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Status of the Eastern Imperial Eagle *Aquila heliaca* in Bulgaria between 1994 and 2002

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ABSTRACT

In Bulgaria between the years 1994 to 2002, research, monitoring and conservation activities on the Eastern Imperial Eagle significantly increased. The total Bulgarian population is estimated to be between 20 to 25 pairs. Fifteen nest sites were discovered. Most of the areas important for breeding are located along the border with Turkey in the Sakar Mountains (7 nests) and Strandja mountains -Dervent Heights (5 nests). The majority of the territories (86%) are located in areas of elevation between 150 and 400m. Seventy-six percent of the nests discovered were in poplar trees. During the nine years of study, almost 65% of the breeding attempts surveyed were successful. The mean breeding success was one young per occupied nest and 1.54 chicks per successful nest. However, during the years 1998-2000, which coincided with an increase in the number of monitored nests, the breeding success was between 0.83 and 0.91 fledglings per occupied nest. The adult birds were mainly sedentary, spending the winter in the breeding territories. Three wintering and temporary settlement areas important for immature birds were identified. The main threats to Imperial Eagles in Bulgaria are: disturbance, cutting of poplar trees and abandonment of pastures

INTRODUCTION

At the end of the 19th century, Imperial Eagles *Aquila heliaca* were widespread throughout Bulgaria. Leverkuhn (after Boev 1978) reported 1,824 nests. Later, the population suffered a rapid decline. Patev (1950) notes that the Imperial Eagle is "one of our rare birds"; Michev & Petrov (1979) reported, for

the period 1970-1978, three cases of confirmed, five probable and 11 possible breeding pairs in Bulgaria. For the period 1980-1993 the breeding population was estimated at 15 to 20 pairs (Petrov *et al.* 1996). According to the International Action Plan for the conservation of the Imperial Eagle (Heredia *et al.* 1996) the breeding population in the country numbers 20 to 25 pairs. This paper is based on the latest available data.

METHODS

During the period 1993-2002 Imperial Eagle research and conservation activities increased significantly due to the involvement of several Bulgarian NGOs and the Ministry of Environment. In 1998-1999 the Ministry of Environment and Water supported a project with the main objective of discovering unknown nests and territories. One hundred and one 10-km UTM squares where old data recorded the presence of the species were searched. The survey was carried out by the Bulgarian Society for the Protection of Birds/BirdLife Bulgaria (BSPB/BirdLife Bulgaria), Green Balkans, Wilderness Fund, Bulgarian Ringing Centre and Sofia University (Imperial Eagle project report, 2000). The research was extended beyond 1999 by BSPB/ BirdLife Bulgaria, Green Balkans and Birds of Prey Protection Society. Seven new nests were discovered. During the breeding season, monitoring of known nests was carried out by members of BSPB/BirdLife Bulgaria and Green Balkans. Volunteers guarded three nests in 2001 and five in 2002. BSPB carried out a distribution survey during the winter of 2001-2002, visiting known breeding territories and other areas where the species occurred in the past.

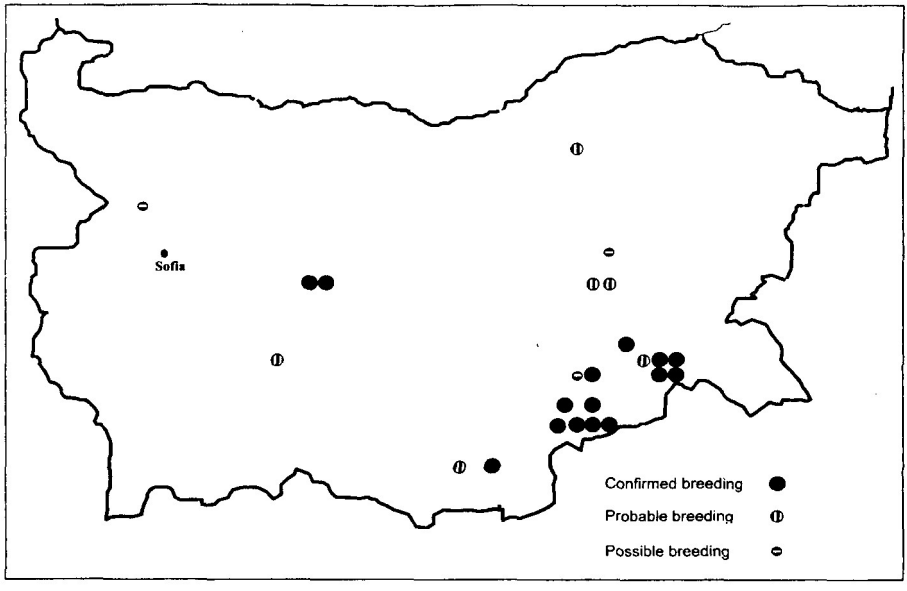
RESULTS

Breeding distribution and population

The contemporary breeding distribution of the Imperial Eagle in Bulgaria is presented in Figure 1. The most important area is the Sakar Mountains where seven nests are known. The second most important area is the neighbouring region of Strandja-Dervent Heights, where five confirmed breeding pairs were recorded. There is the possibility of an additional breeding pair in this area. These regions' habitats are very similar and could be considered as harbouring a subpopulation. Together both regions account for 86 % of the confirmed breeding pairs in Bulgaria. Two other pairs are found in the Sredna Gora region and one in the Eastern Rhodopes.

In the eastern Balkan mountain region 2-3 pairs may exist. There are also observations of single birds and pairs in northern Bulgaria, Western and Eastern Rhodopes and in the western Balkan Mountains. Based on these data, we estimate the Bulgarian population for the period 1994-2002 at 20-25 breeding pairs.

Figure 1. Breeding distribution of the Eastern Imperial Eagle in Bulgaria in 2002.



Habitats

There are two main Imperial Eagle habitats in Bulgaria. The first is in the regions of the Sakar Mountains, Strandja Mountains and Dervent Heights. Here, the terrain is open and hilly with the elevation ranging between 150 and 400m. The regions consist of dry grasslands, arable lands and small forests of oak species, In these areas, Imperial Eagle nests are mainly located in poplar trees along small rivers and streams. Out of the 21 nests discovered in this habitat type, 18 (85%) were found in poplar trees. There were two nests in an oak (*Quercus cerris.*) and one in a Black Locust (*Robinia pseudoacacia*). The nests are often not far from villages, sheep-barns or roads. Nests can occur as close as 300m to villages.

The second habitat is typified by a more rugged and forested terrain. The regions are considered mountainous with elevations ranging from 400 to 1500m. This habitat consists of pastures, oak and beech forests and pine plantations. Three pairs were recorded in this type of habitat. Four nests were discovered, two in pine trees (*Pinus silvestris*), one in an oak tree (*Quercus sp.*) and one in a poplar (*Populus sp.*).

Breeding success

Fifty -four breeding attempts were recorded between 1994 - 2002, (Table 1.) with a 64.81% success rate. This success rate is comparable to Slovakia, 62.80% for the period 1969-1993 (Danko & Chavko 1996), and Hungary, 64% for the period 1977-1993 (Haraszthy *et al.* 1996). As a result of increased conservation activities between 1993-2001, the Hungarian success rate increased to 76.28% (Bagyura *et al.* 2002).

In Bulgaria, the mean breeding success rate for the study period was 1.54 chicks per successful nest. This is similar to Slovakia, 1.53 (Danko & Chavko 1996) and Hungary, 1.51 (Bagyura *et. al.* 2002).

The breeding success from all occupied nests including those that failed ranged from 0.83 to 2.0. Mean breeding success from all occupied nests for the study period was 1.00. This is similar to Slovakia (Danko & Chavko 1996) and Hungary (Bagyura *et. al.* 2002). The annual mean breeding success in Bulgaria declined as the number of nests monitored increased. Between 1998-2002, when more nests were monitored compared to 1994-1997, the breeding success ranged from 0.83 to 0.91 fledglings per occupied nest. This is similar to that in Hungary during the 1980s (0.84), but is lower than the breeding success in Hungary during the 1990s (1.19) (Bagyura *et al.* 2002).

Table 1. Breeding success of the Eastern Imperial Eagle in Bulgaria in the years 1994-2002

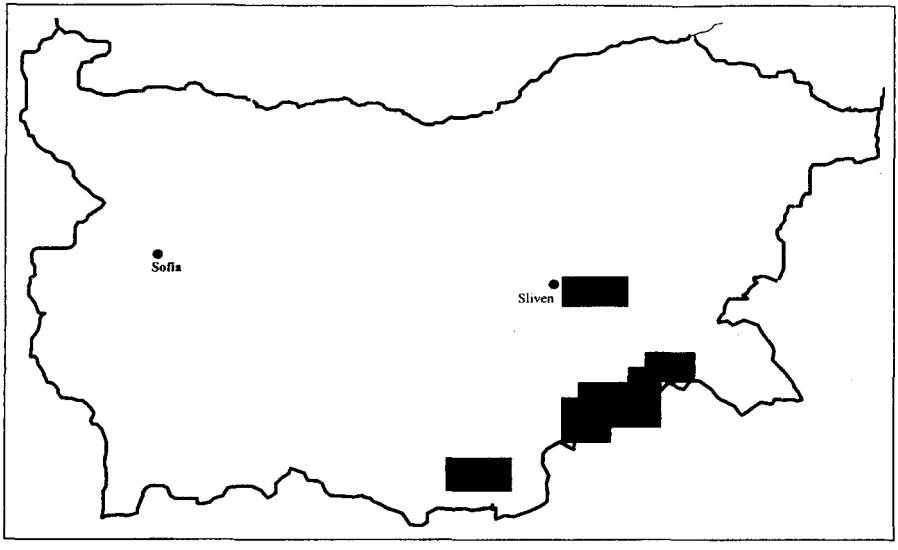
Year	*Breeding pairs*	*Occupied nests*	*Successful nests*	*Number of fledged young*	*Young per successful nest*	*Young per occupied nest*
1994	3	3	2	3	1,5	1
1995	4	3	3	6	2	2
1996	4	4	3	4	1,33	1
1997	5	5	4	5	1,25	1
1998	6	6	4	7	1,75	1,16
1999	8	6	4	5	1,25	0,83
2000	9	7	4	6	1,5	0,86
2001	10	9	4	8	2	0,88
2002	13	11	7	10	1,43	0,91
Total	62	54	35	54	1,54	1

Breeding pairs – Number of pairs with nests located per year.
Occupied nests - Nests where incubation was recorded.
Successful nests - Nests from which young fledged
Number of fledged young – Total number of fledged young per year
Young per successful nest – Average number of young per successful nest
Young per occupied nest - Average number of young per occupied nest

In the recent past Imperial Eagles were considered to be migratory (Simeonov *et al.* 1990). However, more recent observations demonstrate that breeding pairs are wintering in their breeding territories. The data collected during the period 2000-2002 indicated that some of the birds use their nest trees as roosting places during the winter. There are no data on the dispersion of juveniles fledged in Bulgaria since no ringing activities were carried out.

Migration and wintering

Figure 2. Important wintering areas for the Eastern Imperial Eagle in Bulgaria



Immature birds were observed during the autumn and winter mainly in the south but also in the north of the country. Three areas were identified as important stop-over places and wintering grounds for immature birds. These are the eastern Fore Balkans and part of the adjacent Thracian plain, the Sakar Mountains and adjacent Dervent Heights, and the Eastern Rhodopes (Figure 2). The highest numbers of migrating and wintering birds were recorded in the region of eastern Fore Balkans where nine birds were observed simultaneously near the town of Sliven in October. The region of Sliven seems to be an important area for the temporary settlement of juvenile birds due to the high population density of susliks *Spermophilus citellus*. It is possible that a large portion of the wintering or migrating immature birds are immigrating out of the Carpathian and former Yugoslavian populations. In support of this hypothesis are two cases of young birds in their second calendar year found dead in Bulgaria. The birds were ringed in their nests in Slovakia and Yugoslavia (Danko 1996).

THREATS

Breeding habitat loss is one of the main threats. The demand for poplar timber in Bulgaria and illegal tree felling are serious threats. The majority of nests are in poplar trees, which are usually the only remaining tall trees in the lowland areas. The mass cutting of poplars significantly reduces the number of suitable nest sites. This forces pairs to nest in sites prone to human disturbance. There are two recorded cases of the felling of poplars containing an Imperial Eagle nest. In another case, the felling of a nest tree was prevented by a volunteer nest guard. The nests that are still unknown to the conservation community and environmental authorities are especially vulnerable.

Another important threat is abandonment of pastures due to the decrease of livestock numbers. This in turn contributes to the decrease in the suslik population because grazing keeps the grass short. Susliks are important prey for some of the pairs (Simeonov & Petrov 1980; Milev *et al.* in press).

Disturbance during the breeding season is another important threat. In the Sakar and Strandja Mountains, the nests are in open pastures and close to agricultural fields. Generally, the birds are accustomed to routine agricultural activities. They stay in the nest while shepherds herd domestic animals near it or when cars, horse carts and tractors pass nearby. However, the appearance of strange machinery or the unusual behaviour of people causes them to leave the nest. Examples of such are the appearance of a truck with workers, birdwatchers, holiday-makers, and shepherds shouting or listening to a radio.

For the study period there are no records of Imperial Eagles being shot or poisoned. Shooting could be a problem since some hunters still illegally kill raptors for trophies. Other people consider raptors as pests and will shoot them on sight. This is especially dangerous in the areas where unknown pairs may exist and awareness campaigns have not yet been implemented. Poisoning is a potential threat since there are cases of poisoned vultures (Hristov 1998; Hristo Hristov, *pers. comm.*).

There is no evidence of an Imperial Eagle dying due to a collision with power lines or electrocution. The power line network in Bulgaria includes many dangerous structures for birds. There are several cases of other raptors being killed or injured from collisions or electrocutions, so this threat cannot be ignored. (Stoychev & Karafeizov, in press).

Conservation

In Bulgaria, the Imperial Eagle is strictly protected. Poisoning and trapping are completely forbidden. Bulgaria has ratified the Bern, Bonn, and CITES conventions. A National Action Plan for the conservation of the Imperial Eagle has been created and 4,943.80 hectares of important habitat have been declared as protected. There is a monitoring programme, and at the same time educational activities are carried out among farmers, hunters, foresters and children in the breeding areas. The goal has been to create pride in the occurrence of a nest near a village. Three posters and two leaflets have been published. For some of the nests, local people are paid on a part-time basis to ensure their protection. Permanent nest guarding by volunteers was started in 2001. Three nests were guarded in 2001 and five in 2002. Artificial feeding is provided in the Eastern Rhodopes and Sakar Mountains. Collaborations with tour companies were achieved, thus avoiding disturbances while ensuring some income for the local communities.

DISCUSSION

In the last ten years research on and monitoring of the Imperial Eagle in Bulgaria has increased. The discovery of 13 nests allows for the first time the monitoring of breeding success. The mean breeding success from successful nests is close to those recorded in Hungary (Bagyura *et al.* 2002) and Slovakia (Danko & Chavko 1996). The mean breeding success from all breeding attempts due to a higher percentage of pairs that failed is lower compared to the one established in Hungary in the 1990s. It is important to note that the

breeding success in the last two years would be even lower if some of the nests had not been saved from inevitable destruction by volunteer guards. Properly undertaken conservation measures would contribute to a further increase in the breeding success and strengthen the population.

The negative Imperial Eagle population trend in Bulgaria during the 1980s and early 1990s reported by Tucker & Heath (1994) and Petrov *et. al.* (1996) has been reversed. For the study period there were no instances of a pair disappearing from a known nest site. The population in Bulgaria seems now to be stable or might even be increasing. In 2002, three pairs were discovered that consisted of immature birds.

There is, however, a reported decline for the region of the Eastern Rhodopes during the period 1994-1997 (Hristov & Stoynov 2002). In this region with very rugged relief, the first occupied nest was discovered in 2002 (Demerdjiev 2002), so more investigations are necessary to clarify the situation.

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