

# A population of diurnal raptors on Dravsko polje (NE Slovenia)

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Between 1985 and 1996 quantitative data were collected about raptor populations on Dravsko polje (46°25'N, 15°45'E) in Slovenia. A total of 8 (including 2 possible breeders) species were reported to occur in the area under study. The average bird density was 2.8 pairs/10 km<sup>2</sup>. The greater part of the breeding community is comprised of two species *i.e.* Kestrel *Falco tinnunculus* and Common Buzzard *Buteo buteo*. Breeding density of the Common Buzzard is up to 0.66 pair/10 km<sup>2</sup> and density of the Kestrel up to 1.43 pair/10 km<sup>2</sup>. The breeding population of Kestrel decreased steadily during 12 years of study, from about 30 nests at the start (1985-1986) to about 15 at the end of the study (1995-1996). The changes are significant. Breeding communities were also analysed in relation to the migratory habits of birds of prey. The density of the breeding community on Dravsko polje depended primarily on the density of resident raptors (average value: 2.2 pairs/km<sup>2</sup>). The differences between numbers of pairs according to migratory habits is highly significant.

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## 1. Introduction

In Slovenia few analyses of breeding populations of raptors have been carried out on quantitative data (e.g. Polak 1993, Trontelj 1994). Geister (1995) attempted to estimate numbers of all the species which breed in Slovenia, but his extrapolation to such large area (20,256 km<sup>2</sup>) may lead to substantial errors. This paper attempts the quantitative estimation of the population of eight species of raptors breeding on Dravsko polje.

## 2. Study area and methods

This study was conducted on Dravsko polje alluvial plains (Drava field) (about

210 km<sup>2</sup>) in NE Slovenia between the river Drava and Mt. Pohorje at altitudes from 238 m to 270 m (46°25'N, 15°45'E). Dravsko polje is an intensive agriculture area. On Dravsko polje numerous man-made water bodies (fish ponds, reservoirs, gravel pits) and villages can be found. The area belongs to the sub-Pannonic phytogeographical area (Marinček 1987). The climate is Continental (mean annual rainfall = 1000 mm, mean temperature = 8°C) (see Furlan 1990 for details).

The habitats of Dravsko polje were classified into four categories: woodland (forests, scrubs, hedges) - about 18%, open area (fields, meadows) - about 68%, urban land (villages, farmhouses, airport) - about 12%, wetland (ponds, reservoirs, gravel pits) - about 2%.

Research began in 1985 and ended in 1996; it is based on more than 500 days of field work, spread over the entire year, with a peak activity of field work during spring and summer months.

Data were collected on the distribution of pairs, and the feeding habits and reproductive cycle of some species. The information was recorded on 1 : 25 000 scale maps as confirmed or probable breeding records following the classification of the EOAC method.

Possible breeding (presence of adult birds in suitable habitats during breeding periods) is not considered in the present paper, as it is not uncommon for some raptors to occur in the study area without attempting to breed (e.g. White-tailed Eagle *Haliaeetus albicilla*, Peregrine *Falco peregrinus*).

A total of 8 species were reported to occur in the area under study. In the total area of 210 km<sup>2</sup>, up to 66 pairs (possible breeders area excluded) of raptors breed, the average density being 2.8 pairs/10 km<sup>2</sup>. The bulk of the breeding community is comprised of two species, i.e. Kestrel and Common Buzzard.

Some resident species (Common Buzzard, Sparrowhawk *Accipiter nisus*, Goshawk *Accipiter gentilis*) show seasonal fluctuations in their numbers: all mentioned species are much commoner in winter (pers. obs.). Their breeding densities (Buzzard: up to 0.66 pair/10 km<sup>2</sup>; Sparrowhawk: up to 0.14 pair/10 km<sup>2</sup>; Goshawk: up to 0.38 pair/10 km<sup>2</sup>) are below the values given for other European localities for the same species (e.g. Anonimus 1989, Gemauf & Winkler 1991,

Tab. 1. Breeding parameters and migratory habits of population of eight species of raptors on Dravsko polje (NE Slovenia): ? - possible breeders, T - tropical migrant, S - resident species.

Species	No. of breeding pairs	Density (pair/10 km <sup>2</sup> )	Migratory habits
<i>Pernis apivorus</i>	6-8	0.29-0.38	T
<i>Circaetus gallicus</i>	1?	-	T
<i>Circus aeruginosus</i>	1?	-	T
<i>Accipiter gentilis</i>	6-8	0.29-0.38	S
<i>Accipiter nisus</i>	1-3	0.05-0.14	S
<i>Buteo buteo</i>	12-14	0.57-0.66	S
<i>Falco tinnunculus</i>	15-30	0.7-1.43	S
<i>Falco subbuteo</i>	2-3	0.1-0.14	T
Total (excluding possible breeders)	42-66	2.0-3.14	

Chi-square test were used for statistical comparison of data sets (Sokal & Rohlf 1995).

### 3. Results and discussion

The composition of the bird community on Dravsko polje is shown in Tab. 1.

Newton *et al.* 1991, Danko *et al.* 1994, Henrioux & Henrioux 1995, Teyrovsky 1995). Only Glutz Von Blotzheim *et al.* (1989) and Steiner (1992) give similar densities for the Goshawk and the Buzzard as were found for Dravko polje (Tab. 2). Sparrowhawk can be detected only with difficulty in woodland, so their numbers may have been underestimated.

Tab. 2. A comparison of the results of quantitative studies made on Dravsko polje (NE Slovenia) with other areas > 50 km<sup>2</sup> in Central Europe.

Species	Density (pair/10 km <sup>2</sup> )	Study area	Source
<i>Pernis apivorus</i>	up to 3.2	Lorraine (France, 147 km <sup>2</sup> )	Cramp & Simmons 1980
	up to 0.64	District Boblingen (Germany, 440 km <sup>2</sup> )	Glutz Von Blotzheim <i>et al.</i> 1989
	0.39	District Stuttgart (Germany, 1825 km <sup>2</sup> )	Glutz Von Blotzheim <i>et al.</i> 1989
	up to 0.55	Slovak karst (Slovakia, 362 km <sup>2</sup> )	Uhrin 1992
	up to 0.32	Krivoklatsko area (Czech Republic, 630 km <sup>2</sup> )	Pojer 1992
	0.36	Between river Krems and Steyr (Austria, 112 km <sup>2</sup> )	Steiner 1992
	1.1	Zahorska nizina (Czech Republic, 126 km <sup>2</sup> )	Danko <i>et al.</i> 1994
	up to 0.6	Ljubljansko barje (Slovenia, 160 km <sup>2</sup> )	Trontelj 1994
	0.49	Swiss midland (Switzerland, 144 km <sup>2</sup> )	Henrioux & Henrioux 1995
	up to 0.3	Doupov Hills (Czech Republic, 600 km <sup>2</sup> )	Tejrovsky 1995
	up to 0.38	Dravsko polje (Slovenia, 210 km <sup>2</sup> )	this study
	<i>Accipiter gentilis</i>	up to 0.09	District Peine (Germany, 343 km <sup>2</sup> )
up to 0.12		Hamburg and vicinity (Germany, 2050 km <sup>2</sup> )	Glutz Von Blotzheim <i>et al.</i> 1989
0.23		District Lobau (Germany, 400 km <sup>2</sup> )	Glutz Von Blotzheim <i>et al.</i> 1989
0.5		Drava valley (Austria, 60 km <sup>2</sup> )	Gemauf & Winkler 1991
0.49		Swiss midland (Switzerland, 144 km <sup>2</sup> )	Henrioux & Henrioux 1995
up to 0.5		Doupov Hills (Czech Republic, 600 km <sup>2</sup> )	Tejrovsky 1995
up to 0.38		Dravsko polje (Slovenia, 210 km <sup>2</sup> )	this study
<i>Accipiter nisus</i>	0.08-1.1	Flachen (Germany, 137 km <sup>2</sup> )	Glutz Von Blotzheim <i>et al.</i> 1989
	1.16	Between river Krems and Steyr (Austria, 112 km <sup>2</sup> )	Steiner 1992
	2.62	Territory of Prague (Czech Republic, 495 km <sup>2</sup> )	Danko <i>et al.</i> 1994
	0.69	Swiss midland (Switzerland, 144 km <sup>2</sup> )	Henrioux & Henrioux 1995
	up to 0.5	Doupov Hills (Czech Republic, 600 km <sup>2</sup> )	Tejrovsky 1995
	up to 0.14	Dravsko polje (Slovenia, 210 km <sup>2</sup> )	this study
	<i>Buteo buteo</i>	up to 2.46	District Peine (Germany, 354 km <sup>2</sup> )
2.7		Drava valley (Austria, 60 km <sup>2</sup> )	Gemauf & Winkler 1991
0.8		Between river Krems and Steyr (Austria, 112 km <sup>2</sup> )	Steiner 1992
2.5		Swiss midland (Switzerland, 144 km <sup>2</sup> )	Henrioux & Henrioux 1995
up to 0.66		Dravsko polje (Slovenia, 210 km <sup>2</sup> )	this study
<i>Falco tinnunculus</i>	1	Schleswig-Holstein (Germany, 200 km <sup>2</sup> )	Ziesemer 1973
	up to 0.86	District Peine (Germany, 336 km <sup>2</sup> )	Oelke 1981
	up to 1.4	Oberhausen (Germany, 78 km <sup>2</sup> )	Glutz Von Blotzheim <i>et al.</i> 1989
	1	Drava valley (Austria, 60 km <sup>2</sup> )	Gemauf & Winkler 1991
	up to 1.7	Germany, 100 km <sup>2</sup>	Kostrzeva 1991
	0.27	Austria, 112 km <sup>2</sup>	Steiner 1992
	2.7	Swiss midland (Switzerland, 144 km <sup>2</sup> )	Henrioux & Henrioux 1995
	up to 1.43	Dravsko polje (Slovenia, 210 km <sup>2</sup> )	this study
<i>Falco subbuteo</i>	up to 0.06	District Peine (Germany, 354 km <sup>2</sup> )	Oelke 1981
	0.27	Between river Krems and Steyr (Austria, 112 km <sup>2</sup> )	Steiner 1992
	up to 0.17	Doupov Hills (Czech Republic, 600 km <sup>2</sup> )	Tejrovsky 1995
	up to 0.14	Dravsko polje (Slovenia, 210 km <sup>2</sup> )	this study

The Kestrel on Dravsko polje usually nest in old nests of Corvids (i.e. *Pica pica*, *Corvus corone cornix*), in old building and on transmission-line pylons (Janžekovič & Šorgo 1995, pers. obs.). It was found

throughout the study area, showing a preference for open area with small woodlands. Its breeding density was similar to the values given by other authors (e.g. Ziesemer 1973, Glutz Von Blotzheim *et*

al. 1989, Gemauf & Winkler 1991, Kostrzewa 1991) and much higher than those given by Oelke (1981) and Steiner (1992). The breeding population decreased steadily during 12 years of study, from about 30 nests at the start (1985-1986) to about 15 at the end of the study (1995-1996). The changes between years are significant (Chi-square test,  $\chi^2=5.0$ ,  $p < 0.05$ ). This decline is thought to be associated with the use of pesticides, high predation rate by small mammalian predators, competition with Corvids for nest sites and a consequent reduction in the area of suitable nesting and foraging habitat.

Density of the Honey Buzzard *Pernis apivorus* was similar to the values given for Germany, Czech republic, Slovakia and Austria (Tab. 2) and much lower than the density found in Lorraine, France (Cramp & Simmons 1980), in Stuttgart, Germany and other towns (Glutz von Blotzheim *et al.* 1989) and on Ljubljansko barje, Slovenia (Trontelj 1994) (Tab. 2). According to Cramp & Simmons (1980), high breeding density is presumably correlated with high density of Honey Buzzard's main food (wasps).

The density of the Hobby *Falco subbuteo* on Dravsko polje is calculated as 0.14 pairs/10 km<sup>2</sup>. Because of its breeding biology, which makes it hard to find during the breeding cycle, numbers of this species are underestimated. Its breeding density was similar to the values obtained in Norway (Steen 1994) and in the Czech republic (Tejrovsky 1995) and lower than the values obtained by Steiner (1992) and Henrioux & Henrioux (1995) (Tab. 2).

The density of the breeding community on Dravsko polje depended primarily on the density of resident raptors (average

value: 2.2 pairs/10 km<sup>2</sup>). The differences between numbers of pairs according to migratory habits (Tab. 1) is highly significant (Chi-square test,  $\chi^2=29.3$ ,  $p < 0.0001$ ).

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## Összefoglalás

### Nappali ragadozómadarak populációi Dravsko pole-n (ÉK Szlovénia)

Kvantitatív felmérést végeztünk a Dravsko polje (46°25'N, 15°45'E) (ÉK Szlovénia) ragadozómadár állományain 1985-1996 között. A vizsgált területen 8 fajt mutattunk ki, köztük kettő költése bizonytalan. Az átlagos ragadozómadár sűrűség 2,8 pár/10 km<sup>2</sup> volt. A két leggyakoribb faj a vörös vércse (*Falco tinnunculus*) és az egerész ölyv (*Buteo buteo*) volt. Az egerész ölyv sűrűsége 0,66 pár/10 km<sup>2</sup>-t is elérte, a vörös vércsée pedig az 1,43 pár/10 km<sup>2</sup>-t. A vörös vércse állománya jelentősen csökkent a vizsgálati idő alatt, 30 fészekről 15-re. A Dravsko polje-i ragadozómadár állomány sűrűsége elsősorban a nem vonuló fajoktól függött, melyek összességének átlaga 2,2 pár/10 km<sup>2</sup> volt.

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