

**INTERNATIONAL ACTION PLAN FOR THE
RED-BREASTED GOOSE (*Branta ruficollis*)**



Compiled by:

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Timetable

First draft: October 1994
Workshop: December 1994 - Strasbourg, France
Second draft: January 1995
This version: September 1995

Reviews

This action plan should be reviewed and updated every five years and/or when agricultural practices in Bulgaria and Romania change significantly. An emergency review will be undertaken if sudden major environmental changes, liable to affect the population, occur within the species' range, and/or goose numbers decline.

Geographical scope

The action plan needs to be implemented in Azerbaijan, Bulgaria, Greece, Kazakhstan, Romania, Russia, Turkey and Ukraine.

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SUMMARY

The Red-breasted Goose *Branta ruficollis* is not only one of the rarest goose species in the world, it is also one of the most attractive, making it highly suitable as a “flagship” species for conservation throughout its range. It nests in June–July in the Russian arctic and winters in temperate regions along the Black Sea coast (Bulgaria, Romania, Ukraine and Turkey). The total number and distribution of Red-breasted Geese has puzzled scientists for many years, as counting them in their vast range (of c.1,200,000 km²) is often difficult. Since the early 1900s, population estimates have been based on incomplete data resulting in information which was either geographically incomplete or simply non-existent for years at a time (see Annex 2). Existing data suggest that the population suffered a dramatic decline from 60,000 to 25,000 during the late 1950s and 1960s, but recent comprehensive counts of over 70,000 geese may indicate that a sizeable proportion of the population was missed and that previous estimates were too low. The decline during the 1960s was accompanied by, and possibly due to, large-scale re-distribution from the wintering grounds on the Caspian Sea coast, where massive land-use changes occurred, to the Black Sea coast.

Threats and limiting factors

- * **Potential land-use changes - high**
- * **Hunting and disturbance - high**
- * **Wetland habitat loss in non-breeding areas - medium**
- * **Climate change - unknown, probably medium**
- * **Predation - unknown**
- * **Industrial development at breeding sites - unknown**
- * **Rodenticides - unknown**

Conservation priorities at European level

- * **Maximum protected status of the Red-breasted Goose and its habitats - essential**
- * **Future agricultural policies which are sympathetic to the needs of the geese by providing suitable feeding habitat - essential**
- * **Adequate population monitoring on staging and wintering grounds - essential**
- * **Adequate monitoring of current threats including changes in agricultural practice and hunting pressure in the wintering grounds and industrial developments in the Russian breeding grounds - essential/high**

- * **Adequate protection and management for key sites - high**
- * **Public awareness campaign particularly in wintering and staging states - high**
- * **Setting up of a multinational Red-breasted Goose Working Group to organise monitoring schemes and research effort, and to coordinate conservation efforts throughout the species' range - high**

INTRODUCTION

The Red-breasted Goose *Branta ruficollis* is the smallest goose in the western Palearctic and easily distinguishable by its pattern of black, white and chestnut-red. It is also one of the rarest Palearctic geese, and breeds on the tundra between the Arctic Circle and 78°N in west-central Siberia, mostly on the Taimyr peninsula. Disturbance from hunting and oil exploration may pose threats to the breeding population (Vinokurov 1990). The species winters predominantly on the western Black Sea coast where the greatest threats are illegal and unregulated hunting and potential changes in agricultural practices in Bulgaria and Romania.

The Red-breasted Goose is classified by IUCN as globally threatened in the category Insufficiently Known (Groombridge 1993). According to the new criteria developed by IUCN (Mace and Stuart 1994) the Red-breasted Goose is still classified as globally threatened and is listed as Vulnerable (Collar *et al.* 1994). At the European level it is considered Localised (Tucker and Heath 1994). The Red-breasted Goose is listed in Annex I of the EU Wild Birds Directive and in CITES Appendix II. It is protected under the Bonn Convention (Appendix II) and the Bern Convention (Appendix II).

The total number of Red-breasted Geese has been something of a mystery for many years (Owen 1980). Between 1956 and 1969 the population may have declined from 60,000 to 25,000, although other explanations of the disparity in counts are plausible (see 'Population', below). During this period the majority of the geese switched wintering sites from the coasts of the Caspian Sea, where habitat was lost and hunting pressure may have been great, to the western coast of the Black Sea. Recent coordinated, mid-winter counts approached 75,000 individuals (Black and Madsen 1993), though it is likely that there are as many as 78,000 (D. Vangeluwe pers. comm. 1994). As much as 90% of the population winters at only three or four sites in Bulgaria and Romania, and if current pressures result in these areas becoming unsuitable, the population could once more be displaced, and may decline as a result.

Based on two counts in the 1990s, Callaghan and Green (1993) ranked the species, according to the Mace-Lande criteria, as Safe, i.e. not meeting the threatened species criteria. However, our understanding of the status of the Red-breasted Goose is still very poor: (1) population estimates are too variable, suggesting instability, and only three of the last 10 mid-winter counts approached 70,000; (2) the species may be susceptible to massive population decline due to habitat loss in the winter quarters; and (3) potent, man-made limiting factors including changes in agricultural policy, hunting and oil exploration, are in operation. Action must be taken to ensure that current pressures on the Red-breasted Goose are monitored and quantified throughout the range-states so that their effects on the species can be adequately assessed and removed where necessary.

An international Red-breasted Goose workshop took place in Strasbourg on 5 December 1994 (WWT/IWRB Threatened Waterfowl Research Group and IWRB Goose Research Group).

PART 1. BACKGROUND INFORMATION

Distribution

* Breeding range

The breeding range of the Red-breasted Goose is restricted to the arctic tundra of the Taimyr, Gydan and Yamal peninsulas (Figure 1). In all, 70% of the breeding population nests in the Taimyr (Kostin 1985), the rest in Gydan and Yamal. For detailed accounts of breeding sites within these areas see Krivenko (1983), Vinokurov (1990) and Kostin and Mooij (in press). The breeding range in the Taimyr area is thought to be expanding (E. Syroechkovski, Jr. pers. comm. 1994). Small numbers may be breeding in the tundra west of the Ural mountains (Vinokurov 1990), but this is not likely to be a significant proportion of the population.

Figure 1. Summer distribution of the Red-breasted Goose *Branta ruficollis* in the Russian tundra (based on Vinokurov 1990, new breeding sites by E. Syroechkovski, Jr., location of reserves from *WWF Arctic Bull.* 3: 17).

Ramsar sites: 1 Gorbita delta, 2 Yenisey inner delta, 3 upper Dvuobye.

* **Staging areas**

Almost all Red-breasted Geese migrate down the eastern side of the Urals, pass through the Turgay lowlands between the southern end of the Urals and the Kazakh uplands, turn south-west over the northern Caspian Sea, and then move on towards the western Black Sea coast (Owen 1980).

Staging areas are thought to be the same for both spring and autumn migration, and the available literature indicates that there appear to be four major ones. From the breeding grounds, the birds migrate south along a corridor only 100–150 km wide (*Red Data Book of the Kazakh SSR*), across the Nadym and Pura basins, to the first staging area at the Ob floodplains on the Arctic Circle (V. Krivenko pers. comm. 1994). The next site is on the middle Ob near Khanty-Mansisk, Russia. A small number have been known to stage in the region between Surgut and the River Vakh. From the middle Ob, the birds move south-west across the south of the west Siberian plain, over the town of Kustanai to the third major staging area on the Tobol-Ishim forest-steppe and the watersheds of the Ubagan, Ulkayak and Irgizin rivers in the Kazakh uplands (Krivenko 1983). Passing over the towns of Orsk and Aktyubinsk, they then move across the north of the Caspian Sea to stage in the Manych valley, Russia. Some may stop off on the Sea of Azov and may remain to winter on the northern Black Sea coast in the Ukraine, but it seems that the next stop is generally the main wintering grounds in Bulgaria and Romania (see Figure 2).

* **Winter quarters**

Prior to 1950, the main wintering areas were the southern coasts of the Caspian Sea, particularly the south-west coast. In 1968, counts indicated that about half the wintering population shifted to the west coast of the Black Sea (Annex 2) which is c.1,800 km west of the Caspian. In the 1970s, very few Red-breasted Geese were found on the traditional sites on the Caspian, presumably because of reduced food availability and hunting pressure (Grimmett and Jones 1989). Scattered records of small flocks further south may indicate that the birds ranged much further before monitoring began. The earliest known records of Red-breasted Geese are from Egyptian friezes c.6,000 years old (Kohl 1958), perhaps suggesting that they were once frequent visitors to that area.

The current wintering areas on the Black Sea coast are the Shabla and Durankulak lakes of Bulgaria, the lagoon/steppe complex of the Danube delta in Romania, and the Dobrodgea plateau which lies between the Danube and the coast and spans the Bulgaria/Romania border (Michev *et al.* 1991, Munteanu *et al.* 1991, P. Iankov *in litt.* 1995). In recent winters, 80–90% of the world population of Red-breasted Geese wintered in Bulgaria (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994). Small flocks winter in the Ukraine and possibly Azerbaijan while others may visit Greece (IWRB 1994, D. Vangeluwe pers. comm. 1994). Occasionally very small numbers reach Hungary, Turkey, Iraq and Iran. The species is accidental in the United Kingdom, Belgium, Netherlands, Norway, Sweden, Denmark, Finland, Germany, France, Poland, Czech Republic, Slovakia, Austria, Italy, Spain, Albania, Serbia, Israel, Cyprus, Egypt and south-east China (Cramp and Simmons 1977).

Figure 2. The main flyway and staging areas of the Red-breasted Goose *Branta ruficollis*.

Population

It has been difficult to monitor changes in Red-breasted Goose numbers as the birds range across a wide wintering area (c.1,200,000 km²) and counts have been infrequent. The maximum population estimates and counts (where available) for each year since 1899 are given in Annex 2. Prior to 1954, records were scarce, but it is thought that numbers were larger than, or similar to, those of today. In 1899 “many tens of thousands of Red-breasted Geese were seen in their wintering sites” (Krivenko 1983). Between 1956 and 1967 numbers were estimated at c.50,000–60,000; the best coverage was achieved in the winters of 1967 and 1968 when a total of 49,000 was counted in the Black and Caspian Sea regions, divided equally between the two. Between 1969 and 1989 count totals did not exceed 30,000, and ornithologists suggested that the population might have crashed due to the birds being forced from their traditional wintering area on the Caspian Sea and/or the effects of DDT on Peregrines *Falco peregrinus* which protect nesting geese from arctic foxes *Alopex lagopus* (see 'Life history', below). Recent counts, which included coverage throughout the Black Sea wintering range, gave population estimates of 70,000–74,000 in three consecutive years. However, the overall count for 1993/94 was only 37,400 (Table 1), in spite of near-optimum count coverage (excluding the Caspian region), illustrating the erratic nature of population estimates.

The 1991–1993 counts indicate, therefore, either that the population doubled in size in just a few years (i.e. from 25,000 in 1989 to 70,000 in 1991) or, more likely, that significant proportions of the population were not recorded in previous years, especially in the late 1980s. Indications from other, well studied, goose populations (Owen and Black 1990) suggest that the former hypothesis is unlikely. It is also possible, therefore, that the apparent decline in the Red-breasted Goose population in the 1970s may have been much less dramatic.

The apparent increase in Red-breasted Goose numbers may be due to improved monitoring, but as information is limited it may also be the result of improved conservation in both the breeding and wintering ranges and/or possibly the recovery of populations of birds of prey. Recent world population estimates are 70,000 to 74,000 (Table 1, Annex 2).

Table 1. Population size of the Red-breasted Goose in Europe, 1992–1994. Figures are numbers of individuals, from mid-winter counts and observations (see Annex 2 for details).

	No. of individuals		
	1992	1993	1994
Bulgaria	42,816	59,206	30,000
Romania	26,913	14,650	4,308
Ukraine	0	0	3,038
Greece	0	0	9
Others	10	0	0
Total	69,739	73,856	37,355

Life history

* **Breeding**

Red-breasted Geese arrive on the breeding grounds in early June, around the time that the snow on the tundra melts. They nest in colonies averaging five to six pairs (Kostin and Mooij in press). Laying begins in the second half of June and the clutch contains 3–10 eggs, most commonly 4–5. Incubation lasts 25 days and the fledging period 5–6 weeks (Owen 1980). Clutch loss is usually less than 15–20% (Borodin 1984). Breeding success fluctuates from year to year and depends mainly on the birds' condition when they arrive on the breeding grounds, as well as on climate, predation and population levels of birds of prey (Kostin and Mooij in press). Severe climatic conditions can inhibit all recruitment. The arctic fox is the main predator, the degree of predation depending largely on the cyclical variation in abundance of the fox's main prey, the lemming, and on the proximity of nests to those of Peregrines, Rough-legged Buzzards *Buteo lagopus* and gulls which are thought to impart protection from the fox. Observations showed a correlation between the presence of nests of these birds and the average number of nests of Red-breasted Geese (Kostin 1985, Kostin and Mooij in press).

* **Moult**

Red-breasted Geese moult on, or near, the breeding grounds (Figure 1). The flightless stage of moult lasts for 15–20 days between mid–July and late August. Non-breeders moult two weeks earlier (Uspenski 1965).

* **Feeding**

During breeding, grass leaves and the shoots of cotton-grass *Eriophorum angustifolium* make up the bulk of the diet (Uspenski 1965). Grass shoots may be supplemented with tubers and rhizomes on steppe habitat during migration (Dementiev and Gladkov 1952). Historically, when the geese wintered on the Caspian Sea coast, they fed on glasswort *Salicornia* from coastal mudflats and steppe pasture/stubble (Cramp and Simmons 1977, Owen 1980), but loss of these natural habitats may have forced the geese onto the agricultural lands of the Black Sea coast. On the main wintering sites in Romania and Bulgaria the geese now feed predominantly on winter wheat, barley, maize, some pasture grasses and spilt grain (Sutherland and Crockford 1993, D. Munteanu *in litt.* 1994). In Bulgaria in March, the geese will feed on grass shoots in ploughed fields (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994). Other plants taken include pondweed *Potamogeton* and seeds of *Galium* and *Bolboschoenus* (Owen 1980).

* **Migration**

The spring migration starts in March. There are three to four main staging areas (see 'Distribution', above, and Figure 2). In early May the birds reach the Kazakh uplands and by early June have reached the breeding grounds. Autumn migration starts in mid–September, birds reaching Kazakhstan by the end of September (Cramp and Simmons 1977, Owen 1980). A few may continue south to the Aral Sea, while the majority travel south-west towards the Caspian. Small flocks may remain to winter on the Caspian Sea coast in Azerbaijan and some individuals continue south to Iran and Iraq. The majority, however, travel on to the western Black Sea coast, arriving in October–November and are usually found with White-fronted Geese *Anser albifrons*. Small numbers may visit Greece from the main winter quarters in Bulgaria and Romania (D. Vangeluwe pers. comm. 1994).

* **Habitat requirements**

Nesting is mostly in tundra and sometimes in open parts of northern shrub tundra, where the species favours high and dry situations on steep river banks, steep rocky slopes, low rocky

craggs or gulleys. Cover is usually thin and includes dwarf birch *Betula*, willow *Salix* or dead grass (Cramp and Simmons 1977). Proximity to the nests of Peregrines, Rough-legged Buzzards or gulls may improve breeding success (see above). The geese usually nest close to adequate water, to provide a refuge for the young (Cramp and Simmons 1977).

There is little information available on the habitat and its use at staging sites, though steppe habitats are apparently used on migration (Cramp and Simmons 1977).

On the western Black Sea coast, the winter feeding habitat comprises agricultural land dominated by cereal crops and grassland (Sutherland and Crockford 1993). The birds periodically fly to coastal lakes to drink. These lakes, situated up to 50 km from the feeding areas, are also safe night-roosts. The proximity of drinking and roosting sites to feeding areas may influence winter distribution (D. Munteanu *in litt.* 1994). In Bulgaria, Red-breasted Geese roost on water; usually in the middle of lakes, but occasionally, or in times of high hunting pressure, on the sea if it is calm. When the lakes freeze (which is rare) they roost on the ice (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994, D. Vangeluwe pers. comm. 1994). Roost sites in Romania are in remote parts of wetlands where the geese utilise shallow water, and muddy and sandy beaches with low aquatic vegetation (D. Munteanu *in litt.* 1994). On the Evros delta in Greece, the Red-breasted Goose feeds, and possibly roosts, on a specific area of natural vegetation (G. Handrinos *in litt.* 1994).

Threats and limiting factors

*** Land-use changes**

Due to recent political changes, there are now proposals for abandonment, division and privatisation of land in Romania and Bulgaria (Crockford 1991, Black and Madsen 1993). This may lead to changes from the cereals favoured by the geese to cash crops such as vines and vegetables, which Red-breasted Geese do not utilise. Land-use change on the Caspian Sea coasts was the likely cause of the massive re-distribution to the Black Sea coast and apparent decline in numbers during that time. Land-use changes in Bulgaria and Romania may result in a similar loss of wintering habitat, thereby causing another re-distribution event which may in turn lead to further population decline.

Although preliminary enquiries suggest that only one third of arable land in South Dobrogea may be privatised (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994), the threat lies in whether privatisation will lead to: (1) unforeseen land-use change, such as large-scale conversion to cash crops, development or increased hunting; and/or (2) intensification of existing arable land, which in turn may lead to conflict between geese and landowners as happens in western Europe (J. Mooij pers. comm. 1994).

Importance: high

*** Hunting and disturbance from other human activities**

The Red-breasted Goose is protected throughout its range except in Romania. Although Romanian legislation prohibited the hunting of the species during the 1993/94 season (D. Munteanu *in litt.* 1993), there has so far been no similar provision for 1994/95 onwards. The number of geese shot (of any species) is not monitored in any of the range-states. This, together with the lack of regular productivity estimates (proportion of young birds in flocks,

brood sizes, population estimates), makes it difficult to assess the impact that hunting may have.

In the highly populated area of the Yenisey inner delta (71°N 82°E) south of the Gydan and Taimyr peninsulas, the Red-breasted Goose is the most abundant goose species and is consequently hunted (E. Syroechkovski, Jr. pers. comm. 1994).

Disturbance caused by the hunting of closely associated species, particularly the White-fronted Goose, may influence the foraging performance, distribution and reproductive success of the Red-breasted Goose, as is evident in other goose species (Madsen 1995). On the Black Sea coast, shooting is concentrated near the roost sites (coastal lakes) for about one hour at dawn and one hour at dusk, although shooting on inland feeding areas during the day also occurs. As many as 300–500 shots per hour have been counted as the birds arrive and depart the roost at Lake Shabla, Bulgaria (T. Michev pers. comm. 1994). Privatisation of land around Lake Shabla has altered the boundaries of the government residence situated there, and as a result hunters now have access to areas much closer to the roost sites (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994).

Visiting hunters from countries such as Italy, Spain and France are becoming an increasing problem in Bulgaria and Romania. Such tourist hunters do not respect quotas, hunt at night and hunt on every day of the week (local people hunt only on three days of the week) thus extending the time that the geese are disturbed and shot. Tourist hunters also make little effort to distinguish between the White-fronted Goose and the protected Red-breasted Goose (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994).

In Romania, wintering geese are intentionally and illegally poisoned, and the carcasses are then sold at markets as food (D. Munteanu *in litt.* 1994).

In Russia, Red-breasted Geese are known to nest on river banks and some of the best fishing areas are also along these rivers. Consequently, disturbance from boat traffic, fishermen and their dogs is perhaps becoming an increasing problem (V. Flint pers. comm. 1994). Human depopulation of the northern areas means, however, that access is more difficult/expensive, thereby reducing the number of people visiting these regions (E. Syroechkovski, Jr. pers. comm. 1994).

Importance: high

*** Loss of wetland habitats in non-breeding areas**

In addition to land-use changes in the winter quarters (see above), further sources of habitat loss are given here.

In Romania, the Dobrodgea lagoons are being artificially separated from the Black Sea. The resulting decrease of salinity may increase freezing, thereby reducing available roosting and drinking areas, which in turn may push geese further south to less suitable sites (Crockford 1991).

In Greece, degradation of habitat through drainage and development has left little habitat for wintering geese (Handrinos 1991). In Macedonia alone, 40% of the area of inland lakes has been drained and 95% of the marshland has been reclaimed for agriculture. These changes are

affecting the ground water balance and promoting salinisation of the remaining area, thereby furthering habitat loss (Handrinos 1991).

Importance: medium

* **Climate change**

On the Russian tundra, severe weather can prevent 80% of the potential breeding population from nesting (Kostin 1985) and, in some years, may result in no recruitment of offspring whatsoever. The percentage of geese which breed and the number of nests per colony seem to be determined by conditions at the beginning of June, namely temperature, precipitation and snow cover of the cliffs (Kostin and Mooij in press).

Deteriorating weather and consequent reduction of food availability on migratory routes and at staging areas may lead to increased mortality in autumn/winter (Krivenko 1983) and reduced breeding success in spring/summer (Kostin and Mooij in press).

In the winter quarters, severe weather reduces growth of winter wheat, an important part of the Red-breasted Goose diet (Borodin 1984). Drought conditions in autumn can cause reduced growth of cereal crops resulting in reduced quantity and quality of goose food during the winter (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994, D. Munteanu pers. comm. 1994).

If climate change were to lead to severe weather on the breeding or wintering grounds, in several successive years, it could cause a significant decline in the population.

Importance: unknown, probably medium

* **Predation**

Reproductive success of the Red-breasted Goose is partly influenced by predation by the arctic fox. The degree of predation is dependent on population levels of birds of prey (see 'Life history', above). During the 1950s, numbers of Peregrines declined as a result of organochlorine pesticides (DDT) and disturbance (Cramp and Simmons 1980). The consequent loss of protection for Red-breasted Geese during the nesting period could have resulted in a decline in breeding success either through increased predation or lack of suitable nesting sites (Isakov 1972, Kostin 1985). Red-breasted Goose numbers apparently increased during the time that populations of these birds of prey were recovering.

Importance: unknown

* **Industrial development**

Development of oil and gas depots, and the consequent disturbance from land and air, may have forced the Red-breasted Goose to abandon many breeding sites in Gydan and Yamal (Vinokurov 1990).

Importance: unknown

* **Rodenticides**

In Bulgaria, use of rodenticide has in the past (especially the winter of 1988/89) caused the deaths of many wintering geese, including Red-breasted Geese (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994).

Importance: unknown

Conservation status and recent conservation measures

Only those range-states of past or present international importance for the Red-breasted Goose are listed below. See Annex 2 for detailed counts and estimates for each country.

*** Azerbaijan**

The current status of the species is unclear. While some suggest that c.500 individuals (0.6% of the population) regularly winter there (D. Vangeluwe pers. comm. 1994), others say that the species probably no longer occurs in the area and has not done so in any significant numbers for the last 20–30 years (see Annex 2) (M. Patrikeev pers. comm. 1995).

Until the 1970s, the coasts of the Caspian Sea were the main wintering site for the Red-breasted Goose. In 1956, a maximum of 60,000 were thought to use this site (100% of the then-known population) (Cramp and Simmons 1977). Drainage for market gardening and a change from cereal and rice crops to cotton and vines (Grimmett and Jones 1989) reduced the area of suitable habitat and may have forced the geese to abandon this area. In 1989, 500 birds were reported in the south-west of the Caspian (Vinokurov 1990), but this observation was never confirmed and it is unlikely that the habitat, which is unsuitable, could support these geese (M. Patrikeev pers. comm. 1995).

Prior to 1990, the species had threatened status and was protected by law. The Kisil-Agach State Reserve gave protection to the species, and hunting and trapping were prohibited. Annual waterfowl counts were carried out by Russian ornithologists. However after 1990, when Azerbaijan declared its independence from the U.S.S.R., the Russian ornithologists left and it is likely that all conservation laws were annulled (M. Patrikeev *in litt.* 1994).

*** Bulgaria**

The species is listed as Endangered in the Red Data Book of Bulgaria (Botev and Peshev 1985), and protected under the Law for the Conservation of Nature (1967) whereby a fine soon to be increased from US\$4.60 to US\$460, is imposed for damage to a protected species (Michev *et al.* 1991, B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994).

The hunting season is restricted from 1 September to 31 January, with hunting permitted on Saturday, Sunday and Wednesday, though few local people hunt on Wednesdays (Wilson and Moser 1994, B. Ivanov *in litt.* 1995).

As much as 90% of the world population of Red-breasted Geese winters on Shabla and Durankulak lakes (T. Michev unpublished results in Wilson and Moser 1994). Lake Durankulak is a Ramsar site and Lake Shabla is protected by Bulgarian law (B. Ivanov *in litt.* 1995). There used to be a 500 m zone around Lake Shabla in which shooting was prohibited (Ivanov and Pomakov 1981), but privatisation of the land has changed the borders of the protected zone (B. Ivanov, P. Iankov and G. Dandliker *in litt.* 1994, D. Vangeluwe pers. comm. 1994). In 1995 Shabla Lake was designated as protected (510.8 ha through Act 31, 24 January 1995). The biggest part of the protected area is now fenced. Up to 60,000 Red-breasted Geese have been recorded on Lake Shabla in late January during 1991–1994 (77% of the population) (B. Ivanov pers. comm. 1994). The Committee on Forests is responsible for enforcing hunting laws, but violations are increasing as a result of poor enforcement, and shooting regularly occurs from within the 500 m zone and even from the lake itself (Black and

Madsen 1993, Wilson and Moser 1994, D. Vangeluwe pers. comm. 1994, P. Iankov *in litt.* 1995). Legislation to control hunting by tourists is in preparation.

Special programmes are underway to protect the Red-breasted Goose and eight other species in Bulgaria, supported by BirdLife International and IWRB (Wilson and Moser 1994). A joint project of the Ministry of the Environment and the Swiss Association for the Protection of Birds (SVS, the BirdLife Partner organisation in Switzerland) on the coastal wetlands of the Black Sea includes the preparation and implementation of a management plan for Lakes Shabla and Durankulak. The Red-breasted Goose will be the main focus of these management plans. The project started in 1994 and will last three years (funded by the Swiss government). Since January 1995, a privately run conservation organisation, Le Balkan, has been renting 197 ha of land for wintering geese.

Extensive monitoring of the population, coordinated with counts in Romania, was initiated in winter 1990/91 (D. Vangeluwe pers. comm. 1994), and in January 1993 ornithologists from the U.K. and Denmark joined Romanian and Bulgarian teams to conduct coordinated surveys and for discussions on Red-breasted Goose conservation (Black and Madsen 1993). Another survey was carried out in 1994 by a team from the RSPB.

Educational materials such as posters depicting the Red-breasted Goose have been prepared.

* **Greece**

Legislation to protect the Red-breasted Goose was instigated in 1985. The species is listed as Endangered in the Greek Red Data Book (Handrinos 1992). Since 1993, hunting of all goose species has been banned.

The Evros delta is the most important site in Greece for wintering Red-breasted Geese and has Ramsar and EU Special Protection Area status. Though degradation of the habitat has resulted in fewer birds wintering there, small flocks of c.50 birds visit regularly. Regular counts of wintering geese are conducted, and numbers since 1963 have typically ranged from 0 to 116 (0-0.2%). In relatively cold periods larger numbers migrate from Romania/Bulgaria to Greece (D. Vangeluwe pers. comm. 1994). A maximum of 2,000 Red-breasted Geese was recorded in the severe winter of 1984/85 (2.7% of the population) (Handrinos 1991). Hunting is permitted in a small part of the Evros delta, away from the areas usually used by Red-breasted Geese.

Efforts have been made to regulate the influx of salt water into lagoons on the Evros delta by constructing a temporary earth dam in the river. A full management and delineation study for the Evros delta has now been completed (G. Handrinos *in litt.* 1994).

* **Hungary**

Up to 16 birds have been reported annually since 1984 in Hortobagy and Kiskunsag national parks.

* **Kazakhstan**

The Red-breasted Goose is protected and included in the Red Data Book (1991). There is reported to be a major staging area on the Tobol-Ishim forest-steppe and the watersheds of the Ubagan, Ulkayak and Irgizin rivers in the Kazakh uplands (52.5°N 65°E), but its current

importance is not known and there are no resources for carrying out basic survey work (Zhatkanbayev pers. comm. 1995). A maximum of 3,000 birds was recorded during spring in the period 1972–1977 (8.6% of the 1972–1977 population) and a maximum of 15,000 in autumn (42.5% of the 1977 population) (Krivenko 1983).

* **Romania**

For the winter of 1993/94 Red-breasted Geese were completely protected by decision No. 501/14 July 1993 by the Ministry of Waters, Forests and Environment Protection (D. Munteanu *in litt.* 1993), but this law was not automatically renewed for 1994/95, so currently the geese are not protected. Conservationists await the Ministry's decision on a new proposal put forward for future years (D. Munteanu pers. comm. 1994). The hunting season, formerly 15 August to 31 March, has been shortened to cover 10 September to 1 March (D. Munteanu *in litt.* 1993).

The recently adopted law for the Danube Delta Biosphere Reserve (Ramsar site) will give strict control to all forms of wildlife utilisation by a system of permits, administered and enforced by the reserve administration (Wilson and Moser 1994).

The Danube delta, the Razelm-Sinoie complex and the Dobrodgea plateau are the most important sites in Romania for the Red-breasted Goose (Madsen 1994). On the Dobrodgea plateau, the main feeding site, the geese are not protected; a maximum of 33,830 was recorded feeding there in the winter of 1990/91 (45.7% of the population) (Sutherland and Crockford 1993).

Extensive monitoring of the population, coordinated with counts in Bulgaria, was initiated in the winter of 1990/91 (D. Vangeluwe pers. comm. 1994), and in January 1993 ornithologists from the U.K. and Denmark joined Romanian and Bulgarian teams to conduct coordinated surveys and for discussions on Red-breasted Goose conservation (Black and Madsen 1993).

Educational materials such as posters depicting the Red-breasted Goose have been prepared.

* **Russia**

The Red-breasted Goose is protected in Russia. It is listed as Rare in the Red Data Book of the U.S.S.R. (Borodin 1984). In 1970 an export ban was declared.

On 13 September 1994, Russia ratified the Ramsar Convention. The Gorbitya and Yenisey inner deltas were designated Ramsar sites (Figure 1). Also included were (1) the Ob floodplains (upper Dvuybye), just north of Khanty-Mansiysk (62.5°N 67°E), where a maximum of 10,000 Red-breasted Geese has been recorded (13.5% of the 1993 population), and (2) Lake Manych-Gudilo (47°N 42°E) where 25,000 were recorded in autumn 1976 (62.5% of the 1976 population) (Krivenko 1983).

Up to 70% of the breeding population nests on the Taimyr peninsula (Kostin 1985). Large areas of this region have been given reserve status, but only c.20% of the known breeding sites lie within these reserves (Figure 1). The percentage of breeding pairs which this represents is unknown. In 1978 the largely unprotected Pura-Pysina watershed in the Taimyr held the highest concentration of breeding birds (Kostin 1985). Ramsar status was proposed for part of this area, but was not ratified.

Since the changes in the communist administration, reserves and the enforcement of hunting legislation are now controlled by regional authorities. Consequently, there is less communication with a central administration and less monitoring and regulation of activities in remote areas (I. Kostin pers. comm. 1994).

An extensive study of the Red-breasted Goose's breeding biology and the implications for its conservation was carried out during 1977–1983 (Kostin 1985). Recent analyses of some aspects of the breeding biology and breeding success have been made (Kostin and Mooij in press).

Over the past 10 years, surveys have discovered several new breeding sites beyond the known range (E. Syroechkovski, Jr. pers. comm. 1994) (Figure 1).

In November 1994 the Working Group on Geese of Eastern Europe and Northern Asia was established with the aim of supporting and developing studies on Red-breasted and Lesser White-fronted Geese in Russia and to plan conservation measures to protect the most important areas for these species. An international goose research project, based in the Russian arctic and including studies on the Red-breasted Goose, is planned for 1995. Participants include the Russian Academy of Sciences, Wildfowl and Wetlands Trust, Dutch Institute for Forestry and Nature Research, and Danish National Environmental Research Institute (EU funded).

Educational materials such as posters depicting the Red-breasted Goose have been prepared.

*** Ukraine**

The Red-breasted Goose is protected. The species is thought to use the Sea of Azov as a staging area, and flocks of 2,000–3,000 winter on the Ukrainian coast of the Black Sea. The most important sites are the Yagorlytski and Tendra Bays (Madsen 1994). During mild periods birds will migrate from Romania/Bulgaria to the Ukraine (D. Vangeluwe pers. comm. 1994). Regular counts of wintering geese are conducted, and a maximum of 3,038 Red-breasted Geese was recorded in the winter of 1993/94 (4.1% of the population) (IWRB 1994).

PART 2. AIMS AND OBJECTIVES

AIMS

In the short term, to maintain the Red-breasted Goose population at no less than 70,000 individuals.

OBJECTIVES

1. POLICY AND LEGISLATIVE

1.1. To protect wintering Red-breasted Geese from adverse changes in agricultural policy

The effects of agricultural policies in Bulgaria and Romania are crucial to wintering Red-breasted Geese. Under the former Soviet administration large “bread basket” areas of winter-wheat were farmed, and it is these which are now supporting thousands of wintering Red-breasted Geese. If current policies on privatisation allow large-scale intensification and/or change to cash crops, the geese could be displaced to other, less favourable habitats and decline as a result. New agricultural policies should be sympathetic to the species.

The Red-breasted Goose is considered a priority species in the European agricultural and inland wetlands conservation strategies currently being prepared by BirdLife International (Tucker *et al.* in press).

Priority: essential

Time-scale: short

1.2. To ensure that all range states give the maximum appropriate legal protection to the Red-breasted Goose and its habitat

Legislation banning all hunting of the species should be promoted in Romania and maintained in all other range states. Regulations to control tourist hunters should be promoted as necessary. New legislation to protect sites used by the species should be encouraged where required. Penalties should be sufficiently high to be an effective deterrent against offences.

Priority: essential

Time-scale: short

1.2.1. Synchronise the waterfowl hunting seasons between neighbouring range-states

Reducing the hunting season to a minimum period in all states (end of January) would help to lower hunting pressure on Red-breasted Geese and reduce conflict between hunters and the authorities.

Priority: medium

Time-scale: medium

1.3. To involve international conventions in ensuring international cooperation over the conservation of the Red-breasted Goose

All range-states should be encouraged to participate in joint international actions under the auspices of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) under the Bonn Convention.

Priority: high

Time-scale: short

2. SPECIES AND HABITAT PROTECTION

2.1. To prevent shooting and other destruction or disturbance of Red-breasted Geese

Full enforcement of legislation protecting the Red-breasted Goose should be promoted. To minimise direct mortality from hunting and other activities (including poisoning), complete wildfowl shooting bans could be introduced at all key sites during the times when the geese are present. Where possible, non-hunting buffer zones should be created around these sites.

Adequate wardening should be promoted at all vulnerable key wintering sites to protect Red-breasted Geese from threats such as illegal shooting, the use of poison and unnecessary disturbance.

Prosecution of any offenders should be sought with penalties which are sufficiently high to deter future offences.

Priority: essential

Time-scale: ongoing

2.2. To ensure adequate protection for key Red-breasted Goose sites

2.2.1. Ensure optimum statutory protection for important sites

Promote the designation as protected areas of any sites identified as nationally or internationally important for the species, especially key roost sites.

Priority: high

Time-scale: short

2.2.2. Prevent further loss of Red-breasted Goose habitat both in the breeding and wintering grounds

Promote full environmental impact assessments for development proposals which may have a negative impact on the species, including wetland loss in wintering areas and habitat fragmentation and degradation by mining and exploration for oil and gas. These developments should be monitored and diversion to less important areas should be encouraged.

Priority: high

Time-scale: ongoing

2.3. To prevent further deaths from rodenticides

If the use of rodenticides in the winter quarters is found to be a problem (see 3.6.) measures to control their use should be put into place.

Priority: medium

Time-scale: medium

2.4. Where applicable, to enhance staging and wintering habitats by “farming” the land for the geese in areas currently used by the species

If the results of the research on the feeding and distribution studies listed below (3.2., 3.2.1., 3.2.2., 3.3.1. and especially 3.3.2.) show it to be necessary, feeding habitat management strategies based on the results of this research should be considered. Habitat enhancement can increase the chance of survival and the reproductive success of the birds. These measures should be initiated in key sites and if appropriate extended to areas regularly, but less commonly used for wintering.

Priority: unknown

Time-scale: medium

2.5. To promote international cooperation for conservation of the Red-breasted Goose

A multilateral agreement for the conservation of Red-breasted Geese should be pursued with the aim of finalising detailed conservation planning with member states in the species' flyway.

The elaboration of such an agreement as well as the coordination of research on the species could be conducted within the framework of a Red-breasted Goose working group which would include representatives of each of the main range states.

Priority: high

Time-scale: short/medium

3. MONITORING AND RESEARCH

3.1. To monitor annually population size and structure

Coordinated winter counts in Bulgaria, Romania, Ukraine, Greece and Azerbaijan, similar to the one conducted in 1992/93 (Black and Madsen 1993), would give an indication of the stability of the population. The frequency of these counts should be increased to up to twice per month in the peak season. Age ratio and brood size should be included in the counts to give an indication of recruitment, survival rates and age structure (Black and Madsen 1993).

Distribution and numbers of breeding Red-breasted Geese should also be monitored.

Priority: essential

Time-scale: ongoing

3.2. To assess the current status of areas reported to be important for Red-breasted Geese but for which there is little or no information

3.2.1. Current status of spring and autumn staging areas

Little is known about the staging areas. The most important staging areas should be identified; distribution of geese, habitat use and threats in these areas should be determined. Marking birds with rings, collars or satellite transmitters may help to determine migration routes and staging areas.

Priority: essential

Time-scale: short

3.2.2. Current status of traditional wintering sites

It is not known whether some traditional wintering sites are still being utilised by the species. Distribution and numbers of geese and habitat use in these areas should be determined.

Priority: high

Time-scale: short

3.2.3. Current status of traditional breeding sites

Periodically update information on the breeding areas.

Priority: medium

Time-scale: medium

3.3. To conduct research relevant to the conservation of the species

3.3.1. The relationship between spring fattening and breeding success

Studies on this matter are required to determine from which habitats the geese are obtaining adequate resources for nesting.

Priority: medium

Time-scale: medium

3.3.2. Feeding and behavioural ecology during migration and in winter

These studies are necessary to ensure that any habitat enhancement projects optimise survival and reproductive rates.

Priority: medium

Time-scale: medium

3.3.3. Feeding ecology of breeding females

These studies are required to determine constraints on nesting success imposed by the phenology, availability and value of the food resources and the potential dependence on protection from birds of prey, especially Peregrines.

Priority: medium

Time-scale: medium

3.4. To monitor changes in land use in the winter quarters

Following the changes in agricultural policies and practices, the Red-breasted Goose's habitat in Bulgaria and Romania should be monitored and, if changes are seen to be affecting the suitability of the land for the geese, actions to prevent displacement of the species should be taken (see 1.1.).

Priority: essential

Time-scale: ongoing

3.5. To monitor and assess the impact of mortality and disturbance caused by hunting, including the hunting of White-fronted Geese

Particular attention should be focused on assessing the impact of tourist-hunting on the Red-breasted Goose so as to make recommendations on any necessary regulations to control their activities (see 1.2. and 2.1.).

Priority: high

Time-scale: short

3.6. To monitor the possible impacts on the Red-breasted Goose of the use of rodenticides

This research is needed to determine if actions are needed (see 2.3.).

Priority: medium

Time-scale: medium

4. PUBLIC AWARENESS AND TRAINING

4.1. To promote awareness of the conservation needs of the species among people using Red-breasted Goose habitat

4.1.1. Increase public awareness of the importance of the species

Relevant government departments and non-government organisations should be encouraged to raise the profile of the Red-breasted Goose in their range-states, particularly where illegal shooting has been reported.

Priority: high

Time-scale: ongoing

4.1.2. Initiate education/awareness programmes

Especially for hunters, particularly tourist hunters, fishermen and farmers in each range-state, designed to inform them of the status of the species and the need for protection.

Priority: high

Time-scale: ongoing

4.2. To promote the conservation of areas used by the Red-breasted Goose and other species of threatened waterbird

The Red-breasted Goose could be used as a flagship species to promote the conservation of habitat which is valuable to several threatened species including Dalmatian Pelican *Pelecanus crispus*, Pygmy Cormorant *Phalacrocorax pygmeus*, Lesser White-fronted Goose *Anser erythropus*, Marbled Teal *Marmaronetta angustirostris*, Ferruginous Duck *Aythya nyroca* and White-headed Duck *Oxyura leucocephala*.

Priority: high

Time-scale: ongoing

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ANNEX 1. RECOMMENDED CONSERVATION ACTIONS BY COUNTRY

*** Azerbaijan**

- 2.5./3.1. Efforts should be made to find a Red-breasted Goose Working Group member for Azerbaijan who will coordinate regular winter counts. It has been suggested that a Turkish ornithologist could monitor Azerbaijan as an interim solution until a representative can be found.
- 3.2.2. The current status of Azerbaijan as a wintering site should be clarified as soon as possible.

*** Bulgaria**

- 1.1. Consideration should be given to the conservation of the Red-breasted Goose when new agricultural legislation and policies are drawn up.
- 1.2. The Ministry of the Environment and Committee of Forestry should encourage the Parliament to adopt the newly proposed legislation for the control of tourist hunters.
- 2.1. The no-hunting buffer zones around Lakes Shabla and Durankulak should be redefined and perhaps enlarged to 500 m. Key sites should be actively guarded during critical periods.
- 2.1./3.5. Disturbance and mortality caused by hunting should be monitored and regulated.
- 2.1. Tourist hunters should be restricted to areas where they will not disturb Red-breasted Geese or where disturbance is not a problem.
- 2.2.1./2.4. Promote the designation of Lake Shabla as a Ramsar site and Reserve status and the feasibility of establishing an adjacent refuge that is “farmed” for the geese should be assessed.
- 2.5. An ornithologist from a Bulgarian agency (possibly BSPB) should be formally selected to represent Bulgaria in a multinational Red-breasted Goose Working Group.
- 2.3./3.6. Encourage the stricter control of rodenticide use and promote a complete ban in core feeding areas for Red-breasted Geese, where alternative methods should be implemented and monitored.
- 3.1. Coordinated winter counts between Bulgaria, Romania, Ukraine, Greece and Azerbaijan should be conducted once to twice monthly on a formal and annual basis.
- 3.3.1. Ecological and behavioural studies of Red-breasted Geese in the winter quarters should be initiated.

- 4.1. Public awareness of the importance of the species and the threats it faces should be raised.

*** Greece**

- 1.2.1. It is recommended that the end of the hunting season should be brought forward to the end of January.
- 2.1./3.5. Promote a review of hunting regulations and activities. Where necessary, disturbance and mortality caused by hunting should be monitored and regulated.
- 2.5. An ornithologist from a Greek agency (possibly the Ministry of Agriculture) should be formally selected to represent Greece in a multinational Red-breasted Goose Working Group.
- 2.2.2. The use of EU Structural Funds should be evaluated to prevent further habitat loss in wetlands used by the Red-breasted Goose.
- 2.4. Promote further protection and enhancement of habitats used by wintering Red-breasted Geese, particularly in the Evros delta, to enable them to support larger numbers of geese and in order to provide suitable alternative wintering sites.
- 3.1. More frequent winter counts, coordinated with those in Bulgaria, Romania, Ukraine and Azerbaijan, would be valuable for determining movements of Red-breasted Geese.

*** Kazakhstan**

- 2.5. An ornithologist from a Kazakhstan agency (possibly the Institute of Zoology) should be formally selected to represent Kazakhstan in a multinational Red-breasted Goose Working Group.
- 3.1. Regular counts of goose numbers utilising the staging areas should be initiated.
- 3.2.1. The current importance of Kazakhstan staging areas should be determined as soon as possible.
- 3.3.1. Studies on goose ecology and behaviour in the staging areas should be initiated.

*** Romania**

- 1.1. Consideration should be given to the conservation of the Red-breasted Goose when new agricultural policies are drawn up.
- 1.2. Promote permanent protected status throughout Romania, including a total ban on shooting, for the Red-breasted Goose.
- 1.2. Encourage an annual hunting close season policy.

- 1.2.1. It is recommended that the hunting season should close at the end of January.
- 2.1. Shooting of Red-breasted Geese should be prevented.
- 2.1. The problems of mortality and disturbance caused by tourist hunters should be addressed.
- 2.1. Deliberate poisoning of feeding geese must be prevented.
- 2.1./3.5. Disturbance caused by the hunting of other goose species should be assessed and regulated where necessary.
- 2.2.1. Promote protected status for areas of the Dobrodegea plateau used by the geese.
- 2.2.2. The rate and effects of isolation of the Dobrodegea lagoons from the sea should be assessed and, where appropriate, counter-measures taken.
- 2.4. Some areas of the Dobrodegea plateau could be farmed for the geese.
- 2.5. An ornithologist from a Romanian agency (possibly ROS) should be formally selected to represent Romania in a multinational Red-breasted Goose Working Group.
- 3.1. Coordinated winter counts between Romania, Bulgaria, Ukraine, Greece and Azerbaijan should be conducted once to twice monthly on a formal and annual basis.
- 3.3.1. Ecological and behavioural studies of Red-breasted Geese in the winter quarters should be initiated.
- 4.1. Public awareness of the importance of the species and the threats it faces should be raised.

*** Russia**

- 1.2./2.1./
3.5. Promote a review of hunting regulations and activities. Where necessary, disturbance and mortality caused by hunting should be monitored and regulated.
- 2.2.1. Encouraged the extension of the existing Taimyr reserves to include the most important Red-breasted Goose nesting sites.
- 2.2.2. Efforts should be made to limit disturbance caused by oil/gas in the breeding range.
- 2.4. Staging areas on the Ob river and in the Manych valley should be assessed and where necessary, protected and enhanced.

- 2.5. An ornithologist from a Russian agency (possibly CSRLGMNR) should be formally selected to represent Russia in a multinational Red-breasted Goose Working Group.
- 2.5. Encourage improved communications with the more remote regional authorities regarding conservation matters.
- 3.2.1. The current importance of staging areas in Russia should be assessed.
- 3.2.3. The distribution of breeding colonies should be monitored, particularly in the relatively unknown western part of the breeding range (E. Syroechkovski, Jr. pers. comm. 1995).
- 3.3.3. Breeding ecology studies should be initiated to determine the constraints on breeding success.
- 4.1. Public awareness of the importance of the species and the threats it faces should be raised.

*** Turkey**

- 1.2.1. Promote the closing of the hunting season at the end of January.

*** Ukraine**

- 2.1./3.5. Encourage a review of hunting regulations and activities. Where necessary, disturbance and mortality caused by hunting should be monitored and regulated.
- 2.5. An ornithologist from a Ukrainian agency (possibly Shevchenko University) should be formally selected to represent the Ukraine in a multinational Red-breasted Goose Working Group.
- 3.1. Coordinated winter counts between the Ukraine, Romania, Bulgaria, Greece and Azerbaijan should be conducted once to twice monthly on a formal and annual basis.
- 3.2.1. Surveys of location, goose numbers and habitat use should be made on staging areas.
- 3.3.1. Ecological and behavioural studies of Red-breasted Geese at the staging sites should be initiated.

ANNEX 2. Maximum counts or rough estimates of numbers of Red-breasted Goose *Branta ruficollis*, 1899–1994 (where data are available).

For winter counts, data are given for January or February of that year. * on migration, + breeding.

Year	Romania	Bulgaria	Caspian Sea	Greece	Turkey	Iran	Hungary	Ukraine	Russia
1899			tens of thousands ²⁴						
1930	small flocks ⁵⁰	solitary birds and small flocks ⁵¹							
1936	14 ²								
1939		15–20 ¹¹							
–1950		"rare" ¹¹							
1954				300 ¹⁶					
1955									
1956									
1957									
1958									
1959									
1960									10,000
1961									"
1962									"
1963				40 ¹⁷					"
1964				45 ¹⁷					"
1965									"
1966									"
1967	25,000 ³								"
1968	25,000 ²⁷		24,000 ²⁴	12 ¹⁷					"
1969	25,000 ²²			54 ¹⁷					"
1970	4,080 ⁴	1,000 ¹¹	25,000 ²⁴	12 ¹⁷		16 ³⁵			
1971	9,300 ⁵			200 ²⁹					
1972	6,000 ⁵			4 ¹²			7 ¹³		
1973							14 ¹³		7,500p
1974				7 ¹⁷			41 ¹³	40,000 ^{53/*}	
1975	6,000 ⁶						10 ¹³	"	15,000
1976	5,500 ⁶	1,500 ¹²	20,000 ^{50/*}	2 ¹⁷				"	25,000
1977	1,000 ⁷	1,274 ²⁶					1 ¹³	"	

Year	Romania	Bulgaria	Caspian Sea	Greece	Turkey	Iran	Hungary	Ukraine	Russia
1978	4,250 ⁸	1,580 ¹¹					86 ¹⁴	"	3,250 ^p
1979	200 ⁵⁰	15,071 ²⁶		<50 ²⁹			43 ¹³	"	27,000
1980		16,566 ²⁶					60 ¹³	"	
1981		2,306 ²⁶	<10 ³⁰					"	1,500 ²
1982		12,243 ¹⁰						"	
1983	6,000 ²⁸	9,948 ¹⁰						"	
1984	"	6,890 ¹⁰					47 ¹⁵	"	
1985	"	14,047 ¹⁰		2000 ¹⁷					
1986	"								
1987	"	13,800 ¹⁰							
1988	2,400 ⁹	3,093 ¹⁰							
1989	11,630 ⁹	12,548 ¹⁰	500 ³²	116 ³⁵					
1990	4,310 ¹⁰							86 ³⁵	30,000
1991	36,335 ¹							717 ³⁵	
1992	26,913 ¹⁸	42,816 ¹⁸			9 ³⁵		1 ³⁵		
1993	14,650 ³⁴	59,206 ^{35,34}							
1994	4,308 ³⁵	30,000 ³⁷		9 ³⁸				3038 ³⁵	

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