		
9.2. Shallow [usually less than 6 m deep at low tide; includes sea bays and straits]		‡
<b>10. Coastline</b>		
10.3. Estuarine Waters	‡	‡
10.6. Coastal Brackish/Saline Lagoons	‡	‡
10.7. Coastal Freshwater Lagoons	‡	‡
<b>12. Artificial - Aquatic</b>		
12.1. Water Storage Areas (over 8 ha)	‡	‡
12.2. Ponds (below 8 ha)	‡	‡
12.3. Aquaculture Ponds	‡	‡
12.4. Salt Exploitation Sites	‡	‡
12.6. Wastewater Treatment Areas	‡	‡
12.9. Canals and Drainage Channels, Ditches	‡	‡

### 3. Threats

The Ferruginous Duck faces various threats throughout its range. In this section, information on key threats and their impacts on the population at a global level are presented in detail. A complete list of the threats facing the species in the breeding and non-breeding seasons, and their relative importance, is presented in Table 4. Threats have been identified according to the IUCN Species Survival Commission SIS Threats Authority files.

The criteria used to assess threats in this review are:

Critical	a factor causing or likely to cause <b>very rapid declines</b> (>30% over 10 years);
High	a factor causing or likely to cause <b>rapid declines</b> (20-30% over 10 years);
Medium	a factor causing or likely to cause relatively <b>slow, but significant, declines</b> (10-20% over 10 years);
Low	a factor causing or likely to cause <b>fluctuations</b> ;
Local	a factor causing or likely to cause <b>negligible declines</b> ;
Unknown	a factor that is likely to affect the species but is not known to what extent.

#### 3.1. Specific threats

##### 3.1.1. Habitat Loss/Degradation (human induced)

**Importance:** CRITICAL

**Specific threat category:**

Agriculture: Crops: Shifting agriculture and Agro-industry farming

Agriculture: Freshwater aquaculture

Extraction: Groundwater extraction

Infrastructural development: Human settlement, Tourism/Recreation, Transport – water, Dams

Invasive alien species (directly impacting habitat)

**Special cases:**

Together with habitat degradation, the loss of wetland habitat from human developments is probably the most significant factor in the decline of the Ferruginous Duck (e.g. Kirwan 1997; Robinson & Callaghan 2003). For example, 60% of wetlands in Greece and over 90% in Bulgaria have been drained since 1900 (Handrinos 1992; Petkov 1998), most of which would have been prime habitat for the species (Tucker & Heath 1994). In particular, canalisation of rivers and flood defence works has caused the loss of most European floodplain wetlands, most of which were prime habitat for the Ferruginous Duck. To some extent, this has been compensated by the creation of extensively managed fishponds, for example on the Danube Floodplain in Bulgaria. Increased aridity in the climate of central Europe may also have caused widespread loss of some important wetlands (Tucker & Heath 1994). In contrast, irrigation projects in the Middle East appear to be creating suitable habitat (Yahya 1994).

Many wetlands important for the Ferruginous Duck have been degraded without being destroyed. The species' dependence on highly structured wetlands with rich macrophyte and emergent plant growth makes it particularly sensitive to habitat alterations. The most important negative alterations include degradation of emergent vegetation (e.g. through cutting and clearance of aquatic macrophytes; Smole 2003), disruption of water regimes (when this causes a reversion to a less structured wetland or succession to scrub), siltation, and increased turbidity (causing loss of macrophytes). Agents of these changes include intensification of agriculture/fisheries, over-grazing, general development, recreation (particularly water-based), inadequate sewage treatment, dam and barrage constructions, and excessive water abstraction.

Of particular note, however, is the degradation of extensively managed fishponds by abandonment (causing succession to scrub) or intensification (causing reversion to open water with little or no plant growth). For example, about 60% of the Ferruginous Ducks in Romania breed on fishponds where >50% of fishponds have been abandoned since 1989. Similar, large-scale abandonment has occurred in Bulgaria, Croatia, Hungary, Russia, Lithuania and Bosnia and Herzegovina (e.g. Petkov 1998). Intensification is also a major problem in some countries, and is often subsidised by foreign aid. For example, a complex of over 70 fishponds in south-east Germany was formerly an important breeding area, but following intensification only 1-2 pairs nest annually.

Introduction and stocking of the Grass Carp *Ctenopharyngodon idella* across Europe has probably fuelled the decline of the Ferruginous Duck, for example in north-east Slovenia. Introduction of the fish usually causes substantial reductions in macrophyte biomass and corresponding declines in species dependent on these plant communities (Bain 1993). However, although these fish caused a massive reduction of macrophyte biomass at Lake Neusiedl (Austria/Hungary), a substantial breeding population of the Ferruginous Duck remains, although effects on productivity and long-term viability are unknown.

### 3.1.2. Harvesting [hunting/gathering]

**Importance:** HIGH

**Specific threat category:**

Food: Subsistence use/local trade

Other: Illegal recreational harvesting

**Special cases:**

Earlier this century, Phillips (1923) reported that large bags of Ferruginous Ducks were easily obtained. Presently, large numbers (between 1,500 and 2,500) are shot on autumn passage through the Volga delta, while on the wintering grounds in Africa and southern Asia the Ferruginous Duck is a common quarry of native and foreign hunters (G. Dzamirzoev pers. comm. 2002).

In most European countries, the species is now protected, but illegal hunting is an important problem (Hecker 1994; Tucker & Heath 1994; Robinson & Callaghan 2003). Law enforcement is often poor. Also, this species nests relatively late and many broods are not independent before the onset of the hunting season in most European countries (which generally begins in August). For example, approximately 50% of young in Croatia have not fledged by 15 August, when the hunting season begins. This could reduce significantly productivity in hunted areas owing to, for example, mortality of brooding females. Illegal hunting mortality can be very high – at one fish farm in Croatia, 458 Ferruginous Ducks were killed in one season, despite the fact that fines for illegal hunting in Croatia are high (about 500 Euro per duck) (Schneider-Jacoby 2003b). There are also reports of 100 birds being killed by Italian hunters in Bosnia and 65 birds being killed illegally in Albania (N. Baccetti pers. comm. 2003).

### 3.1.3. Accidental mortality

**Importance:** HIGH

**Specific threat category:**

Bycatch: Fisheries-related: Entanglement and Poisoning

Bycatch: Terrestrial: Shooting and Poisoning

**Special cases:**

Diving ducks are prone to lead shot ingestion (Pain 1992), which is still used legally in gun shot cartridges in most European countries (Fawcett 1996; Beintema 2001) and probably elsewhere. Although there are no recorded instances of lead poisoning in the Ferruginous Duck, it undoubtedly occurs (Hecker 1994). Accidental hunting mortality owing to confusion with other ducks, particularly *A. fuligula* and *A. ferina*, is a common problem (Hecker 1994; Tucker & Heath 1994). The latter problem is accentuated by the fact that Ferruginous Ducks commonly mix with other *Aythya* species during the non-breeding season.

Diving ducks are prone to becoming trapped in fishing nets, which in some instances can cause significant mortality. Although this has only been noted as a problem for the Ferruginous Duck in Romania, it is, no doubt, a more widespread problem (Callaghan 1999).

### 3.1.4. Pollution (affecting habitat and/or species)

**Importance:** HIGH

**Specific threat category:**

Water pollution

**Special cases:**

Although the effects of eutrophication on the Ferruginous Duck have never been measured quantitatively, the species is regarded as a good indicator of trophic status and acute eutrophication is an acknowledged threat (Petkov pers. comm.; Zhmud 2003). For example, rapid succession as a result of continued input of nutrient and sediment rich water from agricultural areas neighbouring the Göksu Delta (Turkey) is seriously threatening the site's continued international importance for the Ferruginous Duck (Green 1998a).

### 3.1.5. Natural disasters

**Importance:** CRITICAL

**Specific threat category:**

Drought

**Special cases:**

Reduced precipitation, and over the last three years a serious drought, in central Europe, central and south-west Asia, has caused widespread loss and reduction of wetland habitats (Krivenko 1991; IRICP 2001). This has probably caused a corresponding decline in Ferruginous Duck numbers. Central and Southwest Asia represents the largest region of persistent drought over the past three years anywhere in the world. Significant shortfalls in precipitation have led to widespread social and economic impacts, particularly in Iran, Afghanistan, Western Pakistan, Tajikistan, Uzbekistan and Turkmenistan. Agriculture, animal husbandry, water resources, and public health have been particularly stressed throughout the region. Preliminary analysis suggests that the drought is related to large-scale variations in the climate across the Indian and Pacific Oceans, including the recent "La Niña" in the eastern Pacific.

Conditions on the wintering grounds in north and west Africa are determined by the amount of late summer rain (Trolliet 2003). For almost thirty years, from the 1960s to 1990s, this region experienced a very dry period, with nearly all annual rainfalls below average. Although rainfall was higher in 1998 and 1999, drought conditions are expected to increase in severity over the longer term with significant decreases in rainfall predicted (Trolliet 2003).

The potential long-term effects of climate change on the distribution and behaviour of the Ferruginous Duck remain unclear, but potentially catastrophic. Any positive effects also remain unclear.

### 3.1.6. Changes in native species dynamics

**Importance:** UNKNOWN

**Specific threat category:**

Competitors

**Special cases:**

Declines in the numbers and range of the Ferruginous Duck in some countries, e.g. Poland and Slovenia, has been accompanied by increase in the numbers of other *Aythya* species that prefer similar habitats. The role of interspecific competition has, however, yet to be investigated.

### 3.1.7. Human Disturbance

**Importance:** UNKNOWN (potentially MEDIUM)

**Specific threat category:**

Recreation/tourism

**Special cases:**

Disturbance from human activities on and around wetlands can, for example, reduce waterbird productivity, habitat availability and even cause local extinctions (e.g. Petkov 1998). Although it is commonly perceived to be a problem facing the Ferruginous Duck, particularly during the breeding period, the effects and impacts of recreational disturbance are notoriously difficult to measure. However, at Lake Constance, Germany, a moulting group of about 20 birds has developed since reductions in disturbance during the post-breeding period (together with increasing numbers of other species) (Schneider-Jacoby 2001). At two key sites in Bulgaria, the species has become extinct in recent years with the only change apparent being more intensive use of sites by anglers and water-sports (Petkov 1998).



**Table 4. Relative importance of threats to the Ferruginous Duck *Aythya nyroca* in the breeding and non-breeding season**

Threat category			Breeding season	Non-breeding season
<b>1. Habitat Loss/Degradation (human induced)</b>				
	1.1. Agriculture			
	1.1.1. Crops			
		1.1.1.1. Shifting agriculture	HIGH	HIGH
		1.1.1.3. Agro-industry farming	CRITICAL	CRITICAL
	1.1.7. Freshwater aquaculture		CRITICAL	CRITICAL
	1.3. Extraction			
	1.3.6. Groundwater extraction		HIGH	HIGH
	1.4. Infrastructure development			
	1.4.2. Human settlement		HIGH	HIGH
	1.4.3. Tourism/recreation		HIGH	UNKNOWN (potentially HIGH)
	1.4.5. Transport – water		UNKNOWN (potentially HIGH)	UNKNOWN (potentially HIGH)
	1.4.6. Dams		HIGH	HIGH
	1.5. Invasive alien species (directly impacting habitat)		MEDIUM	MEDIUM
<b>3. Harvesting [hunting/gathering]</b>				
	3.1. Food			
	3.1.1. Subsistence use/local trade		HIGH	HIGH
	3.6. Other	(Illegal recreational harvesting)	HIGH	HIGH
<b>4. Accidental mortality</b>				
	4.1. Bycatch			
	4.1.1. Fisheries-related			
		4.1.1.3. Entanglement	UNKNOWN (potentially MEDIUM)	UNKNOWN (potentially MEDIUM)
		4.1.1.5. Poisoning	UNKNOWN (potentially HIGH)	UNKNOWN (potentially HIGH)
	4.1.2. Terrestrial			
		4.1.2.2. Shooting	HIGH	HIGH
		4.1.2.3. Poisoning	UNKNOWN (potentially LOW)	UNKNOWN (potentially LOW)
<b>6. Pollution (affecting habitat and/or species)</b>				
	6.3. Water pollution		HIGH	HIGH
<b>7. Natural disasters</b>				
	7.1. Drought		CRITICAL	CRITICAL
<b>8. Changes in native species dynamics</b>				
	8.1 Competitors		UNKNOWN	UNKNOWN
<b>10. Human disturbance</b>				
	10.1. Recreation/tourism		UNKNOWN (potentially MEDIUM)	UNKNOWN (potentially MEDIUM)

## 4. Policies and legislation relevant for management

### 4.1. International conservation and legal status of the species

Table 5 shows the status of the Ferruginous Duck under the main international legislative instruments for conservation. Those countries that regularly support Ferruginous Ducks and which are also contracting parties to each of these conventions, agreements and directives are identified in Annex I.

The Ferruginous Duck is listed as Near Threatened on the IUCN Red List of Threatened Animals (BirdLife International 2000). It is listed on Annex I of the European Union Directive on the Conservation of Wild Birds (79/409/EEC) (Birds Directive), on Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), and on Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

**Table 5. International conservation and legal status of species** (Note: Headers in grey relate to measures relevant to European countries only).

World Status (IUCN)	European Status	SPEC category	EU Birds Directive Annex	Bern Convention Annex	Bonn Convention Annex	African-Eurasian Migratory Waterbird Agreement	Convention on International Trade in Endangered Species
LR/nt	Vulnerable	SPEC 1	Annex I	Appendix III	Appendix I (15/07/97) Appendix II (as an Anatidae spp.) (15/07/97)	Africa (winter) A1c Europe (winter) A3c SW Asia A1c (09/01/99)	Appendix III Ghana (26/02/76) (Originally listed as Anatidae spp.)

### 4.2. Member States/Contracting parties obligations

The obligations/commitments of Member States/Contracting Parties under various Directives/Conventions are presented in Annex 2. Of those countries considered, 62 (81%) are full Contracting Parties to the Ramsar Convention, 50 (65%) to CMS, 29 (38%) to the AEWA (four of these as signatory only), 30 (39%) to the Bern Convention, 76 (99%) to the CBD, 67 (87%) to CITES (11 of these are accession only, 3 approved only), and 9 (12%) are full members of the European Union and are bound by the EU Birds and Habitats Directives (this would increase after the accession of potentially 10 new member states by 2004).

### 4.3. National policies, legislation and ongoing activities

The legally protected status of the Ferruginous Duck in the 77 countries where it regularly occurs is shown in Table 6. The protected status is currently unknown for most (41, 53%) countries. In 31 countries (40%), it is fully protected, in one country (the Former Yugoslav Republic of Macedonia) only seasonally protected (between 1 March and 31 July), and totally unprotected in three countries, two of which hold large numbers of breeding and wintering birds.

**Table 6. Protection of the Ferruginous Duck *Aythya nyroca* under national legislation, by Party.**

<b>Country</b>	<b>Legal protection</b>	<b>Country</b>	<b>Legal protection</b>
Afghanistan	Unknown	Mali	Unknown
Albania	Unknown	Malta	Unknown
Algeria	Unknown	Mauritania	Unknown
Armenia	Unknown	Mongolia	Unknown
Austria	Yes	Morocco	Unknown
Azerbaijan	Unknown	Myanmar	Yes
Bangladesh	Yes	Nepal	Unknown
Belarus	Yes	Niger	Unknown
Belgium	Yes	Nigeria	Unknown
Bhutan	Yes	Oman	Unknown
Boshia and Herzegovina	No	Pakistan	Unknown
Bulgaria	Yes	Poland	Yes
Cameroon	Yes	Portugal	Unknown
Central African Republic	Unknown	Republic of Moldova	Yes
Chad	Unknown	Romania	Yes
China	Unknown	Russian Federation	Yes
Croatia	Yes	Saudi Arabia	Unknown
Cyprus	Unknown	Senegal	Unknown
Czech Republic	Yes	Slovakia	Yes
Egypt	Unknown	Slovenia	Yes
Eritrea	Unknown	Spain	Yes
Ethiopia	Unknown	Sudan	Unknown
France	Yes	Switzerland	Yes
Gambia	Yes	Tajikistan	Unknown
Georgia	No	Thailand	Unknown
Germany	Yes	The Former Yugoslav Republic of Macedonia	Partial (1 March-31 July)
Greece	Yes	The Netherlands	Yes
Hungary	Yes	Tunisia	Yes
India	Unknown	Turkey	Yes
Iraq	Unknown	Turkmenistan	Unknown
Islamic Republic of Iran	Yes	Ukraine	Yes
Israel	Unknown	United Arab Emirates	Unknown
Italy	Yes	Uzbekistan	Unknown
Jordan	Unknown	Viet Nam	Unknown
Kazakhstan	Unknown	Yemen	No
Kenya	Unknown	Yugoslavia	Yes
Latvia	Unknown		
Lebanon	Yes		
Libyan Arab Jamahiriya	Unknown		
Lithuania	Unknown		

#### 4.4. Site (and habitat) protection and research

BirdLife International select Important Bird Areas (IBAs) through the application of quantitative ornithological criteria, based on the best available information on population sizes and trends. The complete list of IBAs identified for the Ferruginous Duck, together with their co-ordinates, the numbers of birds they support, the season for which they are important and the criteria used to identify the site, are shown in Annex 1.1 (as of July 2002). The protection status of each of these IBAs is shown in Annex 1.2, together with the appropriate designations. Table 7 presents a summary of the proportion of Ferruginous Ducks in the IBA suite of each country in the range during the breeding and non-breeding seasons. The proportion of the national total protected by the IBA suite in the breeding and non-breeding seasons is also presented for each country.

Of the 185 IBAs identified for the Ferruginous Duck, only 9% are known to be fully protected and 16% have management plans prepared (Annex 1.2). There are numerous other sites not currently qualifying for IBA status that have, at some time over the last 50 years, supported internationally important numbers of Ferruginous Ducks. For completeness, these sites are shown in Annex 1.3.

Of the 35 countries in the breeding range where IBAs have been fully documented, 46% did not have any IBAs identified for the Ferruginous Duck and 34% had 75-100% of the national total within the IBA suite. Of the 59 countries in the non-breeding range where IBAs have been fully documented, 54% did not have IBAs identified for the Ferruginous Duck and 31% had 75-100% of the national total within the IBA suite. Of the most important countries during the breeding season, 75-100% of the 2,000-6,000 pairs in Romania, 0% of the 3,000 pairs in Azerbaijan, <25% of the 1,000-3,000 pairs in Croatia, and <25% of the 1,000 pairs in the Ukraine occurred within each of the IBA suites in those countries. Of the most important countries during the non-breeding season, 50-75% of the 14,300 birds in Mali, 0% of the 5,000 birds in Sudan, <25% of the 7,500 birds in Egypt, and 75-100% of the 1,000-9,000 birds in Azerbaijan occurred within each of the IBA suites in those countries. There are no IBAs in Bangladesh, Mongolia, Turkmenistan, Kazakhstan or Uzbekistan, yet all these countries support large numbers of Ferruginous Ducks during the non-breeding season (Table 1).

**Table 7. Knowledge on occurrence of the Ferruginous Duck *Aythya nyroca* in Important Bird Areas** (Grey cells represent periods when the species is probably not present in the country. The breeding season includes estimates of breeding and resident bird numbers and the non-breeding season includes estimates of passage and wintering bird numbers).

	Number of IBAs where the species breeds <sup>1</sup>	Estimated % of national popn. in IBAs <sup>2</sup>	Estimated % of popn. in protected IBAs during the breeding season <sup>3</sup>	Number of IBAs where the species occurs in the non-breeding season <sup>1</sup>	Estimated % of national popn. in IBAs <sup>2</sup>	Estimated % of popn. in protected IBAs during non-breeding season <sup>3</sup>
Afghanistan	0	0	0	1	75-100	0
Albania	0	0	0	0	0	0
Algeria	2	75-100	75-100	4	75-100	?
Armenia	1	75-100	?	2	75-100	<25
Austria	2	75-100	75-100	0	0	0
Azerbaijan	0	0	0	0	0	0
Bangladesh				-	-	-
Belarus	2	75-100	75-100 (Partial)			
Belgium				0	0	0
Bhutan				-	-	-
Bosnia and Herzegovina	2	0	0	0	0	0
Bulgaria	3	25-50	25-50	4	75-100	75-100
Cameroon				0	0	0

	Number of IBAs where the species breeds <sup>1</sup>	Estimated % of national popn. in IBAs <sup>2</sup>	Estimated % of popn. in protected IBAs during the breeding season <sup>3</sup>	Number of IBAs where the species occurs in the non-breeding season <sup>1</sup>	Estimated % of national popn. in IBAs <sup>2</sup>	Estimated % of popn. in protected IBAs during non-breeding season <sup>3</sup>
Central African Republic				0	0	0
Chad				1	75-100	75-100
China	-	-	-	-	-	-
Croatia	9	<25	<25 (Partial)	3	75-100	75-100
Cyprus				0	0	0
Czech Republic	0	0	0	0	0	0
Egypt				5	<25	?
Eritrea				0	0	0
Ethiopia				4	50-75	?
France				0	0	0
Gambia				0	0	0
Georgia	2	0	0	0	0	0
Germany	0	0	0	0	0	0
Greece	9	75-100	75-100 (Partial)	8	75-100	75-100 (Partial)
Hungary	10	75-100	25-50 (Full) 25-50 (Partial)	1	75-100	75-100 (Partial)
India	-	-	-	-	-	-
Iraq				5	75-100	0
Islamic Republic of Iran	9	75-100	?	12	75-100	?
Israel				2	<25	?
Italy	3	25-50	<25 (Full) 25-50 (Partial)	11	75-100	75-100
Jordan				0	0	0
Kazakhstan	-	-	-	-	-	-
Kenya				0	0	0
Latvia	0	0	0			
Lebanon				1	<25	?
Libyan Arab Jamahiriya				0	0	0
Lithuania	0	0	0			
Mali				5	50-75	?
Malta				0	0	0
Mauritania				2	75-100	?
Mongolia	-	-	-	-	-	-
Morocco	0	0	0	0	0	0
Myanmar				-	-	-
Nepal				-	-	-
Niger				0	0	0
Nigeria				1	75-100	?
Oman				4	75-100	?
Pakistan				-	-	-

	Number of IBAs where the species breeds <sup>1</sup>	Estimated % of national popn. in IBAs <sup>2</sup>	Estimated % of popn. in protected IBAs during the breeding season <sup>3</sup>	Number of IBAs where the species occurs in the non-breeding season <sup>1</sup>	Estimated % of national popn. in IBAs <sup>2</sup>	Estimated % of popn. in protected IBAs during non-breeding season <sup>3</sup>
Poland	5	75-100	75-100	0	0	0
Portugal	1	75-100	0	0	0	0
Republic of Moldova	0	0	0	0	0	0
Romania	4	75-100	25-50 (Full) <25 (Partial)	3	25-50	25-50
Russian Federation	4	75-100	75-100 (Partial)	3	50-75	25-50 (Partial)
Saudi Arabia	3	75-100	?	2	75-100	?
Senegal				1	50-75	?
Slovakia	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0
Spain	0	0	0	0	0	0
Sudan				0	0	0
Switzerland	0	0	0	0	0	0
Tajikistan	-	-	-	-	-	-
Thailand				-	-	-
The Former Yugoslav Republic of Macedonia	0	0	0	0	0	0
The Netherlands				0	0	0
Tunisia	1	<25	?	3	75-100	?
Turkey	15	50-75	<25 (Full) 45 (Partial)	5	50-75	<25 (Full) 25-50 (Partial)
Turkmenistan	-	-	-	-	-	-
Ukraine	5	<25	<25	1	75-100	0
United Arab Emirates				0	0	0
Uzbekistan	-	-	-	-	-	-
Viet Nam				-	-	-
Yemen				1	75-100	?
Yugoslavia	7	25-50	<25	0	0	0

<sup>1</sup>Estimates of the number of IBAs where the species breeds or spends part of the non-breeding season were obtained from data held in the BirdLife International World Bird Database (data extracted July 2002).

<sup>2</sup>Estimates of the % of the population present in the IBA suite of an individual country were calculated using information on maximum population sizes presented in Table 1 and maximum site totals from the BirdLife International World Bird Database (data extracted July 2002) presented in Annex 1.1.

<sup>3</sup>Estimates of the % of the national population present in protected IBAs were calculated using information on maximum population sizes presented in Table 1 and maximum site totals and protection status information from the BirdLife International World Bird Database (data extracted July 2002) presented in Annexes 1.1 and 1.2.

#### 4.5. Recent conservation measures

Below is a selection of known conservation measures and research activities undertaken in individual countries within the last 20 years:

**Austria:** A study of habitat requirements, food and behaviour of the Ferruginous Duck was conducted at Lake Neusiedl in 1995, and a full census was carried out in 1996 (Dvorak & Tebbich 1998).

**Azerbaijan:** A study to assess the number, distribution and ecology of the Ferruginous Duck in Azerbaijan was undertaken in the late 1990s by the Azerbaijan Ornithological Society (Sultanov 2003). Surveys of threatened waterfowl in Azerbaijan in September 1997 and February - March 1998, conducted by The Wildfowl & Wetlands Trust (UK) in collaboration with the Azerbaijan International Oil Consortium, and the Azerbaijan Ornithological Society, located Ferruginous Ducks at six sites (WWT unpubl. data).

**Bulgaria:** National censuses of the species were conducted by BSPB in 1996/97 and 2002 (Petkov 2003b). The most important breeding site (Mechka Fishponds) has been suggested for protection. Management plans have been completed for the most important breeding areas, including the most important along the Black Sea coast. These were compiled with BSPB's active participation within the framework of the Bulgarian-Swiss Biodiversity Conservation Programme. A National Action Plan has also been prepared (Petkov 2001). BSPB/BirdLife Bulgaria have been actively raising public awareness about the species in Bulgaria and counter training is on-going (N. Petkov pers. comm. 2002). A PhD study on the distribution and ecology of the species is being undertaken at the Central Laboratory of General Ecology.

**Croatia:** The status and ecology of the Ferruginous Duck was studied at Draganic Fishponds between 1991 and 1994 (Kralj *et al.* 1997, Radovic *et al.* 1998). The German NGO Euronatur has conducted a number of site-based conservation projects on *the* Ferruginous Duck, including lobbying for greater protection of their fishpond habitat, and has investigated the distribution and ecology of the species and the impact of hunting in Croatia (Schneider-Jacoby 2003b). A research project on the Ferruginous Duck has just begun on fishponds in Donji Miholjac, near the Drava River (J. Smole in litt. 2002).

**France:** An unsuccessful re-introduction was carried out in the 1970s in Villars des Dombes (Lebreton 1977). Currently, a re-introduction is being attempted at Le Marais de Ganne (Saint Andre des Eaux), where an open enclosure of pinioned birds is used to breed fully-winged juveniles. If 50 wild breeding pairs are not established within ten years of the start of this project, it will be terminated. In 1996, ten pinioned birds raised ten fully-winged individuals.

**Germany:** The small German breeding population of the Ferruginous Duck is monitored annually by the "Ornithologische Arbeitsgemeinschaft (Ornithological Working Group) Bodensee" (M. Schneider-Jacoby in litt. 2000).

**Greece:** A census of Ferruginous Ducks in Crete is currently being undertaken by the Natural History Museum of Crete (Dretakis 2000). Ecology and habitat use were investigated at Amvrakikos in 2001 during a Life-Nature Project (Zogaris & Handrinos 2003).

**Hungary:** The first full full census of breeding numbers and research was undertaken by the Hungarian Wetland Specialist Group in the late 1990s. More recently, there have been censuses undertaken since 1997 (Szabo & Vegvari 2003).

**India:** An effort to monitor Ferruginous Ducks in the Brahmaputra valley in Assam was initiated in 1990 by Gauhati University (Talukdar & Bhattacharjee 2000).

**Italy:** Ecological research on the species was undertaken in Northern Italy during the late 1990s (Saporetti 2000). There have been around 20 reintroduction programmes in Italy over the past decade (Bellucci 2000). Although most have been unsuccessful, apparently self-sustaining breeding populations were established at the Eastern Bologna Plain and Alviano Lake (Hecker 1994; Tinarelli 2001; Melega 2003). Within the framework of the Italian Action Plan for the species, a survey was carried out in 2002 to obtain an updated estimate of the Italian breeding population (Melega 2003).

**Kazakhstan:** In collaboration with the National Avian Research Centre (United Arab Emirates) and the Institute of Zoology (Almaty), The Wildfowl & Wetlands Trust surveyed six sites in south-east Kazakhstan in July 1999, locating a total of 570 Ferruginous Ducks including 40 broods.

**Morocco:** A project investigating the ecology of the Ferruginous Duck in Morocco was initiated in the mid 1990s by various Moroccan organisations and the Estación Biológica de Doñana (Green 1995; Green *et al.* 2002).

**Poland:** Studies of breeding ecology were undertaken in the 1980s at Milicz Fishponds (Stawarczyk 1995). Data on habitat selection and population trends have been collected (Wieloch 1998, 2003). An national action plan will be prepared shortly (Wieloch pers. comm.).

**Russian Federation:** Recent censuses and studies of the ecology of the Ferruginous Duck have been undertaken in the Prekavkazye and Daghestan regions (Pishvanov *et al.* 1999; Kazakov *et al.* 2001). Public awareness schemes, aimed primarily at hunters, have been initiated in these areas.

**Slovenia:** Censuses have been conducted by The Bird Watching and Bird Study Association of Slovenia (DOPPS).

**Spain:** A re-introduction programme was launched by the Instituto para la Conservación de la Naturaleza (ICONA) in south-west Spain in 1992. In the Acebuche-Huerto-Pajasarea of the Guadalquivir Marshes, 49 individuals were released in 1992 and 1993, from which three pairs bred in 1993. A further 45 were released in south-west Spain during 1994 and 1995, and over 30 in 1996.

**Turkey:** A study of the ecology of the Ferruginous Duck was made at the Gösku Delta in the mid 1990s (Green 1998a).

**Uzbekistan:** Surveys of the Bukhara and Kashkadarya regions of south-west Uzbekistan were undertaken by the Uzbekistan Zoological Society in 1997 (Mukhina & Lanovenko 1998).

**West and Central Africa:** Aerial counts of Ferruginous Ducks were undertaken in the Inner Niger Delta and the Lake Chad Basin between 1970 and 2001 (Trolliet & Girard 2001).

#### **4.6. Habitat Conservation**

BirdLife International select Important Bird Areas (IBAs) through the application of quantitative ornithological criteria, based on the best available information on population sizes and trends. The complete list of IBAs identified for the Ferruginous Duck, together with their co-ordinates, the numbers of birds they support, the season for which they are important and the criteria used to identify the site, are shown in Annex 2. The protection status of each of these IBAs is shown in Annex 3, together with the appropriate designations. Of the 185 IBAs identified for the Ferruginous Duck, only 8.6% are known to be fully protected and 16.2% have management plans prepared (Annex 3). There are numerous other sites that have, at some time over the last 50 years, supported internationally important numbers of the Ferruginous Duck and may, or may not, be components of existing IBAs. For completeness, these sites are shown in Annex 4.



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## 6. Annexes

**Annex 1. Contracting parties to international conventions, agreements and directives that are relevant for conservation of the Ferruginous Duck *Aythya nyroca* (acc. – accession only; app. – approved only; sig. – signatory only).**

Country	Ramsar	CMS	AEWA	Bern	EU	CBD	CITES
Afghanistan						•	•
Albania	•	•	•	•		(•) acc.	
Algeria	•					•	•
Armenia	•					(•) acc.	
Austria	•			•	•	•	•
Azerbaijan	•			•		(•) app.	•
Bangladesh	•					•	•
Belarus	•	•				•	•
Belgium	•	•	(•) sig.	•	•	•	•
Bhutan						•	•
Bosnia and Herzegovina	•					(•) acc.	
Bulgaria	•	•	•	•		•	•
Cameroon		•				•	•
Central African Republic		•				•	•
Chad	•	•				•	•
China	•					•	•
Croatia	•	•	•	•		•	•
Cyprus	•	•		•		•	•
Czech Republic	•	•		•		(•) app.	•
Egypt	•	•	•			•	•
Eritrea						(•) acc.	•
Ethiopia						•	•
France	•	•	(•) sig.	•	•	•	•
Gambia	•	•	•			•	•
Georgia	•	•	•			(•) acc.	•
Germany	•	•	•	•	•	•	•
Greece	•	•	(•) sig.	•	•	•	•
Hungary	•	•	•	•		•	•
India	•	•				•	•
Iraq							
Islamic Republic of Iran	•					•	•
Israel	•	•	•			•	•
Italy	•	•		•	•	•	•
Jordan	•	•	•			•	•
Kazakhstan						•	•
Kenya	•	•	•			•	•
Latvia	•	•		•		•	•
Lebanon	•		•			•	
Libyan Arab Jamahiriya	•	•				•	
Lithuania	•	•		•		•	•
Mali	•	•	•			•	•
Malta	•	•		•		•	•

Country	Ramsar	CMS	AEWA	Bern	EU	CBD	CITES
Mauritania	•	•				•	•
Mongolia	•	•				•	•
Morocco	•	•	(•) sig.			•	•
Myanmar						•	•
Nepal	•					•	•
Niger	•	•	•			•	•
Nigeria	•	•				•	•
Oman						•	
Pakistan	•	•				•	•
Poland	•	•		•		•	•
Portugal	•	•		•	•	•	•
Republic Of Moldova	•	•	•	•		•	•
Romania	•	•	•	•		•	•
Russian Federation	•					•	•
Saudi Arabia		•				(•) acc.	•
Senegal	•	•	•	•		•	•
Slovakia	•	•	•	•		(•) app.	•
Slovenia	•	•		•		•	•
Spain	•	•	•	•	•	•	•
Sudan			•			•	•
Switzerland	•	•	•	•		•	•
Syrian Arab Republic	•	•	•			•	
Tajikistan	•	•				(•) acc.	
Thailand	•					•	•
The Former Yugoslav Republic of Macedonia	•	•	•	•		(•) acc.	•
The Netherlands	•	•	•	•	•	(•) acc.	•
Tunisia	•	•		•		•	•
Turkey	•			•		•	•
Turkmenistan						(•) acc.	
Ukraine	•	•	•	•		•	•
United Arab Emirates						•	•
Uzbekistan	•	•				(•) acc.	•
Viet Nam	•					•	•
Yemen						•	•
Yugoslavia	•					•	•

## Annex 2. Important Bird Areas identified for the Ferruginous Duck *Aythya nyroca*.

Country	International name	Area (ha)	Location		Population		Year	Season	Criteria
			Lat (N)	Long (E)	Min	Max			
<b>Afghanistan</b>	Hamun-i-Puzak	35000	31.60	61.80	100		1976	winter	A1, B2
<b>Algeria</b>	Complexe de zones humides de la plaine de Guerbes - Sanhadja	42100	36.88	7.27	35	35	1987	winter	A1, A4i
	Lac des Oiseaux---Garaet et Touyour	70	36.78	8.12			2001	winter	A1
	Lac Oubeira	2200	36.83	8.38	15	15	1992	winter	A1
	Lac Tonga	2700	36.85	8.50	600	600	1992	breeding	C6
	Lac Tonga	2700	36.85	8.50	717	717	1997	non-breeding	A1
	Marais de Mekhada	8900	36.80	8.00			2001	breeding	A1
<b>Armenia</b>	Armash fish-farm	2795	39.75	44.77	25	30	0	breeding	A1, B2
	Armash fish-farm	2795	39.75	44.77	1	700	1995	non-breeding	A1, B2
	Lake Sevan	150000	40.33	45.33	0	60	1995	non-breeding	B2
<b>Austria</b>	Neusiedler See	23272	47.82	16.77	150	200	1996	resident	A1, B2
	Southern Seewinkel and Zitzmannsdorfer Wiesen	14000	47.75	16.83	10	15	1996	breeding	A1, C1, C6
<b>Belarus</b>	Beloe fish-farm	5700	52.28	27.73	0	22	1991	breeding	A1, C1, C6
	Mid-Prpyat	100000	52.15	27.00	50	150	1995	breeding	A1, C1
<b>Bosnia and Herzegovina</b>	Bardaca	700	45.12	17.45	0	0	0	breeding	A1, B2
	Hutovo blato	6144	43.05	17.77	0	0	0	breeding	B2
<b>Bulgaria</b>	Atanasovo lake	1950	42.57	27.48	2	88	1996	passage	B2
	Durankulak lake	2000	43.67	28.55	60	0	2001	unknown	B2
	Kalimok complex	1000	44.00	26.47	6	20	1996	breeding	B2
	Mandra-Poda complex	2270	42.42	27.38	60	0	2001	unknown	B2, C6
	Mechka fish-ponds	800	43.73	25.82	10	30	1996	breeding	A1
	Mechka fish-ponds	800	43.73	25.82	100	3,000	1996	passage	A1, A4i, B1i, B2
	Orsoya fish-ponds	360	43.78	23.12	20	20	1996	breeding	A1
	Orsoya fish-ponds	360	43.78	23.12	48	79	1996	passage	A1
	Shabla lake complex	3100	43.57	28.57	10	88	1996	passage	A1
	Srebarna lake	1445	44.12	27.07	60	0	2001	unknown	A1
<b>Chad</b>	Lake Fitri	195000	12.83	17.50	3,800	3,800	1999	winter	A1
<b>Croatia</b>	Alluvial wetlands of the River Danube	37111	45.67	18.83	1,000	1,000	1994	passage	A1
	Alluvial wetlands of the River Danube	37111	45.67	18.83	50	50	1991	breeding	A1
	Alluvial wetlands of the River Drava	68002	45.92	17.25	100	200	0	breeding	A1
	Alluvial wetlands of the River Sava	210000	45.50	17.00	20	0	2001	breeding	A1, B2
	Donji Mihaljac fish-ponds	981	45.75	18.20	10	40	1993	breeding	A1, B2
	Grudnjak fish-ponds	1020	45.67	18.05	20	50	1993	breeding	A1
	Jelas field	10000	45.08	17.75	11	52	1996	winter	A1, A4i, B1i, B2
	Jelas field	10000	45.08	17.75	120	160	0	breeding	A1
	Koncanica fish-ponds and surrounding area	10000	45.67	17.07	10	50	0	breeding	B2
	Nasicka Breznica fish-ponds	1345	45.58	18.22	20	50	1993	breeding	B2
	Pokupsko depression	10000	45.62	15.70	3,200	5,200	0	passage	A1, B2
	Pokupsko depression	10000	45.62	15.70	70	120	0	breeding	A1
<b>Egypt</b>	Aswan reservoir	1500	24.00	32.90				winter	A1
	Lake Burullus Protected Area	46000	31.48	30.83				winter	A1
	Lake Nasser	540000	23.10	32.73				winter	A1, B2
	Upper Nile	15000	25.15	32.72	730	730		winter	A1, A4i, B1i, B2
	Wadi El Rayan Protected Area	71000	29.22	30.37				winter	A1
<b>Ethiopia</b>	Bishoftu lake	93	8.80	39.00	3	5		winter	A1, B2

Country	International name	Area (ha)	Location		Population		Year	Season	Criteria
			Lat (N)	Long (E)	Min	Max			
	Chelekleka lake and swamp		8.85	38.97	3	5		winter	A1, B2
	Green Lake	54	8.85	39.10	4	5		winter	A1, B1i, B2
	Lake Ashenge		12.58	39.50	30		1995	winter	A1, B2
<b>Georgia</b>	Javakheti Plateau	200000	41.50	43.67	0	0	1996	breeding	B2
	Kolkheti	150000	42.17	41.83	0	0	1996	passage	A1
<b>Greece</b>	Amvrakikos gulf	25000	39.00	21.00	25	100	1996	breeding	A1, B2
	Lake Chimaditis and Lake Zazaris	5390	40.62	21.55	30	60	1996	breeding	A1, B2
	Lake Distos	2600	38.35	24.13	10	0	1988	breeding	B2
	Lake Kalodiki, Margariti and Karteri marshes	1650	39.33	20.45	10	15	1997	breeding	A1, B2
	Lake Kastoria (Orestiada)	3400	40.52	21.30	0	30	1993	breeding	B2
	Lake Kerkini	12000	41.20	23.15	0	0	1995	resident	A1, B2
	Lake Mitrikou (Ismarida)	6500	40.97	25.28	0	0	0	resident	A1
	Lake Stymphalia	1309	37.85	22.47	2	10	1996	breeding	A1, B2
	Lakes Trichonida and Lysimachia	14279	38.57	21.47	0	225	1989	winter	A1
	Nestou delta and coastal lagoons	22000	40.97	24.80	0	0	0	passage	A1
	North, east and south Kithira island	18000	36.23	23.05	5	70	1996	passage	A1, B2
	Porto Lagos, Lake Vistonis, and coastal lagoons (Lakes of Thrace)	15300	41.02	25.08	0	0	0	resident	A1
	Reservoirs of former Lake Karla	1200	39.53	22.70	40	0	1996	passage	A1
	Sperchios valley and delta-Maliakos gulf	34000	38.85	22.53	0	0	0	passage	A1, B2
<b>Hungary</b>	Biharugra fish-ponds	16000	46.97	21.57	30	0	1994	breeding	A1, B2
	Bodrog flood-plain	10000	48.25	21.33	15	0	1993	breeding	A1, B2
	Hortobágy	136300	47.62	21.07	50	70	1996	breeding	A1
	Inner Somogy	216300	46.22	17.30	50	0	1996	breeding	A1, B2
	Kis-balaton	14745	46.67	17.22	100	200	1996	breeding	A1, B2
	Nagyberek	19400	46.73	17.55	27	30	1995	breeding	B1i
	Pacsmag fish-ponds	487	46.58	18.38	50	60	1996	breeding	B1i
	Pusztaszer Landscape Protection Area	22320	46.25	20.17	60	0	1996	breeding	B1i, B2
	Sárvíz valley	14700	47.00	18.55	80	100	1993	passage	B1i
	Sárvíz valley	14700	47.00	18.55	18	18	1993	breeding	B1i
	Vértes Mountains and Zámoly Basin	29400	47.42	18.33	10	20	1996	breeding	A1, B1i, B2
<b>Iran, Islamic Republic of</b>	Anzali Mordab complex	15000	37.42	49.47	130		1977	passage	A1
	Anzali Mordab complex	15000	37.42	49.47	51		1977	winter	A1
	Cheghakor marsh	1600	31.83	50.83	103		1992	winter	A1, B1i, B2
	Dasht-e Arjan and Lake Parishan	52800	29.57	51.88	150		1977	winter	A1
	Dasht-e Arjan and Lake Parishan	52800	29.57	51.88	4		1977	breeding	A1, C1
	Dez river marshes and plains	20000	31.83	48.63	11		1977	winter	A1, A4i, B1i, C1, C2
	Gandoman marsh	1500	31.83	51.10	140		1992	winter	A1, C1
	Gori Gol	120	37.83	46.67	4		1977	breeding	A1, C1
	Gori Gol	120	37.83	46.67	40		1977	passage	A1, C1
	Hamoun-i Sabari and Hamoun-i Hirmand	250000	31.17	61.17	5	10	1977	breeding	A1, C1
	Hashelan marsh and Doh Tappeh plains	10050	34.55	46.92	130		1977	winter	A1, C1
	Hashelan marsh and Doh Tappeh plains	10050	34.55	46.92	4		1977	resident	C6
	Lake Kobi	1200	36.95	45.50	4		1977	breeding	A1
	Lake Uromiyeh	483000	37.50	45.50	4		1977	breeding	A1
	Lake Zaribar	1550	35.53	46.12	20	50	1977	breeding	A1
	Lake Zaribar	1550	35.53	46.12	250		1977	passage	A1
	Seyed Mohalli, Zarin Kola and Larim Sara	1600	36.75	53.00	185		1977	passage	A1
	Shadegan marshes, Khor-al Amaya, Khor Musa	425140	30.17	48.67	4		1977	breeding	B1i
	Shadegan marshes, Khor-al Amaya, Khor Musa	425140	30.17	48.67	10		1977	winter	A1, B1i

Country	International name	Area (ha)	Location		Population		Year	Season	Criteria
			Lat (N)	Long (E)	Min	Max			
	Shur Gol, Yadegarlu and Dorgeh Sangi lakes	2500	37.02	45.52	4		1977	breeding	A1, B1i, B2
	South end of the Hamoun-i Puzak	14900	31.33	61.75	30		1977	winter	B1i
	Voshmigir dam	500	37.20	54.75	15		1977	winter	A1, B1i, B2
<b>Iraq</b>	Attariya plains	50000	33.42	44.92	13		1979	winter	A1, B1i, B2
	Baquba wetlands	2000	33.92	44.83	515	1,000	1968	winter	B1i
	Haur Al Sa'adiyah	140000	32.17	46.63	30		1967	winter	B1i
	Mahzam and Lake Tharthar	455000	34.33	43.37	10		1992	winter	B1i
	Samara dam	20000	34.25	43.83	25		1992	winter	B1i, B2
<b>Israel</b>	Jezre'el, Harod and Bet She'an valleys	40000	32.53	35.33	9		1991	resident	A1, B1i, B2
	Jezre'el, Harod and Bet She'an valleys	40000	32.53	35.33	20		1991	winter	B1i, B2
	Judean foothills	60000	31.75	34.92	20		1991	winter	B1i, B2
<b>Italy</b>	Biviere and Plain of Gela	28052	37.02	14.33	0	1,500	1986	passage	B1i
	Brabbia peatland and Lake Varese	2437	45.78	8.75	4	6	1996	breeding	B1i
	Gargano Promontory and Capitanata Wetlands	207378	41.42	15.92	1,000	1,000	1985	winter	B2
	Oristano wetlands and Cape San Marco	22595	39.87	8.48	0	210	1995	passage	B1i, B2
	Ponte Buriano-Lago della Penna	200	43.52	11.75	1	10	1995	passage	A1
	Pools of Florence plain	1000	43.80	11.07	0	20	1996	passage	A1
	Punte Alberete and Valle della Canna, Pineta San Vitale and Pialassa della Baiona	4152	44.50	12.25	0	20	1996	breeding	A1
	Simeto mouth and Biviere di Lentini	3398	37.40	15.10	280	280	1998	passage	A1
	Simeto mouth and Biviere di Lentini	3398	37.40	15.10	67	67	1995	winter	A1, A4i
	Simeto mouth and Biviere di Lentini	3398	37.40	15.10	15	20	1997	breeding	A1, A4i, B1i
	Stagnone di Marsala and Trapani salt pans	4454	37.78	12.50	10	10	1992	winter	A1
	Valli di Argenta	2000	44.57	11.83	12	12	1989	winter	A1
	Valli di Comacchio and Bonifica del Mezzano	44013	44.62	12.17	95	95	1976	winter	B2
	Venice lagoon	68982	45.37	12.47	3	33	1994	winter	A1
	Vico lake	4000	42.33	12.17	4	4	1995	winter	A1
<b>Lebanon</b>	Ammiq swamp	280	33.77	35.77	1	2	1974	non-breeding	B1i, B2
<b>Mali</b>	Lac Faguibine	45000	16.75	-4.00	300	300	1983	winter	A1, B2
	Lac Fati	13500	16.20	-3.68	2,150	2,150	1985	winter	A1, B2
	Lac Horo	18900	16.22	-3.92	5,600	5,600	1987	winter	A1, B2, C1, C6
	Lac Télé	5600	16.55	-3.75	300	300	1984	winter	A1, B2, C1, C6
	Séri	40000	14.83	-4.67	350	350	1986	winter	C6
<b>Mauritania</b>	Lac d'Aleg	4275	17.10	-13.98	120	120	1999	winter	B2, C6
	Sawana--Oum Lellé	1200	16.33	-9.28	85	85	2000	winter	A1, B2, C1, C6
<b>Nigeria</b>	Hadejia-Nguru wetlands	300000	12.65	10.55	1,594	1,594	1988	winter	C6
<b>Oman</b>	Khaw r ad Dahariz	150	17.02	54.18	16			passage	B2
	Khawr Dhirif	100	18.93	57.35	15			passage	B1i, B2
	Khawr Rawri	1100	17.03	54.43	30			winter	B1i, B2
	Wadi Darbat	78000	17.10	54.45	17			winter	B1i, B2
<b>Poland</b>	Barycz river valley	25700	51.53	17.42	40	130	1994	breeding	A1, A4i, B1i
	Przemków ponds	1046	51.57	15.82	4	6	1990	breeding	A1
	Solska Forest Landscape Park	28980	50.38	23.13	4	6	1995	breeding	A1
	Tysmienica river valley	14500	51.60	22.82	3	8	1993	breeding	A1, A4i
	Woniesc reservoir	900	51.98	16.73	5	11	1988	breeding	A1, A4i, B1i, B2
<b>Portugal</b>	Pera marsh	170	37.10	-8.33	2	2	2001	breeding	A1, C1
<b>Romania</b>	Balta Alba, Amara and Jirlau lakes	2680	45.25	27.25	0	1,000	1995	passage	A1, C1
	Cefa fish-ponds and Radvani wood	1000	46.92	21.68	2	20	1996	breeding	A1
	Danube Delta and Razelm-Sinoe complex	442000	44.93	29.20	3,000	0	1996	breeding	A1, B1i, C1, C2

Country	International name	Area (ha)	Location		Population		Year	Season	Criteria
			Lat (N)	Long (E)	Min	Max			
	Lake Comana	800	44.17	26.10	20	30	1993	breeding	A1, B1i, C1, C2
	Lake Strachina	1050	44.67	27.60	20	0	1993	breeding	C6
	Mehedinti fish-ponds-Izvoarele	210	44.35	22.67	20	0	1996	breeding	A1, C1
	Murani lake and Pischia forest	1500	45.92	21.33	6	41	1997	breeding	A1, B1i, C1, C2
	Portile de Fier reservoir	32000	44.57	22.20	2	850	1996	passage	A1, A4i, B1i
	Satchinez marsh	236	45.97	21.07	40	50	1996	breeding	A1, A4i, B1i
	The Little Island of Braila	14862	44.92	27.92	46	50	1993	breeding	A1
	Vadeni-Mata-Cârja-Radeanu wetlands	380	46.07	28.12	19	40	1996	breeding	A1
<b>Russian Federation</b>	Achikol'skiye lakes	20000	43.78	47.17	250	300	1982	breeding	A1
	Dadynskiye lake	45000	45.27	45.07	70	0	1996	non-breeding	A1, B1i, B2
	Delta of the River Don	53800	47.17	39.42	100	150	1997	passage	B1i
	Delta of the River Don	53800	47.17	39.42	25	30	1997	breeding	A1, B1i, B2
	Lake Adzhi	2000	42.32	48.08	17	25	1997	breeding	A1, B1i, B2
	Mouth of Samur river	7000	41.87	48.50	10	100	1989	passage	B1i, B2
	Volga Delta	1150000	46.00	48.50	0	1,000	1996	breeding	B1i, B2
<b>Saudi Arabia</b>	Al-Ha'ir	2500	24.50	46.83				resident	A1, B1i, B2
	Al-Ha'ir	2500	24.50	46.83	36	69	1991	winter	A1, B1i, B2
	Al-Hasa lagoons	7500	25.50	50.00				breeding	B2
	King Faisal Airbase, Tabuk		28.38	36.63	4	9		breeding	A1, B1i, B2
	Malaki dam	2500	17.05	42.97	45	83	1992	winter	A1
<b>Senegal</b>	Djoudj wetlands	56000	16.33	-16.25	12	50	1992	winter	A1, B2
<b>Syrian Arab Republic</b>	Bahrat Homs	5300	34.62	36.53	250	300	1982	passage	A1
	Bahrat Homs	5300	34.62	36.53				winter	A1
	Tual al-'Abba	30000	36.42	39.33	20			passage	A1
<b>Tunisia</b>	Douz Laâla	100	33.47	8.97	5	10	1996	breeding	B2
	Ghidma	100	33.43	8.80				winter	A1, B2
	Ichkeul	12600	37.17	9.67	20	90	1991	winter	A1
	Lebna reservoir	1000	36.70	10.93	200	300		passage	A1, B2
<b>Turkey</b>	Akdogan lake	2000	41.73	39.15	20	20	2001	breeding	A1, B1i, B2
	Aksehir and Eber lakes	53600	38.60	31.30	10	10		breeding	B1i, B2
	Çorak lake	1150	37.68	29.77	100	100	1970	winter	A1, B1i, B2
	Éregli marshes	37000	37.53	33.75	10	10		breeding	A1
	Göksu delta	14480	36.30	33.97	30	30	1995	breeding	A1, C1
	Hotamis marshes	16500	37.58	33.05	89	89	1994	unknown	A1, C1
	Isikli lake	7300	38.23	29.92	97	97	1992	winter	A1, A4i, B1i, C1, C2, C6
	Karakaya Reservoir	30000	38.33	38.56	60	100	1997	winter	C6
	Karakuyu Marshes	800	38.08	30.16	20	0	1996	breeding	B2, C6
	Karamik marshes	4500	38.43	30.83	10	10		breeding	C6
	Kesikköprü Reservoir	1500	39.37	33.33	20	0	1997	breeding	A1, B2
	Kizilirmak delta	16110	41.60	36.08	150	150		breeding	B1i
	Kocaçay delta	4200	40.38	28.48	70	70		breeding	B1i, B2
	Kulu lake	860	39.08	33.15	10	10		breeding	A1, B1i, B2
	Marmara lake	6800	38.62	28.00	25	25	0	breeding	A1
	Mogan lake	1500	39.77	32.80	150	200	1994	winter	A1
	Moğan lake	1500	39.77	32.80	10	10		breeding	A1
	Salda lake	4370	37.55	29.67	400	400	1990	winter	A1
	Sultansazligi	39000	38.33	35.27	20	20		breeding	A1
	Terkos lake	5850	41.32	28.53	20	0	2000	breeding	A1

Country	International name	Area (ha)	Location		Population		Year	Season	Criteria
			Lat (N)	Long (E)	Min	Max			
	Uluabat lake	13500	40.17	28.58	0	32	1998	breeding	A1, A4i
<b>Ukraine</b>	Kagul lake	10500	45.22	28.43	30	50	1999	breeding	A1, A4i
	Kugurluj and Kartal lakes	19200	45.28	28.65	30	60	1999	breeding	A1
	Latorytsya river valley near Chop	7000	48.47	22.30	40	60	1997	breeding	A1
	River Danube	2500	45.38	29.12	10	30	1999	breeding	A1
	Shats'ki lakes	32850	51.55	23.82	20	0	1994	breeding	A1
	Snake island	17	45.25	30.20	50	100	1999	passage	A1, A4i
<b>Yemen</b>	Ta'izz wadis	11000	13.65	44.00	72			passage	A1
	Ta'izz wadis	11000	13.65	44.00	10	150	1992	winter	A1
<b>Yugoslavia</b>	Carska bara	9300	45.27	20.42	30	50	1997	breeding	A1, A4i
	Dubovac-Ram	12000	44.82	21.27	30	40	1996	breeding	A1, A4i
	Gornje Podunavlje	30000	45.62	18.97	30	50	1997	resident	A1, A4i
	Jegricka	5400	45.33	20.17	50	70	1997	breeding	A1, A4i
	Lake Skadar	40000	42.18	19.25	20	30	1998	breeding	A1, A4i
	Subotica lakes and sandy terrain	20000	46.07	19.82	15	25	1997	breeding	A1
	Uzdin fish-pond	5500	45.22	20.63	100	150	1997	breeding	A1, A4i

**Criteria:** the following criteria were used to identify IBAs for *Aythya nyroca*

*Category A1* Species of global conservation concern: The site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern.

*Category A4* Congregations: i) The site is known or thought to hold, on a regular basis, = 1% of a biogeographic population of a congregatory waterbird species.

*Category B1* Congregations: I) The site is known or thought to hold = 1% of a flyway or other distinct population of a waterbird species.

*Category B2* Species with an unfavourable conservation status in Europe: The site is one of the 'n' most important in the country for a species with an unfavourable conservation status in Europe (SPEC 2, 3) and for which the site-protection approach is thought to be appropriate.

*Category C1* Species of global conservation concern: The site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern.

*Category C2* Concentrations of a species threatened at the European Union level: The site is known to regularly hold at least 1% of a flyway population or of the EU population of a species threatened at the EU level (listed on Annex 1 and referred to in Article 4.2 of the EC Birds Directive).

*Category C6* Species threatened at the European Union level: The site is one of the five most important in the European region (NUTS region) in question for a species or subspecies considered threatened in the European Union (i.e. listed in Annex 1 of the EC Birds Directive).

### Annex 3. Protection status of Important Bird Areas for the Ferruginous Duck *Aythya nyroca*.

Country	International name	Protection status	Protected areas name	Management Plan
<b>Afghanistan</b>	Hamun-i-Puzak	(None)		no
<b>Algeria</b>	Complexe de zones humides de la plaine de Guerbes-Sanhadja	?		no
	Lac des Oiseaux---Garaet et Touyour	(Partial)	Unknown	no
	Lac Oubeira	(Full)	Unknown	no
	Lac Tonga	(Full)	Unknown	no
	Marais de Mekhada	(None)		no
<b>Armenia</b>	Armash fish-farm	?		no
	Lake Sevan	Full	Lake Sevan (Ramsar)	no
<b>Austria</b>	Neusiedler See	Full	Neusiedler See-Seewinkel (National Park, Special Protection Area (SPA)), Neusiedlersee, Seewinkle & Hansag (Ramsar)	no
	Southern Seewinkel and Zitzmannsdorfer Wiesen	Full	Neusiedler See-Seewinkel (National Park, SPA), Neusiedlersee, Seewinkle & Hansag (Ramsar), Neusiedler See (National Park)	no
<b>Belarus</b>	Beloe fish-farm	None		no
	Mid-Prípyat	Partial	Mid-Prípyat State Landscape Zakaznik (Ramsar), Nizovie Jaseldy (Zakaznik), Nizovie Sluchi (Zakaznik), Prostyr (Zakaznik), Ustie Lani (Zakaznik)	no
<b>Bosnia and Herzegovina</b>	Bardaca	Partial	IBA BA003 (Ornithological reserve)	no
	Hutovo blato	Full	Hutavo Blato (Ramsar), IBA BA001 (Ornithological reserve)	no
<b>Bulgaria</b>	Atanasovo lake	Partial	Atanasovo Lake (Buffer zone, Ramsar, Reserve)	no
	Durankulak lake	Partial	Durankulak lake (National Monument, Ramsar)	no
	Kalimok complex	Partial	Bezimenen Island (Protected Landscape)	no
	Mandra-Poda complex	Partial	Izovorska Mouth (Protected Landscape), Poda Lagoon (Protected Landscape)	no
	Mechka fish-ponds	None		no
	Orsoya fish-ponds	None		no
	Shabla lake complex	Partial	Shabla Lake (Protected Landscape, Ramsar)	no
	Srebarna lake	Partial	Srebarna (Ramsar, Reserve, World Heritage Site)	no
<b>Chad</b>	Lake Fitri	(Full)	Unknown	no
<b>Croatia</b>	Alluvial wetlands of the River Danube	Partial	Kopacki Rit (Nature Park, Ramsar, Special Reserve), Repas Nature Park (Nature Park), Veliki Pazut (Special Reserve), Krapje Dol (Other), Lonjsko Polje and Mokro Polje (Ramsar), Rakita (other), Vrazje Blato (Other)	no
	Alluvial wetlands of the River Drava	Partial	Kopacki Rit (Nature Park, Ramsar, Special Reserve), Repas Nature Park (Nature Park), Veliki Pazut (Special Reserve), Krapje Dol (Other), Lonjsko Polje and Mokro Polje (Ramsar), Rakita (other), Vrazje Blato (Other)	no
	Alluvial wetlands of the River Sava	Partial	Kopacki Rit (Nature Park, Ramsar, Special Reserve), Repas Nature Park (Nature Park), Veliki Pazut (Special Reserve), Krapje Dol (Other), Lonjsko Polje and Mokro Polje (Ramsar), Rakita (other), Vrazje Blato (Other)	no
	Donji Miholjac fish-ponds	None		no
	Grudnjak fish-ponds	None		no
	Jelas field	None		no
	Koncanica fish-ponds and surrounding area	None		no
	Nasicka Breznica fish-ponds	None		no
	Pokupsko depression	Partial	Crna Mlaka (Ramsar, Special Reserve)	no
<b>Egypt</b>	Aswan reservoir	(Partial)	Unknown	yes
	Lake Burullus Protected Area	(Full)	Unknown	yes
	Lake Nasser	(None)		no
	Upper Nile	?		yes



Country	International name	Protection status	Protected areas name	Management Plan
	Wadi El Rayan Protected Area	(None)		no
<b>Ethiopia</b>	Bishoftu lake	?		no
	Chelekleka lake and swamp	?		no
	Green Lake	?		no
	Lake Ashenge	?		yes
<b>Georgia</b>	Javakheti Plateau	Partial	Borjomi-Kharagauli National Park (National Park)	no
	Kolkheti	Partial	Ispani II Marshes (Ramsar), Kolkheti Nature Reserve (Zapovednik), Wetlands of Central Kolkheti (Ramsar)	no
<b>Greece</b>	Amvrakikos gulf	Partial	Amvrakikos gulf (Ramsar), Amvrakikos Kolpos (SPA), Limnthalassa Tsoukalio kai Valtos Rodias (Game Refuge)	no
	Lake Chimaditis and Lake Zazaris	Partial	Hintsko-Heimadi/Limnohorion (Game Refuge), Limnes Cheimaditida-Zazari (SPA)	no
	Lake Distos	Partial	Argriro- Pr. Hlias-Panaqia/Aliveriou-Argirou-Pra (Game Refuge)	no
	Lake Kalodiki, Margariti and Karteri marshes	Partial	Elos Kalodiki (Site of conservation importance), Valtos Kalodikou/Margaritiou-Eleftheriou-Spath (Game Refuge)	no
	Lake Kastoria (Orestiada)	Partial	Limni, Vouno Kastorias (Game Refuge)	no
	Lake Kerkini	Partial	Artificial Lake Kerkini (Ramsar), Techniti Limni Kerkinis (SPA)	no
	Lake Mitrikou (Ismarida)	Full	Lake Mitrikou (Protected area), Lake Vistonis, Porto Lagos, Lake Ismaris & adj. La (SPA, Ramsar), Mavromatiou-Limni Mitrikou/Imerou-Mavromatiou (Game refuge)	no
	Lake Stymphalia	Partial	Gidomandra/Laukas (Game refuge)	no
	Lakes Trichonida and Lysimachia	Partial	Limnes Trichonida kai Lysimachia (Site of conservation importance)	no
	Nestou delta and coastal lagoons	Partial	Dasohorion (Font tis Amerikis)/Erasmion (Game refuge), Dasos Nestou (Kotza Orman) (Game Refuge), Delta Nestou (SPA), Nestos Delta & adjoining lagoons (Ramsar), Nestou delta and coastal lagoons (Protected area)	no
	North, east and south Kithira island	Partial	Nisides Kythron: Prasonisis, Dragonera, Antidragon (SPA), Thalaria Kythron (Game Refuge)	no
	Porto Lagos, Lake Vistonis, and coastal lagoons (Lakes of Thrace)	Partial	Fanariou/Porto Lagos (Game Refuge), Lake Vistonis, Porto Lagos, Lake Ismaria & adj. la (Ramsar, SPA), Porto Lagos, Lake Vistonis, and coastal lagoons (Protected area)	no
	Reservoirs of former Lake Karla	None		yes
	Sperchios valley and delta-Maliakos gulf	Partial	Ekvolos Sperchiou (Game Refuge), Ygrotopos Ekvolon Sperchiou (SPA)	yes
<b>Hungary</b>	Biharugra fish-ponds	Partial	Biharugra Fishponds (Ramsar), Koros-Maros (National Park)	yes
	Bodrog flood-plain	Partial	Bodrogzug (Ramsar), Long-erdo (Nature Conservation Area), Tokaj-Bodrogzug (Landscape Protected Area)	no
	Hortobágy	Partial	Hortobagy (National Park, Ramsar), Hortobagy Natyional Park (Biosphere Reserve)	no
	Inner Somogy	Partial	Balata-to (Nature Conservation Area), Boronka melleki (Landscape Protected Area), Csokonyavisontai fas legelo (Nature Conservation Area), Duna-Drava (National Park), Rinyaszentkiralyi erdo (Nature Conservation Area)	no
	Kis-balaton	Full	Balaton-felvideki (National Park), Kis-Balaton (Ramsar)	no
	Nagyberek	Partial	Nagyberek Feherviz (Nature Conservation Area)	
	Pacsmag fish-ponds	Full	Pacsmag Fishponds (Ramsar), Pacsmagi-tavak (Nature Conservation Area)	no
	Pusztaszer Landscape Protection Area	Full	Pusztaszer (Ramsar), Pustaszeri (Landscape Protected Area)	no
	Sárvíz valley	Partial	Retszilás Fishponds (Ramsar), Retszilási-tavak (Nature Conservation Area), Sarviz-volgy (Landscape Protected Area)	no
	Vértes Mountains and Zámoly Basin	Partial	Vertesi (Landscape Protected Area)	no
<b>Iran, Islamic Republic of</b>	Anzali Mordab complex	(Full)	Unknown	no
	Cheghakor marsh	?		yes
	Dasht-e Arjan and Lake Parishan	(None)		no
	Dez river marshes and plains	(Partial)	Unknown	no
	Gandoman marsh	(None)		no
	Gori Gol	(Full)	Unknown	no
	Hamoun-i Sabari and Hamoun-i Hirmand	(Full)	Unknown	yes

Country	International name	Protection status	Protected areas name	Management Plan
	Hashelan marsh and Doh Tappeh plains	(None)		no
	Lake Kobi	(Full)	Unknown	yes
	Lake Uromiyeh	(Full)	Unknown	no
	Lake Zaribar	(None)		yes
	Seyed Mohalli, Zarin Kola and Larim Sara	(None)		no
	Shadegan marshes, Khor-al Amaya, Khor Musa	(Partial)	Unknown	no
	Shur Gol, Yadegarlu and Dorgeh Sangi lakes	(Full)	Unknown	yes
	South end of the Hamoun-i Puzak	(Partial)	Unknown	yes
	Voshmigir dam	(None)		yes
<b>Iraq</b>	Attariya plains	(None)		yes
	Baquba wetlands	(None)		yes
	Haur Al Sa'adiyah	(None)		yes
	Mahzam and Lake Tharthar	(None)		no
	Samara dam	(None)		yes
<b>Israel</b>	Jezre'el, Harod and Bet She'an valleys	?		no
	Judean foothills	?		no
<b>Italy</b>	Biviere and Plain of Gela	Partial	Biviere and Plain of Gela (SPA), Biviere di gela (Ramsar, Regional Nature Reserve)	no
	Brabbia peatland and Lake Varese	Full	Lago di Biandronno (Regional Nature Reserve), Palude Brabbia (Ramsar, Regional Nature Reserve), V. del Mincio, Paludi di Ostiglia, Torbiere d'Iseo (SPA)	yes
	Gargano Promontory and Capitanata Wetlands	Partial	Saline di Margherita di Savoia (Ramsar)	no
	Oristano wetlands and Cape San Marco	Partial	Stagno di C bras (Ramsar), Stagno di Corru S'Ittiri, Stagni di San Giovanni e (Ramsar), Stagno di Mastras (Ramsar), Stagno di Pauli Maiori (Ramsar), Stagno di S'Elena Arrubia (Ramsar), Stagno di Sale Porcus (Ramsar)	no
	Ponte Buriano-Lago della Penna	Partial	Ponte Buriano-Lago della Penna (Wildlife Reserve)	yes
	Pools of Florence plain	None		yes
	Punte Alberete and Valle della Cannà, Pineta San Vitale and Pialassa della Baiona	Partial	Delta del Po (Regional Nature Park), Pialassa della Baiona e Risega (Ramsar), Pineta di Ravenna (San Vitale) (Nature Reserve), Punta Alberte (Ramsar), Punte Alberte e Valle della Cannà (SPA), Valle Gorino, Bertuzzi, Comacchio, Ortazzo, Baiona (SPA)	yes
	Simeto mouth and Biviere di Lentini	Partial	Oasi del Simeto (Regional Nature Reserve), Simeto mouth and Biviere di Lentini (SPA)	yes
	Stagnone di Marsala and Trapani saltpans	Partial	Isole dello Stagnone di Marsala (Regional Nature Reserve), Saline di Trapani e Paceco (Regional Nature Reserve), Stagnone di Marsala and Trapani saltpans (SPA)	no
	Valli di Argenta	Partial	Delta del Po (Regional Nature Park), Valle Campotto e Bassarone (Ramsar), Valle Santa (Ramsar), Valle Santa e Val Campotto (SPA), Valli Argenta e Marmorta (Wildlife Reserve)	yes
	Valli di Comacchio and Bonifica del Mezzano	Partial	Delta del Po (Regional Nature Park), Destra foce fiume Reno (Statae nature Reserve), Foce fiume Reno (Statae Nature Reserve), RN Sacca di Bellocchio e Foce Fiume Reno (SPA), Sacca di Bellocchio (Ramsar), Sacca di Bellocchio I (Nature Reserve), Sacca di Bellocchio II (Nature Reserve), Sacca di Bellocchio III (Nature Reserve), Valle Gorino, Bertuzzi, Comacchio, Ortazzo, Baiona (SPA), Valli residue dell comprensorio di Comacchio (Ramsar)	yes
	Venice lagoon	Partial	Barene di S. Guiliano (Wildlife Reserve), Boschi di Ca Savio-Punta Sabbioni (Wildlife Reserve), Ca Roman (Wildlife Reserve), Casse di Colmata (Wildlife Reserve), Dune delgi Alberoni (Wildlife Reserve), Isolotto petrolchimico e Laguna Viva (Wildlife Reserve), Laghett Decal (Wildlife Reserve), Laguna di Venezia: Valle Averte (Ramsar), Le Vignole-Le Certosa (Wildlife Reserve), Pineta di Ca Ballarin (Wildlife Reserve), Seca del Bacan (Wildlife Reserve)Valle Averte (SPA), Valle Millecampo (State Nature Reserve)Vallesina-Canale Casson (Wildlife Reserve)	no
	Vico lake	Partial	Lago di Vico (Regional Nature Reserve)	no

Country	International name	Protection status	Protected areas name	Management Plan	
<b>Lebanon</b>	Ammiq swamp	?		no	
	Lac Faguibine	?		no	
	Lac Fati	?		no	
	Lac Horo	(Full)	Unknown	no	
	Lac Télé	?		no	
	Séri	?		no	
<b>Mauritania</b>	Lac d'Aleg	?		no	
	Sawana--Oum Lellé	?		no	
<b>Nigeria</b>	Hadejia-Nguru wetlands	?		no	
<b>Oman</b>	Khawr ad Dahariz	?		no	
	Khawr Dhirif	?		no	
	Khawr Rawri	?		no	
	Wadi Darbat	?		no	
<b>Poland</b>	Barycz river valley	Full	Dolina Baryczy (Landscape Park), Las Pardolinski (Nature Monument), Stawy Milickie (Nature Reserve), Stawy Milickie Nature Reserve (Ramsar), Wydymacz (Nature Reserve), Wzgorza Ostrzeszowskie I Kotlina Odolanowska (Protected Landscape Area), Biebrza National Park (Ramsar), Biebrzanski Park Narodowy (National Park)	no	
	Przemków ponds	Full	Przamski Park Krajobrazowy (Landscape Park)	no	
	Solska Forest Landscape Park	Full	Puszcza Solska (Landscape Park)	no	
	Tysmienica river valley	None		no	
	Woniesc reservoir	None		no	
	<b>Portugal</b>	Pera marsh	None		no
<b>Romania</b>	Balta Alba, Amara and Jiriau lakes	Partial	Lake Amara (Nature Reserve), Lake Balata Alba (Nature Reserve), Visani Bird Sanctuary (Nature Reserve)	no	
	Cefa fish-ponds and Radvani wood	Partial	Radvani Wood Mixed Heron Colony (Bird Sanctuary)	no	
	Danube Delta and Razelm-Sinoe complex	Full	Danube Delta (Ramsar), Danube Delta Biosphere Reserve (Biosphere Reserve, World Heritage Site)	no	
	Lake Comana	Partial	Gradinari Wood (Nature Reserve)	no	
	Lake Strachina	None		no	
	Mehedinti fish-ponds-Izvoarele	None		no	
	Murani lake and Pischia forest	Partial	Mlastinile Murani (Nature Reserve)	no	
	Portile de Fier reservoir	None		no	
	Satchinez marsh	Partial	Satchinez Bird Reserve (Nature Reserve)	no	
	The Little Island of Braila	Partial	Little island of Braila (Nature Reserve)	no	
	Vadeni-Mata-Cârja-Radeanu wetlands	None		no	
	<b>Russian Federation</b>	Achikol'skiye lakes	None		no
	Dadynskiye lake	None		no	
Delta of the River Don	Partial	Azovski Uchastok Opytnogo Okhotkhozaystva (Zakaznik), Donskoiy rybniy (Zapovednik), Girlovskiy (Zakaznik)	yes		
Lake Adzhi	None		yes		
Mouth of Samur river	Partial	Samursky (Zakaznik)	yes		
Volga Delta	Partial	Astrakhanskiy (Zapovednik), Astrakhanskiy Zapovednik (Biosphere Reserve), Volga Delta (Ramsar)	yes		
<b>Saudi Arabia</b>	Al-Ha'ir	(Partial)	Unknown	no	
	Al-Hasa lagoons	?		yes	
	King Faisal Airbase, Tabuk	(None)		no	
	Malaki dam	(None)		no	
<b>Senegal</b>	Djoudj wetlands	(Full)	Unknown	no	
<b>Syrian Arab Republic</b>	Bahrat Homs	(None)		no	

Country	International name	Protection status	Protected areas name	Management Plan
	Tual al-'Abba	(None)		no
<b>Tunisia</b>	Douz Laâla	?		no
	Ghidma	?		no
	Ichkeul			no
	Lebna reservoir			no
<b>Turkey</b>	Akdogan lake	None		no
	Aksehir and Eber lakes	Partial	Aksehir & Eber Golu (SIT)	no
	Çorak lake	None		no
	Eregli marshes	Partial	Eregli Sazligi (Nature Reserve, SIT)	no
	Göksu delta	Full	Gosku Delta Game Reserve (Game Reserve), Gosku Delta Ramsar (Ramsar), Gosku Delta (SIT), Gosku Delta SPA (SPA)	no
	Hotamis marshes	Partial	Hotamis Sazligi SIT (SIT)	no
	Isikli lake	None		no
	Karakaya Reservoir	None		no
	Karakuyu Marshes	None		no
	Karamik Marshes	Partial	Karamik Golu (SIT)	no
	Kesikköprü Reservoir	None		no
	Kizilirmak delta	Partial	Kizilirmak Deltasi (Game Reserve, Ramsar), Kizilirmak Delta SIT (SIT)	no
	Kocaçay delta	None		no
	Kulu lake	Partial	Kulu Golu (SIT)	no
	Marmara lake	None		no
	Mogan lake	Full	Mogan Golu (SPA)	no
	Salda lake	Partial	Salda Lake SIT (SIT)	no
	Sultansazligi	Full	Sultan Sazligi (Game Reserve, Nature Reserve), Sultansazligi (Ramsar, SIT)	no
	Terkos lake	None		no
	Uluabat lake	Partial	Uluabat Golu (Ramsar)	no
<b>Ukraine</b>	Kagul lake	None		no
	Kugurluj and Kartal lakes	Partial	Kartal Lake (Ramsar), Kugurlui Lake (Ramsar)	no
	Latorytsya river valley near Chop	None		no
	River Danube	None		no
	Shats'ki lakes	Partial	Shatsk (National Park), Shatsk Lakes (Ramsar)	no
	Snake island	None		no
<b>Yemen</b>	Ta'izz wadis	?		no
<b>Yugoslavia</b>	Carska bara	Partial	Stari-Begej-Carska Bara (Special Nature Reserve), Stari Begej/Carska Bara Special Nature Reserve (Ramsar)	no
	Dubovac-Ram	None		no
	Gornje Podunavlje	Partial	Gornje Podunavlje (Regional Nature Park)	no
	Jegricka	Partial	Jegricka (Strict Nature Reserve)	no
	Lake Skadar	Partial	Skadarsko Jezero (National Park, Ramsar)	no
	Subotica lakes and sandy terrain	Partial	Ludasko Jezero (Special Nature Reserve), Ludasko Lake (Ramsar), Palic (Regional Nature Park), Seleveniske pustare (Special Nature Reserve)	no
	Uzdin fish-pond	None		no

**Protection status:** Protection Status categories shown without parentheses are based on the degree of overlap between protected areas and IBA boundaries (i.e. **Full:** Protected area falls within IBA boundary; **Partial:** Part of protected area falls within IBA boundary; **None:** None of the protected area fall within the boundary of the IBA. Those shown within parentheses are based on assessments by Scott & Rose (1996) and do not necessarily relate to the amount of overlap with current IBA boundaries.

**Annex 4. Sites that have, at some time in the last 50 years, supported internationally important numbers of *Aythya nyroca* and yet which may, or may not be components of existing IBAs.**

Country	Key site	Location		Season	No. pairs	No. individuals	Protected status	Ref.
		Lat (N)	Long (E)					
Azerbaijan	Absheron Peninsula (coastal waters)	40.35	49.82	non-breeding		<500	None	1
	Aggel (Ah Gol) Lake	40.08	47.67	winter		840	Full	2
	Divichi Liman	41.25	49.08	non-breeding		>100	Partial	1, 3
	Divichi Liman	41.25	49.08	breeding	10-40		Partial	
	Kura Delta	39.30	48.47	non-breeding		>100	None	1
	Kizil Agach	39.12	48.35	non-breeding		>100	Partial	1
	Lake Aggel	40.08	47.67	non-breeding		<500	Full	1, 3
	Lake Aggel	40.08	47.67	breeding	60-70		Full	1, 3
	Lake Mahmud-chala	39.50	48.67	breeding	>20		Partial	1, 2
	Lake Mahmud-chala	39.50	48.67	winter		500	Partial	
	Lake Sarasy	48.35	40.00	non-breeding		>100	Partial	1
	Lake Sarasy	48.35	40.00	breeding	>30		Partial	1
	Lake Sarasy	48.35	40.00	winter		>300	Partial	
	Novogolovskaya-Chala	?	?	winter		500	None	2
	Varvara Reservoir	?	?	winter		500	None	2
Bangladesh	Haor Basin			winter		50,000	?	4
Bosnia and Herzegovina	Prnjavor Fishponds	44.70	17.66	breeding	>30		None	5
	Sanciani Fishponds	44.93	16.77	breeding	>50		None	5
Bulgaria	Cherni Vruh Fishponds	42.45	27.45	non-breeding		>100	?	6, 7
	Tsibarsko Blato Marsh	43.80	23.75	breeding	10-20		?	6, 7
Cameroon	Waza National Park*	11.25	14.67	winter		500 (30)	Full	2
Chad	Mare Tchakam*	13.48	20.73	winter		100 (50)	Unknown	2
China	Caohai Nature Reserve	26.83	14.25	winter		2,000	?	8
Croatia	Crna Mlaka Fishponds	45.61	15.75	breeding	30-80		Full	5, 9, 10
	Crna Mlaka Fishponds	45.61	15.75	non-breeding		100-500	Full	
	Dragani Fishponds	45.57	16.93	breeding	60-100		None	11
	Dragani Fishponds	45.57	16.93	non-breeding		200-400	None	
	Garešnica Fishponds	45.57	16.93	breeding	>30		None	5
	Kopaevskirit & Podunavlje fishpond	45.88	18.85	breeding	50-200		Partial	5, 9, 11, 12
	Kopaevskirit & Podunavlje fishpond	45.88	18.85	non-breeding		100-1,000	Partial	
	Lipovljani Fishponds	45.40	16.85	breeding	>30		None	5, 9, 13
	Lipovljani Fishponds	45.40	16.85	non-breeding		100-350	None	
	Pisarovina Fishponds	45.55	16.93	breeding	>20		None	5, 10
	Pisarovina Fishponds	45.55	16.93	non-breeding		>100	None	
	Poljana Fishponds	45.55	16.93	breeding	>50		None	5
	Sišani Fishponds	45.82	16.65	breeding	>50		None	5
	Sloboština Fishponds	45.25	17.20	breeding	>20		None	5
	Hungary	Dinnyes Ferto + Velencio-To	47.17	18.53	breeding		90	Full
Lake Feher at Kardoskut		46.50	20.63	breeding		50	?	2
Somogy region		46.35	17.82	breeding	80		Partial	14
Szaporca		45.83	18.10	non-breeding		100	Full	2
	Tiszaalpari Ret	47.80	20.00	breeding		30	?	2
India	Kaziranga National Park	?	?	winter		170	?	15
	Brahmaputra Sanctuary	?	?	winter		230	?	15
Iraq	Baquba Wetlands	33.92	44.83	winter		1,000	None	2

Country	Key site	Location		Season	No. pairs	No. individuals	Protected status	Ref.
		Lat (N)	Long (E)					
Islamic Republic of Iran	Bakhtegan and Tashk Lakes	29.67	53.50	winter		5,000	Full	2
	Galugah Ab-Bandan	37.00	49.00	winter		180	?	2
	Lapoo-Zargmarz Ab-Bandan*	36.83	53.28	winter		290 (60)	Partial	2
	Chogha Kor Marsh*	31.92	50.90	winter		120 (70)	None	2
	Miankaleh and Gorgan Bay	36.83	53.75	winter		1,600	Full	2
	Sharol Dasht	36.00	46.00	winter		620	?	2
Israel	Carmel Coast	32.55	34.92	winter		150	Partial	2
	Hula Valley	33.05	35.62	winter		750	Full	2
Italy	Lesina	41.82	15.30	winter		200	?	2
	Manfredonia Gulf*	41.57	15.88	winter		250 (50)	?	2
Kazakhstan	Chardara Vdchr*	41.17	68.25	winter		100 (50)	?	2
	Ili River Delta	45.50	74.50	winter		7,500	Full	2
Lithuania	Meteliai Lakes	54.30	23.78	breeding		20	Full	2
	Zuvintas Lake	54.50	23.62	breeding		20	Full	2
Mongolia	Wuliangsu Hai	?	?	winter		30,000	?	42
Myanmar	Minhla-Nyaung Lake	20.83	96.03	winter		720	?	8
	Inle Lake	20.17	97.03	winter		120	?	8
	Yewai Lake	?	?	winter		130	?	8
	Mongpai Lake	?	?	winter		<1,000	?	16
Nigeria	F. Yedseram: Bama	11.50	12.51	winter		200	Partial	2
Mali	F. Niger: Gourna Rharous-Bourem*	16.58	00.16 (W)	winter		230 (10)	?	2
Nigeria	Kazaure*	12.67	08.17	winter		300 (50)	?	2
	Nguru-Matara (Kano)	12.83	10.00	winter		830	?	2
Republic of Moldova	Costesti Reservoir	?	?	non-breeding		>100	?	18
	Prut floodplain wetlands (Cahul to Slobozia Mare)	45.85	28.13	non-breeding		>100	?	18
	Prut floodplain wetlands (Cahul to Slobozia Mare)	45.85	28.13	winter		>100	?	18
	Southern end of Dubasari Reservoir	47.35	29.10	non-breeding		>100	?	18
	Cuciurgan Reservoir	46.43	30.23	non-breeding		>100	?	18
	Cuciurgan Reservoir	46.43	30.23	winter		>100	?	18
	Black Sea coast*	44.50	28.83	winter		170 (30)	Partial	2
Romania	Murighol	?	?	breeding	500-600		Partial	19, 20
	Lake Terchighiol	43.97	28.67	winter		>100	None	19, 20
Russian Federation	Azov Sea: Kuban Delta	45.33	37.25	breeding		1,500	None	2
	Kuban Delta & neighbouring lagoons	45.33	37.25	breeding	70		None	2, 29
Slovakia	Cicovske Mrtve Rameno	47.75	17.73	breeding		30	Full	2
	Parizske Mociare	47.75	18.52	breeding		60	Full	2
Sudan	White Nile Bird Sanctuary	1575	32.50	winter		110	Full	2
	Sud Region	?	?	winter		5,000	?	30
Tunisia	Barrage Chiba	36.70	10.77	breeding	50		None	31.
	Barrage Kheirat	36.13	10.20	postbreeding		240	None	32
	Sebkhet Kelbia	35.83	10.30	postbreeding		180	Full	33
	Barrage El Houareb	35.58	09.90	postbreeding		1,400	Full	34
	Barrage Oued El Hajar	36.87	11.03	breeding	20		Full	32
	Barrage Oued El Hajar	36.87	11.03	winter		270	Full	32
	Barrage Moussa	36.13	10.30	breeding	20		None	35
	Barrage Oued Rmal	36.35	10.35	postbreeding		1,680	None	36

Country	Key site	Location		Season	No. pairs	No. individuals <sup>1</sup>	Protected status	Ref.
		Lat (N)	Long (E)					
	Menzel Dar Bel Ouasr Sebkhah*	35.93	10.38	winter		150 (30)	Unknown	2
	Sebkhah Sidi Mansour	34.23	09.50	winter		2,500	Unknown	2
<b>Turkey</b>	Manyas Gölü	40.23	28.00	winter		>100	Full	2
	Marmara Gölü	38.58	28.10	winter		>100	None	2, 37
	Van Sazligi	38.48	43.32	breeding		30	None	2
<b>Turkmenistan</b>	Kelifskiye Lakes	37.83	64.30	winter		5,000	?	2
<b>Ukraine</b>	Dnestr Delta/Denestrovskiy Liman	46.28	30.30	breeding	>20		Partial	38, 39
	Dnestr Delta/Denestrovskiy Liman	46.28	30.30	non-breeding		>100	Partial	
	Karkinitiski Bay	45.18	33.00	Breeding	130		Full	38
	Ponyzzya Onipza (Lower Dnepr River)	46.50	32.53	breeding	140		Partial	38
	Ponyzzya Onipza (Lower Dnepr River)	46.50	32.53	non-breeding		>100	Partial	
	Dnepr Delta	46.50	32.30	breeding	140		Partial	38, 40
	Dnepr Delta	46.50	32.30	non-breeding		>100	Partial	
<b>Uzbekistan</b>	Chardarya Reservoir	41.08	68.30	winter		220	?	2
	Talimardzhan Reservoir	38.42	65.58	winter		150	?	2
	Middle Amu-Darya River	?	?	winter		140	?	41
<b>Yugoslavia</b>	Vrsacki Rit	45.00	21.18	winter		100	?	9
	Lake Ludaš	46.08	19.83	breeding	>50		?	2, 18
	Stari Begej	45.27	20.42	breeding	>30		?	2, 18
	Baeka Palaukie	44.75	21.32	winter		100	?	2
	Jazovo-Mokrin	45.83	20.25	breeding		30	None	2
	Baeka Joploa	45.82	19.62	winter		200	Unknown	2

<sup>1</sup> Where two figures are given, the first is the maximum, the second (in parentheses) is the mean.

\* Sites for which the mean # number of *Aythya nyroca* present was below the threshold for international importance but the maximum was above (Scott & Rose 1996).

**Ref.:** 1 Patrikeev in litt. 1997, 2 Scott & Rose 1996, 3 Patrikeev 1996, 4 E. Ul-Haque pers. comm. 2002., 5 D. Radovic in litt. 1997, 6 N. Petkov in litt. 1996, 7 N. Petkov in litt. 1997, 8 Miyabayashi & Mundkur 2001, 9 J. Mikuska in litt. 1997, 10 Grimmett & Jones 1989, 11 Radovic *et al.* in press, 12 Getz 1996, 13 Schneider-Jacoby 1998, 14 Hungarian Rare & Colonial Bird Monitoring Programme, 15 Talukdar & Bhattacharjee 2000, 16 Htin Hla pers. comm. 2002., 17 Green 1998a, 18 N. Zubkov in litt. 1997, 19 D. Munteanu in litt. 1995, 20 K. J. Botond in litt. 1996, 29 V. Zubakin in litt. 1997, 30 C. Papaconstantinou in litt. 1997, 31 M. Smart in litt., 32 H. Azafzaf pers. comm. 2002., 33 Hamrouni 1997, 34 Meininger *et al.* 1994, 35 Azafzaf & Hamrouni 2002, 36 Azafzaf 2001, 37 G. Eken in litt. 1997, 38 I. Gorban in litt. 1996 & 1997, 39 I. Rusev in litt. 1997, 40 Dement'ev & Gladkov 1952, 41 Kashkarov & Mukhina 1997, 42 D. Capper pers. comm. 1999.