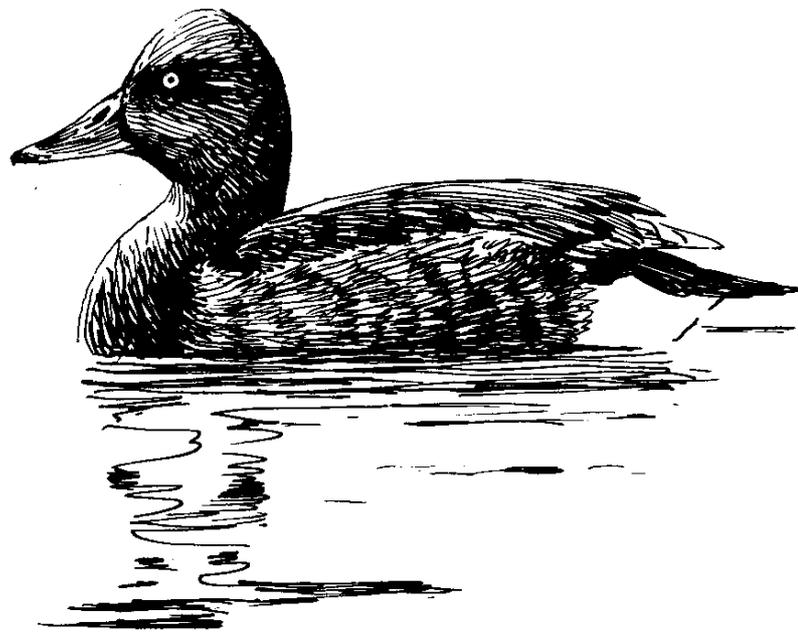


# Ferruginous Duck (*Aythya nyroca*)





## European Species Action Plan Ferruginous Duck (*Aythya nyroca*)

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### Reviews

This action plan should be reviewed and updated every four years (first review due 2001). An emergency review will be undertaken if there are sudden major changes liable to affect the population.

### Geographical Scope

This action plan needs implementation in the following European range states of the Ferruginous Duck: Albania, Armenia, Austria, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, France, Georgia, Germany, Greece, Hungary, Italy (including Sardinia), Lithuania, Moldova, Poland, Romania, Russia (European), Slovakia, Slovenia, Spain, Turkey, Ukraine, former Yugoslav Republic of Macedonia, and Yugoslavia (Serbia-Montenegro).

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# SUMMARY

This plan provides the first international framework of action for the conservation of the Ferruginous Duck. This species is a poorly known, partial migrant, widely distributed in Europe, Asia and Africa. During the first quarter of the 20th century, it was described as one of the most plentiful Anatidae species over a great part of its range. Since, it has undergone a large, long-term decline in Europe, and numbers continue downward in most countries. Approximately 13,000-24,000 pairs breed currently, and it is thought the European breeding population constitutes about half the world population. During the winter, most seem to migrate to Africa and the Middle East, leaving about 3000-14,000 individuals in Europe.

The principal threats are habitat loss and degradation, and hunting. Others include introduction of non-native species (particularly Grass Carp *Ctenopharyngodon idella*), drowning in fishing nets, lead poisoning, disturbance, and climate change.

In Europe, 27 countries contain sites regularly utilised by this duck. Little information on the birds status is available from some of these countries, including a number of countries formerly included within Yugoslavia and the Soviet Union. A preliminary inventory of 81 internationally important sites is developed within the plan; only 18% of these are known to be protected fully. The species has received little international conservation action, although a number of national initiatives have developed recently.

In the short-term, the aim of this action plan is to maintain the current population and range of the Ferruginous Duck in Europe, and in the medium- to long-term to promote increases and expansion. International efforts will be critical for implementation in countries that lack adequate resources for conservation, which tend to be those with the largest numbers of this duck.

## **Threats and limiting factors**

- Habitat loss - high
- Habitat degradation - high
- Hunting - high
- Introduction of non-native species - unknown
- Entrapment in fishing nets - unknown
- Lead poisoning - unknown
- Disturbance - unknown
- Climate change - unknown

## **Conservation priorities**

Promote full protection of the Ferruginous Duck and its habitat through national and international legislation - high

Promote development and implementation of national and regional strategies that further the objectives of this plan, or adapt for that purpose existing strategies - high

Promote conservation in the wider environment for the benefit of the Ferruginous Duck and its habitat - high

Promote adequate protection and management of key sites - high

Prevent mortality and disturbance caused by hunting - high

Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised -high

Locate and assess the status of key areas - high

Monitor adequately the remaining population - high

Investigate productivity and mortality - high

Investigate habitat requirements and feeding ecology - high

Undertake research necessary to alleviate detrimental consequences of socioeconomic development - high

Develop efficient catching methods and equipment - high

Develop effective census techniques - high

Investigate the impact of Grass Carp on Ferruginous Ducks and their habitat - high

Develop and implement effective education programmes for the conservation of the Ferruginous Duck and its habitat – high

## 1. Introduction

Although once considered "one of the most plentiful [Anatidae] species over a great part of its range" (Phillips 1923), the Ferruginous Duck (*Aythya nyroca*) is now listed as Vulnerable on the *IUCN Red List of Threatened Animals* (Baillie & Groombridge 1996). 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).

The Ferruginous Duck was only recognised officially as globally threatened in 1994 (Collar *et al.* 1994), and partly as a consequence it has received little international conservation action. The first international workshop held for this species was convened in Tokaj (Hungary) on 11th and 12th October 1996, primarily to discuss the content of this action plan. It was attended by 24 experts from 14 European countries (Austria, Bulgaria, Germany, Greece, Hungary, Italy, Lithuania, Russia, Slovakia, Spain, UK, Ukraine, Poland and Romania). This action plan is based on discussions held during the workshop, and on further information received before and after. Unless referenced specifically, the sources of information within this document are the compiler and main contributors.

This is the first international action plan for the Ferruginous Duck. Reasonably good information has been collected on this species for 18 European countries containing sites regularly used by this bird (Austria, Azerbaijan, Bulgaria, Croatia, Czech Republic, France, Georgia, Germany, Greece, Hungary, Italy, Lithuania, Moldova, Poland, Romania, Slovakia, Spain, and Turkey). However, there is a dearth of information from 9 countries (Albania, Armenia, Belarus, Bosnia-Herzegovina, most of Russia, Slovenia, Ukraine, former Yugoslav Republic of Macedonia, and Yugoslavia [Serbia-Montenegro]). This generates inherent problems when developing priorities for action, and ought to be considered when interpreting this plan.

## 2. Background information

### 2.1. Distribution and population

Palaearctic. The present breeding range of the Ferruginous Duck extends east from western Europe to western China (Sinkiang and northern Szechuan) and western Mongolia, and north from Iran to Lithuania (Figure 1). Europe comprises about half of the species' breeding range (Tucker & Heath 1994). 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 breeding range in Europe is concentrated in eastern and central areas, with smaller numbers in the north, west and south (Figure 2).

The species is chiefly migratory, although some southern breeding birds remain in their breeding areas year-round (Scott & Rose 1996). Movements are poorly understood since ringing data are sparse, and very little is known of the migration routes. Most European birds seem to spend the winter in Africa and the Middle East, though substantial numbers remain in southern Europe, particularly in milder years. Key winter areas for European breeding birds are unclear, though seem to include the Niger Basin wetlands of Mali, the Chad Basin, the coastal wetlands of Egypt and Israel (Scott & Rose 1996), and wetlands north of the Sud in Sudan.

No biologically meaningful populations are identifiable, though Scott & Rose (1996) make arbitrary divisions of the population for practical purposes.

As a breeding species, this duck has declined severely in population size and range in many European countries. Tucker & Heath (1994) estimate the European breeding population to total 11,000-25,000 pairs. Updated information using the methodology of Tucker & Heath (1994), but including estimates from more countries (Azerbaijan, Bosnia-Herzegovina, Georgia, former Yugoslav Republic of Macedonia, and Yugoslavia), suggest a revised population figure of 13,000-24,000 pairs (Table 1). The species has declined in most countries (Table 1; Figure 3), but most acutely in the Ukraine where during the 1950s the population was estimated at 70,000-80,000 pairs, but numbers currently 1500-5,000 pairs (>95% decline). Also, numbers breeding in Spain have declined from about 500 pairs earlier in the 20th century (Valverde 1960) to the verge of extinction currently (0-4 pairs annually), and in Moldova

breeding numbers have declined from 1000-1300 pairs in the 1980s to 20-100 pairs currently.

Winter numbers in Europe also seem to have declined markedly (Table 2). 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 c.20% of the delta area), August counts declined from 979 in 1978 to 89 in 1982 (Paspaleva *et al.* 1984).

Total numbers remaining to winter in Europe seem to have been overestimated 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 overestimate. Total counts between 1982 and 1986 averaged only 700, while typical counts in recent years have included 832 in 1992 and 762 in 1994 (Scott & Rose 1996). Table 2 suggests 3000-14,000 individuals winter in Europe.

It must be stressed that large margins of error ought to be attached to nearly all estimates of numbers of this species, since it is very difficult to census accurately owing to its secretive behaviour, choice of densely vegetated wetlands, and identification problems when present in mixed *Aythya* flocks. Also, almost all census data have been collected *ad hoc*, either as part of general waterbird monitoring programmes or casual observations.

## **2.2. LIFE history**

### ***Breeding***

The Ferruginous Duck has monogamous pair-bonds of seasonal duration, and breeds late relative to most other European Anatinae. Pairs form late, from January onwards, and most birds arrive on breeding grounds in pairs. Arrival occurs from early March in southern Europe (Handrinos & Acriotis 1997; Radovic *et al.* in press) to early April and into May further north (Dement'ev & Gladkov 1952; Cramp & Simmons 1977). The nest is located on the ground close to water, or above water in dense reeds and other aquatic vegetation. Occasionally, nests are located within gull (*Laridae*) colonies, such as at Milicz fishponds in Poland (Stawarczyk 1995). A single clutch is laid usually, totalling 7-10 eggs (range = 6-14), with larger clutches probably containing dumped eggs (Cramp & Simmons 1977; Kiss 1980). Incubation begins from late May to late June in southern Europe (Radovic *et al.* in press), 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

sometime during incubation). 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 (Dement'ev & Gladkov 1952; Cramp & Simmons 1977). No information is available on breeding success.

### ***Feeding***

Omnivorous, but plant material predominates in analyses of stomach contents. Chiefly seeds and other parts of aquatic plants, such as *Potamogeton* spp, *Carex* spp, *Ceratophyllum* spp, *Scirpus* spp, *Najas* spp and *Carex* spp, and macro-algae such as *Chara* spp. However, animal material can predominate locally, and includes invertebrates such as chironomids, snails and beetles, and also frequently small fish (typically 2-7 cm) and frogs (Phillips 1923; Dement'ev & Gladkov 1952; Sterbetz 1969; Cramp & Simmons 1977; Amat & Soriguer 1982; Kiss *et al.* 1984; Paspaleva *et al.* 1984; Ponyi 1994; Green 1996; Patrikeev 1996). Daily food intake is probably <100 g (*contra* Paspaleva *et al.* 1984). Seasonal and regional differences in feeding have not been studied.

Areas of shallow water (about 30-100 cm) close to dense littoral vegetation are the favoured feeding areas. A substantial cover of floating vegetation (eg. *Nymphoides peltata*, *Trapa natans* and *Nymphaea alba*) also seems to characterize feeding sites in many areas. Food is taken by dabbling at the surface, when swimming with head submerged or up-ending, and by diving (Sterbetz 1969; Cramp & Simmons 1977; Amat & Soriguer 1982; Dvorak *et al.* 1997; Green 1996).

### ***Moulting and 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 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 (eg. Volga, Dnestr and Danube) (*contra* Cramp & Simmons 1977). A number of Croatian fishponds support post-breeding flocks of several hundred birds. Departure from breeding localities begins in September and peaks in October (Dement'ev & Gladkov 1952; Cramp & Simmons 1977; Handrinos & Acriotis 1997; Radovic *et al.* in press).

### ***Habitat Requirements***

Concentrated in lowland, continental middle latitudes, extending to high altitudes only sporadically (eg. in Georgia and Armenia). During

breeding, prefers fairly shallow expanses of water, rich in submergent and floating vegetation, fringed by dense stands of emergent plants. Large river deltas often support substantial breeding numbers, as do open floodplains with numerous oxbows and shallow lakes/ponds. In some areas, saline, brackish or alkaline wetlands are commonly utilised for breeding, for example in Hungary (Sterbetz 1969), Romania (Kiss *et al.* 1984) and Turkey (Green 1996). In central and eastern Europe, extensively managed fishponds are an important breeding habitat, which are similar in character to natural floodplain wetlands (eg. oxbows). During the non-breeding season habitat choice is similar, though coastal waters, inland seas and large, open lagoons are also frequented (Cramp & Simmons 1977; Amat & Soriguer 1982).

### **2.3. Threats and limiting factors**

#### ***Habitat loss***

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. For example, 60% of wetlands in Greece have been drained since 1900 (Handrinos 1992a), most of which would have been prime habitat for the species (Tucker & Heath 1994). In particular, canalisation of rivers and flood defence works have caused the loss of most European floodplain wetlands, most of which were prime habitat for the Ferruginous Duck. To a small extent, this has been compensated by the creation of extensively managed fishponds, for example on the Danube Floodplain in Bulgaria.

Importance: high

#### ***Habitat Degradation***

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 them particularly sensitive to habitat alterations. The most important negative alterations include eutrophication (eventually causing loss of macrophytes), degradation of emergent vegetation, 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, over-grazing, general development, recreation (particularly water-based), inadequate sewage treatment, dam and barrage constructions, and excessive water abstraction. For example, rapid succession as a result of continued input of nutrient and sediment rich water from agricultural areas neighbouring Göksu Delta (Turkey) is seriously threatening the

sites continued international importance for the Ferruginous Duck (Green 1996).

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 Ferruginous Ducks breed on fishponds in Romania, where >50% of fishponds have been abandoned since 1989. Similar, large-scale abandonment has occurred in Bulgaria, Hungary, Russia, Lithuania and Bosnia-Herzegovina. 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 were formerly an important breeding area, but following intensification only 1-2 pairs nest annually.

Importance: high

#### ***Hunting***

Early in the 20th century, Phillips (1923) reported large bags of the Ferruginous Duck were easily obtained, suggesting some naivety to hunters. Presently, large numbers (between 1,500 and 2,500) are shot on autumn passage through the Volga delta, while on the wintering grounds in Sudan (and perhaps elsewhere) it is a common quarry of foreign hunters.

In most European countries, the duck is now protected, but illegal hunting and accidental hunting mortality owing to confusion with other ducks, particularly the Tufted Duck *Aythya fuligula* and Common Pochard *Aythya ferina*, are common problems (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. 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 15th August, when the hunting season begins. This could reduce significantly productivity in hunted areas owing to, for example, mortality of brooding females.

Importance: high

#### ***Introduction of non-native Species***

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 Ferruginous Duck remains, though effects on productivity and long-term viability are unknown.  
Importance: unknown

#### ***Entrapment in Fishing Nets***

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.

Importance: unknown

#### ***Lead Poisoning***

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). Although there are no recorded instances of lead poisoning in the Ferruginous Duck, it no doubt occurs (Hecker 1994).

Importance: unknown

#### ***Disturbance***

Disturbance from human activities on and around wetlands can, for example, reduce waterbird productivity, habitat availability and even cause local extinctions. Although it is commonly perceived to be a problem facing the Ferruginous Duck, particularly during the breeding period, there are few adequately reported examples. However, at Lake Constance, Germany, a moulting group of about 20 Ferruginous Ducks has developed since reductions in disturbance during the post-breeding period (together with increasing numbers of other *Aythya* species).

Importance: unknown

#### ***Climate Change***

Reduced precipitation in the centre of Europe has caused widespread loss and reduction of wetland habitats (Krivenko 1991). This has probably caused a corresponding decline in Ferruginous Duck numbers, and has been highlighted as a problem for the species in Slovakia.

Importance: unknown

## **2.4. Conservation status and recent conservation measures**

Numbers and key sites for Ferruginous Duck in most European countries remain inadequately known, more so than many other waterbird species. Notwithstanding, Tables 1 and 2 provide population estimates and trends for the Ferruginous Duck in each European country for breeding and wintering separately. Table 3 provides a draft inventory of internationally important sites for the species throughout Europe, and Table 4 lists those sites excluded from the draft inventory for various reasons. Figures 4, 5 and 6 show the geographical position of sites listed in Table 3.

"Key sites" are referred to repeatedly in the following text, and are considered to be sites that are either nationally or internationally important. Sites that are nationally-important but not so at international level are not enumerated exhaustively here owing to the magnitude of the task. They are, however being identified as part of the review by BirdLife International of Important Bird Areas in Europe. These sites, along with an innumerable multitude of small sites in which there may only a few pairs are collectively important for the species, however. Thus, a combination of site protection for key areas, and general measures affecting certain habitat features, is called for.

### **Albania**

Degree of legal protection is unclear.

The species is generally scarce. It seems important breeding sites once existed (eg. Lake Shkodra and Lake Mikri Prespa), but these have been degraded heavily (see Grimmett & Jones 1989).

No specific conservation programmes have been conducted for the species.

### **Armenia**

Degree of legal protection is unclear.

An uncommon resident, known only from Lake Sevan and adjacent Gilli Marsh, and the floodplain of the Araks River (Dement'ev & Gladkov 1952; Adamian & Klem 1997). Other possible sites include Lake Arpi, Vardakar Reservoir, Kechoot Reservoir, and Tolors Reservoir (Adamian & Klem 1997).

No specific conservation programmes have been conducted for the species.

## **Austria**

Fully protected from hunting.

An important and probably stable breeding population occurs at Lake Neusiedl, on the Hungarian/Austrian border (estimated at 150-200 pairs on the Austrian side). At adjacent Seewinkel, an area with many shallow salt ponds, the species was widespread and common in the 1960s (approximately 50 pairs), but declined to effective extinction during the 1980s. However, the species has recolonised this site recently, with 10-15 pairs nesting annually. Both sites are designated SPAs under the European Union Birds Directive.

A study of habitat requirements, food and behaviour of the duck was conducted at Lake Neusiedl in 1995, and a full census was carried out in 1996.

## **Azerbaijan**

Degree of legal protection is unclear.

The Ferruginous Duck nests at lakes Aggel and Saraesy (Mil Steppe), Shilian Marsh (Shirvan Steppe), Lake Mahmud-chala (southern Mugan), Divichi Liman and possibly at smaller wetlands of the Samur-Divichi Lowland. The most important wintering site is Lake Saraesy, with smaller but regular numbers at Lake Aggel, Varvara Reservoir and lakes of southern Mugan (Mahmund-chala and Novogolovskaya-chala). Until the 1950s/60s, the duck was common in winter at Karasy, Shilian and Kurgala marshes, and the Shirvan Steppe, but there have been no recent records (Patrikeev 1996).

No specific conservation programmes have been conducted for the species.

## **Belarus**

Full legal protection and included in the national Red Data Book.

Probably mainly a summer visitor to the southern part of the country. Dement'ev & Gladkov (1952) describe the species as "extremely rare" in Belorussia (now Belarus), and currently only 50-75 pairs are estimated to breed (Tucker & Heath 1994). The Pripyat floodplain is the most important area. There are several protected areas within the floodplain, but wider land-use changes may be a threat in the future.

No specific conservation programmes seem to have been conducted for the species.

## **Belgium**

Protected from hunting (Hecker 1994).

Up until the late 1970s, at least one pair of Ferruginous Ducks bred annually in Belgium, but there has been no confirmed record since (Devos *et al.* 1989; Hecker 1994). The species is also a rare and erratic passage and winter visitor (records rarely exceeding 10 *per annum*), and no site holds birds regularly (*contra* Hecker 1994).

No specific conservation programmes have been conducted for the species (Hecker 1994).

## **Bosnia-Herzegovina**

Degree of legal protection is unclear.

Breeding seems to be concentrated on fishponds in the north (on the border with Croatia and within the Sava Valley). Flocks probably occur on passage, and have been recorded in mid-winter.

No specific conservation programmes have been conducted for the species.

## **Bulgaria**

Listed in the Red Data Book of Bulgaria and protected by the law for the protection of nature.

Mainly a summer visitor, with breeding pairs scattered throughout the country, though concentrated in the Danube Floodplain. On passage, numbers total several thousand (September-October), with a peak count of 1000-3000 at Mechka fishpond. Very few overwinter.

A national survey of the species organised by BSPB will be completed in 1997, and the most important breeding site (Mechka Fishponds) has been suggested for protection. Management plans have been completed for some of the most important breeding sites, including the most important along the Black Sea coast. These were compiled either by BSPB or with its active participation within the framework of the Bulgarian-Swiss Biodiversity Conservation Programme.

## **Croatia**

Degree of legal protection is unclear.

A large breeding population is concentrated in the north, while important winter and, in particular, passage numbers also occur (Hagermeier & Blair 1997; Radovic *et al.* in press). Crna Mlaka is one of the most important autumn passage sites in Europe, with up to 5000 birds estimated. It is unprotected.

The numbers and seasonal activity of the duck have been studied over recent years at Draganici Fishponds (Radovic *et al.* in press), and preliminary ecological work has been undertaken at Kopacki Rit and the Podunavlje Fishponds in Baranja (Getz 1996). Monitoring is being undertaken at Draganici, Crna Mlaka and Lipovljana, partly supported by Euronatur.

### **Czech Republic**

Fully protected by law.

Although once frequent (Cramp & Simmons 1977), currently 0-3 pairs nest annually. The species is also scarce during passage, with up to five birds recorded annually. The reasons for the decline and near extinction are unclear.

No specific conservation programmes have been conducted or is planned for the species, owing to its sporadic occurrence in small numbers. All sites where the species breeds regularly are within protected areas.

### **France (including Corsica)**

The Ferruginous Duck has been protected by law (Decree 17.04 81) since 1981 (Hecker 1994).

A rare migrant and winter visitor to France and a sporadic breeder (Cruon *et al.* 1992). It seems equally rare in Corsica (P.J. Benstead in litt. 1997). The most regular site in France is the Camargue, where the duck is seen annually between October and January (Hecker 1994); sightings are usually of one to five individuals (Isenmann 1993). One or two individuals are also recorded annually at La Dombes (Ain), and also there are regular sightings at Marais de Brière (Loire Atlantique) (Hecker 1994). There are very few breeding records in the 20th century, the most recent being in 1993 at La Dombes, where the female possibly mated with a Tufted Duck *Aythya fuligula* (Hecker 1994; Roux 1994).

An unsuccessful re-introduction was conducted 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 the project, it will be terminated (Pourreau & Rambaud undated). In 1996, ten pinioned pairs raised ten fully-winged individuals.

### **Georgia**

Degree of legal protection unclear.

Reported as breeding in valleys of the Akhalkalaki Plateau (Dement'ev & Gladkov 1952), and possibly elsewhere. Passage and winter numbers may be significant in the lowlands, especially during winters of cold weather north of the Caucasus. Lake Paleostomi is probably the most important site. During passage and winter, hunting is very intensive at sites used by this duck, with little enforcement of regulations.

No specific conservation programmes seem to have been conducted for the species.

### **Germany**

Fully protected under the Federal Conservation Law and included in Category 1 of the German Red Data Book.

The duck has bred sporadically across most of the country, but most regularly in the east (eg. in the Elbe, Oder and Havel valleys and in the fishponds of Uckermark and Oberlausitz). A moulting flock of about 20 birds has recently developed at Lake Constance (Bödensee), and small post-breeding groups gather also in the Danube and Rhein areas (Schuster *et al.* 1983; Hölzinger 1987; Hecker 1994). It is scarce in winter, but since the early 1970s has occurred regularly on the Untersee area of Lake Constance (Bezzel 1985; Hecker 1994).

No specific conservation programmes have been conducted for the species.

### **Greece**

Included in the Red Data Book as *Vulnerable* (Handrinos 1992b) and protected from hunting.

The Ferruginous Duck was formerly a widely distributed breeding species, but is now confined to a few wetlands of Ipeiros (mainly the Amvrakikos Gulf), Macedonia and Thrace, with occasional isolated pairs elsewhere on the mainland. Also, artificial reservoirs within the former Lake Karla (Thessalía) have been utilised increasingly. The duck occurs in significant numbers during both autumn passage (mainly October) and spring passage (mid-March to early May), but larger numbers occur in autumn, for example over 2,000 at Spercheios Delta on 30th October 1988. Large flocks formerly occurred on the sea off Crete and more recent data suggest regular off-shore passage in autumn (Handrinos & Acriotis 1997). Small numbers also winter in Crete, and in recent years it has also been seen regularly in winter on the mainland. The maximum year count on the

mainland was 108 and the maximum site count was 93 at Lake Kerkini (both in 1988), which apart from the Amvrakikos Gulf is the main regular wintering site (Handrinos & Acriotis 1997).

The conservation status of many Greek wetlands remains a cause for concern, with some, such as Lake Vistonis, coming under recent threat from projects supported by EU funds, a situation that has afflicted Greek wetlands persistently since the early 1980s.

No specific conservation programmes have been conducted for the species.

### **Hungary**

Strictly protected by national legislation.

Once distributed widely throughout the country, the Ferruginous Duck has undergone a sharp decline in the 20th century in many areas of Hungary (Sterbetz 1969). However, high concentrations of breeding birds remain locally (eg. Somogy region, Kisbalaton, Pusztaszer region, and Pacsmag fishponds).

No specific conservation programmes have been conducted for the species. However, a full census of breeding numbers and some research activity will begin in 1997, conducted by the Hungarian Wetland Specialist Group.

### **Italy (including Sardinia)**

Completely protected under the national law of wildlife protection and hunting (National Law no. 968/1977) (Hecker 1994).

In the 19th century, the Ferruginous Duck was a common breeder in Tuscany (Maremma) and was a confirmed or probable breeder in Piemonte, Veneto, Toscana, Sicily, Sardinia and the Po Delta. Following land reclamation between 1850 and 1950, the species lost many important breeding areas. Currently, the duck is distributed sporadically over much of the lowlands, with highest breeding numbers occurring in the Po Basin. Large flocks occur on passage sporadically, and can over-winter in milder years (Brichetti *et al.* 1984, 1992; Chelini 1984; Hecker 1994).

Ecological research on the species is currently being conducted in the Ravenna wetlands. WWF Italy has launched a reintroduction project and during 1991-1994, 117 birds had been released in seven WWF reserves. By 1994, a total of 15 pairs of released birds had bred (Hecker 1994).

### **Lithuania**

Degree of legal protection is unclear.

Lithuania is on the extreme northern boundary of the breeding range of the Ferruginous Duck. Pairs are concentrated in the south, and numbers have declined in some areas. For example, in Zuvintas Nature Reserve, there were 15-20 breeding pairs in 1920-1930, but only 3-8 during 1966-1985. Odd birds occur during migration and there are few winter records (Zalakevicius 1995).

No specific conservation programmes have been conducted for the species.

### **Moldova**

Fully protected.

A recent, massive decline has occurred in the breeding population, from 1000-1300 pairs in the 1980s (cited in Tucker & Heath 1994), to 20-100 pairs currently. The reasons include habitat loss and degradation, disturbance, and since 1991, a sharp increase in poaching as a result of the deterioration of the national economy. During winter, the species occurs mainly in the lower Dniester and Prut rivers. Spring and autumn passage through the country remains substantial, particularly in areas with large areas of open water (eg. reservoirs and barrages). The duck is hunted illegally during autumn migration.

No specific conservation programmes have been conducted for the species.

### **Netherlands**

Fully protected under the Bird Protection Act. Hunting of a similar species, the Tufted Duck (*Aythya fuligula*), has been banned since the 1996/1997 hunting season.

The Ferruginous Duck has been a rare breeding bird throughout the 20th century. Prior to 1970, there were 10 confirmed breeding records and during 1973-1977 the annual numbers were estimated at 1-5 pairs (Teixeira 1979). Subsequently, however, numbers have totalled 0-1 pairs annually (SOVON 1988; Hecker 1994). During 1992-1994, there were no breeding records except for a male seemingly paired to a female Tufted Duck in 1993 and 1994 (Woets 1994; van Dijk *et al.* 1997).

The species was a more numerous non-breeding visitor to The Netherlands earlier in the 20th century, for example at Zwarte Meer up to 100 annually occurred on autumn passage. Currently, however, it is a rare and sporadic non-breeding

visitor and although up to 35 have been recorded annually since 1979, there are no sites that regularly hold birds (SOVON 1987; Hecker 1994).

No specific conservation programmes have been conducted for the species, because of its current sporadic occurrence.

### **Poland**

Protected from hunting.

The species is distributed in small numbers throughout much of the country during the breeding season, with by far the highest concentration (45-110 pairs) located at Milicz Fishponds (Wrockaw). Small groups are regularly recorded on passage sporadically, but very few winter.

No specific conservation programmes have been conducted for the species.

### **Romania**

No legal protection.

The species is widely distributed, but concentrated in the eastern lowlands (in particular the Danube Delta). Early in the 20th century it was considered abundant, but has undergone a sharp decline owing mainly to habitat loss (particularly of large areas of the Danube Floodplain).

No specific conservation programmes have been conducted for the species.

### **Russia (European)**

No current legal protection, but the species will be included within the forthcoming 2nd edition of the national Red Data Book.

During breeding, patchily distributed, with highest concentrations in the south and generally not found above 55-60°N. Large post-breeding flocks often gather in several southern deltas (especially the Volga), and smaller numbers may remain to winter in milder years (Dement'ev & Gladkov 1952).

No specific conservation programmes have been conducted for the species.

### **Slovakia**

Full legal protection.

The Ferruginous Duck was widespread and abundant as a breeding bird during the first half of the 20th century. Now, however, it is locally distributed and no sites hold more than a few breeding pairs. Key areas include the Danube

Lowlands, the East Slovakia Lowlands, and the Košice Basin (including the Slovakian Karst area). Construction of barrages on the Danube and declining water levels in the East Slovakian Lowlands are expected to cause further declines. In mild winters, up to 40 birds remain within the country, but more usually very few or none winter.

No specific conservation programmes seem to have been conducted for the species.

### **Slovenia**

Full legal protection.

Breeding is restricted to Lake Cerknica (central Slovenia) and the sub-Pannonian region (north-east Slovenia) (Geister 1995). About 2-5 pairs nest annually at Lake Cerknica. Numbers in the north-east are also small, and seem to be concentrated on floodplain wetlands of the Drava and Mura rivers (including fishponds). During the last 10 years, numbers in the north-east have declined dramatically, possibly due, at least in part, to the introduction of Grass Carp (*Ctenopharyngodon idella*) and consequent degradation of feeding areas. Illegal hunting and habitat destruction have also probably contributed to the decline. There is a regular spring and autumn passage through the country, for example at Lake Cerknica (were 35 birds were recorded on 8th April 1996) and in the north-east (where <25 birds occur currently). In winter, birds are scarce (Sovinc 1994), with <10 usually being recorded (mainly on reservoirs bordering the River Drava and on the Adriatic coast).

Censuses are being conducted currently by The Bird Watching and Bird Study Association of Slovenia (DOPPS).

### **Spain**

Fully protected under national legislation, and included in the national Red Data Book (Blanco & Gonzalez 1992).

Once distributed widely and abundant in the south and east, with up to 500 pairs breeding in the Guadalquivir Marshes (Valverde 1960; Hecker 1994). Currently, the species is on the verge of extinction as a breeding bird. Small groups and individuals occur regularly on passage and during winter, but the species is scarce generally (Amat & Soriguer 1982; Dolz *et al.* 1989; Blanco & Gonzalez 1992; Hecker 1994).

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-Pajas area 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.

### **Switzerland**

Not protected by federal law from 1st September to 31st January, when it can be hunted. However, 15 of the 26 Cantons have protected the species. A proposal for full, national protection of the species is in preparation for May 1997, which if successful would become law in 1997/1998.

There are two breeding records in the 20th century, in 1991 and 1992 at a small pond close to Frauenfeld. During 1989-1993, a mean of 18 birds wintered in the country, and there are a few sites that regularly hold small numbers (most notably Untersee-Ende und Rhein).

No specific conservation programmes have been conducted for the species, owing to its sporadic occurrence in small numbers.

### **Turkey**

Fully protected from hunting under Terrestrial Hunting Legislation No. 3167.

The species is very rare in the south-east, and locally distributed elsewhere, although high concentrations occur locally. There is a regular passage of small groups and individuals, and large flocks occasionally, particularly in the west. In general, very few birds over-winter, but during exceptional years (eg. 1990) over 1000 can occur. There seems to have been a marked decline of both breeding and wintering numbers, probably owing mainly to wetland degradation (Kasperek 1992; Kirwan in press).

No specific conservation programmes have been conducted for the species.

### **Ukraine**

Protected from hunting and included in the national Red Data Book.

During the 1950s, about 70,000-80,000 pairs nested in the Ukraine, but numbers have declined sharply to about 1,500-5,000 pairs. These are largely within the Danube Delta, with smaller numbers in the Dnepr Delta (c. 140 pairs), west Ukraine (c. 40 pairs) and north Krym (c. 150 pairs). Important numbers also nest in the Dnestr Delta. Large post-breeding flocks occur frequently in the larger estuaries of the Black Sea coast, for example the Dnestr and Danube where about 200-400 birds moult. A sizeable population (c. 500-1,500 birds)

also over-winters, unless particularly hard weather develops. Reasons for the decline are unclear, but probably include wetland loss and degradation (particularly reclamation), and hunting.

No specific conservation programmes have been conducted for the species.

### **Former Yugoslav Republic of Macedonia**

Only legally protected during the breeding season (1st March to 31st July).

The only known breeding site is Lake Prespa, where about 3-5 pairs nest annually. Birds also occur during passage and winter, for example at Lake Ohrid (>70 birds recorded on passage) and Lake Prespa (>20 birds on passage and <10 wintering).

No specific conservation programmes have been conducted for the species.

### **Yugoslavia (Serbia-Montenegro)**

Degree of protection unclear.

Breeding seems to be concentrated in the north (Hagermeier & Blair 1997). There is a regular passage, and about 500 birds over-winter at Lake Skadar.

No specific conservation programmes seem to have been conducted for the species.

## **3. AIMS AND OBJECTIVES**

### **Aims**

In the short-term, to maintain the current population and range of the Ferruginous Duck in Europe. In the medium- to long-term, to promote increases in population and range within Europe.

### **Objectives**

#### **3.1. Policy and legislation**

3.1.1. *To promote national and international policies that specifically favour the protection of the Ferruginous Duck and its habitat*

3.1.1.1. To promote full protection of the Ferruginous Duck and its habitat through national and international legislation

A firm legislative basis is essential to species conservation. In most European countries, the Ferruginous Duck is fully protected, but in some (eg. Romania and Russia) it has no protection.

Priority: high  
Time-scale: short

3.1.1.2. To promote development and implementation of national and regional strategies that further the objectives of this plan, or adapt for that purpose existing strategies

National and regional conservation strategies for the Ferruginous Duck in Europe ought to reflect the objectives of this plan. Existing strategies need to be adjusted in some areas, while new strategies need to be developed in others.

Priority: high  
Time-scale: short

3.1.1.3. To promote conservation in the wider environment for the benefit of the Ferruginous Duck and its habitat

Owing to the dispersed distribution of the Ferruginous Duck in Europe, a site-based conservation approach will not be entirely successful. Policy and legislation that affect the wider environment (ie. outside protected areas) ought to be adjusted so that they benefit the species and its habitat. Tucker & Evans (1997) provides a framework for developing such action. Following the recommendations of this book, national wetland strategies and action plans should be developed in each European range state that consider fully the conservation needs of the Ferruginous Duck and other globally threatened wetland species.

Priority: high  
Time-scale: short

3.1.1.4. Protected area policy

Protected areas policies and regulation should promote the conservation management of all Important Bird Areas where the Ferruginous Duck breeds, migrate and winter. For Ferruginous Ducks do concentrate on a rather small number of sites, the protection of IBAs is a useful tool towards an effective protection of the species.

Countries that have embarked on the process of accession to the European Union (very important for Ferruginous Duck: Bulgaria, Hungary, Poland, Romania, Slovakia) should consider what opportunities exist to use the approximation process and any associated funding support to

establish and manage a network of protected areas.

Priority: high  
Time-scale: medium

## **3.2. Species and habitat conservation**

3.2.1. *To promote adequate protection and management of key sites*

All sites supporting nationally or internationally important numbers of the Ferruginous Duck need to be adequately protected and managed under a management plan that prioritises the conservation needs of the species. Only 18% of internationally important sites for this species are known to be fully protected (Figure 7). All sites qualifying as internationally important should be designated Special Protection Areas (SPAs) (under the EU Birds Directive 79/409/EEC), Ramsar sites (under the Ramsar Convention), or otherwise protected fully under national legislation. Any new developments in key areas that are likely to significantly affect this species should be subject to an appropriate environmental assessment which takes full account of the protection requirement of *Aythya nyroca*. In the case of Natura 2000 sites in the EU, this should follow the procedure given in Article 6 of the Habitats Directive.

As the species is relatively widespread among several countries, conservation successes and techniques should be shared. In particular, any experience to be gained through the approximation process leading to EU enlargement (such as, for example, development of Environmentally Sensitive Areas), should be shared.

Priority: high  
Time-scale: short

3.2.2. *To restore key sites*

Many important sites for the Ferruginous Duck have been degraded recently, in particular extensively managed fishponds and floodplain wetlands. Wetland restoration programmes should aim to restore such sites where feasible and appropriate. In particular, appropriate management of fishponds could potentially restore large areas of suitable habitat.

Priority: medium  
Time-scale: medium

3.2.3. *To prevent mortality and disturbance caused by hunting*

Hunting mortality and associated disturbance are frequently highlighted as a principal threat to the Ferruginous Duck in Europe. The species deserves full protection under national law in all range states, and at key sites all waterfowl shooting should be regulated to prevent avoidable mortality of this duck.

In addition, refuge areas should be established within hunting zones, hunting seasons should be internationally compatible, and non-toxic shot should be used for all hunting over wetlands.

Priority: high  
Time-scale: short

3.2.4. *To re-introduce the species to areas of its former range*

Reintroduction ought to be considered a last measure in conservation strategies for this species, and any attempts ought to first fulfil the IUCN guidelines for reintroduction (Kleimen *et al.* 1994) and the guidelines developed by Black (1991) for bird re-introductions. Any current programmes that do not satisfy these criteria ought to be terminated, and resources spent more effectively.

Priority: low  
Time-scale: long

3.2.5. *To prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised*

Invasive species can have substantial long-term effects on wetland habitats, and in particular the Grass Carp *Ctenopharyngodon idella* is probably responsible for the degradation of large areas of Ferruginous Duck habitat across Europe (although this has not been studied). The fish is still commonly introduced to European wetland systems as a means of reducing macrophyte biomass. As a precautionary measure, such introductions ought to be prevented within and surrounding key areas for the Ferruginous Duck. In addition, if research (see Objective 3.3.9.) shows the fish degrades Ferruginous Duck habitat substantially, the carp should be controlled or eradicated in areas where it is likely to impact the duck significantly.

Priority: high  
Time-scale: long

3.2.6 *To prevent drowning in fishing nets*

Drowning in fishing nets may cause significant mortality, for example in the Danube Delta. This

should be investigated were necessary, and actions taken to alleviate any problems (eg. spatial or temporal zoning of fishing activity, or appropriate alterations to fishing techniques and/or equipment).

Priority: low  
Time-scale: long

### 3.3. Monitoring and research

3.3.1. *To locate and assess the status of key areas*

Key sites for Ferruginous Ducks breeding in Europe are poorly known in many countries, in particular passage and winter sites in Africa and the Middle East. Surveys should be conducted to locate such areas and assess their conservation status. Satellite tracking may prove a useful future aid to this objective.

Priority: high  
Time-scale: short

3.3.2. *To monitor adequately the remaining population*

While a minor but substantial proportion of staging and wintering sites undergo an annual midwinter census during the International Waterfowl Census (coordinated by Wetlands International), practically no systematic monitoring of the population is undertaken during the breeding period. Monitoring schemes should be developed that provide maximum and regular coverage, particularly at key sites, at appropriate times of the year (including wintering areas in Africa and the Middle East). Counts should be broken down by sex and age (juvenile/adult) whenever possible, as a basis for assessing productivity. Monitoring should be internationally coordinated and the data regularly analysed to assess population sizes and trends.

Priority: high  
Time-scale: short

3.3.3. *To promote and develop conservation research*

3.3.3.1. *To investigate migratory movements*

Large-scale movements are very poorly understood since ringing recoveries are scarce. When suitable satellite transmitters have been developed, these should be used to investigate the migratory movements of the European breeding population. Ideally, birds should be marked from a sample of locations spread across Europe.

Priority: medium  
Time-scale: medium

### 3.3.3.2. To investigate productivity and mortality

Very little is known of the rates of or factors affecting productivity and survival of the Ferruginous Duck. An adequate understanding is essential for effective management of the population at both small and large scales. Results of studies of these life-history parameters should be used to construct population simulation models to aid conservation management, where feasible and appropriate.

Priority: high  
Time-scale: medium

### 3.3.3.3. To investigate habitat requirements and feeding ecology

Knowledge of favoured habitat and feeding areas remains rudimentary. Comprehensive studies are required throughout the annual cycle, which should be used to inform site management and protection.

Priority: high  
Time-scale: medium

### 3.3.3.4. To undertake research necessary to alleviate detrimental consequences of socio-economic development

Many key sites are threatened from consequences of socio-economic development, such as the abandonment and intensification of fishponds, industrial development and agricultural intensification. Specific research is often necessary to understand adequately the causes and effects of these developments so that effective conservation strategies can be developed.

Priority: high  
Time-scale: short

### 3.3.3.5. To develop criteria for ageing broods

Studies of productivity require criteria for ageing broods, which as yet have not been developed for the Ferruginous Duck. This is easily done using captive individuals (the species is well established in captivity).

Priority: medium  
Time-scale: medium

### 3.3.3.6. To develop efficient catching methods and equipment

Ferruginous Ducks are not easily caught, particularly during the breeding season, which can handicap ecological investigations that require marked individuals. Research should aim to

develop suitable trapping methodologies and equipment.

Priority: high  
Time-scale: medium

### 3.3.3.7. To investigate moult strategy

An adequate understanding of moult strategy is necessary for effective conservation, since, for example, males may congregate at specific sites during periods of full moult (during which time the birds are flightless). Such periods are often critical bottlenecks in the annual cycle and require specific conservation attention. As yet, knowledge of the moult strategy of the Ferruginous Duck is very incomplete. Research should investigate the timing and duration of moults at various latitudes and any associated local or regional movements. Captive birds should be utilised when necessary.

Priority: medium  
Time-scale: medium

### 3.3.3.8. To develop effective census techniques

Ferruginous Ducks are difficult to census adequately, since they frequently occur at low densities within highly vegetated wetlands. Peak flight activity varies seasonally and between sexes (and probably also ages). Research is necessary to develop effective census techniques for the various seasons, but particularly during breeding. Methods should aim to separate sexes and ages (juvenile/adult) where possible.

Priority: high  
Time-scale: short

### 3.3.3.9. To investigate the impact of Grass Carp on Ferruginous Ducks and their habitat

Owing to their potentially devastating affect on macrophyte communities, Grass Carp *Ctenopharyngodon idella* are probably responsible for the degradation of large areas of Ferruginous Duck habitat across Europe, but this has not been studied. The fish are still commonly introduced to European wetland systems as a means of reducing macrophyte biomass. Research is necessary to investigate what impact the fish have on Ferruginous Ducks and their habitat, so that firm policies on the introduction and control of this fish in European wetlands can be formulated and implemented.

Priority: high  
Time-scale: short

### **3.4. Public awareness and training**

#### *3.4.1. To develop and implement effective education programmes for the conservation of the Ferruginous Duck and its habitat*

As yet, there have been no education programmes conducted for the Ferruginous Duck. Programmes need to be directed at hunters (to alleviate mortality and disturbance from hunting), fishery managers (to promote extensive management), and people local to key sites (to promote sustainable use and protection of those sites). Programmes need to incorporate research, planning, implementation and evaluation, as described by Jacobson (1991), Pomerantz & Blanchard (1992), and Blanchard (1995).

Priority: high  
Time-scale: short

#### *3.4.2. To produce material for the promotion of conservation of the Ferruginous Duck and its habitat*

Promotional materials (eg. leaflets and posters) provide a simple and inexpensive method of disseminating information on the conservation of the Ferruginous Duck, particularly amongst special interest groups (eg. hunters and wetland managers). Their effectiveness, however, is difficult to assess, and often impossible. Nonetheless, in the absence of sufficient funds for pursuing the previous objective sufficiently, promotional materials ought to be produced and disseminated where necessary. In particular, information for hunters on the identification of this species is necessary.

Priority: medium  
Time-scale: medium

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## 4. References

- Adamian, M.S. & Klem, D.Jnr. 1997. *A field guide to the birds of Armenia*. American University of Armenia, Yerevan, Armenia.
- Akçakaya, R., Barýp, S. & Bilgin, C. 1983. *Sultansazlýpý Conservation Project*. Unpublished Report Middle East Technical University, Ankara, Turkey. (in Turkish).
- Amat, J.A. & Soriguer, R.C. 1982. Datos sobre selección de hábitat y ecología alimenticia del Porrón Pardo (*Aythya nyroca*). *Doñana Acta Vertebrata* 9: 388-394.
- Anonymous. 1995. *IBA criteria: categories and thresholds*. BirdLife International, Cambridge, UK.
- Ardamatskaya, T.B. & Sabinevsky, B.V. 1990. The distribution and status of waterfowl in the northern Black Sea region in winter. In: Matthews, G.V.T. (ed.). *Managing waterfowl populations*. IWRB Special Publication 12. IWRB, Slimbridge, UK. pp 39-42.
- Baillie, J. & Groombridge, B. 1996. *1996 IUCN red list of threatened animals*. IUCN, Gland, Switzerland.
- Bain, M.B. 1993. Assessing impacts of introduced aquatic species: Grass Carp in large systems. *Environmental Management* 17: 211-224.
- Bauer, H. & Berthold, P. 1996. *Die Brutvögel Mitteleuropas*. Wiesbaden, Aula-verlag.
- Bezzel, E. 1985. *Kompendium der Vögel Mitteleuropas; Nonpasseriformes - Nishtsingvögel*. Wiesbaden, Aula-verlag.
- Black, J.M. 1991. Reintroduction and restocking: guidelines for bird recovery programmes. *Bird Conservation International* 1: 329-334.
- Blanchard, K.A. 1995. Seabird conservation on the North Shore of the Gulf of St. Lawrence: the effects of education on attitude and behaviour towards a marine resource. In: Palmer, J., Goldstein, W. & Curnow, A. (eds.). *Planning education to care for the earth*. IUCN, Gland, Switzerland. pp 39-50.
- Blanco, J.C. & González, J.L. (eds.). 1992. *Libro rojo de los vertebrados de España*. Colección Técnica, ICONA.
- Brichetti, P., Canova, L. & Saino, N. 1984. Status and distribution of breeding Anatidae in Italy and Corsica. *Avocetta* 8: 19-42.
- Brichetti, P., Francheschi, P. & Baccetti, N. 1992. *Fauna d'Italia*. Uccelli I. Edizioni Cablerini, Bologna.
- Chelini, A. 1984. *La Anatre Selvatiche. Vita, ambiente e abitudini specie per specie*. E Olympia Firenze.
- Cramp, S. & Simmons, K.E.L. (eds.). 1977. *The birds of the western Palearctic*. Vol. 1. Oxford: Oxford University Press.
- Cruon, R., Erard, C., Lebreton, J.D. & Nicolau-Guillaumet, P. 1992. Liste des oiseaux de France. *L'Oiseau et la R.F.O.* 62: 97-116.
- Deceuninck, B. 1997. *Synthese des denombrements de canards et foulques hivernant en France 1967-1995*. Ministère de l'Environnement, Paris.
- Deceuninck, B., Maillot, N., Maheo, R., Kerautret, L. & Riols, C. 1997. *Denombrements de cygnes, oies, canards et foulques hivernant en France*. Ministère de l'Environnement, Paris.
- Dement'ev, G.P. & Gladkov, N.A. (eds.). 1952. *Birds of the Soviet Union*. Vol. IV. Sovetskaya Nauka, Moscow.
- Devos, K., Meire, P. & Kuijken, E. 1989. Witoogeend *Aythya nyroca*. In: Vlavico, M. (ed.). *Vogels in Vlaanderen*. IMP, Bornem.
- van Dijk, A.J., Hustings, F., Sierdsema, H. & Verstrael, T. 1997. Rare and colonially breeding birds in the Netherlands in 1992-1993. *Limosa* 70: 11-26. [In Dutch with English summary].
- Dolz Garcia, J.C., Ripoll, G.M & Pedrero, J.H. 1989. Status of some threatened Anatidae species in the Comunidad Valenciana, east Spain. *Threatened Waterfowl Research Group Newsletter* 1: 7-8.
- Dvorak, M., Nemeth, E., Tebbich, S., Rössler, S. & Busse, K. 1997. *Verbreitung, bestand und habitatwahl schilfbewohnender vogelarten in der naturzone des Nationalparks Neusiedler See - Seewinkel*. Biologisches Forschungsinstitut Burgenland - Bericht 86.
- Ertan, K-T. 1996. *Kocaçay Delta: birds of Turkey* 12. Heidelberg.
- Fawcett, D. 1996. *Lead poisoning in waterfowl: international update report 1995*. Unpublished Report. IWRB, Slimbridge, UK.

- Geister, A. 1995. *The atlas of the breeding birds of Slovenia*. DZS, Ljubljana.
- Getz, D. 1996. Preliminary research of Ferruginous Duck (*Aythya nyroca*) ecology in the area of special preservation "Kopacki Rit" and the fishponds "Podunavlje" in Baranja. *Šumarski List* 120: 319-326.
- Green, A.J. 1996. *The summer ecology of the Marbled Teal* (*Marmaronetta angustirostris*), *Ferruginous Duck* (*Aythya nyroca*) and other ducks in the Göksu Delta, Turkey in 1995. Unpublished Report. Doñana Biological Station, Sevilla, Spain.
- Hagermeier, W. & Blair, M. (eds.). 1997. *The EBCC atlas of European breeding birds: their distribution and abundance*. T & AD Poyser, London.
- Handrinos, G.I. 1992a. Wetland loss and wintering waterfowl in Greece during the 21st century: a first approach. In: Finlayson, M., Hollis, T. & Davis, T. (eds.). *Managing Mediterranean wetlands and their birds*. IWRB Special Publication 20. IWRB, Slimbridge, UK. pp 183-187.
- Handrinos, G.I. 1992b. Birds. In: Karandinos, M. & Legakis, A. [*The red data book of threatened vertebrates of Greece*]. Hellenic Zoological Society of Athens, Athens. (In Greek).
- Handrinos, G. & Acriotis, T. 1997. *The birds of Greece*. Helm, London.
- Hecker, N. 1994. Ferruginous Duck *Aythya nyroca*. In: van Vessem, J. (ed.). *Actions to prevent avoidable mortality for threatened waterbirds in the European Union*. Unpublished Report. IWRB, Slimbridge, UK. pp 67-106.
- Hölzinger, J. 1987. *Die Vögel Baden-Württemberg*s. 1.2. Gefährdung und Schutz, Karlsruhe. pp 725-1420.
- Hubec, K., Chytil, J., Stastny, K. & Bejcek, V. 1995. The birds of the Czech Republic. *Sylvia* 31: 97-149.
- Hustings, F. & van Dijk, K. (eds.). 1994. *Bird census in the Kizilirmak Delta, Turkey, in Spring 1992*. WIWO Report 45.
- Isenmann, P. 1993. *Oiseaux de Camargue*. Société d'Etudes Ornithologiques, Brunoy, France.
- Jacobson, S.K. 1991. Evaluation model for developing, implementing, and assessing conservation education programs: examples from Belize and Costa Rica. *Environmental Management* 15: 143-150.
- Kasperek, M. 1985. *Die Sultansümpfe: naturgeschichte eines vogelparadieses in Anatolien*. Heidelberg.
- Kasperek, M. 1987. *Kulu Gölü: birds of Turkey 5*. Heidelberg.
- Kasperek, M. 1992. *Die vögel der Türkei: eine Übersicht*. Kasperek Verlag, Heidelberg.
- Kirwan, G.M. in press. Status of the Ferruginous Duck (*Aythya nyroca*) in Turkey. *Bird Conservation International*.
- Kiss, J.B. 1980. Interessante Brutbeobachtungen im Donaudelta 1977. *Vögel der Heimat* 50: 243-245.
- Kiss, J.B., Rékási, J. & Sterbetz, J. 1984. A study of the foods of the Mallard (*Anas platyrhynchos*) and of the Ferruginous Duck (*Aythya nyroca*) in the Danube Delta (Romania). *Puszta* 2: 39-51.
- Kleiman, D.G., Stanley Price, M.R. & Beck, B.B. 1994. Criteria for reintroductions. Olney, P.J.S., Mace, G.M. & Feistner, A.T.C. (eds.). *Creative conservation: interactive management of wild and captive populations*. Chapman & Hall, London.
- Krivenko, V.G. 1991. [*Climatic variability and waterfowl populations*]. Moscow. (In Russian).
- Lebreton, J.D. 1977. *Les oiseaux nicheurs rhônalpins*. Villeurbanne.
- Magnin, G. & Yarar, M. 1997. *Important bird areas in Turkey*. DHKD, Istanbul, Turkey.
- Mayhew, P.W. 1988. The daily energy intake of European Wigeon in winter. *Ornis Scandinavica* 19: 217-223.
- Monval, J-Y. & Piro, J-Y. 1989. *Results of the IWRB International Waterfowl Census 1967-1986*. IWRB Special Publication 8. IWRB, Slimbridge, UK.
- OST (Ornithological Society of Turkey). 1969. *Bird Report 1*. Sandy, UK.
- Pain, D.J. 1992. Lead poisoning of waterfowl: a review. In: Pain, D.J. (ed.). *Lead poisoning in waterfowl*. IWRB Special Publication 16. IWRB, Slimbridge, UK.
- Paspaleva, M., Kiss, B.J. & Talpeanu, M. 1984. Sur la dynamique de quelques espèces d'oiseaux dominants dans le Delta du Danube. *Travaux du Muséum d'Histoire Naturelle Grigore Antipa* 25: 313-329.

- Patrikeev, M. 1996. The status of the Ferruginous Duck in Azerbaijan. *Threatened Waterfowl Specialist Group News* 9: 30-32. The Wildfowl & Wetlands Trust, Slimbridge, UK.
- Phillips, J. 1923. *A natural history of ducks*. Boston: Houghton Mifflin.
- Pomerantz, G.A. & Blanchard, K.A. 1992. Effective communication and education strategies for wildlife conservation. *Transactions of the North American Wildlife and Natural Resource Conference* 57: 156-163.
- Ponyi, J.E. 1994. Abundance and feeding of wintering and migrating aquatic birds in two sampling areas of Lake Balaton in 1983-1985. *Hydrobiologia* 279/280: 63-69.
- Pourreau, J. & Rambaud, P. undated. *Projet de réintroduction du Fuligule Nyroca (Aythya nyroca) en Brière*. Unpublished Report. LPO, Rochefort, France.
- Radovic, D., Kralj, J. & Tutiš, V. in press. Number and seasonal activity of Ferruginous Duck at Draganic Fishponds (NW Croatia) and estimation of its population in Croatia. *Threatened Waterfowl Specialist Group News* 11. TWSG, Slimbridge, UK.
- Roux, F. 1994. Fuligule nyroca (*Aythya nyroca*). In: Yeatman-Berthelot, D. & Jarry, G. (eds.). *Nouvel atlas des oiseaux nicheurs de France 1985-1989*. Société Ornithologique de France, Paris. pp 730-731.
- Rüger, A., Prentice, C. & Owen, M. 1986. *Results of the IWRB International Waterfowl Census 1967-1983*. IWRB Special Publication 6. IWRB, Slimbridge, UK.
- Schneider, M. 1988. Endangered and rare birds in the alluvial wetlands of the Sava River on the Posavina, Croatia. *Larus* 40: 167-178.
- Schuster, S., Blum, B., Jacoby, H., Knötzsch, G., Leuzinger, H., Schneider, M., Seitz, E. & Willi, P. 1983. *Die Vögel des Bodenseegebietes*. Ornithologische Arbeitsgemeinschaft Bodensee, Stuttgart.
- Scott, D.A. & Rose, P. 1996. *Atlas of Anatidae populations in Africa and western Eurasia*. Wetlands International 41. Wetlands International, Wageningen, The Netherlands.
- Sovinc, A. 1994. *The atlas of the wintering birds in Slovenia*. DZS, Ljubljana.
- SOVON. 1987. *Atlas van de Nederlandse Vogels*. Arnhem.
- SOVON. 1988. [New estimates of breeding bird numbers in the Netherlands]. *Limosa* 61: 155-162. (In Dutch).
- Stawarczyk, T. 1995. [Reproductive strategies of ducks breeding at high densities in Milicz Fishponds]. *Prace Zoologiczne Uniw. Wroclawskiego* 31: 3-110. (In Polish with English Summary).
- Sterbetz, I. 1969. *Feeding ecology of the Ferruginous Duck in Hungary*. Unpublished Report. Hungarian Ornithological Institute, Budapest.
- Teixeira, R.M. (ed.). 1979. *Atlas van de Nederlandse Broedvogels*. Natuurmonumenten, 's-Gravenland.
- Tucker, G.M. & Evans, M.I. 1997. *Habitats for birds in Europe: a conservation strategy for the wider environment*. BirdLife Conservation Series 6. BirdLife International, Cambridge, UK.
- Tucker, G.M. & Heath, M.F. 1994. *Birds in Europe: their conservation status*. BirdLife Conservation Series No. 3. BirdLife International, Cambridge, UK.
- Valverde, J.A. 1960. Vertebrados de las Marismas del Guadalquivir: introducción a su estudio ecológico. *Arch. Inst. Aclim. Almería* 9: 1-168.
- Williams, P. 1996. *WORLDMAP, priority areas for biodiversity: using version 4*. Privately distributed by the author, The Natural History Museum, London.
- Woets, D. 1994. De witoogeend: broedvogel in De Weerribben? *Noordwesthoek* 21: 33-35.
- Zalakevicius, M. 1995. *Birds of Lithuania*. Special Issue (Volume 11) of Acta Ornithologica Lituanica. Institute of Ecology, Vilnius, Lithuania.

## 5. ANNEX

### Recommended Conservation Actions by Country

"Key sites" are referred to repeatedly in the following text, and are defined as sites of either national or international importance. Internationally important sites are those regularly supporting 20 breeding pairs, or 100 wintering or passage individuals (see Table 3 for a draft inventory). In this document, little effort has been taken to identify nationally important sites (generally considered to be those that regularly support 1% of the national total), owing to the magnitude of the task. Therefore, few are specifically mentioned, although their conservation is, of course, acknowledged as important.

#### Albania

- 1.1.1 Promote full legal protection of the Ferruginous Duck if necessary.
- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites, in particular any internationally important sites that may be identified.
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.

3.2 Develop maximum and regular census coverage of key areas at appropriate times of the year, in particular at any internationally important sites that may be identified and including counts by sex and age (juvenile/adult) whenever possible.

3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.

3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.

3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular with regard to fishpond management.

4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

#### Armenia

1.1.1 Promote full legal protection of the Ferruginous Duck if necessary.

1.1.2 If significant numbers are found, develop and implement a national strategy that furthers the objectives of this plan.

1.1.3 If significant numbers are found, develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.

2.1 Promote adequate protection and management of key sites, in particular any internationally important sites that may be identified.

2.2 Restore key sites where feasible and appropriate.

- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at any internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 If significant numbers are found, investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 If significant numbers are found, investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed.
- 4.1 If significant numbers are found, develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Austria**

- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, particularly Grass Carp.
- 3.2 Continue regular monitoring of breeding birds at 3-5 year intervals.

- 3.3.2 Develop a detailed, long-term research programme on the breeding ecology of the species at Lake Neusiedl, including investigations of habitat requirements, home range use, feeding ecology, and population dynamics.

### **Azerbaijan**

- 1.1.1 Promote full legal protection of the Ferruginous Duck if necessary.
- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.

- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed.
- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Belarus**

- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.

- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.

- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed.

- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Belgium**

Owing to the scarcity and unpredictable occurrence of the duck, specific actions are inappropriate at present.

### **Bosnia-Herzegovina**

- 1.1.1 Promote full legal protection of the Ferruginous Duck if necessary.
- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important

- sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular with regard to fishpond management.
- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.
- Bulgaria**
- 1.1.2 Develop and implement a national action plan and strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).
- 3.1 Conduct further surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular with regard to fishpond management.
- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme and in particular with regard to waterfowl hunters.
- Croatia**
- 1.1.1 Promote full legal protection of the Ferruginous Duck if necessary.
- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.

2.3	Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.		productivity and mortality of established birds.
<b><u>Georgia</u></b>			
2.5	Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).	1.1.1	Promote full legal protection of the Ferruginous Duck if necessary.
		1.1.2	If significant numbers are found, develop and implement a national strategy that furthers the objectives of this plan.
3.1	Conduct further surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.	1.1.3	If significant numbers are found, develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
3.2	Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.	2.1	If significant numbers are found, promote adequate protection and management of key sites, in particular any internationally important sites.
3.3.2	Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.	2.2	Restore key sites where feasible and appropriate.
3.3.3	Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.	2.3	Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
3.3.4	Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular with regard to fishpond management.	2.5	Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).
4.1	Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.	3.1	Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
		3.2	Develop maximum and regular census coverage at appropriate times of the year, particularly at any internationally important sites that may be found and including counts by sex and age (juvenile/adult) whenever possible.

### **Czech Republic**

2.2 Restore former key sites where feasible and appropriate.

### **France**

Owing to the scarcity and unpredictable occurrence of the duck, specific actions are inappropriate for the wild population.

2.4 Conduct research on the reintroduction programme and publish the results, including investigation of movements,

3.3.2 If significant numbers are found, investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.

3.3.3 If significant numbers are found, investigate habitat requirements and feeding ecology and use the results to inform site protection and management.

3.3.4	Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed.	2.2	Restore key sites where feasible and appropriate, and promote the creation/enhancement of potential Ferruginous Duck habitat at existing and planned irrigation reservoirs in the former Karla region (Thessalia).
4.1	If significant numbers are found, develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.	2.3	Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas, and in particular enforce closed seasons in the Amvrakikos area and at Lake Kalodiki.
<b><u>Germany</u></b>			
1.1, 2.1	Prevention as far as possible of further drainage of wetlands and prevention of additional river regulation.	2.5	Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
1.1, 2.3,	Prevention of persecution in breeding, migration and wintering sites.		
4.1, 4.2		3.1	Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
1.1, 4.1	Prevention of recreational disturbance in areas important for the species.		
4.2		3.2	Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
2.2	Restoration of wetlands, for example oxbow lakes.		
2.3, 4.1	Cessation of hunting throughout its range.		
4.2		3.3.2	Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
<b><u>Greece</u></b>			
1.1.2	Develop and implement a national strategy that furthers the objectives of this plan.	3.3.3	Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
1.1.3	Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.	3.3.4	Undertake research to alleviate detrimental consequences of socioeconomic development, including especially wetland drainage, destruction of reedbeds and deepening of artificial reservoirs.
1.1.4	Promote the legal protection of key sites (IBAs).		
2.1	Promote adequate protection and management of key sites, in particular Rodhia Marsh in the Amvrakikos area, Lake Cheimaditis, Lake Kalodiki and Lake Ioannina. Review the current EU-funded development projects and plans at Lake Vistonis Special Protection Area, evaluate their impact on threatened species and take the necessary mitigation actions, including cancellation of inappropriate projects.	4.1	Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme and particularly with regard to hunting (including the production of Ferruginous Duck identification leaflets for hunters).

## **Hungary**

- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular regarding fishpond management.

- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

## **Italy (including Sardinia)**

- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites.
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed.

4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Lithuania**

1.1.1 Promote full legal protection of the Ferruginous Duck if necessary.

1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.

1.1.4 Promote the legal protection of key sites (IBAs).

2.1 Promote adequate protection and management of key sites.

2.2 Restore key sites where feasible and appropriate.

2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.

2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.

3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.

3.2 Develop maximum and regular census coverage at appropriate times of the year, including counts by sex and age (juvenile/adult) whenever possible.

3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.

3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.

3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular with regard to fishpond management.

### **Moldova**

1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.

1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.

1.1.4 Promote the legal protection of key sites (IBAs).

2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).

2.2 Restore key sites where feasible and appropriate.

2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.

2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.

3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.

3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3), including counts by sex and age (juvenile/adult) whenever possible.

3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.

3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.

3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed.

4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Netherlands**

Owing to the scarcity and unpredictable occurrence of the duck, specific actions are inappropriate. However, the species may benefit from reduction of eutrophication and pollution in the long-term.

### **Poland**

1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.

1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.

1.1.4 Promote the legal protection of key sites (IBAs).

2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).

2.2 Restore key sites where feasible and appropriate.

2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.

2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).

3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.

3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.

3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.

3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.

3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular with regard to fishpond management.

4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Romania**

1.1.1 Promote full legal protection of the Ferruginous Duck.

1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.

1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.

1.1.4 Promote the legal protection of key sites (IBAs).

2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).

2.2 Restore key sites where feasible and appropriate.

2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.

2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).

2.6 Alleviate mortality caused by drowning in fishing nets by, for example, spatial or temporal zoning of fishing activity, or

- appropriate alterations to fishing techniques and/or equipment.
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular regarding fishpond management.
- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, -particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular regarding fishpond management.

### **Russia (European)**

- 1.1.1 Promote full legal protection of the Ferruginous Duck.
- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.
- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Slovakia**

- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites.

2.2	Restore key sites where feasible and appropriate.	2.2	Restore key sites where feasible and appropriate.
2.3	Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.	2.3	Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
2.5	Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).	2.5	Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised, particularly Grass Carp in the floodplain wetlands of the Drava and Mura rivers.
3.1	Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.	3.1	Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
3.2	Develop maximum and regular census coverage at appropriate times of the year, including counts by sex and age (juvenile/adult) whenever possible.	3.2	Develop maximum and regular census coverage at appropriate times of the year, including counts by sex and age (juvenile/adult) whenever possible.
3.3.2	Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.	3.3.2	Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
3.3.3	Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.	3.3.3	Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
3.3.4	Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular regarding fishpond management.	3.3.4	Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular regarding fishpond management.
4.1	Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.	4.1	Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Slovenia**

- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Control tourism at Lake Cerknica. Protect adequately the floodplain wetlands of the Drava and Mura rivers.

### **Spain**

- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote protection of Clot de Galvany.
- 2.2 Restore suitable habitat in Marismas del Gaudalquivir.

- 2.3 Ban hunting or at least use of lead shot at El Hondo, and in other hunting areas prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of those areas.
- 2.4 Conduct research on the reintroduction programme and publish the results, including investigation of movements, productivity and mortality of any established birds.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat.

### **Switzerland**

- 1.1.1 Promote full legal protection of the Ferruginous Duck.

Owing to the present scarcity of the species, additional specific actions are inappropriate at present.

### **Turkey**

- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including

- an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed.
- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.

### **Ukraine**

- 1.1.2 Develop and implement a national strategy that furthers the objectives of this plan.
- 1.1.3 Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
- 1.1.4 Promote the legal protection of key sites (IBAs).
- 2.1 Promote adequate protection and management of key sites, in particular internationally important sites (see Table 3).
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or

	eradicate species that have become naturalised (particularly Grass Carp).	2.3	Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
3.1	Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.	2.5	Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised.
3.2	Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites (see Table 3) and including counts by sex and age (juvenile/adult) whenever possible.	3.1	Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
3.3.2	Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.	3.2	Develop maximum and regular census coverage at appropriate times of the year, particularly at internationally important sites that may be found and including counts by sex and age (juvenile/adult) whenever possible.
3.3.3	Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.	3.3.2	If significant numbers are found, investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
3.3.4	Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular regarding fishpond management.	3.3.3	If significant numbers are found, investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
4.1	Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.	3.3.4	Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed.
<b><u>Former Yugoslavia Republic of Macedonia</u></b>			
1.1.1	Promote full legal protection of the Ferruginous Duck.	4.1	If significant numbers are found, develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally coordinated under a national programme.
1.1.2	If significant numbers are found, develop and implement a national strategy that furthers the objectives of this plan.	<b><u>Yugoslavia (Serbia-Montenegro)</u></b>	
1.1.3	If significant numbers are found, develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.	1.1.1	Promote full legal protection of the Ferruginous Duck if necessary.
1.1.4	Promote the legal protection of key sites (IBAs).	1.1.2	Develop and implement a national strategy that furthers the objectives of this plan.
2.1	Promote adequate protection and management of key sites.	1.1.3	Develop a national strategy for the conservation of the Ferruginous Duck and its habitat in the wider environment.
2.2	Restore key sites where feasible and appropriate.		

- 2.1 Promote adequate protection and management of key sites, in particular any internationally important sites that may be found.
- 2.2 Restore key sites where feasible and appropriate.
- 2.3 Prevent hunting mortality and associated disturbance by appropriate regulation of hunting activities and management of hunting areas.
- 2.5 Prevent the introduction of species that may adversely affect the Ferruginous Duck or its habitat, and control or eradicate species that have become naturalised (particularly Grass Carp).
- 3.1 Conduct surveys in order to construct a comprehensive site inventory, including an assessment of the conservation status of each site.
- 3.2 Develop maximum and regular census coverage at appropriate times of the year, particularly at any internationally important sites that may be found and including counts by sex and age (juvenile/adult) whenever possible.
- 3.3.2 Investigate factors affecting productivity and mortality, and use measurements of these parameters to construct population simulation models to aid conservation management wherever possible and appropriate.
- 3.3.3 Investigate habitat requirements and feeding ecology and use the results to inform site protection and management.
- 3.3.4 Undertake research to alleviate detrimental consequences of socioeconomic development wherever needed, in particular regarding fishpond management.
- 4.1 Develop and implement education programmes for the conservation of the Ferruginous Duck and its habitat wherever needed, ideally *coordinated* under a national programme.

**TABLE 1: Breeding population estimates and trends of the Ferruginous Duck in Europe (1976-1996)**

Country	Size (pairs)	Data Quality <sup>1</sup>	Ref <sup>2</sup>	Trend <sup>3</sup>	Data Quality <sup>1</sup>	Ref <sup>2</sup>
Albania	100-300	2	1	-1	2	1
Armenia	10-100	3	18,33	?	-	-
Austria	150-200	1	2,3	0	2	2,3
Azerbaijan	150-200	2	4,5	-1	3	4,5
Belarus	50-75	3	1	-2	1	1
Bosnia-Herzegovina	150-500	3	18	?	-	-
Bulgaria	110-160	2	6	-1	2	1,6
Croatia	1000-3000	2	7	0	2	7
Czech Republic	0-3	1	32	-2	1	1,32
Georgia	10-1000	3	18	?	-	-
Germany	1-20	2	8,23,24	-2	2	8
Greece	200-250	2	9,10	0	3	9,10
Hungary	500-600	2	25	-1	2	25
Italy (inc. Sardinia)	30-50	2	11	0	2	11
Lithuania	10-100	3	1	0	3	1
Moldova	20-100	2	18,31	-2	1	18,31
Netherlands	0-1	1	1,20	F	2	1,20
Poland	250-300	2	13	-1	2	1
Romania	8000	2	14	-1	1	1
Russia (European)	500-1500	3	1	-2	2	1
Slovakia	20-40	2	1	-1	2	1
Slovenia	5-15	2	1,28	-2	2	1,29
Spain	0-4	2	15	-2	1	1
Switzerland	0-1	1	1,22	F	1	1,22
Turkey	500-600 <sup>4</sup>	2	16,21	-1	2	16,21
Ukraine	1500-5000	2	17,26,30	-2	1	1
Former Yugoslav Republic of Macedonia	3-5	2	12,18,19,27	-1	3	18
Yugoslavia	150-1500	3	18,19,27	?	-	-
<b>TOTAL</b>	<b>13,000-24,000</b>	<b>2</b>	<b>18</b>	<b>-1</b>	<b>2</b>	<b>18</b>

<sup>1</sup> 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.

<sup>2</sup> References: **1** Tucker & Heath 1994; **2** M. Dvorak in litt. 1996; **3** S. Tebbich in litt. 1996; **4** M. Patrikeev in litt. 1996; **5** Patrikeev 1996; **6** N. Petkov in litt. 1996; **7** Radovi\_ *et al.* in press; **8** A. Habemeier in litt. 1997; **9** G. Handrinos in litt. 1996; **10** C. Papaconstantinou in litt. 1996; **11** P. Boldreghini in litt. 1996; **12** M. Schneider-Jacoby verbally 1996; **13** M. Wieloch in litt. 1996; **14** J.B. Kiss in litt. 1996; **15** A. Green verbally 1996; **16** G.M. Kirwan in litt. 1996; **17** I. Gorban in litt. 1996; **18** Compiler's interpretation of available information; **19** Hagermeier & Blair 1997; **20** van Dijk *et al.* 1997; **21** Kirwan in press; **22** W. Müller in litt. 1997; **23** P. Herkenrath in litt. 1997; **24** Bauer & Berthold 1996; **25** G. Szimuly in litt. 1997; **26** A. Mikityuk in litt. 1997; **27** B. Micevski in litt. 1997; **28** Geister 1995; **29** B. Stumberger in litt. 1997; **30** I. Rusev in litt. 1997; **31** N. Zubcov in litt. 1997; **32** Hubec *et al.* 1995; **33** Adamian & Klem 1997.

<sup>3</sup> Trend in numbers is assessed by assigned to one of the following categories: **+2** Large increase of at least 50% since 1976; **+1** Small increase of 20-49% since 1976; **0** Stable, with overall change less than 20% since 1976; **-1** Small decrease of 20-49% since 1976; **-2** Large decrease of at least 50% since 1976; and **F** Fluctuating with changes of at least 20%, but no clear trend since 1976.

<sup>4</sup> An upper limit of 1000 pairs may be more appropriate for the Turkish population (C.C. Bilgin & G. Eken in litt. 1997).

**TABLE 2: Mid-winter population estimates and trends of Ferruginous Duck in Europe (1976-1996) (only countries regularly supporting >10 individuals are shown)**

Country	Size (individuals)	Data Quality <sup>1</sup>	Ref <sup>2</sup>	Trend <sup>3</sup>	Data Quality <sub>1</sub>	Ref <sup>2</sup>
Albania	100-2000	3	18	?	-	-
Armenia	10-200	3	21,26	?	-	-
Azerbaijan	1000-5000	2	6,28	?	-	-
Belgium	0-20	2	7,21	F	2	7,21
Bosnia-Herzegovina	0-500	3	21	?	-	-
Bulgaria	0-50	2	8	F	2	21
Croatia	0-200	2	20,21	F	2	20
France	1-25	1	23,24,25	F	1	23,24,25
Georgia	100-200	3	28	?	-	-
Germany	20	2	10,11	F	2	21
Greece	30-50	2	12,13	F	2	21
Italy (inc. Sardinia)	100-400	2	1	F	2	1
Moldova	300-1000	2	21,27	?	-	-
Netherlands	5-35	1	7,19	F	1	7
Poland	10-30	2	2	F	2	2
Romania	100-200	2	15	-1	2	15
Slovakia	0-40	2	16	F	2	16
Spain	5-30	2	3	-2	2	3
Switzerland	10-30	1	9	F	1	9
Turkey	0-1500	2	4,5,21,22	-1	2	4,22
Ukraine	500-1500	2	14,17	-2	2	17
Yugoslavia	500-1000	2	18,21	?	-	-
TOTAL	3000-14,000	2	21	-1	2	21

<sup>1</sup> 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.

<sup>2</sup> References: **1** P. Dall'Antonio in litt. 1997; **2** M. Weiloch in litt. 1997; **3** A.J. Green verbally 1996; **4** G.M. Kirwan in litt. 1996; **5** A.J. Green in litt. 1997; **6** Patrikeev 1996; **7** Hecker 1994; **8** N. Petkov in litt. 1996; **9** W. Müller in litt. 1997; **10** M. Schneider-Jacoby verbally 1996; **11** A. Habemeier verbally 1996; **12** G. Handrinos in litt. 1996; **13** C. Papaconstantinou in litt. 1996; **14** I. Rusev in litt. 1997; **15** J.B. Kiss in litt. 1996; **16** Pa\_enovský in litt. 1996; **17** I. Gorban in litt. 1996; **18** B. Micevski in litt. 1997; **19** Unpublished data from BirdLife International/European Birds Census Council, European Birds Database; **20** Radovi\_ *et al.* in press; **21** Compiler's interpretation of available information; **22** Kirwan in press; **23** B. Deceuninck in litt. 1997; **24** Deceuninck *et al.* 1997; **25** Deceuninck 1997; **26** Adamian & Klem 1997; **27** N. Zubcov in litt. 1997; **28** P. Cranswick verbally 1997.

<sup>3</sup> Trend in numbers is assessed by assigned to one of the following categories: **+2** Large increase of at least 50% since 1976; **+1** Small increase of 20-49% since 1976; **0** Stable, with overall change less than 20% since 1976; **-1** Small decrease of 20-49% since 1976; **-2** Large decrease of at least 50% since 1976; and **F** Fluctuating with changes of at least 20%, but no clear trend since 1976.

**TABLE 3: Preliminary inventory of internationally important sites for the Ferruginous Duck (*Aythya nyroca*) in Europe**

Country, Site & Coverage <sup>1</sup>	Coordinates	Criteria <sup>2</sup>	Protection	Notes	Data Source <sup>3</sup>
<b>Armenia</b> (Coverage: Poor) No information					
<b>Austria</b> (Coverage: Good) Lake Neusiedl	N4748E1650	150-200 (BP)	Full	Small decline in last 25 years	1,2
<b>Azerbaijan</b> (Coverage: Good) Absheron Peninsula (coastal waters) Divichi Liman	N4021E4949 N4115E4905	<500 (PI) 10-40 (BP); >100 (PI)	None Partial	No means of protection and threatened by pollution Scott & Rose (1996) data suspect. Protected only in breeding season	3 3,4
Kura Delta Kizil Agach	N3918E4828 N3907E4821	>100 (PI) >100 (PI)	None Partial	Poorly surveyed Probably shares birds with Novogolovskaya-chala	3 3
Lake Aggel	N4005E4740	60-70 (BP); <500 (PI)	Full	Full protection until 1991, current situation unclear	3,4
Lake Mahmud-chala	N3930E4840	>20 (BP)	Partial	Scott & Rose (1996) data suspect. Protected only in breeding season	3
Lake Saraesy	N4821E4000	>30 (BP); >100 (PI); >300 (WI)	Partial	Hunting is allowed in autumn and winter	3
<b>Belarus</b> (Coverage: Poor) Prypiat Floodplain	N5205E2700	>20 (BP)	Partial		5
<b>Bosnia-Herzegovina</b> (Coverage: Moderate) Barda_a Fishponds Hutavo Blato	N4505E1725 N4302E1746	>50 (BP) >100 (WI)	None Partial	Peak count = 500 in 1969. Intensive hunting within protected area	28 5,28
Prnjavor Fishponds Sani_ani Fishponds	N4442E1740 N4456E1646	>30 (BP) >50 (BP)	None None		28 28
<b>Bulgaria</b> (Coverage: Good) Cherni Vruh Fishponds Kalimok Fishponds	N4227E2727 N4219E2632	>100 (PI) 6-20 (BP); >100 (PI)	? ?	Also supports 3-5 breeding pairs Peak count of 200 birds on passage (year unknown)	6 6
Mechka Fishponds	N4336E2550	10-30 (BP); 100-3000 (PI)	None	Former marsh of the Danube Floodplain	6,7
Orsoya Fishponds	N4350E2312	20-30 (BP); 60-100 (PI)	None	Former marsh of the Danube Floodplain	6,7
Tsibarsko Blato Marsh	N4348E2345	15-20 (BP)	None	Temporary marsh on the Danube Floodplain	6,7
<b>Croatia</b> (Coverage: Good) Crna Mlaka Fishponds	N4537E1545	30-80 (BP); 100-500 (PI)	Full	IWC count of 5000 passage individuals unreliable	21,28,44
Donji Miholjac Fishponds	N4546E1810	>300 (BP); >100 (PI)	None	Recent increase in numbers, and partial protection pending	8,21,28
Dragani_ Fishponds	N4534E1538	60-100 (BP); 200-400 (PI)	None	Stable, possibly slightly increasing numbers	8,28
Garešnica Fishponds Grudnjak Fishponds	N4534E1656 N4538E1802	>30 (BP) >50 (BP); 100-250 (PI)	None None		28 21,28
Jelas Fishponds	N4508E1751	50-200 (BP); >100 (PI)	Partial	Up to 1500 on passage, and irregular during winter (up to 122)	5,7,8,28,4 4
Kon_anica Fishponds Kopa_evski rit & Podunavlje fishpond	N4538E1707 N4553E1851	>50 (BP) 50-200 (BP); 100-1000 (PI)	None Partial	Podunavlje fishpond is unprotected.	28 21,28,29,4 4
Lipovljani Fishponds	N4524E1651	>30 (BP); 100-350 (PI)	None	Peak count of 350 passage birds	21,28,30
Našice Fishponds Pisarovina Fishponds	N4532E1812 N4535E1552	>50 (BP) >20 (BP); >100 (PI)	None None		28 28,44
Poljana Fishponds Siš_ani Fishponds Sloboština Fishponds	N4533E1656 N4549E1639 N4515E1712	>50 (BP) >50 (BP) >20 (BP)	None None None		28 28 28

**TABLE 3 (cont)**

Country, Site & Coverage <sup>1</sup>	Coordinates	Criteria <sup>2</sup>	Protection	Notes	Data Source <sup>3</sup>
<b>Georgia</b> (Coverage: Poor) No information					
<b>Greece</b> (Coverage: Good) Amvrakikos Lake Kalodiki Lake Cheimaditis  Spercheios Delta	N3852E2050 ? N4030E2135  N3850E2240	80-100 (BP) 20 (BP) 30 (BP)  >100 (PI)	Full ? Full  Partial	Non-hunting zone and proposed Natura 2000 site and SPA Supported over 2000 birds in October 1988	9,10 31 9,10  5,24,25
<b>Hungary</b> (Coverage: Good) Biharugra Fishponds Hortobágy region Somogy region Sárvíz Valley (inc. Dinnyés Fertő & Velence Lake) Kisbalaton  Pusztaszer region (inc. Szeged fishpond & Kardoskút) Regöly-Pacsmag fishponds	N4658E2135 N4737E2105 N4621E1749 N4711E1834  N4640E1715  N4620E2007 N4635E1823	25 (BP); 100 (PI) 50 (BP) 80 (BP) 25 (BP)  <150 (BP); >200 (PI) 30 (BP) 40 (BP)	Partial Partial Partial Partial  Full  Partial Partial		11 11 11 41  41  11 41
<b>Italy (including Sardinia)</b> (Coverage: Good) Punta Alberete & Vallee Della Canna	N4430E1215	20-25 (BP)	Full		12
<b>Moldova</b> (Coverage: Good) Costesti Reservoir Prut floodplain wetlands (Cahul to Slobozia Mare) Southern end of Dubasari Reservoir Cuciurgan Reservoir	N4551E2808  N4721E2906  N4626E3014	>100 (PI) >100 (PI); >100 (WI) >100 (PI)  >100 (PI); >100 (WI)	? ? ?  ?	Includes Cahul Fishponds and Beleu Lake.	46 46 46 46
<b>Poland</b> (Coverage: Good) Milicz Fishponds	N5130E1615	45-110 (BP)	Full		13
<b>Romania</b> (Coverage: Moderate) Balta Alba  Br_ila Small Island Danube Delta & Razim-Sinoe Lagoons Murighiol Lake Comana Lake Terchighiol  Por_ile de Fier Reservoir	N4515E2715  N4519E2759 N4510E2920  ? N4410E2606 N4358E2840  N4442E2220	>20 (BP); >100 (PI); >100 (WI) >20 (BP) >1000 (BP); >100 (PI) 500-600 (BP) 100 (PI) >100 (WI)  >100 (PI)	None  Partial Full  Partial None None  None	No recent data  Jurilovca and Maliuc are key areas  IWC data; peak count 1990 IWC data; peak count of 150 winter 1988 IWC data; peak spring count of 846 in 1996	5  14 14,15,26  14,15 5 5  5
<b>Russia</b> (Coverage: Poor) Kuban Delta & neighbouring lagoons Volga Delta	N4520E3715  N4615E4830	70 (BP)  >2500 (PI)	None  Partial	IWC summer peak count of 1500 individuals, but year unknown Possibly much greater than 2500 birds, primarily in autumn	5,42  7,16,42
<b>Turkey</b> (Coverage: Good) Aksehir & Eber Gölü  Göksu Delta Kizilirmak Delta Kocaçay Delta Mogan Gölü Sultansazlığı  Corak Gölü Kulu Gölü  Manyas Gölü	N3836E3118  N3650E3520 N4135E3604 N4015E2715 N3945E3249 N3820E3515  N3741E2948 N3902E3310  N4014E2760	>20 (BP)  25-30 (BP) 150-200 (BP) 70-100 (BP) 20 (BP) 40 (BP); >100 (PI)  100 (WI) >100 (PI)  >100 (WI)	None  Full Partial None  Full  None None  Full	Peak count of c.100 individuals in May 1966  Peak count = 140 birds (Aug 1991) IWC data; peak count 1970 >100 birds in July 1984; may not regularly support >100 IWC peak winter count of 3000 in 1967	32  17,18,19 18,19,33 18,19,34 18,19 36,37,38,39  5 5,40  5

**TABLE 3 (cont)**

Country, Site & Coverage <sup>1</sup>	Coordinates	Criteria <sup>2</sup>	Protection	Notes	Data Source <sup>3</sup>
Marmara Gölü	N3835E2806	20-25 (BP); >100 (WI)	None	IWC peak winter count of 860 in 1990	5,35
Salda Gölü	N3730E2941	>100 (WI)	None	IWC peak winter count of 400 in 1990	5
Mogan Gölü	N3945E3249	>100 (PI); >100 (WI)	Full	Peak count of 200 passage birds in 1994	38
<b>Ukraine</b> (Coverage: Poor)					
Dnestr Delta/Denestrovskiy Liman	N4617E3018	>20 (BP); >100 (PI)	Partial		20,45
Karkinitzki Bay	N4511E3300	130 (BP)	Full		20
Ponyzzya Onipza (Lower Dnepr River)	N4630E3232	140 (BP); >100 (PI)	Partial		20
Danube Delta (inc. Yagozlytski & Tendrovski Bays)	N4620E3152	1000-2500 (BP); >100 (PI); >100 (WI)	Partial	Ket areas include Stentsovskiy plavny and lakes Kugurlut & Katlabuh	20,45
Dnepr Delta	N4630E3220	140 (BP); >100 (PI)	Partial	Kahovske Reserve is a key breeding area	20,27
<b>Yugoslavia (Serbia-Montenegro)</b> (Coverage: Poor)					
Vrsacki Rit	N4500E2111	100 (WI)	?	Mean winter count of 112 during 1988-1991	21
Donje Podunavlje	N4449E2117	50 (BP)	?	IWC summer peak count of 150 individuals, but year unknown	5,44
Lake Ludaš	N4605E1950	>50 (BP)	?	IWC summer peak count of 150 individuals, but year unknown	5,44
Skadarsko Jezero (Lake Skadar)	N4215E1911	150 (BP); >100 (PI); 500 (WI)	?	Few on Albanian side; winter count of 25,000 (1991) seems erroneous	22,23,43
Stari Begej	N4516E2025	>30 (BP)	?	IWC summer peak count of 90 individuals, but year unknown	5,44
Baeka Palaukie	N4445E2119	100 (WI)	?	IWC data; peak count 1988	5

<sup>1</sup> Coverage in each country is subjectively classified as Good (67-100% of key sites probably identified), Moderate (34-66% of key sites probably identified) or Poor (0-33% of key sites probably identified).

<sup>2</sup> International importance in Europe is recognised by the regular presence of  $\geq 20$  breeding pairs (BP) (Anon. 1995) and/or  $\geq 100$  post-breeding (PI) or wintering (WI) individuals. The latter is revised down from 500 (Anon. 1995) given the new winter population estimate in Europe (ie. 5,000-15,000 individuals, see "Distribution and Population").

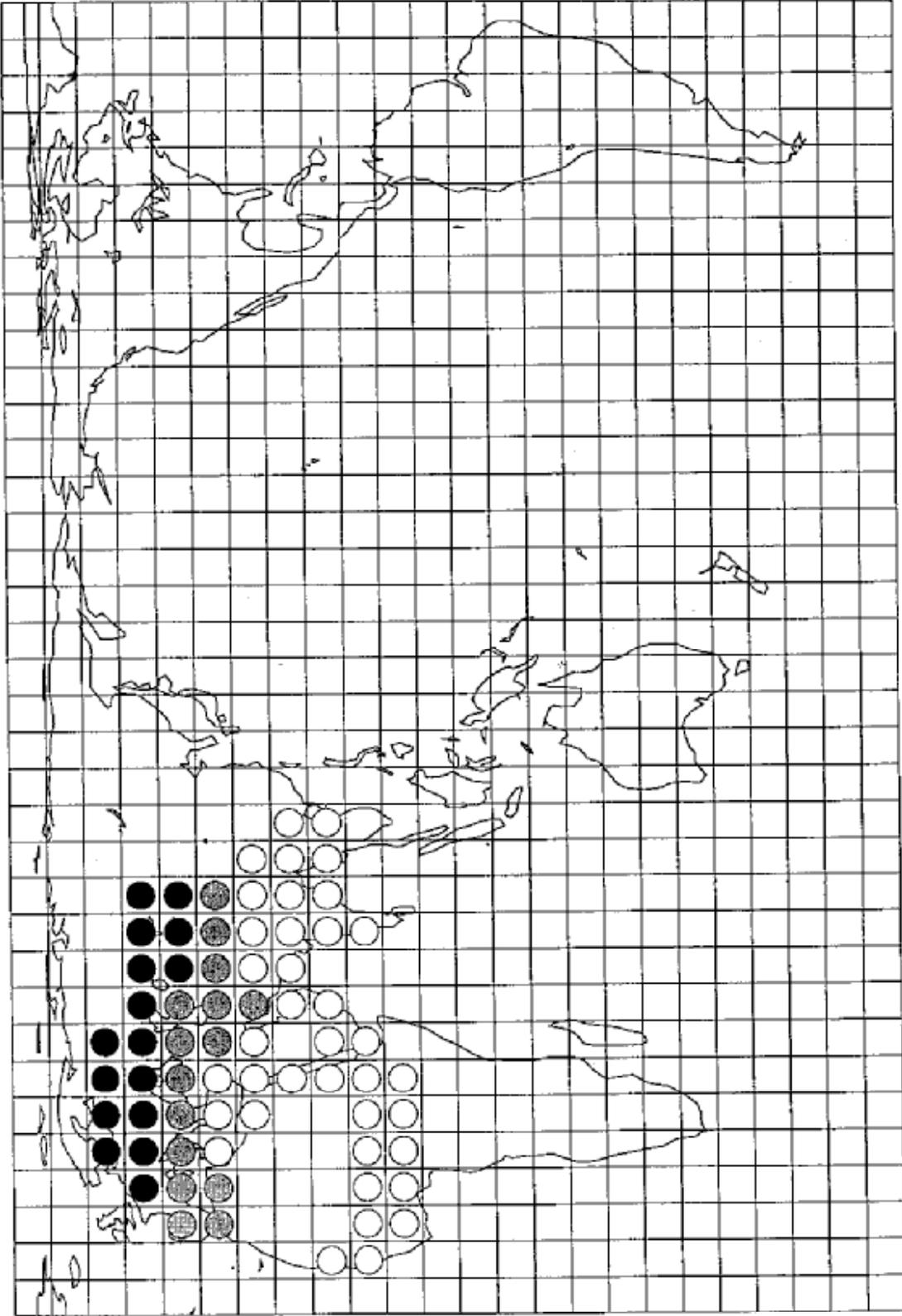
<sup>3</sup> References: **1** M. Dvorak in litt. 1996; **2** S. Tebbich in litt. 1996; **3** Patrikeev in litt. 1997; **4** Patrikeev 1996; **5** Scott & Rose 1996; **6** N. Petkov in litt. 1996 & 1997; **7** Compilers interpretation of available information; **8** Radovi\_ *et al.* in press; **9** G.I. Handrinos in litt. 1996; **10** C. Papakonstantinou in litt. 1996; **11** Hungarian Rare & Colonial Bird Monitoring Programme 1996; **12** P. Boldreghini in litt. 1996; **13** M. Weiloch in litt. 1997; **14** D. Munteanu in litt. 1995; **15** K.J. Botond in litt. 1996; **16** G.M. Rusanov verbally 1996; **17** Green 1996; **18** G.M. Kirwan in litt. 1996; **19** M. Yasar in litt. 1996; **20** I. Gorban in litt. 1996 & 1997; **21** J. Mikuska in litt. 1997; **22** M. Schneider-Jacoby verbally 1996 & in litt. 1997; **23** M. Dvorak verbally 1996; **24** Handrinos & Acrotis 1997; **25** Hecker 1994; **26** Paspaleva *et al.* 1984; **27** Dement'ev & Gladkov 1952; **28** D. Radovi\_ in litt. 1997; **29** Getz 1996; **30** Schneider 1988; **31** C. Papakonstantinou in litt. 1997; **32** OST 1969; **33** Hustings & van Dijk 1994; **34** Ertan 1996; **35** G. Eken in litt. 1997; **36** Kasperek 1985; **37** C. Bilgin in litt. 1997; **38** Magnin & Yasar 1997; **39** Akçakaya *et al.* 1983; **40** Kasperek 1987; **41** Data from Hungarian Important Bird Area Project; **42** V. Zubakin in litt. 1997; **43** B. Micevski in litt. 1997; **44** Grimmett & Jones 1989; **45** I. Rusev in litt. 1997; **46** N. Zubcov in litt. 1997.

**TABLE 4: Sites omitted as internationally important for the Ferruginous Duck (*Aythya nyroca*) in Europe**

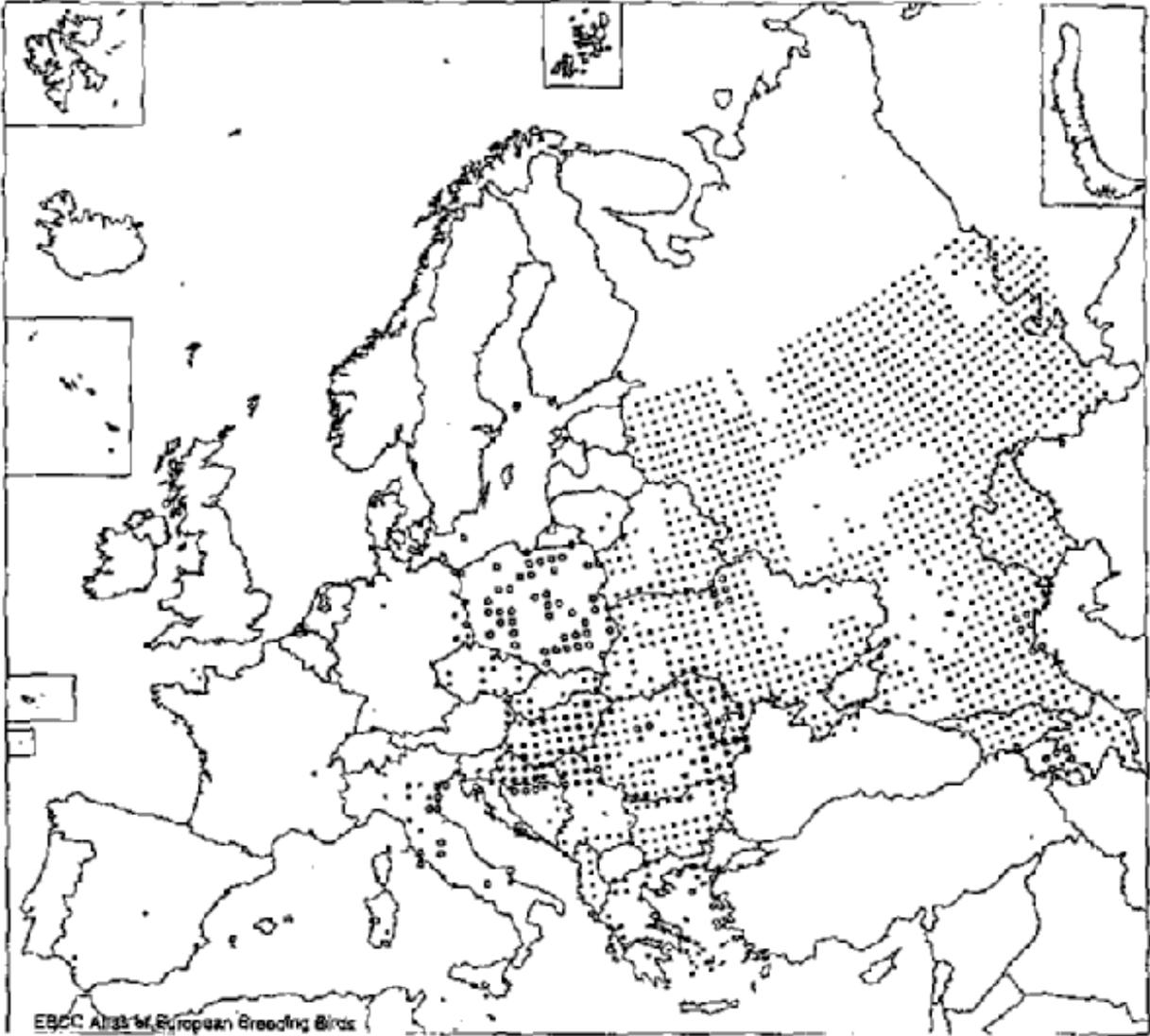
Country & Site	Coordinates	Data suggesting possible importance <sup>1</sup>	Reason for omittance
<b>Azerbaijan</b> Lake Novogolovskaya-chal Varvara Reservoir	N3912E4896 N4038E4843	500 (WI) (IWC data; Scott & Rose 1996) 500 (WI) (IWC data; Scott & Rose 1996)	Unreliable data (M. Patrikeev in litt. 1997) Unreliable data (M. Patrikeev in litt. 1997)
<b>Croatia</b> Prelog	N4620E1635	120 (WI) (IWC data; Scott & Rose 1996)	Unreliable data (see Radovi_ <i>et al.</i> in press)
<b>Greece</b> Evros Delta  Lake Mitrikou  Lake Vistonis and Porto Lagos Lagoon Lake Kerkini  Lake Kastorias  Lake Mikri Prespa	N4052E2600  N4059E2519  N4100E2505 N4112E2309  N4029E2118  N4045E2104	20 (BP) (Grimmett & Jones 1989) 60 (BP) (Grimmett & Jones 1989) 20 (BP) (Grimmett & Jones 1989) 60 (BP) (Grimmett & Jones 1989) 10-30 (BP) (Grimmett & Jones 1989) "common" (BP) (Grimmett & Jones 1989)	Decline to 10 BP (Hecker 1994; G.I. Handrinos in litt. 1996; C. Papakonstantinou in litt. 1996) Decline to <10 BP (Hecker 1994; G.I. Handrinos in litt. 1996; C. Papakonstantinou in litt. 1996) Decline to 10 BP (G.I. Handrinos in litt. 1996; C. Papakonstantinou in litt. 1996) Decline to <10 BP (Hecker 1994; G.I. Handrinos in litt. 1996; C. Papakonstantinou in litt. 1996) Decline to <10 BP (Hecker 1994; G.I. Handrinos in litt. 1996; C. Papakonstantinou in litt. 1996) Extinct as a breeding bird (Hecker 1994)
<b>Hungary</b> Szaporca	N4650E1806	100 (PI) (IWC data; Scott & Rose 1996)	Does not regularly support >100 PI (G. Szimuly in litt. 1997)
<b>Italy</b> Lesina	N4149E1518	200 (WI) (IWC data; Scott & Rose 1996)	Does not regularly support >100 WI (P. Dall'Antonio in litt. 1996)
<b>Poland</b> Borzymowskie	N5231E1852	200 (WI) (IWC data; Scott & Rose 1996)	Unreliable data (M. Wieloch in litt. 1997)
<b>Slovakia</b> Parizske Mociare	N4745E1831	30 (BP) (IWC data; Scott & Rose 1996)	Unreliable data (S. Pa_enovský in litt. 1996)
<b>Turkey</b> Amik Gölü		300 (WI) (IWC data)	Site destroyed (G.M. Kirwan in litt. 1997)

<sup>1</sup> Data are presented as breeding pairs (BP), or post-breeding (PI) or wintering (WI) individuals.

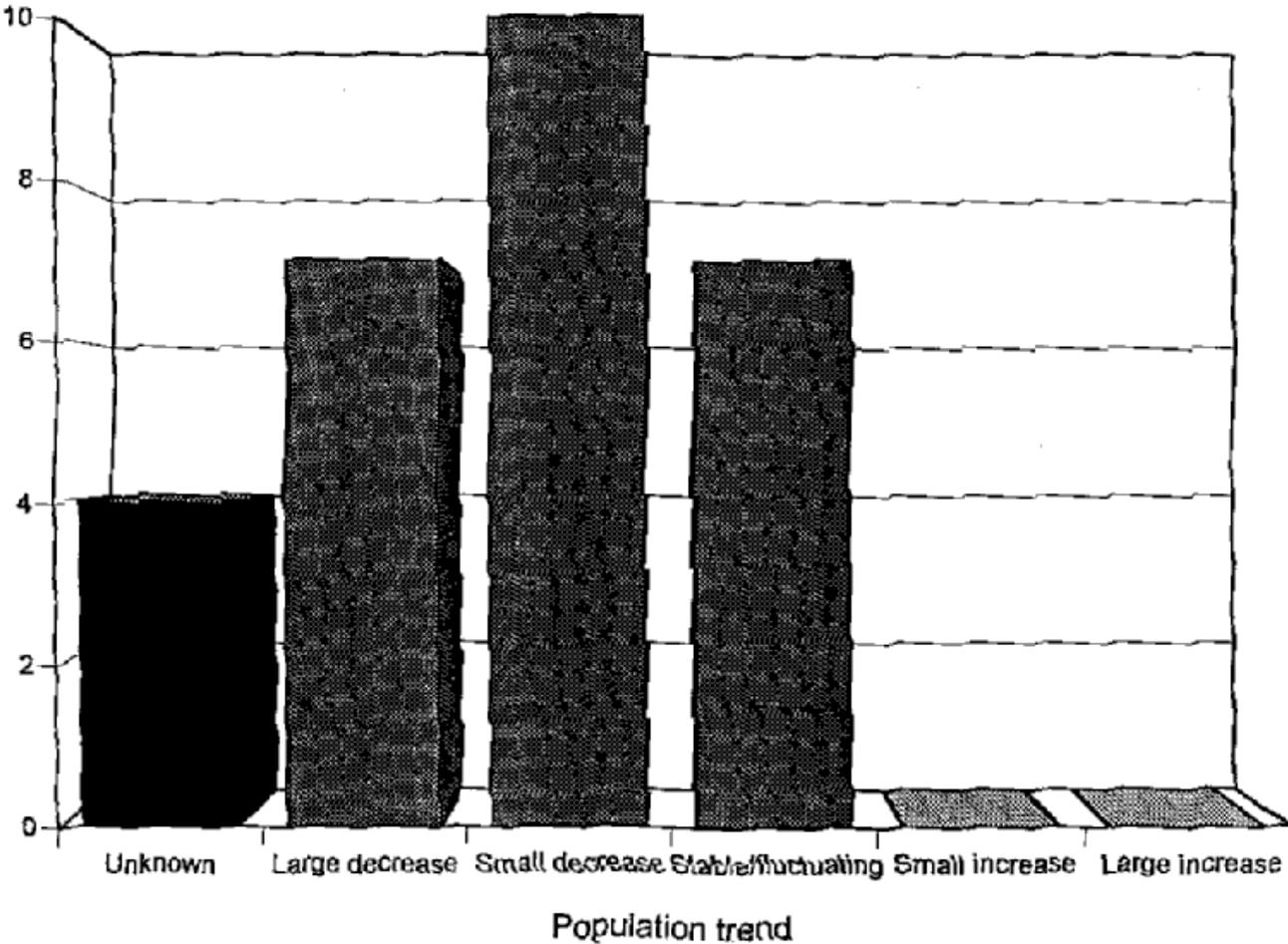
**FIG. 1: Global distribution of the Ferruginous Duck (*Aythya nyroca*). Black circles represent breeding only, grey breeding and wintering, and white wintering only. Produced using WORLDMAP (Williams 1996)**



**FIG. 2: Breeding distribution of the Ferruginous Duck (*Aythya nyroca*) in Europe (supplied by the European Bird Census Council)**



**FIG. 3:** Frequency of population trends of breeding Ferruginous Ducks (*Aythya nyroca*) in European countries during 1976-1996 (see Table 1)



**FIG. 4:** Locations of internationally important breeding sites for the Ferruginous Duck (*Aythya nyroca*) ( $\geq 20$  pairs) in Europe.  
Note: coverage is poor in some countries (see Table 3)



**FIG. 5:** Locations of internationally important passage sites for the Ferruginous Duck (*Aythya nyroca*) ( $\geq 100$  individuals) in Europe. Note: coverage is poor in some countries (see Table 3)



**FIG. 6:** Locations of internationally important mid-winter sites for the Ferruginous Duck (*Aythya nyroca*) ( $\geq 100$  individuals) in Europe. Note: coverage is poor in some countries (see Table 3)



**FIG. 7:** Degree of protection afforded to internationally important sites for the Ferruginous Duck (*Aythya nyroca*) in Europe (data from Table 3)

