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ELEONORA'S FALCON (*FALCO ELEONORAE*, GENE 1839) IN CROATIA: RANGE, THREATS AND THE PROPOSAL OF ACTION AND MANAGEMENT PLAN

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ABSTRACT

Eleonora's Falcon is classified as rare in Europe. This species is also included in the first group of priorities for the protection of biological diversity by the Ministry of Environment and Physical Planning of the Republic of Croatia. Croatian population of Eleonora's Falcon has not been sufficiently researched and its nest sites have not been protected so far. We have been investigating Eleonora's Falcon population in Croatia for three years. The research consisted of two main parts - study of the breeding ecology of colony F3 and census of the entire Croatian population. The population was estimated at 58-68 breeding pairs in six colonies and we made a proposal as to the action and management plan for this species in Croatia.

Key words: *Falco eleonorae*, Eleonora's Falcon, Croatia, action plan, management plan

FALCO DELLA REGINA (*FALCO ELEONORAE* GENE 1839) IN CROAZIA: DISTRIBUZIONE, PERICOLI E PROPOSTA DEL PIANO DI AZIONE E GESTIONE

SINTESI

Il Falco della Regina in Europa è classificato come specie rara. Il suo nome è stato inserito nel primo gruppo delle priorità per la tutela della diversità biologica dal Ministero per l'ambiente della Repubblica di Croazia. La popolazione del Falco della Regina in Croazia non è stata studiata a sufficienza e i suoi siti di nidificazione non vengono ancora tutelati. Da tre anni gli autori studiano la popolazione del Falco della Regina in Croazia. La ricerca comprende lo studio delle modalità di riproduzione della colonia F3 nonché il censimento dell'intera popolazione. Si stima che questa comprenda 58-68 coppie in sei colonie. Gli autori hanno ultimato la proposta per il piano di azione e gestione di questa specie in Croazia.

Parole chiave: *Falco eleonorae*, Falco della Regina, Croazia, piano di azione, piano di gestione

INTRODUCTION

Eleonora's Falcon (*Falco eleonora*, Gene 1839) breeds mostly in the Mediterranean region. The total population of this species, which is classified as rare at the European level (Tucker & Heath, 1994), is estimated at some 6320 pairs (Ristow, *in print*). The species is also included in the first group of priorities for the protection of biological diversity by the Ministry of Environment and Physical Planning of the Republic of Croatia (Državna uprava za zaštitu prirode i okoliša, 1999). The Croatian population of Eleonora's Falcon has not been sufficiently researched enough and most of the data are based on accidental and occasional observations (Jovanović, 1972; Krpan, 1965, 1980; Lukač *et al.*, 1997).

It's nest sites have not been protected so far.

MATERIAL AND METHODS

We have been studying the population of Eleonora's Falcon in Croatia for three years - 1998, 1999 and 2000 (Tab. 1). The research consisted of two main parts - study of the bird's breeding ecology in colony F3 and census of its total Croatian population.

Tab. 1: Years, locations and dates of the carried out fieldwork.

Tab. 1: Leta, lokacije in datumi terenskega dela.

YEAR	LOCATION	DATE
1998	Colony F3	July 25-30
		September 10-11
1999	Colony F3	August 03-08
		September 13
2000	Colony F3	August 07-13
		September 12-21
	Islands of the Central and South Adriatic (census)	August 19-31

The codes of the colonies are according to Walter (1978). During the research, the birds were observed by binoculars BPC 7x50 and BPC4 8x30 and the telescope Opticron HR66 45R from boat cruising along the cliffs and, in some cases, from various islands. During observations from the boat, birds were startled by a special siren in order to make them fly away from their nest sites and thus to enable us to make all the necessary records.

The census was made with the aid of eleven metres long sailing ship and a small boat at the following Central and South Adriatic islands: Dugi otok, Kornati Isles, Jabuka, Kamik, Svetac, Biševo, Vis, Greben, Sušac, Bijelac, Lastovo, Korčula, Mljet and Elafiti Isles. The 1997 data from Palagruža are also included in the census.

Foreign experience and recommendations (Ristow, *in print*) were used, too.

RESULTS

Population of Eleonora's Falcon in Croatia

During the first census of Eleonora's Falcon in Croatia, six colonies were registered (Tab. 2).

Tab. 2: Colonies and a number of breeding pairs estimated during the 2000 census.

Tab. 2: Kolonije in število gnezdečih parov, ugotovljenih med štetjem leta 2000.

COLONY	NUMBER OF PAIRS
F2	6-8
F3	38-42
F4	2
F6	3-4
F7	5-7
F8	4-5

The colonies are situated on five Central Dalmatian islands and defined according to Walter (1979) and Ristow *et al.* (1989).

The area of distribution

Island A covers 4.6 square kilometres. It is temporarily inhabited, with a low level of agriculture, mostly vineyards and Mediterranean vegetation, predominantly maquis and pine forests.

Island B covers 0.08 square kilometres, it is uninhabited and with very poor vegetation. These two islands are the sites of colony F3.



Fig. 1: Eleonora's falcon (*Falco eleonora*). (Photo: D. Ristow)

Sl. 1: Sredozemski sokol (*Falco eleonora*). (Foto: D. Ristow)

Island C covers 90.3 square kilometres and is inhabited, with various activities practised there, such as tourism, agriculture, hunting, traffic and fishing. Colonies F2 and F6 are situated on this island.

Island D is 5.8 square kilometres large with several permanent inhabitants and a low level of agriculture. During the summer there are some tourist activities practised on this island and around it. Colonies F7 and F8 are situated on this island.

Island E is 0.4 square kilometres large, uninhabited and with some low vegetation. Colony F4 is situated on it.

DISCUSSION

Potential threats and limiting factors

Natural factors

Nests of the Eleonora's Falcon could be naturally endangered by various predators, such as snakes, ravens, gulls or some raptor species. Adult falcons are able to defend their nests, and the predators mentioned above should thus not threaten the population. Some parasites and diseases, such as Mallophaga, *Haemaphysalis hoody* and a form of malaria, were also registered in some colonies (Ristow & Wink, 1985), but they do not essentially affect the size of the colonies.

Introduction of allochthonous species to the islands with Eleonora's Falcon colonies

Over 90% of the Croatian population breeds on large inhabited or temporarily inhabited islands. Various predators or other allochthonous species (cats, dogs, rabbits, rats, sheep and so on) were colonized on those islands long ago, and it is likely that their density on some islands has declined due to the depopulation.

Hunting and illegal trade

In the past, the locals were known to eat the nestlings, but this custom has practically disappeared. There is some possibility of an occasional, accidental poaching, and this species could also be interesting for egg collectors due to its rarity. Eleonora's Falcon is not interesting for falconry purposes.

Pressures on the bird's nest sites

Intensive urbanization and sea traffic close to the colonies could be very detrimental for the breeding birds. During the parents' absence, the eggs or young could be attacked by predators, and embryos in eggs could be destroyed due to overheating, if eggs are directly exposed to the sun.

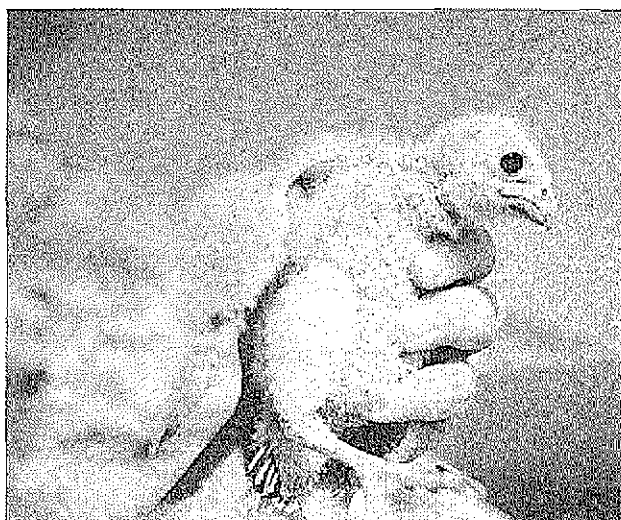


Fig. 2: Nestling of the Eleonora's falcon. (Photo: G. Piasevoli)

Sl. 2: Mladič sredozemskega sokola. (Foto: G. Piasevoli)

Habitat degradation

Disappearance of natural vegetation and intensive agriculture could reduce the food sources for falcons. Forest fires could be a potential cause of disappearance of natural vegetation. Drinking water is also important for the bird's colonies. Small pools, the only reserves of drinking water for falcons, are not maintained nowadays and are rapidly disappearing due to depopulation and decreasing agriculture.

Poisoning

Irresponsible usage of agricultural chemical agents could cause poisoning. This, however, has not been registered in Croatia so far, but it has certainly been recorded in some other countries (Ristow, 2001) and could thus be expected here as well.

Aims and proposed actions

Trends and oscillations regarding the size of the population are completely unknown due to the insufficient research so far. It is necessary, however, that at least the Falcon's present numbers are retained through protection.

The following measures should be undertaken:

1. Legal aspect
 1. 1. To declare protection of all nest sites by the Nature Protection Law as special reserves or nature monuments and to include them in large marine and pelagic islands as a protected and sustainably managed area;
 1. 2. to prevent eventual nest plundering with certain

protection measures in every reserve or nature monument;

1. 3. not to allow hunting activities in the hinterland of the colonies before November 1st;
1. 4. to authorize persons to monitor and guard the colonies, i.e. to immediately intervene and prevent people breaking the law;
1. 5. to include the protection of the colonies in the complete regional and national strategy of the coastal zone development.

2. Economic activities development policy

2. 1. To protect colonies from various pressures caused by too heavy traffic of tourist ships and aircraft; to stimulate development of sustainable, ecological tourism, whose main resource should be well-preserved nature; to prevent any extensive building of new tourist accommodation capacities and other structures on the low urbanized small islands with the Falcon's colonies, especially close to them;
2. 2. to stimulate organic agriculture on the islands, with minimal use of pesticides and herbicides.

3. International cooperation

3. 1. To ensure a coordination of the national action plan with the adequate plans at the international level.

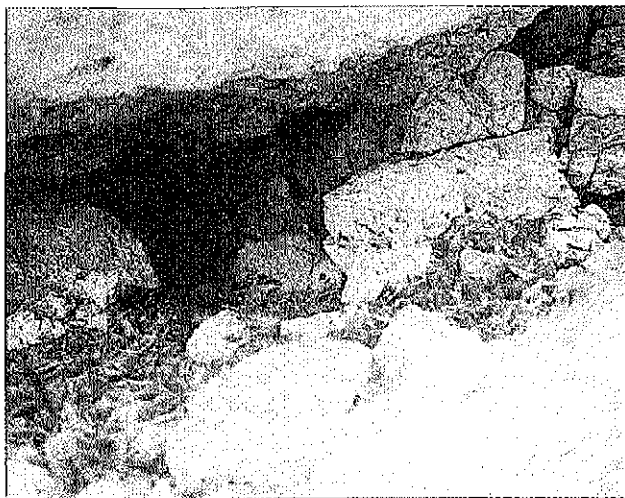


Fig. 3: Nest of the Eleonora's falcon with huge remains of feathers of preys in front of it. (Photo: G. Piasevoli)
Sl. 3: Gnezdo sredozemskega sokola z lepo vidnimi ostanki perja različnih vrst njegovoga plena. (Foto: G. Piasevoli)

4. Habitat protection

4. 1. To ensure natural succession of vegetation in the large parts of the islands, which are known as the Falcon's hunting grounds. For forest management should be under control by nature conservation institutions;
4. 2. to ensure continuous maintenance of small water habitats, in order to prevent them from drying up during the summer;
4. 3. to prevent introduction of allochthonous species to the small islands.

5. Research and monitoring

5. 1. To carry out a census of the entire population every year;
5. 2. to carry out a detailed research in one colony. Research should include counting of eggs and chicks, establishing the breeding success, taking samples of blood and food remains, measuring the eggs, bird ringing and other methods of marking (including satellite tracking), registering the losses in the colony and reasons for them, and observation of any other parameters of the breeding ecology;
5. 3. To observe any eventual changes in all colonies, by temporary short surveys and to react if necessary;
5. 4. to ensure financial and technical conditions for the planned research and monitoring.

6. Public awareness raising

6. 1. To raise the awareness - especially of the locals, young people and boat owners - of the need to protect the Eleonora's Falcon,
6. 2. to raise the awareness that preserved nature is a potentially important economic, primarily tourist, resource;
6. 3. to prepare printed and other materials in Croatian and foreign languages;
6. 4. to cooperate with NGOs;
6. 5. to set up tourist information centres for the natural riches of pelagic islands and marine ecosystems;
6. 6. to cooperate with the maritime police and to train their officers.

Proposed implementers and the duration of the plan

This plan should be implemented by the Ministry of Environment and Physical Planning of the Republic of Croatia and the Public Institution for the Management of Protected Areas in the County of Split and Dalmatia. It should be continual.

CONCLUSIONS

Eleonora's Falcon is classified as a rare species in Europe and, during the first census, the Croatian population was estimated at 58-68 breeding pairs. This is the reason why this species can be considered as potentially endangered in Croatia. Therefore, it is necessary to make an action and management plan for its population in Croatia.

The plan is based on the data collected so far. It con-

sists of the data on the number of birds and colonies, potential threats and limiting factors as well as aims with proposed actions.

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SREDOZEMSKI SOKOL (*FALCO ELEONORAE*, GENE 1839) NA HRVAŠKEM: NJEGOVA RAZŠIRJENOST, OGROŽENOST IN PREDLOG ZA AKCIJSKI NAČRT IN NAČRT UPRAVLJANJA

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POVZETEK

Sredozemski sokol je opredeljen kot redka evropska ptica in vključen v prvo skupino prioritete v ohranjanju biotske raznovrstnosti, kot jih navaja hrvaško Ministrstvo za okolje in prostor. Hrvaška populacija sredozemskega sokola še ni bila ustrezno raziskana in tudi gnezdišča te ujede še niso zaščitena. Glede na to, da je ta vrsta redka in zatorej potencialno ogrožena, je bilo treba pripraviti ustrezen akcijski načrt in načrt upravljanja.

Populacijo sredozemskega sokola na Hrvaškem smo raziskovali tri leta, in sicer v sklopu preučevanja njegove gnezditvene ekologije v koloniji F3 in štetja celotne hrvaške populacije. Potem ko je bilo ocenjeno, da v šestih kolonijah gnezdi od 58 do 68 parov, je bil pripravljen osnutek akcijskega načrta in načrta upravljanja za to vrsto na Hrvaškem.

Potencialne nevarnosti za hrvaško populacijo sredozemskega sokola so naravni dejavniki, naseljevanje alohtonih vrst na otoke, kjer gnezdi ta ptica, lov in nelegalna trgovina, posegi v prostor s sokofovimi gnezdišči, degradacija habitata in zastrupljanje narave. Glavni namen načrta je ohraniti vsaj današnjo populacijo sredozemskega sokola, kar naj bi dosegli s pripravo in uresničevanjem zakonskih predpisov, nadzorom nad gospodarskimi dejavnostmi, mednarodnim sodelovanjem, zaščito habitata, raziskovalnimi dejavnostmi, spremljanjem stanja (monitoringom) in z ozaveščanjem javnosti.

Ključne besede: *Falco eleonorae*, sredozemski sokol, Hrvaška, akcijski načrt, načrt upravljanja

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