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Solitary breeding of Griffon Vulture *Gyps fulvus* on the island of Pag (Croatia) in 1997

Solitarno gnezdenje beloglavega jastreba *Gyps fulvus* na otoku Pagu v letu 1997

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1. Introduction

The present breeding range of Griffon Vulture *Gyps fulvus* in Croatia stretches along the rugged Mediterranean coast of the north-east Adriatic seaboard (Figure 1), from the islands of the Kvarner Archipelago (Kvarner Gulf) to the southern part of Velebit mountain (Perco *et al.* 1983, Kralj 1997, Lukač 1998). The Croatian breeding population has been estimated at 50-100 pairs (Tucker & Heath 1994) or 110-150 pairs (Sušić 1994). The population stronghold of 95-100 pairs, is on the group of four large islands in the Kvarner Archipelago, with about 50 pairs on Cres (Sušić 1994). Other permanent colonies in Kvarner are on the Krk and Prvić, while the number of breeding pairs on Lošinj, Plavnik, Goli, Sv. Grgur and perhaps Rab and Pag are smaller and probably less constant (Perco *et al.* 1983). Breeding was mentioned on the islands Goli, Sv. Grgur, Rab and Pag but not confirmed, since nests with young or an egg have not been recorded on these islands. In fact, breeding has been claimed only by local inhabitants (Perco *et al.* 1983) or by Lovrić (1971) who stated breeding wherever Griffons appeared.

Excluding colonies on the Kvarner islands, a small colony existed on the mainland up to 1999 in Mediterranean canyons (gorges) of Paklenica National Park on the southern coastal slopes of Velebit mountain. This small colony traditionally had nesting ledges on the cliffs of two gorges (Lukač & Stipčević 1997). Recent numbers of breeding pairs in Paklenica National Park ranged from estimates of 8-15 pairs in 1985, 7 pairs in 1996, 8 pairs in 1997, 1 pair in 1998, 3 pairs in 1999, to a complete lack of breeding from 2000 to 2002 (Lukač & Stipčević 1997, Lukač 2000, Lukač *et al.* in press).

Historically, breeding sites have been reported from the mountainous Mediterranean region of Dalmatia (Cvitanić 1963, Kralj 1997, Rucner 1998). Today there is no confirmation of recent breeding, although Griffons certainly bred in the past in much wider areas (Lukač 1998), even in the lowland plains

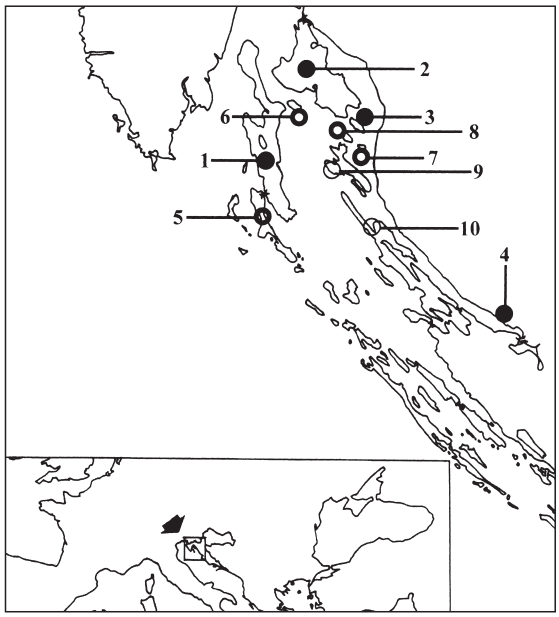

Figure 1: Distribution of breeding of Griffon Vulture *Gyps fulvus* in Croatia (Perco *et al.* 1983, Sušić 1994, Lukač & Stipčević 1997). Symbols (dots and circles) indicate only relative, not precise, breeding sites or colonies on islands in the Kvarner Gulf.
- Main permanent colonies (dots ●): 1. Cres, 2. Krk, 3. Prvić, 4. Paklenica (southern Velebit);
- Occasional breeding (claimed and reported) of small groups or single pairs (bold circles ❍): 5. Lošinj, 6. Plavnik, 7. Goli, 8. Sv. Grgur;
- Occasional breeding (presumed but not reported) of small groups or single pairs (thin circles ○): 9. Rab, 10. Pag (now confirmed)

Slika 1: Gnezditvena razširjenost beloglavega jastreba *Gyps fulvus* na Hrvaškem (Perco *et al.* 1983, Sušić 1994, Lukač & Stipčević 1997); Simboli (točke in krogi) prikazujejo le relativni položaj otokov v Kvarnerskem zalivu in ne natančnih lokacij gnezd ali kolonij.
- Glavne stalne kolonije (točke ●): 1. Cres, 2. Krk, 3. Prvić, 4. Paklenica (južni Velebit);
- Občasno gnezdenje (potrjeno in objavljeno) manjših skupin ali osamljenih parov (debeli krogi ❍): 5. Lošinj, 6. Plavnik, 7. Goli, 8. Sv. Grgur;
- Občasno gnezdenje (verjetno ali neobjavljeno) manjših skupin ali osamljenih parov (tanki krogi ○): 9. Rab, 10. Pag (sedaj potrjeno)

of Slavonia (Kralj 1997). Some other occasional breeding sites are presumed to exist today in the coastal region of Croatia, mainly in the area of the recent breeding distribution, from the Kvarner Archipelago to the southern part of Velebit mountain.

2. Material and methods

The search for a nesting site of Griffon Vulture on the island of Pag was based on information from local inhabitants. The specific location on the island Pag has been checked for ten years (Table 1). The precise nest site location is not stated. At a site of special interest we surveyed, on foot, all accessible cliffs suitable for breeding.

Table 1: Field-days and number of Griffon Vultures *Gyps fulvus* seen on cliffs on Pag (age of birds not specified)

Tabela 1: Terenski dnevi in število beloglavih jastrebov *Gyps fulvus*, opazovanih na gnezdilnem klifu na otoku Pagu (starost ptic ni navedena)

Date		No. of individuals/ št. osebkov
9th	July 1991	10
9th	July 1991	10
16th	March 1993	4
7th	**June 1997**	4 (+1 pull.)
19th	February 1998	4
28th	April 1998	5
10th	June 1998	2
4th	May 1999	1
16th	April 2000	-
11th	May 2000	3
30th	May 2000	2
17th	January 2001	-
28th	April 2001	3

3. Results

A local hunter claimed that, in the eighties, fishermen found a young Griffon Vulture drowned in the sea beneath the sea cliffs on Pag. In 1991 we received similar information. After several years, we succeeded in 1997 in finding one pair of Griffon Vulture with completely fledged young in the nest.

On June 7th 1997, in the late afternoon, we were close to the steep limestone cliffs, about 120 m high, with a peak of more than 200 m above sea level. The southerly exposed base of the cliffs slopes towards the sea coast at an angle of about 45°, so being very favourable for sun-developed thermal-lifts for soaring Griffon Vultures at any season. 4 to 10 Griffons use the cliffs regularly as a resting place, and we were not surprised, at 5.40 p.m., to see two adults flying high along the cliffs. Both Griffons alighted on a cliff ledge, when we noted two more Griffons already sitting on the cliffs nearby. A glimpse at the vertical cliff surface revealed a cup of twigs with grass and completely fledged young Griffon in the nest. The eyrie was placed above a great vertical fissure formed by two massive stone blocks, about 20 metres above the cliff base.

The pair of breeding adults were standing quietly some distance from the nest, while their offspring was lying in the eyrie. Obviously, the young vulture had been hatched and reared in the nest during this season. The cinnamon rufous-brown plumage, buff-brown ruff, leaden bill and behaviour of the young vulture in the nest is typical for completely grown Griffons prior to the first flight (Perco *et al.* 1983). Many white droppings covered the edge of nest and surrounding ledges. The young Griffon in the nest looked healthy and it was clear that it did not fly yet. From 1998 to 2001 the same site was checked again, but the Griffons did not breed. After two years absence, white droppings around the nest were still evident. In May 1999, we took a few photographs, in which the nest cup is clearly seen (Figure 2). Four years later, in 2001, the characteristic nest of the Griffon Vulture was still well preserved and easily recognizable.

4. Discussion

Solitary breeding of Griffon Vulture on the island Pag is not an unexpected phenomenon. The spacing of colonies of cliff-nesting vultures is clearly set by the availability of cliffs, the size of the colonies by the number of suitable ledges, and the availability of food, which dictates a ceiling on bird numbers (Newton 1979). Solitary nesters occur especially in areas with numerous possible nesting sites (Cramp & Simmons 1980, Génsbøl 1992), and this is certainly the case with the rugged island of Pag, which offers a number of scattered cliffs suitable for breeding Griffon Vultures. Breeding was presumed earlier on the island (Perco *et al.* 1983), but until 1997 no evidence of nesting had been obtained or reported. Even the most laborious long-term project on the Griffon Vulture population in the Kvarner Gulf provided no confirmation of breeding on Pag (Sušić 1994 & 2000).

Pag, and the nearest gorges of Paklenica National

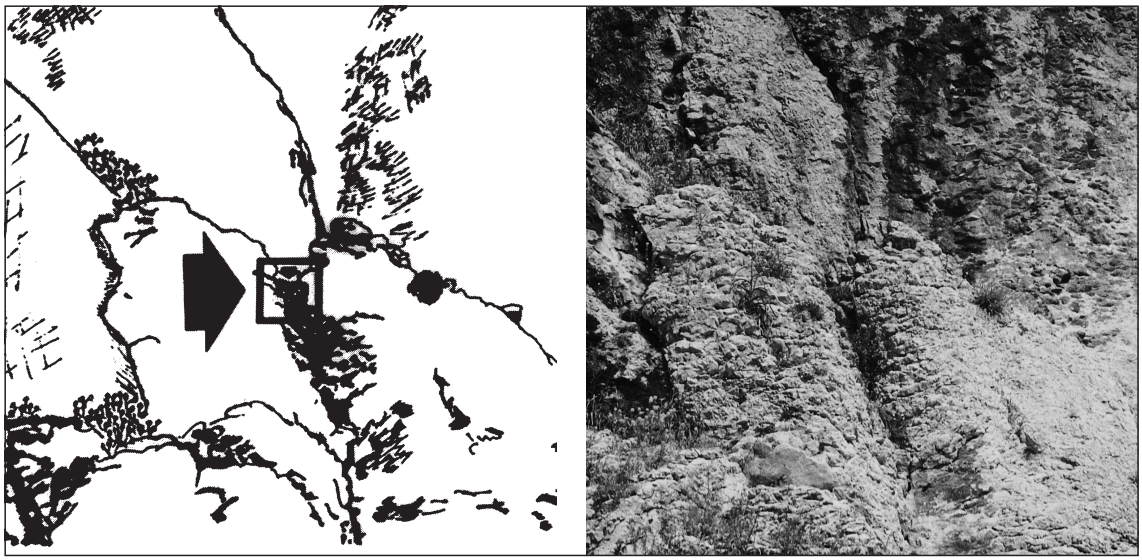

Figure 2: The breeding site of the Griffon Vulture *Gyps fulvus* on the cliffs of Pag on May 4th 1999, with the nest in which one pair reared a young vulture in 1997. The nest in the centre of the square is indicated by arrow. (Photo: M. Stipčević)

Slika 2: Gnezdišče beloglavega jastreba *Gyps fulvus* na klifu na otoku Pagu z gnezdom, v katerem je par leta 1997 vzgojil mladiča (fotografirano 4.5.1999). Glej skico, kjer je gnezdo v središču kvadrata označeno s puščico. (Foto M. Stipčević)

Park, constitute the southern border of the recent breeding area in the north-east Adriatic. In the Kvarner Gulf, occasional breeding of solitary pairs or smaller colonies are to be expected outside the main colony. Colonies fluctuate in size from year to year, sometimes through shifts in individual birds (Newton 1979). The occasional breeding at such sites outside great permanent colonies is influenced by population fluctuation. It can result from a displacement of pairs from other colonies, or simply the establishment of sites by new, young and inexperienced pairs at less favourable habitats, due to intraspecific competition for a hierarchical position at the best cliff ledges of the main colonies. The large colonial vultures, all the Griffons which feed together in numbers on a carcass, do not defend territory, except for about a metre round the nest site (Brown 1976).

The frequency of temporary breeding on the islands of Pag, Lošinj, Plavnik, Goli, Sv. Grgur and Rab, probably depends on the breeding success and mortality rate of Griffon Vultures from the population stronghold in the Kvarner Gulf. There are three main requirements for establishing such isolated breeding sites (Génsbøl 1992). There must be cliffs to provide a nesting site, plenty of food, and a countryside where wind and thermals facilitate long gliding flight. All three requirements are well satisfied on the Pag. The presence of cliffs is more important than the availability of food in determining nesting density (Donázar *et al.* 1985). The presence of many scattered cliffs which hold only a few accessible nesting niches is likely to be the main factor responsible for the solitary and temporary nature of breeding on Pag.

The population stronghold on the islands in the Kvarner Gulf and the small colony in the gorges of Paklenica National Park at the southern Velebit Mountain were connected with the breeding discovered on Pag. All these breeding colonies should be considered as an isolated population of the north-east Adriatic (Perco *et al.* 1983). The breeding range of Griffon Vulture in Croatia thus stretches continuously along the north-east Adriatic coast, through the link of the Kvarner islands, over the island Pag, to the canyons of Paklenica at the southern part of Velebit. Unfortunately, in 2000, breeding of Griffon Vultures in the gorges of Paklenica National Park ceased, and breeding pairs disappeared from this protected area. Since then, nesting or attempts of an adult pair to breed have not been found. The recent, local extinction of this endangered species in the Paklenica National Park is a serious sign of the further decline of the Croatian population. In this respect, the regular occurrence of small numbers of Griffon Vultures and occasional breeding on islands may be of

crucial importance for the possible recolonization of traditional breeding sites on the continent.

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Summary

In Croatia, Griffon Vultures *Gyps fulvus* breed on islands in the Kvarner Gulf and, until recently, on southern Velebit Mountain. The main permanent colonies in the Kvarner Gulf are on the islands of Cres, Krk and Prvić. Breeding on other islands in the Kvarner Gulf (Lošinj, Plavnik, Goli, Sv. Grgur) is irregular. Occasional nesting on Goli, Sv. Grgur, Rab and Pag had not been confirmed or reported until today with the recently discovered nests with young or egg. In July 1997, one pair of breeding adult Griffon Vulture was found with completely fledged nestling in a nest on cliffs on Pag. The nest is situated at the top of a vertical fissure between two upright stone blocks, about 20 meters above the cliff base. This is the first documented record of Griffon Vulture nesting on Pag. This breeding site is a link between the main population stronghold on islands in the Kvarner Gulf and a small group of Griffon Vultures on the mainland which, until recently, have nested on southern Velebit in gorges of Paklenica National Park.

Povzetek

Beloglavi jastrebi *Gyps fulvus* na Hrvaškem gnezdijo na Kvarnerskih otokih in do pred kratkim tudi na južnem delu Velebita. Glavne stalne kolonije v Kvarnerju so na otokih Cres, Krk in Prvić. Gnezditev beloglavih jastrebov na drugih Kvarnerskih otokih (Lošinj, Plavnik, Goli, Sv. Grgur) je neredno. Občasna gnezdenja na otokih Goli, Sv. Grgur, Rab in Pag do danes niso bila potrjena z najdenim gnezdom z jajci ali mladiči. V juliju 1997 je bil par odraslih beloglavih jastrebov najden s popolnoma operjenim mladičem v gnezdu na klifu otoka Paga. Gnezdo je bilo na strmem klifu, visokem okoli 120 m v srednjem delu otoka. Gnezdo je bilo 20 m visoko glede na vznožje klifa v vertikalnem razcepu med dvema vzporednima kamnitima blokoma. Opisana najdba je prvo dokumentirano gnezdenje beloglavih jastrebov na otoku Pagu. Paško gnezdišče je zveza med glavnim delom populacije na otokih Kvarnerskega zaliva z maloštevilno kolonijo, ki je do pred kratkim gnezdila na južnem Velebitu v kanjonu Nacionalnega parka Paklenica.

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