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THE STATUS AND DISTRIBUTION OF ELEONORA'S FALCON (*FALCO ELEONORAE* GENE 1834) IN CROATIA

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Eleonora's falcon (*Falco eleonorae* Gene 1834) has been noted during nesting time on the islands of Mljet, Vis, Biševo, Sv. Andrija (W of Vis), on the Palagruža archipelago, on the islet of Veliki Rašip (Kornati archipelago), and on Kamik rock (W of Sv. Andrija), while before nesting time it has been seen on the islet of Jabuka and Greben rock (SE of Vis). There have been no more than a few irregular sightings on the Kornati islands, which are the most northerly possible nesting place for the bird. In the period between 1989 and 1996 it was estimated that on the Croatian Adriatic islands there were some 21 to 24 pairs all told. Accordingly the total population in the Adriatic comes to at most 40 pairs and it is critically endangered. Since the Adriatic population of this endemic Mediterranean species is isolated from the remainder species' range, regular monitoring of the numbers should be carried out, and the species should be specially protected.

Key words: *Falco eleonorae*, Croatia, Adriatic islands, pairs estimating

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Eleonorin sokol (*Falco eleonorae* Gene 1834) je u Hrvatskoj u doba gnježđenja zabilježen na otocima Mljet, Vis, Biševo, Sv. Andrija (W od Visa), na otočju Palagruža, otočiću Veliki Rašip (Kornati) i hridi Kamik (W od Sv. Andrije), a prije doba gnježđenja na otočiću Jabuka i hridi Greben (SE od Visa). S otočja Kornata koji su najsjevernije gnjezdilište te vrste postoji samo nekoliko neredovitih opažanja. Procjenjuje se da je na hrvatskim otocima Jadrana u razdoblju od 1989. do 1996. godine bilo ukupno 21 do 24 parova, pa se populacija s čitavog Jadrana procjenjuje na najviše 40 parova i time pripada kategoriji kritično ugroženih. Kako je jadranska populacija ove endemične sredozemne ptice izdvojena od ostalog areala vrste, trebalo bi vršiti redovita opažanja (monitoring) brojnosti i posebno je zaštititi.

Ključne riječi: *Falco eleonorae*, Hrvatska, Jadranski otoci, procjena broja parova

INTRODUCTION

Eleonora's falcon (*Falco eleonora* Gene 1834) is distributed in the European and African Mediterranean between the July isotherms of 25 to 27°C (HARTERT 1912, VOOUS 1962, GENSBØL 1986). It nests mainly along the migration routes of small migrating birds. It is itself a migratory species that winters in East Africa, Madagascar and the Mascarene archipelago (ORTA & MEYBURG 1994). Migration starts between mid-October and the beginning of November; it nests between mid-July and the end of August (ORTA & MEYBURG 1994). It has been estimated that the total population is about 4,000 pairs that make up about 100 colonies, mainly on uninhabited islands and rocks, and less frequently on cliffs along the coast of the mainland (CRAMP 1994, ORTA & MEYBURG 1994). As well as in the Adriatic (KR PAN 1965) it has been established that there are colonies in the Canary islands (66 pairs), along the Atlantic coast of Morocco (about 90 pairs), along the Algerian coast (about 30 pairs), in the Balearics (about 600 pairs), Sardinia (about 300 pairs), on the Italian islets and rocks of the Tyrenian Sea and south of Sicily (150 pairs), in the Greek islands of the Aegean (2,300 to 3000 pairs), on the south coast of Turkey (about 18–100 pairs) and on Cyprus (about 100 to 120 pairs) (CRAMP 1994; ORTA & MEYBURG 1994; WINK 1995) (Fig. 1). VOOUS (1962) says that the species is distributed in a relict pattern, while SUŠIĆ (1987) draws attention to the bird's being endemic to the Mediterranean, estimat-

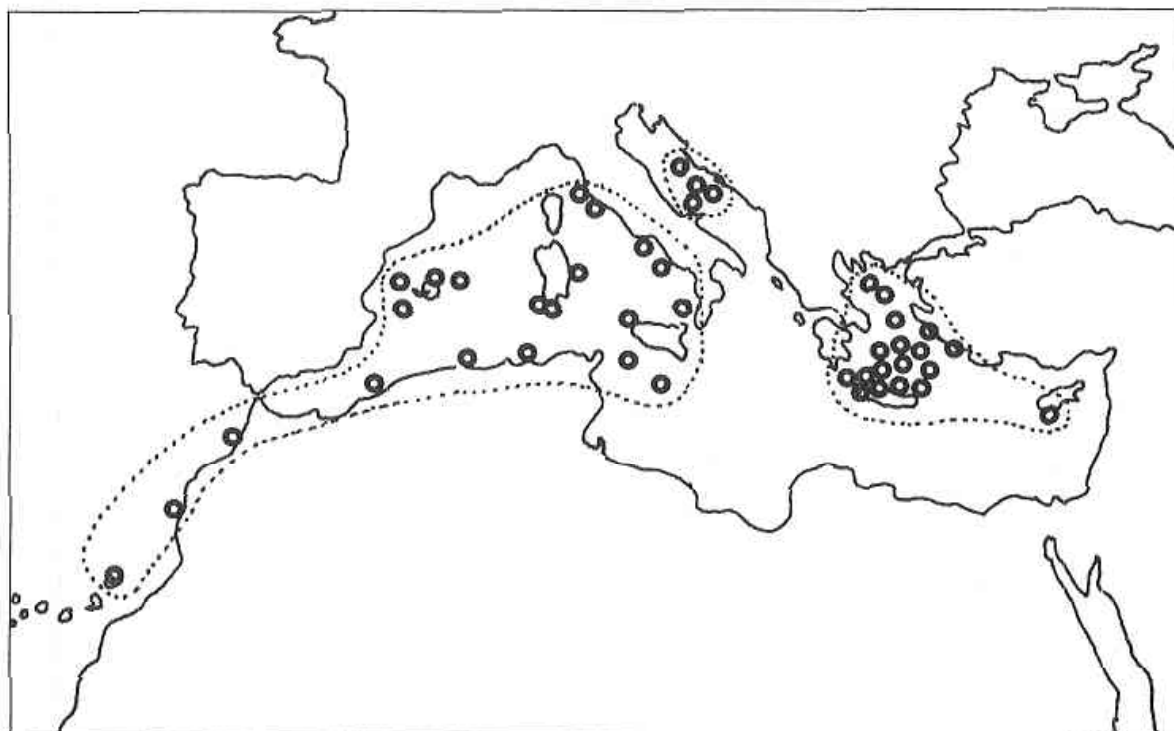


Fig. 1. The distribution of *Falco eleonora* according to CRAMP (1994), ORTA & MEYBURG (1994) and WINK (1995). The northernmost (temporary ?) colony in the Kornati archipelago (GRIMMET & JONES 1989) and the colony on Mljet have been added.

ing the population in Croatia as a possible 50 pairs. Last estimation for Croatia was that of WINK (1995), even 100–150 pairs, with a remark – data quality not provided.

This rare nesting species has been sighted in Croatia to the time of writing on the islands of Biševo, Sv. Andrija and Vis, the Palagruža archipelago (KRPAN 1965: 1970b: 1980), Kamik rock off Sv. Andrija (JOVANOVIĆ 1972) and in the Kornati archipelago (GRIMMET & JONES 1989). It has further been sighted in the Adriatic by HUDSON (1975) in the Italian Tremiti archipelago (12 to 15 pairs), while MATVEJEV & VASIĆ (1973) tentatively place it on the list of nesting species of the coastal area of Montenegro. R. RUCNER (1965) states that the species is a potential nesting bird in the *Oleo-Ceratonion* and *Quercion ilicis* vegetation system within the Balkan peninsula. Although HUDSON (1975) includes it among the endangered species of Europe because of its limited range, *F. eleonora* as a species is not yet truly endangered, although local reductions in numbers have been observed, in Morocco and Cyprus, for example, and some local increases in Spain and Greece (ORTA & MEYBURG 1994; WINK 1995).

The small population of Eleonora's falcon in the Adriatic and its being relatively little known have encouraged us to pay it special attention during our research into the fauna of the Adriatic islands.

MATERIALS AND METHODS

Altogether field research was carried out nine times in the years 1984, 1989–1991, and 1994–1996. The exact dates on which Eleonora's falcon was observed are given in Table 1, and the dates when observations were carried out on Korčula, Lastovo and Šipan are given at the end of the review of results. Observations were made with field glasses (8x30) and a telescope (20x50) while cruising along the coast and among the rocks in a small boat, and while walking in the larger islands.

RESULTS

During field research to date we had 15 sightings of Eleonora's falcon all told, with a total of between 56 and 59 specimens (Table 1). Allowing for possible repeated sightings of the same specimens, we probably sighted a total of between 31 and, at the most, 42 specimens.

The Kornati Islands

Making a very systematic cruise round potential nesting places for *Falco eleonora* in the Kornati group at the end of August, 1984 we recorded only one single individual of this species on the cliffs of Veli Rašip. At the same time, 4 individuals of the peregrine falcon were found, and one common kestrel. In the central channel between the islets of Ždrclac and Laudara on July 28, 1989 we observed 12 individuals.

Table 1. A review of individuals observed and an estimation of the number of pairs of *Falco eleonora* on the Croatian Adriatic islands, and sightings of other falcons (*Falconidae*) that were made at the same time on the same islands. Dates during the nesting period of *F. eleonora* are emphasised.

Islands	Dates	Number of individual falcons sighted				Estimate of possible number of pairs of <i>F. eleonora</i>
		<i>F. eleonora</i>	<i>F. peregrinus</i>	<i>F. biarmicus</i>	<i>F. tinnunculus</i>	
Kornati	Aug 21–22, 1984	1	4		1	
Channel between Laudara and Dugi Otok	Jul 28, 1989	12				6
Vis	Aug 3–5, 1989	4–7				3–5
	Jun 14–15, 1996	6	1		3	
	Jul 26, 1996	1				
Greben	Jun 15, 1996	2			1	1
Biševo	Aug 3–5, 1989	1				2
	Jun 16, 1996	3				
Sv. Andrija	Jun 9–10, 1996	8	1	1		5–6
	Jul 26–27, 1996	10				
Kamik	Jun 9, 1996	1				
Jabuka	Jun 9, 1996	1				?
Kamik od Ostra	Jun 11, 1996	1				1
Velika Palagruža	Jul 27, 1996	1	1			
Mljet	Sep 6–8, 1995	3				3
						21–24

The birds were flying in a flock from 3 to 10 metres above the sea in a south easterly direction. A cruise round Kornat and Murter between October 2 and October 7, 1995 did not result in the sighting of a single individual of Eleonora's falcon.

The Vis archipelago

On August 3, 1989, before noon, in Komiža on the island of Vis, three individuals were sighted hunting insects and alighting on Aleppo pines (*Pinus halapensis*). Later on in the same day, three light phase specimens were sighted. Between 01.30 and 04.00 p.m. they were hunting above pines (*P. halapensis*) and locusts trees (*Ceratonia siliqua*).

The birds swooped fifteen times, only insects constituting the prey. On August 4, 1989, in the town of Vis, one Eleonora's falcon was hunting insects above the cop-pice of Aleppo pines at 07.15 a.m. On the following day, on August 5, 1989, four individuals (three dark and one light phase) were hunting insects over Vis. On June 1996, in Plisko polje, one specimen was observed in flight. On the same day, between Kostirna and the town of Vis, six individuals were observed in the afternoon, all catching insects. On the same day, a total of three *F. tinnunculus* were seen. The next day, above Stiniva Bay (on the southern shore of Vis), one peregrine falcon was seen, its nest later being found.

On June 15, 1996 on the rock called Greben close to the south east coast of Vis we frightened a pair of Eleonora's falcons and one specimen of *F. tinnunculus* on the steep cliffs.

During a cruise round the uninhabited island of Biševo between August 3 and 5, 1989, only one specimen of *F. eleonora* was seen, while on June 1996, a total of three individuals were seen.

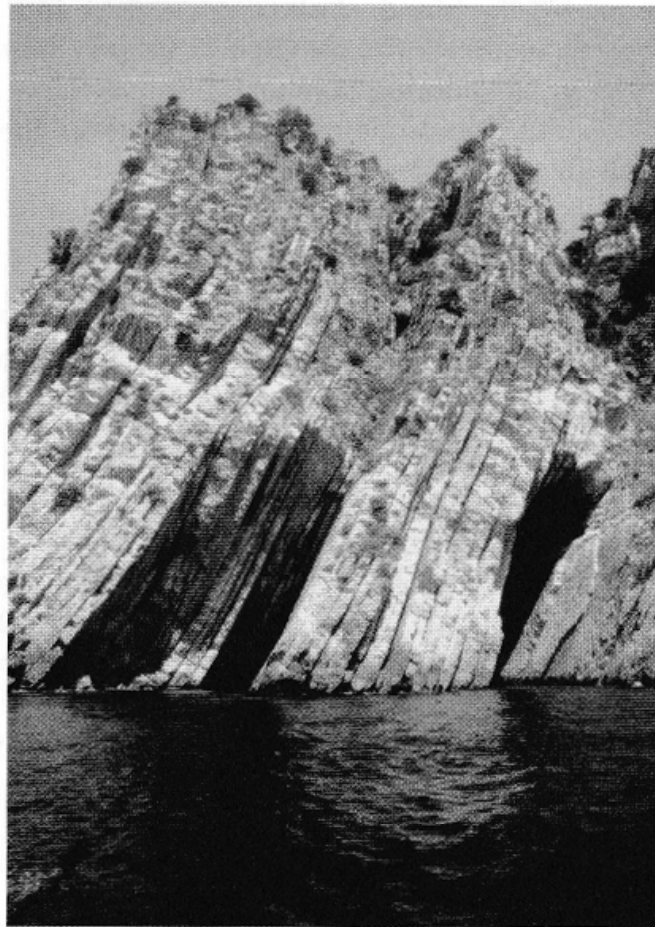


Fig. 2. The area round Cape Trepin, part of the cliffs of the north west coast of Sv. Andrija (Svetac), where the biggest permanent colony of *Falco eleonora* at the present time in the Croatian Adriatic islands has been registered. Photograph: J. Vranić, June 1996

During a boat trip round the uninhabited island of Sv. Andrija (Svetac) on June 9, 1996, eight specimens of *F. eleonora* were seen on the cliffs of the north west coast between Polfumara to Cape Trepin (Figure 2), while two specimens were seen on Kamik rock. These birds were in pairs. On June 10, one *F. peregrinus* and one *F. biarmicus* were seen. On July 26 and 27, 1996, passing by boat under the cliffs of the north west cliffs, we sighted nine specimens, which were mainly in pairs. At twilight, all these falcons were hunting insects above the maquis, Aleppo pines and abandoned fields in the highest part of the island in the Poje region. We watched them hunting as long as we could make them out in the sky (until approximately 9,30 p.m.). At the same time biologists Tonči Rađa and Marijana Vuković saw a falcon (?*F. peregrinus*) on the southern shore; at twilight it flew into the semi-cave in bay of Pol crikva, the nesting place of a small colony of *Apus pallidus*. In the early hours of the following morning, before sunrise, individual specimens of *F. eleonora* began to fly in from the north west side of the island, over the central part, hunting insects. The first hunting session lasted from 05.30 to 06.15 a.m., and the tempo of hunting was accelerated again between 9 and 11 a.m. Watching them from the place called Poje, we could distinguish up to 8 specimens at the same time. Two individuals caught cicadas above the pines (*P. halapensis*). Before we left the island, at about noon, three individuals flew in to Sv. Andrija from the open sea, from the direction of Brusnik islet.

A tour of Jabuka islet in the morning of June 9, 1996 produced a sighting of only one individual of Eleonora's falcon, along with a colony of the numerous *Larus cachinnans*, and a small colony of *Apus pallidus*.

The Palagruža archipelago

In a boat trip around the Palagruža archipelago on June 11, 1996, we saw one *F. eleonora* from the steep southern side of Kamik od Ostra, and another individual on July 27 as well, but on the northern side of Vela Palagruža. Also on Vela Palagruža in July, a *F. peregrinus* (one specimen) was observed.

The island of Mljet

During a stay in Mljet between August 1 and 14, 1994, not a single specimen of *F. eleonora* was sighted. It was only in the next year, on September 6, 1995 that a pair (one light and one dark phase) was spotted from Babino Polje above the peak of the hill Velji grad. The birds alighted on a stone close to the peak. On September 8, 1995 in Polače bay, a single individual (light phase) was sighted hunting insects.

Other islands

During the summer of 1989, Eleonora's falcon was not remarked during ornithological observations in the western part of the island of Korčula (Vela Luka and Tri porta Bay). This was also true of the islands of Lastovo (from August 1 to 10, 1990) and Šipan (July 30, 1994). Unfortunately, no trip was made to the island of Sušac.

DISCUSSION

The sightings to date of Eleonora's falcon on the Croatian Adriatic islands show that this is in Croatia a rare and not very numerous nesting bird. The sightings were exclusively on the outer islands: Mljet, the Palagruža archipelago, Biševo, Vis and its neighbouring islets, Sv. Andrija, Jabuka, and in the waters around Kornati and Dugi otok (Figure 3). So far, this falcon has not been noted on the islands of Šipan, Korčula, Lastovo, Hvar, Brač and Šolta (KRPAN 1970a; 1977; 1980; RUCNER, R. 1977; RUCNER, D. in preparation). We calculate that the total number of individuals in our sightings came to from 31 to 42 specimens, and that the maximum number of nesting pairs does not exceed about 24 (Table 1).

The population of Eleonora's falcon in the Vis archipelago can be calculated as being at most 14 pairs, which is, together with the population on the archipelago of Tremiti, the biggest in the Adriatic. The number of certainly nesting pairs is clearly at present greatest on Sv. Andrija island and Kamik rock (5–6 pairs). Our current estimation of the total population in the Adriatic of at the most 40 pairs is

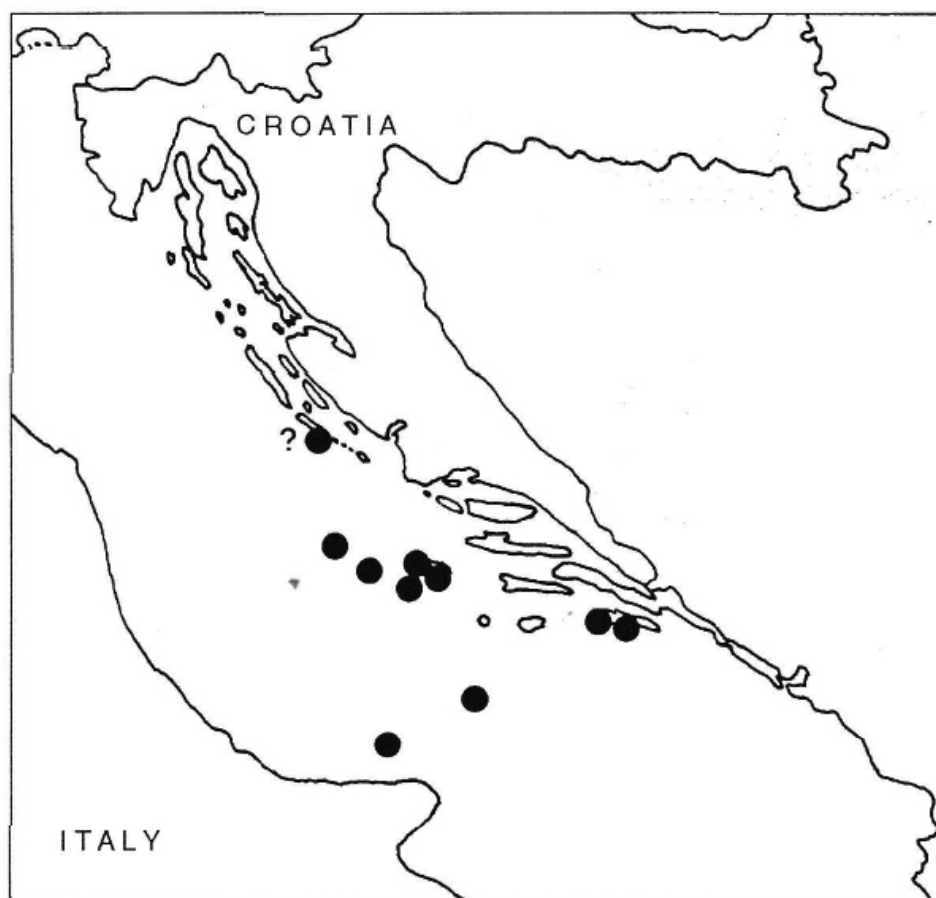


Fig. 3. Localities on the Adriatic islands where *Falco eleonorae* has been noted, according to JOVANOVIĆ (1972), HUDSON (1975), KRPAN (1965; 1980), GRIMMET & JONES (1989) and our own data.

lower than that given by SUŠIĆ (1987) and WINK (1995). This can not be considered a sign that the population has decreased, but because of the overall very small population it is critically endangered (CR) according to IUCN criteria (1994). It is certainly necessary to carry out a census in the same nesting period, going round all the potential nesting places.

Our observations are very different from those of KR PAN (1980) and Tonko Foretić (RUCNER D., in preparation) on Biševo island, as well as those of GRIMMET & JONES (1989) on Kornati archipelago. In the case of Biševo, it is very likely a matter of a local decline of a colony (to Vis ?) because of disturbances during the nesting period from tourists going round the island in motor boats. For in 1966 there were 12 to 14 pairs on Biševo, in 1972 5 to 7 pairs (Foretić in RUCNER, D., in preparation), in 1989 at most one, and in 1996 at most two. On Kornati, the number of nesting pairs was either previously over-estimated (10 pairs in 1989 – GRIMMET & JONES 1989) or else it was only a temporary nester there. *F. eleonora* might well be only an occasional nester on Mljet as well. Renata Rucner kindly made available the diary of ornithologist Dragutin Rucner, which contains data concerning the earliest sighting of this species, from June 1972, at Vilinsko vrelo near Ivanje polje. In 1994, we did not see it on the island, while in 1995 three specimens were sighted in the nesting period.

The population of Eleonora's falcon in the Adriatic is most endangered by the disturbances caused by tourism (Foretić in RUCNER D., in the press), especially on Biševo and in the Kornati. In addition it is under constant threat from the traditional nest-robbing (JOVANOVIĆ 1972), which is clearly widespread in the Mediterranean (ORTA & MEYBURG 1994). For this reason at least the Sv. Andrija colony, on an island without any permanent inhabitants, should be protected against disturbance during the nesting period.

We also assume that the numbers of *F. eleonora* could be affected by the local numerousness of *F. peregrinus* or *F. biarmicus*. This speculation was suggested by the observation of two pairs of *F. peregrinus* (one on Sv. Andrija and the other on Vis) spatially separated from the territory occupied by the *F. eleonora* colony; they inhabited different sides of the island. The Peregrine falcon is recorded in the literature as nesting on Sušac (unreliable data, ČAPEK et al. 1899), Dugi otok and Mljet (RUCNER, D., in the press), Kornati, Krk and Cres (GRIMMET & JONES 1989), while we have noted it additionally on the islands of Šolta, Sv. Andrija and Vis. The Lanner falcon has been observed nesting only on Vela Palagruža (BABIĆ & RÖSSLER 1912).

Our data about the summer diet of *F. eleonora* confirms the observations of KR PAN (1965; 1980) and ŽITKO (1993), that is, the already familiar data that in the summer this species feeds mainly on insects from the genera Lepidoptera, Coleoptera, Odonata and Orthoptera (ORTA & MEYBURG 1994). There are no data from the Adriatic about the feeding habits of the species during the period in which the young begin to fly, apart from information from Foretić who observed an attack on pigeons (RUCNER, D., in the press). Foretić thinks that one of the causes

for the reduction in numbers might be the ever decreasing amount of small birds that migrate across the Croatian Adriatic coast; however, there are no exact data to support this.

CONCLUSION

Falco eleonora was registered for the first time on the island of Mljet; the findings of *Falco eleonora* at all known localities in the Croatian Adriatic islands so far reported have been confirmed, except Kornati islands. All the previous data, still incomplete, about the isolated population of *Falco eleonora* on the Adriatic islands indicate that because of its very small numbers (40 pairs at most; 24 pairs on Croatian islands) it is essential to determine the permanent and occasional nesting places and monitor the numbers of the population; the most important nesting places should be protected at once. The north west part of the island of Sv. Andrija (Svetac), the south east part of Biševo and Greben rock off Vis should be declared ornithological reserves. It should be forbidden to disturb the falcons on their nests from the middle of July until the end of September.

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SAŽETAK

Status i rasprostranjenost Eleonorinog sokola (*Falco eleonora* Gene 1834) u Hrvatskoj

G. Lukač, M. Stipčević i N. Tvrtković

Eleonorin sokol (*Falco eleonora* Gene 1834) je endemična vrsta Sredozemlja čija populacija se procjenjuje na oko 4.000 parova. Gnijezdi se uglavnom u kolonijama, većinom na otocima. Ljeti se hrani letećim kukcima što smo potvrdili i našim opažanjima, a u doba kad ima mlade, krajem ljeta i početkom jeseni, sitnim pticama selicama. U Jadranu je najsjevernija izolirana populacija, za čiju brojnost postoje različite procjene, od oko 50 do 150 parova.

U ovom radu iznosimo podatke opažanja Eleonorinog sokola tijekom više godina, od 1984. do 1996., koje smo zabilježili prilikom opsežnijih istraživanja ptica na hrvatskim otocima Jadrana. Opažali smo ga tijekom ljeta na već poznatim nalazištima, na otočju Kornatima (samo Veli Rašip!) i Palagruži, na otocima Visu, Biševu, Sv. Andriji i susjednoj hridi Kamiku, otočiću Jabuci, ali i na novim lokacijama: kanal

između Dugog otoka i Laudare, hrid Greben kraj Visa, Kamik od Ostra kod Male Palagruže i otok Mljet. Na temelju ukupno 60 opažanja ovog sokola i obilaska gotovo svih potencijalnih gnjezdišta, populaciju u Hrvatskoj procjenjujemo na najviše 23-24 para. Tako bi, s poznatom procjenom kolonije na Tremitima, čitava jadranska populacija iznosila ukupno najviše 40 parova. Prema kriterijima IUCN-a, ona bi imala status kritično ugrožene (CR). Prema podacima iz literature i sadašnjem stanju, došlo je do pada brojnosti kolonije na Biševu, a to bi mogao biti i slučaj s Kornatima. To su lokaliteti gdje je u međuvremenu došlo do pojačanog turističkog posjeta, a time i uznemiravanja ovih sokolova na gnježđenju. Uz to je poznato da je uz druge pučinske ptice i Eleonorin sokol predmet tradicionalnog pljačkanja gnijezda od lokalnog stanovništva. Na osnovu naših podataka, sada najveća kolonija Eleonorinog sokola bi bila na otoku Sv. Andrija (Svetac) i susjednoj hridi Kamiku, sa ukupno 5 do 6 parova. To je otok koji je ostao bez stalnog stanovništva, pa predlažemo da se dio otoka zaštititi kao ornitološki rezervat.